AGRIBALKAN 2022

IV. BALKAN AGRICULTURAL CONGRESS



31 AUGUST – 02 SEPTEMBER 2022,

EDİRNE, TURKEY

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31 AUGUST – 02 SEPTEMBER 2022,

EDİRNE, TURKEY

In Trakya University Balkan Congress Center, Edirne, Turkey

Organized by Trakya University

with

Trakya Universities' Union, Balkan Universities' Union, Namik Kemal University, Onsekizmart University - Turkey, Uludag University, Turkey, Agriculture University of Plovdiv, Trakia University-Stara Zagora - Bulgaria, Democritus University of Thrace – Greece and with contribution of other Balkan Institutions…

Dear Colleagues,

You are welcome to our congress which will be organized by Trakya University supporting with Trakya Universities Union, Balkan Universities Association and together with other Balkan Universities and İnstitutions.

The aim of our international congress is to present the newest research results and research goals, analyze current conditions and perspectives in agriculture.

Conference activities;

Plenary sessions with oral and poster presentations are on 31 August – 02 September 2022.

You are welcome to our congress and Edirne, TURKEY,

Yours sincerely,

Prof. Dr. Erhan TABAKOĞLU

Rector of Trakya University
Honorary Chair of Congress

Prof Dr Yalcin KAYA

Head of Organizing Committee

FOREWORD

Agriculture is so important sector feeding all humankind, but it needs new developments and technologies to supply enough food for increasing world population year by year. Turkey is one leading agricultural economy in the world. Balkan region is one the important agricultural areas of the world having rich soils producing different crops vastly and keeping enormous biodiversity for our future.

As there have been many different scientific meetings around the world, we intended to bring three communities together, namely science, research and private investment, in a friendly environment of Edirne / Turkey to share what they have and get benefit from each other. Trakya University intended to aim that agricultural community in Balkan areas should come together in that important event. Our congress goal is the agricultural subjects should be kept broad in order to provide opportunity to the science community to present their work that can be off value for agriculture.

First Balkan Congress was organized by Trakya University in 2014 as the biggest agricultural congress in Turkey and Balkan region. İn the first congress, over 700 participants were presented total 830 papers (650 poster and180 oral presentations) and invited speakers presented country reports from all Balkan countries. 2nd Balkan Agriculture Congress was organized by Tekirdağ Namik Kemal University in 2017. The 3rd Balkan Agriculture Congress was hosted again in Trakya University in Edirne, Turkey in 2021 due to 40th anniversary of Trakya University. There was a worldwide participation from 41 countries with 406 papers contributed by 988 authors with 288 oral, 118 e-poster presentations.

As fourth one, Trakya University hosted again in Edirne, Turkey in 2022. We would like to thank all participants for great interest to our AGRİBALKAN 2022 congress. There is a worldwide participation from 41 countries with 388 papers contributed by 888 authors.

We hope that this congress will help to solve our problems with establishing good network collaborations, joint projects and better relationships among countries with sharing our knowledge and experiences together. We wish success for this meeting and hope a great scientific achievement with your contributions.

Edirne is very nice, lovely and historical city at just the edge of Europe, but just right at the heart of Balkan region and history endowed with monuments reminding imperial past. We are much pleased to host you all in Edirne and in Turkey. We would like to thank you to join this congress and we would like to give also special thanks our sponsors and collaborators for giving us big supports to organize this event.

We wish you nice stay in Edirne for truly rewarding days.

Prof. Dr. Erhan TABAKOGLU
Rector of Trakya University
Honorary Chair of Congress

Prof Dr Yalcin KAYA
Director of TU Plant Breed. Res. Center
Head of Organizing Committee

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THE EDITORS OF PROCEEDING BOOK OF ABSTRACTS

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EFFECTS OF MEDETOMIDINE/KETAMINE ANAESTHESIA AND ATIPAMEZOLE ON OCULAR PARAMETERS IN DOGS

Murat Kibar

Artvin Vacational School Artvin University, Artvin, TURKEY

muratkibar@artvin.edu.tr

ABSTRACT

The aim of this study was to investigate the effect of the combination of medetomidine with ketamine hydrochloride and their reversal by atipamezole on anesthesia monitoring (AM) and ocular parameters such as intraocular pressure (İOP), horizontal pupil diameter (HPD), and eye tear production (ETP) in dogs. Materials and methods**,** Ten sexually intact female dogs (weiging between 7.5 and 29 kg, and 1.0 to 3.0 yrs of age) were included in the study. General anesthesia was induced 15 min after medetomidine 100 µg/kg İM premedication with ketamine 10 mg/kg İM in th group. At the end of the ovariohysterectomy procedure, atipamezole 500 µg/kg İM was administered. Electrocardiogram, non-invasive blood pressure, respiratory rate, heart rate, pulse oximetry, and rectal temperature were monitored throughout anesthesia. Ocular parameters were evaluated at the baseline (T0), after 10 min premedication (T1), after 10 min induction (T2), after 15 min starting operation (T3), after last suture (T4), and after 10 min reversed (T5). Results, Within the MED-KET group, the ETP significantly reduced after medetomidine and ketamine administrations. Conclusions, Medetomidine/ketamine is effective in reducing the HPD and the ETP and altering the AM response to general anesthesia; atipamezole can be useful for a quick and safe return to baseline values in dogs after abdominal surgery such as ovariohysterectomy.

Keywords: İntraocular pressure; anesthesia monitoring; ketamine; dog.

EFFECTS OF MEDETOMIDINE/PROPOFOL ANAESTHESIA, AND ATIPAMEZOLE ON OCULAR PARAMETERS IN DOGS

Murat Kibar

Artvin Vacational School Artvin University, TURKEY

muratkibar@artvin.edu.tr

ABSTRACT

The aim of this study was to investigate the effect of the combination of medetomidine with propofol and their reversal by atipamezole on anesthesia monitoring (AM) and ocular parameters such as intraocular pressure (İOP), horizontal pupil diameter (HPD), and eye tear production (ETP) in dogs. Materials and methods, Ten sexually intact female dogs (weiging between 7.0 and 27.5 kg, and 0.75 to 3.0 yrs of age) were included in the study. General anesthesia was induced 15 min after medetomidine 100 µg/kg İM premedication with propofol 6 mg/kg İV in the group. At the end of the ovariohysterectomy procedure, atipamezole 500 µg/kg İM was administered. Electrocardiogram, non-invasive blood pressure, respiratory rate, heart rate, pulse oximetry, and rectal temperature were monitored throughout anesthesia. Ocular parameters were evaluated at the baseline (T0), after 10 min premedication (T1), after 10 min induction (T2), after 15 min starting operation (T3), after last suture (T4), and after 10 min reversed (T5). Results, Within the MED-PRO group, the ETP significantly reduced after medetomidine and propofol administrations. Conclusions, Medetomidine/propofol is effective in reducing the HPD and the ETP, and altering the AM response to general anesthesia; atipamezole can be useful for a quick and safe return to baseline values in dogs after abdominal surgery such as ovariohysterectomy.

Keywords: İntraocular pressure; anesthesia monitoring; propofol; dog.

FORAGE CHICORY - A VIABLE ALTERNATIVE IN CATTLE NUTRITION

Radu Neamt [1,], Saplacan Gheorghe [1], Neciu Florin [1], İlie Daniela [1], Mihali Ciprian [1], Mizeranschi Alexandru [1] & Saplacan Silviu [1]*

[1] Research Research and Development Station For Bovine, Romania

neamtr@yahoo.com

ABSTRACT

The aim of the current study was to test the viability of including chicory in cows' diet. A total of 2250 data were recorded from 150 Simmental cows related to 6 forage structures: alfalfa (αα), chicory (C), mixed alfalfa and chicory (αC), mixed gramineous (G), mixed gramineous and alfalfa (Gα), mixed gramineous and chicory (GC). Data aimed total daily duration of forage consumption (TDD), daily round frequency (DRF) and average consumption round (ACR) according to forage structures. The effects of chicory were assessed based on ANOVA protocol with categorical factor "chicory". Chicory significantly influenced ($p \leq 0.05$) TDD and ACR. No significant influence ($p > 0.05$) was recorded related to DRF. Chicory significantly increased TDD and DRF compared to G (4.9 *vs.* 3.18 h/day, 12.1 *vs.* 9.37 bouts/day, $p \leq 0.001$), being comparable with αα (4.4 h/day, 11.3 bouts/day, $p > 0.05$). Also, chicory improved the forage consumption in mixed GC compared to Gα (4.06 *vs.* 3.74 h/day, 10.1 *vs.* 9.8 bouts/day, $p \leq 0.01$). İn mixed αC, chicory increased TDD and DRF compared to αα (4.73 *vs.* 4.4 h/day, 12.6 *vs.* 11.3 bouts/day, $p \leq 0.05$). İn conclusion, the use of chicory in cows' diet could improve the feeding behavioural traits with economically benefits.

Keywords: chicory, feeding behavior, Simmental

EFFECT OF GDF-8 3'UTR POLYMORPHİSM ON LINEAR BODY MEASUREMENTS OF MEAT-TYPE LAMBS AT WEANING IN TURKEY

Vasfiye Kader Esen [1,] & Cengiz Elmaci [2]*

[1] Department of Animal Production Sheep Breeding Research Institute, TURKEY
[2] Department of Animal Science Bursa Uludağ University,Bursa,TURKEY

vasfiye.esen@gmail.com

ABSTRACT

Several attempts have been made to determine gene regions affecting meat yield and quality. The *GDF-8* gene, known as *myostatin* and acts as a negative regulator of muscle growth, is one of the most frequently studied genes. Previous research has indicated that any mutation in the *GDF-8* gene results in increased skeletal muscle formation. Therefore, the present study aimed to explore the effect of *GDF-8 3'UTR* polymorphism on linear body measurements (LBM) of meat-type lambs at weaning in Turkey. A cross-sectional study explored the potential relationship between *GDF-8 3'UTR* polymorphism and LBM. Thus, a total of genotypically identified 193 lamb data (Kivircik: 50, Karacabey Merino: 47, Ramliç:26, German Black-Head Mutton × Kivircik: 47, Hampshire Down × Merino:23) were used to evaluate the relationships between genotype and LBM. This study identified 2 nucleotide substitution: c.*1139 T>G (n:116) and c.*1320 C>T (n:77). No significant difference between the two genotypes was evident for all studied LBM parameters (P>0.05). However, a numerically higher body length (60.68 vs 59.51 cm), withers height (58.32 vs 56.91 cm), back height (58.58 vs 57.39 cm), rump height (58.92 vs 58.20 cm), , chest depth (24.00 vs 23.27 cm), chest width (18.20 vs 18.12 cm), chest circumference (75.49 vs 73.64 cm), leg circumference (46.46 vs 45.26 cm) observed in c.*1139 T>G whereas a higher rump width (18.75 vs 18.64 cm) and cannon bone perimeter (8.81 vs 8.60 cm) in c.*1320 C>T.

Keywords: myostatin, GDF-8 gene, lamb, linear body measurements

LEPTIN GENE EXON 3 POLYMORPHISMS OF SOME MEAT TYPE SHEEP BREEDS IN TURKEY

Vasfiye Kader Esen [1,] & Cengiz Elmaci [2]*

[1] Department of Animal Production Sheep Breeding Research Institute
[2] Department of Animal Science Bursa Uludağ University, Bursa, TURKEY

vasfiye.esen@gmail.com

ABSTRACT

Leptin, known as the satiety hormone, regulates fat stocks and appetite by generating a sense of satiety. Several studies have documented that leptin gene polymorphisms play a crucial role in body weight gain in livestock such as cattle, pigs, and sheep. However, leptin gene polymorphisms have not yet been determined in Turkish sheep breeds. Therefore, this study set out to determine whether polymorphisms on leptin gene exon 3 exist or not in five different sheep breeds. İn the current study, a total of genotypically identified 188 lamb data (Kivircik: 48, Karacabey Merino: 45, Ramliç:23, German Black-Head Mutton × Kivircik: 46, Hampshire Down × Merino:26), obtained by a polymerase chain reaction and single-strand conformation analysis (PCR-SSCP) and DNA sequencing were used. The PCR-SSCP analysis revealed the following four different patterns and thirteen nucleotide substitution: c.68 A>W(A/T), c.72 A >W(A/T), c.73 G>K(G/T), c.85 C>S(G/C), c.87 C>S(G/C), c.181 T>K(G/T), c.235 A>W(A/T), c.244 A>M(A/C), c.250 C>S(G/C), c.460 G>A, c.461 A>R (A/G), c.462 A>R(A/G) c.463 G>C. Four of the thirteen nucleotide substitutions resulted in amino acid changes: *p. Met27Arg, p.Asn45İle, p.Gln48Pro, p.Ser50Cys*. These findings provide a solid evidence base for leptin gene exon 3 in these breeds for further studies, such as effects on weight gain, body conditions, carcass, and meat quality.

Keywords: Leptin, PCR-SSCP, DNA sequencing, sheep

THE FIRST CASE OF MICROBIOLOGICALLY DETECTED MACRORHAPDUS ORNITHOGASTER INFECTION FROM TWO BUDGERIGARS (*Melopsittacus undulatus*) IN TURKEY

Sibel Kizil [1], Aziz Utku Önel [1], Efsun Melike Çeçen [1,], Murat Yildirim [1] & Oğuz Kul [1]*

[1] Department of Faculty of Veterinary Kirikkale University, Kirikkale, TURKEY

vet.efsun@gmail.com

ABSTRACT

İn this case, two 3-year-old budgies with swelling on its chest is presented. Physical examination revealed swelling in the chest, shedding of the feathers, and restlessness. Despite the use of many antibiotics, no response was obtained. The exudate was inoculated in aerobic and microaerofilic conditions at 370C. The causative agent was determined to be *Macrorhabdus ornithogaster* (*M. ornithogaster*) by conventional identification and PCR test. İn this study, zoonotic *M. ornithogaster* was detected microbiologically in budgerigar for the first time in Turkey. İt should not be ignored that yeast infections can also be seen in budgies due to bacterial infections and occasional feeding with poor quality feeds.

Keywords: Budgie, Macrorhabdus ornithogaster, PCR.

USE OF COMPUTER TECHNIQUES FOR PERFORMING MORPHOMETRIC MEASUREMENTS IN BIOLOGY

Manjola Kuliçi [1,] & Arbenita Hasani [2]*

[1] Department of Food and Biotechnology Agricultural University of Tirana, Albania
[2] Food Technology and Biotechnology, Corresponding Author University Hasan Prishtina, KOSOVA

mkulici@ubt.edu.al

ABSTRACT

In this study were performed morphometric measurements of the Hymenoptera *Apis mellifera carnica*, in the district of Tirana. Samples were collected at four different colonies: (1-Kamez, 2- Dajt, 3- Linze, 4-Lunder). From each sample 20 bees were prepared, scanned and measured using computer software. Measuring of 19 morphological characters of honey bees was carried out using advanced technique Scan Photo with Photoshop program (SPT) as well as using the binocular method. Averages estimated from the data of measurements made with the Binocular and SPT methods were: 6.411 and 6.373 for tongue length; 9.264 and 9.237 for fore wing length; 3.144 and 3.114 for forewing width; 2.63 and 2.601 for cubital index; 6.43 and 6.385 for hind wing length; 1.84 and 1.82 for hind wing width; 19.787 for 19.744 number of hooks; 2.557 and 2.552 for femur length; 3.235 and 3.204 for tibia length; 2.051 and 2.031 for metatarsus length; 1.22 and 1.19 for metatarsus width; 2.07 and 2.03 for longitudinal diameter of tergite İV; 0.812 and 0.8 for (TOM A); 0.519 and 0.52 for (TOM B); 0.325 and 0.277 for HLT 5; 2.776 and 2.75 for S3 longitudinal diameter; 1.338 and 1.308 for wax mirror longitudinal; 2.394 and 2.354 for wax mirror transversal; 0.371 and 0.359 for distance between wax mirrors. Comparison between SPT and using Binocular showed no significant difference between the two methods in measuring the chosen morphometric characters. These results show that SPT can be used extensively in Biology to make other morphometric measurements in the direction of Zoology or Botany.

Keywords: Biology, Apis mellifera carnica, Morphological traits, Scan Photo Technique

THE EFFECT OF SWIMMING ACTIVITY AND FEED RESTRICTION OF RAINBOW TROUT (ONCORHYNCHUS MYKISS, WALBAUM) ON AQUAPONİCS

Gökhan Tunçelli [1,] & Devrim Memiş [1]*

[1]Department of Aquaculture Istanbul University Faculty of Aquatic Sciences, ISTANBUL, TURKEY

gokhan.tuncelli@istanbul.edu.tr

ABSTRACT

Aquaponics system is an economically and ecologically efficient food production system in which fish and plants are grown together, using less water. İn order for the aquaponics system to be efficient, the fish, plants and bacteria must be healthy. İn this study, the effects of water flow and feed restriction practices applied to rainbow trout (*Oncorhynchus mykiss*) on the water quality, fish and lettuce (*Lactuca sativa*) growth performance of the aquaponics system were investigated in four decoupled aquaponics systems. For this purpose four experimental groups were formed:Water current applied (1 BL/s) and ad libitum fed group (Group CA), Water current applied (1 BL/s) and feed restricted group (Group CR), Kept in still water (0 BL/s) and ad libitum fed group (Group SA), Kept in still water (0 BL/s) and feed restricted group (Group SR). Fish growth performance indicators such as weight gain (WG, %), feed intake (Fİ, g), condition factor (CF), specific growth rate (SGR, %), feed conversion ratio (FCR) were examined. Plant height, stem diameter, wet weight, root length, number of leaves were investigated. During the experiment, daily temperature (°C), dissolved oxygen (mg L-1), pH, total dissolved solids (mg L-1), salinity (‰) and electrical conductivity (mg L-1) and weekly phosphate (PO4), total phosphorus (TP), nitrite (NO2), nitrate (NO3), iron (Fe) parameters were monitored in the water in the aquaponics system. Plant growth parameters such as plant height and width (cm), plant weight (g), root height (cm)\ and leaf number were measured after the harvest. At the end of the experiment, the CA and SA intaken more feed and achieved higher weight gain compared to CR and SR groups. Fish with CA and CR had higher FCR values, while SA and SR had lower FCR values. İt has been determined that CR and SR have relatively shorter plant heights and longer roots compared to CA and SA. The water quality parameters of the system were determined suitable for fish and plants. İn conclusion, the 1 BB/s flow in rainbow trout fish tank can increase the yield per unit area 'n aquaponics systems as long as enough sufficient feed supply.

Acknowledgement: We thank the Sapanca İnland Fisheries Production Research and Application Unit staff. This work was supported by the Scientific Research Projects Coordination Unit of İstanbul University with Project numbers FDK-2020-37081.

Keywords: Aquaponics system, Rainbow Trout, Feeding, Fish growth performance

INVESTIGATION OF THE EFFECTS OF SWIMMING ACTIVITY AND FEED RESTRICTION ON ANTIOXIDANT ENZYME ACTIVITIES OF RAINBOW TROUT (*ONCORHYNCHUS MYKISS* WALBAUM)

Gökhan TUNCELLI[1], Onur ERTIK[2], Bertan Boran BAYRAK[2], Devrim MEMIS[1], Refiye YANARDAG[2]*

[1]*İstanbul University Faculty of Aquatic Sciences, Department of Aquaculture and Fish Diseases, TURKEY*

[2]*İstanbul University-Cerrahpaşa Faculty of Engineering Department of Chemistry, TURKEY*

gokhan.tuncelli@istanbul.edu.tr

ABSTRACT

Regular physical activity can have either a positive or negative impact on health and biological parameters. The intensity and duration of exercise have an impact on enzymatic activities. Salmonidae fish under increased swimming duration, as well as the interaction of the fish with one another and their stress levels is known to influence the quantity and quality of its flesh as compared to fish kept in still water. When a fish's food is restricted, it loses energy, making it harder for it to meet the higher expense of swimming activity, while simultaneously supporting growth. As a result, water current can have a negative impact on the sustained swimming fish. In this study, the effects of swimming exercise and diet restriction on antioxidant parameters of rainbow trout juveniles such as the level of glutathione, lipid peroxidation, catalase, superoxide dismutase, glutathione peroxidase, glutathione reductase, glutathione-S-transferase, and glucose-6-phosphate dehydrogenase activities in gill, muscle, stomach, liver and kidney tissues were evaluated. The amount of reactive oxygen species and lactate dehydrogenase activities were also evaluated. At the end of the experiment, it was observed that antioxidant enzyme activities of the fish kept in continuous flow differ from that of the fish kept in still water.

Acknowledgment: We thank the Sapanca Inland Fisheries Production Research and Application Unit staff. This work was supported by the Scientific Research Projects Coordination Unit of Istanbul University with Project numbers FDK-2020-37081 and FBG-2018-31504.

Keywords: Swimming activity, Enzyme activity, Fish welfare, Feed restriction, Aquaponics system, Rainbow Trout

POMEGRANATE (*Punica granatum* L.) PEEL BIOACTIVE COMPOUNDS AS NATURAL POULTRY FEED ADDITIVES

Arif Darmawan [1,] & Ergin Öztürk [1]*

[1] Department of Animal Production Ondokuz Mayis University, Samsun, TURKEY

arifdarmawan@apps.ipb.ac.id

ABSTRACT

This review aimed to discuss the ability of pomegranate peel bioactive compounds as poultry feed additives. Plant bioactive compound extracts are commonly used as feed additives in the poultry industry due to the prohibition of antibiotics' application as growth promoters. Punica granatum, which belongs to the Punicaceae family, has long been regarded as a fruit with numerous health benefits. Turkey is the world's fourth-largest producer of pomegranates, with around 600,000 tons in 2020. The antimicrobial and antioxidant activity of pomegranate peel extract (PPE) is related to its phytochemical compounds including catechin, epicatechin, gallocatechin, gallic, ellagic, caffeic, ellagitannins and gallotannins. PPE significantly increased broiler live weight, body weight gain, and egg production of laying hens and quail. Dietary PPE reduced coliform population in the quail caecum, total aerobic bacteria in the broiler intestine, and malondialdehyde (MDA) level in serum and stored broiler breast meat. İt concluded that PPE can be applied as a feed additive, due to its bioactive compounds which are proven to act as antimicrobials and antioxidants that can improve poultry performance. Based on the literature, PPE can be used at levels of 0.01% to 0.05% in poultry feed. However, it is necessary to consider its use at high levels since the largest bioactive compound in PPE is polyphenol tannins which in high doses can bind to protein in the intestinal tract which causes a decrease in protein digestibility.

Keywords: Antimicrobial, antioxidant, extract, feed additives, pomegranate peel, poultry

OVERCOMING HEAT STRESS IN POULTRY THROUGH A NUTRIGENOMIC APPROACH

Arif Darmawan [1,] & Ergin Öztürk [1]*

[1] Department of Animal Production Ondokuz Mayis University, Samsun, TURKEY

arifdarmawan@apps.ipb.ac.id

ABSTRACT

The most problem of poultry farming in tropical countries is heat stress condition that has a negative effect on poultry health and productivity. High ambient temperatures not only result in inferior egg and meat quality but also cause heavy economic losses. This review aimed to discuss the mitigation of poultry heat stress through a nutrigenomic approach. Nutrigenomic is the comprehensive study of how nutrition affects gene expression. Reducing the negative effect of heat stress can be modified by the nutrients approach such as proteins (amino acid), prebiotics, probiotics, vitamins, minerals, and phytogenics. The most studied gene as an indicator of the rapid response of poultry to heat stress is the Heat Shock Protein 70 gene (HSP70). Under heat stress, chickens naturally attempt to maintain thermal homeostasis, which causes an increase in reactive oxygen species in some organs including the liver, heart, and brain and induces HSP70 to protect cells from oxidative injury. The proper nutrient application results in a decrease in the expression of the HSP70 gene indicating a decrease in the heat stress effect. İt concluded that the nutritional approach can be used as a method to overcome heat stress in chickens. Furthermore, the nutrigenomic approach can assist in the implementation of a more precise poultry feeding strategy.

Keywords: Heat stress, chicken, heat shock protein, nutrigenomic

GENETIC TESTING OF THE SAKER FALCON (FALCO CHERRUG) IN BULGARIA

Rusko Petrov [1], Dobry Yarkov [2], Nayden Chakarov [3], Yana Andonova [4,] & Albena Bekyarova [5]*

[1] Department of General Animal Husbandry Trakia University, Bulgaria
[2] Department of Animal Science Trakia University, Bulgaria
[3] Department of Animal Behaviour Bielefeld University, Bulgaria
[4] Ngo Green Balkans, Bulgaria
[5] Trakia University Department of General Livestock Breeding, BULGARİA

yandonova@greenbalkans.org

ABSTRACT

The globally endangered saker falcon is currently being reintroduced in Bulgaria, where the falcons are bred in captivity and released through hacking. Part of the ex-situ activities is genetic testing of the captive group in order to insure the genetic diversity of the released in the wild offspring. İn 2022, tested were 42 Western saker falcons (Falco cherry cherrug) and 68 Eastern saker falcons (Falco cherrug milvipes) for comparison, all breeding in captivity in Bulgaria. İn this study two pairs with some stage of inbreeding were described (cousins and probable cousins). One is the first pair to nest in the wild in Bulgaria after 20 years, which is formed of the offspring of two sisters. The pair, which successfully produced three young in 2018 and three again in 2019, is confirmed to be cousins. The released birds are marked with two sets of İD rings by which they were identified, and their lineage was coming from the Wildlife Rehabilitation and Breeding Centre of Green Balkans, where they were bred and released from. The second is a breeding pair coming from different breeders and with different country metal rings, which turned out to be closely related when tested. Previously they had bred successfully. Two of their chicks were left for the captive breeding programme and they too separately with unrelated mates, successfully had healthy offspring of their own. This suggested that two cousins breeding in the wild can produce healthy saker falcon fledglings, and that two probable cousins can produce healthy sakers, which in turn also had healthy offspring in captivity. The second case proved this inbreeding does not lead to the infertility of the offspring, however known problems are reduced genetic diversity of a (captive) population in the long run, and problems related to a too-small gene pool that may include an increased prevalence of genetic disorders and inbreeding depression. These examples showed that even in the wild saker falcons can choose a relative to mate with, however genetic testing should be done in preparation of pairing saker falcons for captive breeding groups in order to insure the genetic diversity and health of the birds in the long run.

Keywords: conservation, reintroduction, captive breeding, biodiversity, raptors

RESEARCH ON DOMINANT CROSS LAYING HEN EGG COMMERCIAL PRODUCTİON IN LATVIA

Aiga Nolberga-Trūpa Nolberga-Trūpa [1,], Aija Mālniece [2] & Rolands Neimanis [3]*

[1] İnstitute of Animal Sciences Latvia University of Life Sciences and Technologies, Letonya
[2] Clinical İnstitute of Veterinary Latvia University of Life Sciences and Technologies, Letonya
[3] Ltd ""Kurzemes Olas Ltd ""Kurzemes Olas, LETONYA

aigat2@inbox.lv

ABSTRACT

Latvia nowadays faces a growing demand for biologically produced food, including eggs, thus, organic egg producers are interested in making produce with lower net cost, therefore they choose layer crosses for breeding. Research aim is to determine layer crosses that are most suitable for Latvian evironment and are the most productive for organic egg commercial production, as well as to opt for the most suitable biologically produced feed for the selected crosses. The field study was carried out at "Upkalnes" farm hen housing, Talsi municipality, Gibulu rural territory, "Kurzemes olas" Ltd. The study involved three Dominant layer crosses: Dominant Barred D 959, Dominant Tinted D 723 and Dominant Red Barred D 459. A total of 6 groups, each consisting of 100 birds. İn each cross, one part of the birds were fed fith commercially produced organic feed (K- commercial; group codes D723K, D459K and D959K), while the other part – with home-made feed designed for layers (S – home-made, group codes D723S, D459S and D959S). The study was cariied out in the period from May 2019 till March 2021. During the research, none of the Dominant cross layers reached maximum laying intensity point. Throughout the wwhole period, out of all the three hen crosses, only D723 showed significantly higher average laying intensity (p<0.05). Statistically insignificant differencce in productivity was noted between D723 and D459 layer cross (p=0.063). Blood biochemical analysis results prove that protein supply across all groups was adequate, but lipid metabolism was variable. During the research, all birds were well-supplied with calcium and phosphorus, both fed with commercially produced or home-made feed, and no signs of osteoporosis were shown.

Keywords: Laying hens, egg production, Blood, Bone

EXPERIMENTAL DESIGNS FOR TRIPLOID INDUCTION METHODS IN NILE TILAPIA (*Oreochromis niloticus*)

Burak Evren İnanan

Fisheries and Diseases Aksaray University, Aksaray, TURKEY

burakinanan@aksaray.edu.tr

ABSTRACT

Polyploidy is not just commonly used in plant agriculture; it could also be used less commonly in fish culture. İt has been shown that some cultured fish species such as trout, salmon, and tilapia have adaptation ability to survive as triploid. Triploid individuals are desirable due to some advantages such as fast-growing and minimizing problems originated from sextual maturity. Moreover, triploid tilapia individuals prevent overpopulation in the culture of tilapia which could be occurred owing to inherently prolific ability of diploid tilapia. Some methods such as high pressure, thermal shocks, electric shock, chemicals and different pH treatments are applied to a fertilized egg at a certain period after fertilization to obtain triploid individuals. These methods should also include preservation of gametes from collection to use for fertilization. Even though these methods have been applied in many studies, experimental designs of them are not described comprehensively. Since success in triploid individual rate is highly correlated to appropriate application of these methods, detailed definitions of them will be helpful for standardization of obtaining high triploid rates. İn this study, experimental setups and implementation conditions of these methods were depicted and discussed.

Keywords: Tilapia, Triploid, Triploidy induction methods

PRESENCE OF MICROPLASTICS IN STOMACH CONTENTS OF BLUE CRAB CALLINECTES SAPIDUS (RATHBUN, 1896) IN CANAKKALE STRAIT

Seçil Acar [1,], Selin Ertürk Gürkan [2], A. Suat Ateş [3] & Şükran Yalçin Özdilek [4]*

[1] Marine Science Amd Technology Faculty Çanakkale Onsekiz Mart University, Turkey
[2] Biology Çanakkale Onsekiz Mart University, Turkey
[3] Marine Science and Technology Faculty Çanakkale Onsekiz Mart University, Turkey
[4] Department of Biology Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

secilkolsal@gmail.com

ABSTRACT

The aim of this study is to determine the amount of microplastics in the stomach contents of an individual blue crab. The stomach contents of a total of 45 individuals were evaluated in the study. During the examination of the stomach contents, a total of 46 microplastics were recorded from 15 different stomachs. Microplastics detected were black and blue colored filaments. Microplastics were detected in 10 males and 5 juveniles. No microplastics were detected in the stomachs of females. The %İRİ value of microplastic fragments found in all food groups was calculated as 1.40. İt was concluded that the microplastics found in the thread group in the study were generally parts of hunting tools. İt was determined that microplastics are posing a serious concern and are finding their way into crab diets.

Keywords: Blue crab, microplastic, gut content, İRİ, Çanakkale Strait

DETERMINATION OF CHANGES IN SOME NUTRIENT CONTENT OF *Agaricus bisporus* STEM PART FERMENTED WITH RUMEN LIQUID IN DIFFERENT ENVIRONMENTAL CONDITIONS

Şevket Özlü [1,], Emrah Güngör [2], Aydin Altop [1] & Güray Erener [2]*

[1] Department of Animal Production Ondokuz Mayis University, Turkey
[2] Department of Animal Science Ondokuz Mayis University, Samsun, TURKEY

sevket.ozlu@omu.edu.tr

ABSTRACT

This study aimed to determine the nutrient change in the stem part of Agaricus bisporus by using rumen liquid in the solid-state fermentation method. İn this study, a total of 36 samples with three different fermentation times (3, 5, and 7 days), two different initial pHs (6 and 7), and two different inoculation (Yes or no) in a 3x2x2 factorial experiment design and three replications in each group. The stem part of the Agaricus bisporus was sliced into small pieces for fermentation in the laboratory. Rumen content was obtained from Bafra sheep on a farm in Samsun/TURKEY region. The rumen liquid was brought to the laboratory centrifuged at 1000 rpm for 10 minutes in pre-sterilized falcon tubes. Then it was made ready for inoculation. The fermentation medium was decontaminated by the autoclave method before adding rumen liquid, and then 1000 µl of rumen liquid was added to each medium. Fermentation was carried out in incubators set at 37 °C. The samples, which completed the fermentation period, were dried and analyzed for crude protein, cellulose, ash, acid detergent fiber, and neutral detergent fiber. At the end of the research, it was determined that the *A. Bisporus* stem part fermented with rumen liquid positively affects the nutrient content. According to the results obtained, the most effective fermentation time was seven days, and also best fermentation pH was seven, respectively.

Keywords: Fermentation, rumen liquid, nutrient composition, Agaricus bisporus.

POTENTIAL EFFECTS OF SOLID-STATE FERMENTATION ON AGRO-INDUSTRIAL WASTES BIOCONVERSION TO HIGH ADDED-VALUE RUMINANTS FEEDS: A REVIEW

Selim Esen [1,] & Fisun Koç [2]*

[1] Balikesir Directorate of Provincial Agriculture and Forestry Republic of Turkey Ministry of Agriculture and Forestry, Balikesir, TURKEY
[2] Zootekni Bölümü Tekirdağ Namik Kemal Üniversitesi Ziraat Fakültesi, Tekirdağ, TURKEY

selim_esen01@hotmail.com

ABSTRACT

Land disposal of lignocellulosic wastes is a classic problem, leading to environmental pollution and negatively affecting human and animal health. However, the higher biological and chemical oxygen demand of agro-industrial waste and by-products makes them a great alternative source for producing high nutritional animal feed. Thus far, several feasible approaches, including physical, chemical and biological methods, have been made to delignification of these waste and by-products, which are generally disposed into nearby open fields. Solid-state fermentation (SSF) is one of them and has attracted considerable scholarly and popular attention over the past four decades. Biotechnological innovations and their potential advantages compared to submerged fermentation, such as being more cost-effective and requiring less technology and energy, have allowed new avenues for applying SSF in various fields. For example, SSF procedures have been used effectively for enzyme production, breakdown of lignin, fermentation of foods, and biogas production. The research to date has focused on enhancing the conversion of lignocellulosic materials to protein-enriched products or detoxifying hazardous and toxic compounds biologically rather than the potential effects on ruminal digestibility. Therefore, this review has discussed the potential effects of bioconverted agro-industrial wastes on digestibility, dry matter intake and performance of ruminants.

Keywords: Solid-state fermentation, Agro-industrial waste, By-products, Ruminant

CLINICAL PATHOLOGICAL FINDINGS IN DOGS WITH LEISHMANIASIS

Eglantina Xhemollari [1,] & Marvin Brahja [2]*

[1] Preclinical Subject Department Agriculture University of Tirana, Faculty of Veterinary Medicine, Albania
[2] Clinical Department Vet Hospital Tirana, ALBANIA

eglantina_xhemollari@yahoo.it

ABSTRACT

Canine leishmaniasis is a serious zoonotic disease caused by the protozoan parasite *Leishmania infantum* (syn, *L chagasi*) where dogs are the main reservoir. İn this study, 12 dogs of different ages were analyzed. Dogs owners have noticed progressive weakness of their pet, loss of hair in the eye area and in some parts of the limbs, loss of the appetite and loss of vitality. To evaluate the presence or absence of Leishmania, the rapid tests idexx leishmania snap test were used. Defining the diagnosis of the disease is also supported by the cytological examination. Hematological and biochemical parameters were analyzed in all positive samples. Erythrocytes (4.97 ± 1.53), hemoglobin (11.35 ± 4.11), hematocrit, the number of lymphocytes and monocytes are lower than the norm compared to the reference values, while the MCHC value was higher than the norm. The value of BUN (42 ± 29.82) and globulin (4.71 ± 1.11) were higher compared to the norm, while the value of albumin (2.25 ± 0.24) was lower than the norm compared to the reference values.

Keywords: Leishmaniasis, cytological examination, hematological, biochemical parameters

LAMINITIS IN DAIRY COWS

Eglantina Xhemollari [1,] & Elgert Metlli [2]*

[1] Preclinical Subject Department Agriculture University of Tirana, Faculty of Veterinary Medicine, ALBANIA
[2] Pre Clinical Department Agriculture University of Tirana, Faculty of Veterinary Medicine, ALBANIA

eglantina_xhemollari@yahoo.it

ABSTRACT

This study is completed in a farm with 120 dairy cows. İn the beginning of June, the condition of laminitis in the farm with 120 lactating cows, resulted for 15 of them with clinical laminitis and formation of wounds. Within 10 days, the animals progressed to clinical metabolic acidosis and non-profuse watery stools, accompanied by rash and pain reflected by lameness. Because of this condition, an immediate intervention was made, especially in the food ration, which contains fiber, dry matter, concentrate, buffer solutions, and as a result, within 3-4 days, the condition was normalized. During summer until beginning of September, the number of cows with clinical laminitis increased, stimulated by thermal stress. İn late August and early September, the number of heads with clinical laminitis reached to 30 heads. İn all cases where we found signs of metabolic acidosis or redness of the hoof, we carried out general interventions by rebalancing the food ration and using substances with microelements and buffer solutions. As soon as superficial wounds appeared on the legs, the animal was treated individually. For prophylaxis and therapy in all animals, podalic 30% was used in spray form two times a week, as well as the bath for the hooves at the moment when they come out of milk two times a week with podalic 4%, which has given us very good results in farm especially in dairy cows.

Keywords: farm, dairy cows, laminitis

NUTRITION OF LONE WOLVES (*CANIS LUPUS* L.) IN BOSNIA AND HERZEGOVINA - CASE STUDY: KLADANJ AND LJUBINJE WOLVES

Selma Vejzagic

Forest Protection Faculty of Forestry, University of Sarajevo, BOSNİA
selma.vejzagic@web.de

ABSTRACT

The wolf (*Canis lupus* L.) is the most important predator in the natural hunting grounds of Bosnia and Herzegovina. This species has significantly adapted to the new environmental conditions, especially in the era of climate change. Working on the monitoring of species that are of crucial importance for the food chain in nature, we came to the conclusion that the wolf's diet is changing. İn the research, live wolf individuals (locality Ljubinje) and shot individuals (locality Kladanj) were observed. Wolves in these two localities lived in different conditions of climate, hydrology, vegetation, quality of predation and under the influence of different intensity of human activity. The main methods of monitoring individuals are personal observation of individuals in nature, following tracks, monitoring predation based on the remains of prey and analysis of feces, while in the case of shot individuals, the analysis was carried out by sampling the contents of the stomach. The analysis established that the basic diet of the individuals in the Ljubinje locality is still based on meat, mostly birds, cats, dogs, forest hens, foxes, rabbits, jackals, followed by some fruit trees from nature and the remains of food left by people. İndividuals in the Kladanj locality were more likely to feed on smaller birds, smaller dogs, rabbits, mice, domestic and wild fruits, and the remains of garbage (mostly food). Wolves observed in the Ljubinje locality have strong bodies, good quality fur, apparently in good health and live in conditions characterized by less stress, although poaching is present in that locality. The individuals that were analyzed at the Kladanj locality were less developed, malnourished, and lived in conditions of continuous stress (disturbing the peace in the hunting grounds). The main results of the research indicate the existence of a certain level of adaptation of wolves to climate change. Certain species of wild animals, which were the wolves' main source of food, are now beginning to have somewhat altered population dynamics and thus altered numbers. Climatic changes in Bosnia and Herzegovina brought jackals as competition for domestic wolves, but also smaller jackals and inexperienced or injured jackals became food for wolves in the southern parts of Bosnia and Herzegovina. A particularly worrying aspect of the research relates to environmental pollution. The existence of a large amount of waste in hunting grounds and on the banks of streams and rivers was observed. Leaving food remains in hunting grounds and large amounts of food in nature predisposes wild animals to the development of intestinal and cardiovascular diseases. The discarded food contains fats, cholesterol and sugars, which do not appear naturally in the natural diet of wolves. İndustrial sugars and additives from pastries can seriously damage the eyesight, teeth and intestinal flora of wolves. For this reason, the integral protection of predators in coastal habitats is recommended, which would also include the protection of coastal habitats from dumping waste and food remains, as well as remains from slaughterhouses, which are often found in natural hunting grounds, and in the performance of illegal hunting, they serve as bait for wolves, jackals and wild boars.

Keywords: Canis lupus, Nutrition, Kladanj, Ljubinje, lone wolf

IMPACT OF CLIMATE ON BIODIVERSITY AND SEASON DISTRIBUTION OF TICKS OF SHEEP IN SEMI-INTENSIVE BREEDING IN SPREAD BELGRADE AREA

İvan Pavlovic [1,], Oliver Radanović [2], Nemanja Zdravković [3], Jovan Bojkovski [4], Marija Pavlović [5] & Aleksandra Tasić [6]*

[1] Parasitology Scientific Veterinary İnstitute of Serbia
[2] Dep.microbiology and Parasitology Scientific Veterinary İnstitute of Serbia
[3] Bacteriology and Parasitology Scientific Veterinary İnstitute of Serbia, Belgrade,
[4] Ruminants and Swine Diseases Faculty of Veterinary Medicine, University İn Belgrade
[5] Food and Feed Testing Department Scientific Veterinary İnstitute of Serbia
[6] Department of Chemistry and Biochemistry Scientific Veterinary İnstitute of Serbia, SERBIA

dripavlovic58@gmail.com

ABSTRACT

During last decades on Belgrade area were increased. semi-intensive breeding of sheep in village at spread Belgrade area. The rational use of pastures in the period of April-October makes the sheep production sustainable and low input in this period of the year. The specific climate and the unique habitat includes high biodiversity of flora and fauna of the grasslands. Ticks represents one of the indispensable elements of that specific biotope. For this reason tick infestations are common, especially during late spring and autumn months of the year. Examinations of sheep tick fauna from the Belgrade area are periodically carried out in order to monitor the influence of abiotic and climatic factors on their biodiversity. The last research was done in 2013 and in our paper we present the results of research conducted in the period 2019-2020 years. During our examination we examined 53 heards of sheep originated from 23 villages from city districts Mladenovac, Lazarevac, Obrenovac, Grocka, Zemun, Surčin, Palilula, Vozdovac and Zvezdara. İn total we examined 447 animals. The tick species and sex/gender were identified by morphometric characteristics. The main attribute of identification of tick family is a plain dorsal sclerotised scutum or shield, which is often ornate with patterns in white or gold against a brown or grey background and which distinguishes these ticks from other families. This sclerotised plate covers the entire dorsal surface of the male, but only one third of the female's dorsal surface. Second one was the capitulum of hard ticks which just as the mouthparts and is visible from a dorsal view. The peritreme or groove is big and clearly visibly around the stigmal plate. Grooves are deep, linear depressions in the body cuticle, usually on the ventral surface. Hard ticks can be easily differentiated by the shape of the basis capitulum and by the form of anal grooves. Ticks infestation we occured at 51.46% sheep. The most abudant species was *İxodes ricinus* (41.11%), followed by *Dermacentor marginatus* (30.21%), *Rhipicephalus bursa* (15.22%), *R.sanguineus* (14.72%), *Haemaphysalis punctata* (5.21%) and *D.pictus* (1.72%). The sex ratio showed a higher number of females in four species (*İ.ricinus, H.punctata, R. sanguineus* and *D.marginatus),* while higher number of males were detected in *R.bursa* and an equal number of the *D.pictus.* Climate conditions like air temperature, relative humidity and rainfall have a great influence on the population dynamics of ticks. Microclimatic changes in the area of Belgrade (higher summer temperatures, less precipitation, warmer winters without snow) affected the dynamics of the appearance of ticks. The population dynamics of recorded tick

species showed two annual maxima, in spring (April-May) and in autumn (September). İn April population maximum we established for *D.marginatus, D.recticulatus* and *H.punctata* and in May for *İ.ricinus*. The autumn population peak in September and in October occurred for the *İ.ricinus, D.marginatus* and *H.punctata.* Compared to earlier research, tick biodiversity has not changed. The prevalence of individual tick species was not statistically significantly changed. At the same time comparing with results from 2013, the first appearance and population maximum of all established tick species was observed earlier, as well as the time of their presence on pastures. The considerable interchange between spring and autumn tick populations can be attributed mainly to environmental conditions which we established during similar research in several regions of Serbia.The study was funded by the Serbian Ministry of Education, Science and Technological Development (Contract No 451- 03-68/2022-14/200030).

Keywords: Sheep, ticks, climate condition, Belgrade

FLAXSEED OIL AS A NEUROPROTECTIVE AGENT AGAINST ALUMINUM CHLORIDE INDUCED MEMORY IMPAIRMENT IN FEMALE RATS

Lounis Wafaalns

Department of Biology Oran1 University Ahmed Benbella, Algeria

wflns06@gmail.com

ABSTRACT

Aluminum is a very common component of the earth's mineral composition. İt is not an essential element for life, but it enters the human body in several ways, including drinking water,eating food. Many scientific studies have recently shown that aluminum accumulates in the brain, causing severe neurotoxicity. This study investigated the effects of flaxseed oil(FSO)on chloride aluminum(AlCl3) -induced disturbance in female rats brain level. Female rats (Wistar strain) weighting between(100–110g) were used through out the study,and where divided into three groups of 6 rats. groups: Groupİ(control) served as a control group. Groupİİ (+AlCl3) received ip. injection of AlCl3 (75mg/kg body wt) and also, force-feeding with the saline , animals of groupİİİ (AlCl3+FSO) was inoculated by oral gavaging with flaxseed oil (0.5 mg/kg body wt) and received ip. injection of AlCl3.The results were processed by one-way ANOVA and TUKEY test. Statistical analysis of the investigation of memory work type behavior on the y-maze test shows us that Y-maze test indicates that Spontaneous Alternation Performance(PSA) reduced (-63.07%) in AlCl3 group compared to control, while linseed oil treatment of AlCl3-induced rats (AlCl3+FSO) significantly increased spontaneous alternation (56. 60%) compared to the AlCl3 group ,the results of Alternate Arm Returns (AAR) results showed a higher score (+57.53%) in the AlCl3 group compared with the control. However, treatment with FSO showed a significant decrease (-72.15) compared to the AlCl3 group. This negative behavior changment that were noted in the second group (AlCl3) may result from the accumulation of AlCl3 in the hippocampus affecting learning and increased accumulation of (Aβ)beta-amyloid and reducing the antioxidant activity; However, the administration of (FSO) to female rats presented similar to that of the control group, this improvement this improvement is explained by it richness in polyunsaturated fatty acids, which are known to reduce (Aβ) toxicity by promoting its degradation and clearance. İn conclusion, the study shows that aluminum has a neurotoxic effect on the behavior of rats. which are common manifestations of Alzheimer's disease, the treatment used allowed us to observe that the administration of vegetable oil rich in omega 3 played a neuroprotective role against this heavy metal

Keywords: Aluminium, neurotoxcity Linum usitatissimum, environmental pollution

EFFECTS OF DIETARY PROBIOTICS ON THE PRODUCTIVE PERFORMANCES AND BLOOD PARAMETERS IN WEANED PIGS

Aporn Songsang [1,], Supaporn Somrup [2], Monthon Lertworapreecha [3] & Chiraprapha Tuyarum [3]*

[1] Animal Science Thaksin University, Thailand
[2] Animal Science Faculty of Technology and Community Development, Thaksin University, Thailand
[3] Microbiology Program, Department of Biology Faculty of Science, Thaksin University, Phatthalung, 93210, Thailand

asongsang@hotmail.com

ABSTRACT

The aim of this study was to investigate the effects of probiotic product (*Lactobacillus plantarum* and *Bacillus subtilis*) supplementation in diet on productive performances of weaned pigs. A total of 48 weaned pigs (Duroc x Largewhite x Landrace), consisting of 32 males and 16 females, were used in the experiment. The experiment design was a randomized completely block design with 4 treatments.. Each treatment consisted of 4 blocks (body weight 10.0-11.0 kg, 9.0-10.0 kg, 8.0-9.0 kg and 6.5–8.0 kg). Treatment 1) Control diet (commercial diet); Treatment 2) Control diet + antibiotic; Treatment 3) Control diet + probiotic 0.1%; Treatment 4) Control diet + probiotic 0.2%. The experimental period was 27 days. Body weight and feed intakes were recorded every 2 weeks. At the end of the experiment, 4 pigs were randomly chosen from treatment 1, 2 and 4, then blood samples were taken for hematology analysis. The results showed that there were no significant differences in feed intake, weight gain, average daily gain, and feed efficiency among treatments ($P>0.05$). However, a tendency of higher weight gain and average daily gain was observed in pigs receiving diet with antibiotic ($P>0.05$) compared to the other groups. The pigs receiving diet with probiotic 0.2% had higher RBC ($P<0.05$) compared to control group. No significant difference in RBC were obtained between pigs receiving diet with probiotic 0.2% and pigs receiving diet with antibiotics. There were no significant difference in Hemoglobin, Hematocrit, Leukocyte, Neutrophils, Eosinophils, Lymphocytes and Monocytes among treatment. The results indicated that supplementation of *Lactobacillus plantarum* and *Bacillus subtilis* had positive effects on RBC.

Keywords: probiotic, weaned pig, productive performances, blood parameters

EVALUATING KNOWLEDGE, ATTITUDES, AND PRACTICES OF FAMILY-TYPE DAIRY FARMER: CANAKKALE PROVINCE

Seda Özdikmenli Tepeli [1,] & Musa Yalman [2]*

[1] Yenice Vocational School Department of Veterinary Çanakkale Onsekiz Mart University, Çanakkale, TURKEY
[2] Vocational School Deparment of Food Processing Bandirma Onyedi Eylül University Bandirma, Balikesir, TURKEY

sdikmenli@hotmail.com

ABSTRACT

The purpose of this research, determine the structural characteristics of dairy cattle producers who are members of the Çanakkale Province Yenice Dairy Producers Association, to identify the problems they encounter, and to offer solutions for these problems. While evaluating the data, simple averages and percentage calculations were used. Also, Pearson's chi-squared test is used to determine whether there was a statistically significant difference between the groups. İn our research, the 397 farmers participating were women 51.4%, and 48.6% were men farmers. 46.1% of the participants were between the ages of 41-50, and the education level of 85.1% of the producers was a primary school. While 22.4% of the female producers have social security, 46.9% of the male producers have social security. İt has been determined statistically that there is a relationship between gender and social security status. Farmers also deal with agriculture as a second job (69%) apart from animal husbandry. The rate of farmers engaged in only animal husbandry was determined as 28.7%. 28.2% of the producers have been engaged in dairy cow breeding for 16-20 years and 77.8% have at least 10 or more dairy cows. There was no relationship between the experience period in milk production and the decision to call a veterinarian in case of any disease. 94.2% of the farmers consider it necessary to call a veterinarian when the animal gets sick. İn addition, 68.0% of farmers prefer to use antibiotics when a veterinarian gives them. Although 74.3% of farmers did not receive any hygiene training, 59.2% of them were able to define hygiene. The practices of female farmers and males regarding equipment cleaning differ from each other, and this difference was found to be statistically significant ($p<0.05$). While 86.1% of the producers wash the nipples before milking, the milking machine is cleaned after milking at a rate of 84.6%. The material of raw milk holding equipment is 36.5% steel, 33.5% chromium, and 29.0% plastic, respectively. İt was determined that 71.8% of raw milk analyzes (antibiotic, oil, water ratio, etc.) are made by dairy companies. İn the region, 88.2% of the raw milk collected is marketed under the cooperative. Also, 96.5% of this raw milk is purchased and processed by local dairy companies. İn Turkey, raw milk production is an important source of food and livelihood for family-type farmers in rural areas. İt is important to understand the knowledge, attitudes and behaviors of farmers in terms of revising the relevant legislation and developing more effective national strategies to prevent antibiotic resistance.

Keywords: Dairy farmer, knowledge, attitudes, antibiotic, raw milk

EVALUATION OF SOME CHEMICAL AND BIOCHEMICAL PROPERTIES OF DONKEY MILK IN DIFFERENT LACTATION PERIODS

Muhammet Kaptan [1,], Utku Duran [2], Hakan Tüfek [2] & Serkan Sugeçti [2]*

[1] Gida İşleme Bülent Ecevit University, Zonguldak, TURKEY
[2] Department of Laboratory and Veterinary Health Bülent Ecevit University, Zonguldak, TURKEY

m.kaptan@beun.edu.tr

ABSTRACT

Donkey milk is very similar to human milk in terms of protein profile, lactose content, which provides a substrate that stimulates intestinal calcium absorption. Also, due to its high lysozyme content, it inhibits the development of pathogenic microorganisms. İn this study, the biochemical properties of milk taken from donkeys in different lactation periods were investigated. Donkeys in the 4, 7, 8 and 9th lactation periods were used in the study. The amount of fat decreased in the 9th lactation period when compared to the 4th lactation period. Protein and lactose amount and density increased in the 9th lactation period. Although sodium (Na), chlorine (Cl) amounts were decreased in the 9th lactation period when compared to the 4th lactation period, the amount of potassium (K), phosphorus (P), magnesium (Mg) and calcium (Ca) were increased. İn this study, aspartate aminotransferase (AST), alanin aminotransferase (ALT) and Lipase activities decreased, but alkaline phosphatase (ALP), creatinine kinase (CK) and Gamma-Glutamyl Transferase (GGT) activities were increased in the 9th lactation period when compared to the 4th lactation period. Milkotester Master Pro Milk Analyzer was used for chemical analysis and Beckman Coulter au680 analyzer was used for biochemical analysis. İn this study, the chemical and biochemical properties of donkey milk, which has been used in food, pharmacy and medicine in recent years, were determined. İt is very important to determine the content of donkey milk due to its nutritious content and low allergen effect.

Keywords: Chemical and Biochemical Properties, Donkey milk, Lactation Periods

EFFECT OF GRAPEFRUIT ESSENTIAL OIL ADDITION TO THE DIET ON PERFORMANCE, SLAUGHTERING CHARACTERISTICS AND MEAT QUALITY OF MALE QUAILS

Esra Tuğçe Gül [1,], Osman Olgun [1] & Alpönder Yildiz [1]*

[1] Department of Animal Science Selcuk University, Konya, TURKEY

esra.gul@selcuk.edu.tr

ABSTRACT

The current research was conducted to determine the effect of addition of 0, 100, 200, or 300 mg/kg grapefruit essential oil to the diet on the performance, slaughtering and meat traits of male quails. In the study, a total of 96 male Japanese quails aged 91 days were randomly distributed to 4 treatment groups with 6 subgroups and the quails were fed with experimental diets for 30 days. At the final of the study, body weight and feed intake did not affected by the addition of grapefruit essential oil to the diet ($P>0.05$). İn addition, the supplementation of grapefruit essential oil to the diet did not affect carcass and visceral organ weights ($P>0.05$). The pH values of breast and thigh meats significantly decreased with the administration of 200 and 300 mg/kg grapefruit essential oil to the diet (respectively, $P<0.05$, $P<0.01$). Besides, drip loss of breast meat was affected by the addition of grapefruit essential oil to the diet ($P<0.05$). Thigh meat drip loss was considerably increased with the addition of 300 mg/kg grapefruit essential oil to the diet, compared the control group ($P<0.05$). According to the results obtained from this study, the addition of 200 mg/kg grapefruit essential oil to the diet was effective in reducing meat pH without affecting performance parameters and slaughtering characteristics.

Keywords: Quail, meat quality, grapefruit essential oil, slaughtering characteristics, performance

EFFECT OF RED BEET POWDER ADDITION TO THE DIET ON PERFORMANCE, CARCASS AND MEAT QUALİTY OF MALE QUAILS

Osman Olgun [1], Esra Tuğçe Gül [1,] & Alpönder Yildiz [1]*

[1] Department of Animal Science Selcuk University, Konya, TURKEY

esra.gul@selcuk.edu.tr

ABSTRACT

This study was carried out to determine the effect of diets containing red beet powder on performance, carcass traits, and meat quality of male quails that are not used as breeders. İn the study, a total of 96 male Japanese quails at the age of 43 days were randomly allocated to 4 treatment groups with 6 replicates. İn the experiment, male quails were fed with trial diets added red beet powder at the levels of 0, 1, 2, or 3 g/kg to the basal diet for 30 days. The administration of red beet powder to the diet did not affect the body weight ($P>0.05$), but feed intake linearly increased with the addition of red beet powder to the diet ($P<0.01$). Relative breast meat weight linearly decreased ($P<0.05$), but other carcass and organ parameters were not affected by the addition of beet powder to the diet ($P>0.05$). The effect of supplementation of red beet powder to the diet on L*, a* and b* values of breast and thigh meats was found to be insignificant ($P>0.05$). According to the results of this study, it was determined that the addition of red beet powder to male quail diets affected the meat quality after slaughter negatively, but increased the appetite.

Keywords: Male quail, meat quality, red beet powder, performance

LIQUID STATE FERMENTATION USİNG *Lactobacillus* spp. AFFECT THE NUTRITIONAL COMPOSITION OF THE CAP PARTS OF *Agaricus bisporus*

Bahar Güngör [1], Şevket Özlü [2], Emrah Güngör [3,], Aydin Altop [2] & Güray Erener [3]*

[1] Department of Microbiology Ondokuz Mayis University, TURKEY
[2] Department of Animal Production Ondokuz Mayis University, TURKEY
[3] Department of Animal Science Ondokuz Mayis University, Samsun, TURKEY

emrah.gungor@omu.edu.tr

ABSTRACT

The effect of *Lactobacillus* spp. liquid state fermentation on the nutritional composition of *Agaricus bisporus* cap was investigated in this study. *Agaricus bisporus* was obtained fresh, and the cap part was separated from the stem part and cut into small pieces. Each 100 gram of cap was mixed with 400 ml of distilled water in the fermentation flasks. The mixture was enriched with 8.4 g urea (46% N) as a nitrogen source. The caps were separated into two groups, and the fermentation media was adjusted to two different pH values (6 and 7) by using 1 N HCl and 1 N NaOH. All mushrooms were sterilized at 121 °C for 15 min by autoclave and then inoculated with 1 ml *Lactobacillus* spp. (108 CFU/ml). One uninoculated group was also made for each pH level as a positive control. The inoculated mushrooms were incubated at 30°C for 48 hours. At the end of the fermentation, *Lactobacillus* spp. count, pH value, and crude protein and ash content were determined in raw, fermented, and uninoculated *Agaricus bisporus* caps. *Lactobacillus* spp. count was higher in the pH 6 group than in the ph 7 group. Similarly, liquid state fermentation increased the crude protein and decreased the ash content of *Agaricus bisporus* cap in the pH 6 group. However, no change was determined between uninoculated and fermented groups in the pH 7 group. Mushroom and liquid pH were lower ($P<0.05$) in the fermented caps compared with the uninoculated mushrooms in both pH groups. The obtained results showed that liquid state fermentation using *Lactobacillus* spp. improved the nutritional composition of *Agaricus bisporus* cap when the initial pH was six.

Keywords: mushroom caps, Agaricus bisporus, Lactobacillus spp., liquid fermentation

NUTRITIONAL COMPOSITION OF FERMENTED SOUR CHERRY KERNEL USİNG *Bacillus subtilis* IN SOLID-STATE FERMENTATION

Emrah Güngör [1,], Şevket Özlü [2], Aydin Altop [2] & Güray Erener [1]*

[1] Department of Animal Science Ondokuz Mayis University, TURKEY
[2] Department of Animal Production Ondokuz Mayis University, Samsun, TURKEY

emrah.gungor@omu.edu.tr

ABSTRACT

Sour cherry kernels are agricultural residues of fruit juice factories. Solid-state fermentation has been used to improve the nutritional values of agricultural by-products. The effect of *Bacillus subtilis* on the nutritional composition of sour cherry kernel in solid-state fermentation was investigated in this study. Sour cherry kernels were subjected to solid state fermentation using *Bacillus subtilis* (ATCC 21556) for 48 hours. Sour cherry kernels were analyzed before and after fermentation to determine the crude protein (CP), ether extract (EE), ash, crude fiber (CF), neutral detergent fiber (NDF), and acid detergent fiber (ADF) content. *Bacillus subtilis* increased ($P<0.05$) the CP, EE, ash, CF, NDF, and ADF content of sour cherry kernel. However, nitrogen free extract was decreased ($P<0.001$) in sour cherry kernel after solid-state fermentation. *Bacillus subtilis* can be used to increase the crude protein, ether extract, and ash content of sour cherry kernel.

Keywords: sour cherry kernel, Bacillus subtilis, solid-state fermentation, crude protein

THE EFFECTS OF ORGANIC ACIDS AND SACCHAROSE ADDITION TO THE DRINKING WATER OF BROILERS DURING THE WITHDRAWAL PERIOD ON THE CARCASS, HEARTH, LIVER, GIZZARD, AND SMALL INTESTINE WEIGHT

Zafer Binbir [1,] & Ergin Öztürk [2]*

[1] Department of Zootechnics Ondokuz Mayis University, TURKEY
[2] Department of Animal Production Ondokuz Mayis University, Samsun, TURKEY

zaferbinbir@gmail.com

ABSTRACT

This study aimed to determine the effects of adding organic acids and saccharose to the drinking water of broiler chickens on weight loss, carcass yield, hearth, liver, gizzard, and small intestine weight during the pre-slaughter feed withdrawal period. Broilers were housed individually and divided into 4 groups before slaughter. Drinking water was provided*ad libitum* to all groups during the 10-hour feed withdrawal period before slaughter. The treatments were 7.5 pH drinking water (control group), 7.5 pH drinking water with 1% saccharose addition, pH 4.0 drinking water (organic acid addition), and pH 4.0 drinking water with 1% saccharose addition. A mixture of formic acid and citric acid was used as organic acids, and granulated sugar was used as a source of saccharose. The measurementwas conducted at the time of slaughter and 24 hours after slaughter. The addition of organic acids and saccharose increased the gizzard weight and the percentage of gizzard to pre-slaughter live weight. As a result, the addition of organic acids and saccharose to the drinking water of broiler chickens increased the gizzard weight and percentage (compared to the pre-slaughter period) without affecting the body weight, carcass weight loss, heart, liver, and small intestine weight.

Keywords: Organic acids, formic acid, citric acid, saccharose, broiler, pre-slaughter

MOLECULAR CHARACTERISATION OF SOME PLANT-DERIVED RETROTRANSPOSONS BY IRAP-PCR METHOD IN BAFRA LAMBS AT DIFFERENT DEVELOPMENTAL STAGES

Gamze Nur Atil [1,], Levent Mercan [2] & Sevgi Marakli [3]*

[1] Department of Agricultural Bio-Technology Ondokuz Mayis University, Samsun, TURKEY
[2] Department of Agricultural Bio-Technology Ondokuz Mayis University, Samsun, TURKEY
[3] Department of Molecular Bioloqy and Genetics Yildiz Teknik University, İstanbul, TURKEY

gamzenuratil75@gmail.com

ABSTRACT

Bafra sheep obtained by crossbreeding Chios and Karayaka breeds is a genotype with high fertility ability. Retrotransposons are mobile genetic elements, replicating themselves via copy-paste mechanism. İt is known that 20% of the sheep genome consists of retrotransposons. İn this study, the polymorphism ratios of barley-specific *Nikita* and *Sukkula*, tomato-specific *Copia-like*, and soybean-specific *SİRE1* retrotransposons were examined in Bafra lambs at 30th and 60th days of age by using İRAP (İnter-Retrotransposon Amplification Polymorphism) molecular marker method. *Nikita*'s polymorphism rates were 0-63% in 30-day-old and 0-57% in 60-day-old lamb. *Sukkula* showed 0-11% and 6-50% polymorphism ratios in 30-day-old and 60-day-old lambs, respectively. The results of *Copia-like* retrotransposon were determined as 0-18% for 30-day-old and 0-33% for 60-day-old lambs. Moreover, *SİRE1* showed 0-13% and 0-50% polymorphism rates in 30-day-old and 60-day-old lambs, respectively. Retrotransposons belonging to plant species indicated different polymorphism rates in different developmental periods. Whether the cause of this difference is due to dietary genome interactions should be investigated by controlled feeding studies.

Keywords: Epigenetics, mobile genetic elements, nutrigenomics, polymorphism, İRAP-PCR

VALORIZATION OF LIVESTOCK MANURE TO ELECTRICITY GENERATION BY MICROBIAL FUEL CELL: A RENEWABLE ENERGY SOURCE FOR A SUSTAINABLE ENVIRONMENT

Selim Esen [1,] & Fisun Koç [2]*

[1] Balikesir Directorate of Provincial Agriculture and Forestry Republic of Turkey Ministry of Agriculture and Forestry, Balikesir, TURKEY
[2] Zootekni Bölümü Tekirdağ Namik Kemal Üniversitesi Ziraat Fakültesi, Tekirdağ, TURKEY

selim_esen01@hotmail.com

ABSTRACT

Accelerating in fertility worldwide together with proper nutrition influenced the human population. The livestock industry is pivotal in supplying the increased population's nutritional demand. However, this rapidly growing sector results in a massive amount of manure which causes environmental pollution unless disposed of under a suitable method. Livestock manure consists of urine, feces, and bedding materials and is rich in cellulose, hemicellulose, lignin, and abundant nutrients; thus, it is classified as an important second-generation biomass resource. Traditionally, it has been used as a soil conditioner and organic fertilizer. Microbial fuel cell (MFC), is bio-electrochemical reactor converting biochemical energy stored in organic compounds into electrical energy through the catalytic reaction of microorganisms. İn recent years, researchers have investigated various approaches to industrializing MFC: they developed efficient bio-electrocatalytic interfaces, low-cost and durable electrode materials, and an understanding of electron transfer mechanisms. Furthermore, as the most abundant biopolymer in terrestrial ecosystems, the vast majority of recent studies about MFC focused on lignocellulosic biomass. Therefore, this review has explicitly discussed the current status of development and challenges for MFC technologies including the selective enrichment of specific groups of microorganisms and biofilm formation on the anodes to dispose of livestock manure, as an important lignocellulosic material, for a sustainable environment.

Keywords: Microbial fuel cell, Manure, Renewable energy source, Lignocellulosic biomass

CONTRIBUTION TO THE STUDY OF THE SEROPREVALENCE OF BRUCELLOSIS IN CATTLE IN THE CENTRAL REGİON OF ALGERIA

Lynda Abdellaoui

Veterinary Science Saad Dahleb Blida University, Algeria

lyndabdellaoui5@gmail.com

ABSTRACT

Brucellosis is a major zoonosis in the world causing abortions and considerable losses in cattle farms. Through our study we evaluated the prevalence of brucellosis in cattle during suspicions and screening operations of the veterinary services, at the level of the farms of the wilayas of the center (Algiers, Blida, Médéa, Ain Defla and Tipaza).A total of 20,230 samples from cattle were studied during the period from 2016 to 2020. The samples were analyzed with the three serological tests recognized by the National Veterinary Authority, which are EAT, ELİSA-indirect and complement fixation.The overall seroprevalences recorded are respectively 6.26%, 1.52%, 0.48%, 5.49% and 0.94% for the years 2016, 2017, 2018, 2019 and 2020. The lack of regularity and the insufficient number of animals screened generates a calculation of the apparent seroprevalence which is obviously far from the reality on the ground. İn conclusion, in order to optimize the fight against this disease, epidemiological surveillance must be followed by quality laboratory diagnosis.

Keywords: Prevalence, Brucellosis, Cattle, EAT, ELİSA-i, FC

CHEMICAL COMPOSITION AND IN VITRO FERMENTATION CHARACTERISTICS OF *Coridothymus capitatus* L.

Hande Işıl Akbağ

Animal Science Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

hiulku@comu.edu.tr

ABSTRACT

Aromatic plants are popular for human consumption and animal feed, as well as for their aroma compounds and medicinal properties. Thyme has the most common use among aromatic plants and is rich in essential oils. These essential oils are known to have antibacterial, antifungal, and antioxidant properties. There are many studies evaluating the effects of essential oils contained in thyme on rumen microbial population and fermentation. On the other hand, there are few studies examining the chemical composition of the thyme plant and its effects on rumen fermentation. This study aims to evaluate the effects of the harvesting period on the chemical composition and *in vitro* fermentation properties of the thyme plant. For this purpose, the samplings were carried out from five different plants in the natural pasture area in March, June, and September. Dry matter (DM), crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), crude ash (CA), and condensed tannin (CT) analyzes were performed on the samples. The fermentation kinetics, metabolizable energy, and organic matter digestibility levels of *Coridothymus capitatus L.* were also estimated by using the *in vitro* gas production technique. The gas production was measured at 0, 4, 8, 12, 24, 48, 72, and 96 hours of incubations. The DM, CP and ADF content of *Coridothymus capitatus L.* were significantly changed by the sampling period ($P<0.05$). The highest DM content (837.39 g/kg) was found in September, the highest CP content (55.48 g/kg DM) was found in June and the highest NDF content (643.57 g/kg DM) was found in March. The CT concentration was changed from 11.0 to 13.2 g/kg KM and did not change by sampling periods. The *in vitro* gas production, ME and OMP values were significantly affected by the sampling periods. The highest gas production (36.68 ml), ME (7.49 MJ/kg DM) and OMP (50.52 %) values were calculated in July. İn conclusion, the nutritive value, ME and OMD values of *Coridothymus capitatus L.* was high in June and may be sufficient as a source of roughage for browsing ruminants during this period.

Keywords: in vitro gas production, forage, sampling period, condensed tannin

DETERMINATION OF COVERAGE ACTIVITIES OF ADJUVANTS USED WITH PESTICIDES WITH DIFFERENT INGREDIENTS

Medet İtmeç [1,], Bayat Ali [2] & Ömer Bariş Özlüoymak [1]*

[1] Department of Aqricultural Machinery and Technoloqy Enqineerinq Çukurova Unİversİty, Adana, TURKEY

mitmec@cu.edu.tr

ABSTRACT

Since the main principle in the production of pesticides is the fight against the pest, these products are designed and produced by considering their effectiveness on the target pest. However, the pesticide's resistance to meteorological conditions (evaporation, drift) and dynamics on the leaf surface (spreading and sticking) are secondary importance during application. At this point, plant protection products (PPP) that improve the spraying efficiency come into mind. Plant protection products can reduce drift by increasing the drop diameter by changing parameters such as surface tension and viscosity, and by changing the surface contact angle. Besides, it helps to provide the indispensable criteria of pesticides by gaining the feature of better adhesion to the leaf surface. İn this study, the coverage effectiveness of additives with different contents was investigated. The commercial additives Control (Polyvinyl polymer), Kantor (Alkoxylated triglycerides) and Starguar (Methylated oil-based) with different contents were used in the experiments. İn addition, the surface tensions, surface contact angles, droplet diameters and viscosity values of these additives were measured and compared with tap water. The coverage rates of the water sensitive cards (WSP) placed on the moving belt in the laboratory environment were determined. İn the experiments, XR11002 nozzle was preferred, 3 different spray pressures (3, 4, 5 bar), 3 different belt speeds (1; 1.5; 2 m/s) and 3 different additives were evaluated in 3 replications, the results were compared with tap water which is the reference liquid. As a result, additives Control, Kantor and Starguar increased the droplet diameters (192 µm, 191 µm and 188 µm, respectively) compared to tap water at 3 bar spray pressure.

Keywords: Adjuvants, Droplet Size, Coverage Rate.

MECHANICAL AND BEARING CONDITION EVALUATION BY VIBRATION ANALYSIS OF THRESHING UNIT OF COMBINE HARVESTER

Shankar Bhandari [1,], Eglė Jotautienė [2] & Antanas Juostas [3]*

[1] Agricultural Engineering and Safety İnstitute Vytautas Magnus University, LITHUANA
[2] Agricultural Engineering and Safety Vytautas Magnus University, LITHUANIA
[3] Depaftment of Agricultural Engineering and Safety Vytautas Magnus University, LITHUANIA

shankar.bhandari@vdu.lt

ABSTRACT

The bearing and machine condition evaluation of the threshing unit is very crucial before any harvesting season to overcome the problems of unexpected breakdown. The vibration analysis is the most effective way of the condition monitoring of the bearing and other mechanical components of the threshing unit to evaluate the machine condition for harvesting. The FFT (Fast Fourier Transform) demodulation method is used to evaluate the bearing condition and phase analysis is used to evaluate other mechanical condition like looseness, misalignment, and unbalance of the threshing unit of the NİVA SK5. The Adash A4900 Vibrio M analyzer (Adash spol. s.r.o., Ostrava, Czech Republic) is used for vibration signal measurement and DDS Adash software is used for signal processing.

Keywords: Vibration analysis, combine harvester, threshing unit, FFT demodulation, Phase analysis

LAND PREPARATION IMPACTS ON SOİL PHYSICAL PROPERTIES AND GRAIN YIELD OF CANOLA (*Brassica napus* L.)

Alireza Allameh [1,] & Mohamad Reza Alizadeh [2]*

[1] Agricultural Engineering Department Rice Research Institute of Iran, IRAN
[2] Agricultural Engineering Rice Research Institute of Iran, IRAN

a.allameh@areeo.ac.ir

ABSTRACT

Canola is an industrial oilseed which is mainly grown for producing vegetable edible oil. A two-year study was conducted to identify the effects of different tillage methods on some soil physical characteristics and seed yield of canola cultivated in paddy fields. Five different tillage systems were selected as using (i) rotavator, once in depth of 10-15 cm (T1), (ii) rotavator, twice in depth of 10-15 cm (T2), (iii) moldboard plow in depth of 25 cm + rotavator, once in depth of 10-15 cm (T3), (iv) no till-planting through removing rice stubbles from plots (T4), and (v) no till-planting without removing rice stubbles from plots (T5). The experiments laid out on a randomized complete blocks design (RCBD) with three replications. The results revealed that the tillage methods affected soil bulk density, surface residues after tillage, dry mass of weeds, days to germinate seeds, and grain yield significantly ($p < 0.01$). Two treatments (T2 and T3) made considerable reduction in soil bulk density compared to others when tillage performed 15 – 30 cm deep. On treatments T1 to T4, surface residues after tillage decreased 35.37, 50.71, 69.92, and 75.75 %, compared to T5, respectively. T5 owned the maximum dry mass of weeds (71.48 g m-2) while T3 had the minimum one (37.50 g m-2). Means comparison represented that the shortest duration (6.4 days) for seed germination belonged to T2 and T3 in average. The highest and lowest grain yield were associated to T3 (1571 kg ha-1) and T5 (1339 kg ha-1), respectively. Statistically, there was no significant difference among T1 (1432 kg ha-1) and T2 (1537 kg ha-1) with T3 in terms of grain yield.

Keywords: canola, tillage, crop yield, weeds, soil properties

RICE MILLING AND SHEDDING VARIATION AT HARVEST SEASON

Alireza Allameh

Agricultural Engineering Department Rice Research Institute of Iran, IRAN

a.allameh@areeo.ac.ir

ABSTRACT

The quality and yield of all cereal crops are the main objectives of farming operations. Different factors have been enumerated which have had significant effects on these properties. Among them, grain shattering is recounted as an impressive parameter that directly influences on quantity and quality of rice. To identify the variations of grain yield and its milling properties, a two-year study was conducted to assess the impact of grain shattering on them. Factorial experiment arranged by a completely randomized design with five repetitions. The independent variables assigned as rice cultivars at three levels (Hashemi, Gilaneh, and Anam), followed by harvest date at five levels (26, 28, 30, 32, and 34 days after 50% flowering), and grain place on the panicle at three levels (upper, middle, and basal). The dependent variables were chosen as the separating force of grain from its pedicel and milling properties. Data analysis demonstrated that the separating force differed significantly among rice cultivars. The maximum mean force (1.18 N) was obtained when Hashemi harvested at 26 DAF but the minimum force (0.11 N) was related to Anam harvested at 34 DAF. The effect of the year was significant (P = 0.01) owing to late planting in the first year. The separating force illustrated a reduction trend from the first to the last date of harvesting intervals for both study years. İt was 9, 7, and 10 percent for Hashemi, Gilaneh, and Anam, respectively. Since an individual panicle does not ripen evenly, those grains of basal required more detaching force than the upper. An increase of 36, 57, and 51 percent were observed for Hashemi, Gilaneh, and Anam, respectively. Natural shattering went up about 0.049, 0.081, and 0.112 percent for Hashemi, Gilaneh, and Anam, respectively for trial intervals. Late planting in the first year impressed the head rice yield significantly so that cultivars experienced a rise of 6-10 percent in the second year. İt is suggested that the optimum harvest date for rice cultivars would be 30 DAF overall.

Keywords: Rice, quality, shedding, harvest season, head rice yield

FOOD SECURITY, HYDROPONIC FODDER PRODUCTION AND LIVESTOCK FARMING SYSTEM IN ARID AND SEMIARID REGIONS

Arshad Mahmmod Malik Dr

Department of Economics Pmas-Arid Agriculture University Rawalpindi
arshadmm@uaar.edu.pk

ABSTRACT

Green fodder is one of the most important component of feed for livestock. Livestock constitutes about sixty percent of agricultural GDP in Pakistan. Land and water resources are depleting rapidly. Per-capita availability of land and water is also decreasing due to rapid population growth. This scarcity of land and water resources is limiting fodder production in terms of both quality and quantity. Furthermore, in urban area and in peri-urban livestock farming, fodder availability is a serious issue. Even the available fodder is of poor quality which is adversely affecting the health and reproduction of livestock. Therefore, it is of utmost importance to develop some strategies for the efficient production of quality fodder round the year. Hydroponic fodder production is one the best solution to the existing problem. Highly nutritious, palatable, fresh and economic hydroponic fodder can be produced just within 7 days by using small amount of water. Especially in winter season, fodder scarcity is more acute in semi-arid regions like Potohar region of Northern Punjab. Hydroponics fodder production provide solution to these issues. There was a dire need to standardize the different parameters of hydroponics fodder before recommending it to farmers. A research experiment was designed to produce quality fodder round the year through hydroponics technology. Various parameters of the study include seed rate, temperature, light, water, intensity, interval and application method. The data was further analyzed for cost benefit ratio and İRR. Policy makers and planners can use these results while designing food security policies in different geographical and fodder stress areas. Green fodder is one of the most important component of feed for livestock. Livestock constitutes about sixty percent of agricultural GDP in Pakistan. Land and water resources are depleting rapidly. Per-capita availability of land and water is also decreasing due to rapid population growth. This scarcity of land and water resources is limiting fodder production in terms of both quality and quantity. Furthermore, in urban area and in peri-urban livestock farming, fodder availability is a serious issue. Even the available fodder is of poor quality which is adversely affecting the health and reproduction of livestock. Therefore, it is of utmost importance to develop some strategies for the efficient production of quality fodder round the year. Hydroponic fodder production is one the best solution to the existing problem. Highly nutritious, palatable, fresh and economic hydroponic fodder can be produced just within 7 days by using small amount of water. Especially in winter season, fodder scarcity is more acute in semi-arid regions like Potohar region of Northern Punjab. Hydroponics fodder production provide solution to these issues. There was a dire need to standardize the different parameters of hydroponics fodder before recommending it to farmers. A research experiment was designed to produce quality fodder round the year through hydroponics technology. Various parameters of the study include seed rate, temperature, light, water, intensity, interval and application method. The data was further analyzed for cost benefit ratio and İRR. Policy makers and planners can use these results while designing food security policies in different geographical and fodder stress areas.

Keywords: Green fodder, hydroponics, economic, nutrition, livestock

INTERACTIVE EFFECT OF GENOTYPES, ROW SPACING AND SULPHUR FERTILIZATION ON THE PRODUCTIVITY AND SEED OIL QUALITY OF SESAME (*Sesamum indicum*)

Ahmad Sher [1,], Abdul Qayyum [2], Yamin Bibi [3] & Suffana Hayat [4]*

[1] Agronomy Bahauddin Zakariya University, Multan-Pakistan
[2] Agronomy University of Haripur, Pakistan
[3] Botany Pmas, Arid Agriculture University, Rawalpindi, Pakistan
[4] Environmental Sciences Bahauddin Zakariya University, Multan, Pakistan

ahmad.sher@bzu.edu.pk

ABSTRACT

Among plant nutrients, sulphur (S) is considered as a macronutrient that has an important role in development of seed oil. Availability of S for crops depends upon its concentrations present in the soil or exogenous applied S containing fertilizers coupled with genotypic ability to uptake sulphur. Therefore, a two-year research experiment was conducted to assess the effect of genotypes, different sources of Sulphur and row spacing on productivity and oil quality of sesame (*Sesamum indicum*). Treatments comprised of sulphur sources *viz.*, control, elemental S (40 Kg ha-1), gypsum (400 Kg ha-1), sulphate of potash (45 Kg ha-1) and single super phosphate (45 Kg ha-1) factorially combined with two rows spacing (30 and 45 cm) and two sesame genotypes *i.e.* SG-30 and TS-5. All sulphur application sources, row spacings and genotypes significantly ($p \leq 0.05$) affected the growth and yield attributes of the sesame and enhanced the yield; however, the application of gypsum (400 kg ha-1) proved best at 30 cm row spacing. Sesame genotype 'SG-30' performed better under all sulphur sources and row spacings. Based on the results, it is concluded that sesame genotypes 'SG-30' should preferably be grown, and Gypsum (sulfur) application should be applied (400 kg ha-1) at 30 cm row spacing under in arid climate regions.

Keywords: Sulphur sources, row spacing, seed yield, fatty acid profile, sesame genotypes

IDENTIFICATION OF TOLERANT QUINOA (*Chenopodium quinoa*) GENOTYPES AGAINST THE DROUGHT STRESS

Muhammad Sohail Saddiq [1,], Shahid İqbal [2], Muhammad Bilal Hafeez [3] & Jahanzaib [4]*

[1] Agronomy Ghazi University, Pakistan
[2] Department of Agronomy Muhammad Nawaz Shareef, University of Agriculture Multan 66000, Pakistan
[3] Department of Agronomy University of Agriculture Faisalabad 38040, Pakistan
[4] Department of Forestry Bahauddin Zakariya University, Multan 60800, Pakistan

mssaddiq@gudgk.edu.pk

ABSTRACT

The extended period of drought stress is major leading stress under changing climate scenarios. İt is a real threat to future food security. İdentification of a new tolerant plant is the best choice to mitigate the effect on food security. Quinoa is the best option, and it has great potential and genetic variation to grow under severe water stress conditions. Therefore the hydroponic and pot studies were conducted to evaluate the drought-tolerant quinoa germplasm in hydroponic and pot. Twenty quinoa genotypes were grown under water stress conditions in a wirehouse, and physiological characteristics were recorded. The experimental was CRD (complete randomized design) with factorial arrangements. İn a hydroponic study, under different water stress levels (PEG 6000 dose (w/v): 0% (control), 0.3%, and 0.6%)) seedling growth traits (fresh plant weight, plant dry weight, root length, shoot length, relative growth rate of root length and shoot length) and physiological characteristics (K+ accumulation in leaf, proline, phenolic content in leaf, membrane stability index, carotenoid, chlorophyll content a and b) were recorded. Yield-related attributes were measured in the pot study under three moisture levels as determined by water holding capacity (WHC) of soil: control (100 irrigated), 50% drought stress (50% WHC), and 75% water stress (25% WHC). Among the genotypes, 1 followed by 16, 5, 10, 7, 4, and 6 produce maximum grain yield, which was strongly linked to improved physiology characteristics, i.e., K+ accumulation in leaf, proline, phenolic content in leaf, and carotenoid in hydroponic culture. While genotypes 3, 8, 13, and 20 were poor responses to seedling growth and grain yield under drought stress conditions in both studies.

Keywords: Quinoa, Drought tolerant, proline, K+ accumulation, grain yield, GGE biplot

EVALUATION OF INTROGRESSED LINES OF SUNFLOWER (*Helianthus annuus* L.) UNDER CONTRASTING WATER TREATMENTS

Saeed Rauf

Department of Plant Breeding & Genetics College of Agriculture, University of Sargodha, Pakistan

saeedbreeder@hotmail.com

ABSTRACT

Drought stress is a major production constraint in crops globally. Crop wild relatives are important source of resistance and tolerance for both biotic and abiotic stresses, respectively. A breeding program was initiated to introgress drought tolerance in sunflower through hybridization between the wild species *Helianthus argophyllus* and the cultigen pool of *H. annuus*. Selection was carried out in the F2 to F5 segregating populations for high cuticular waxes, smaller leaf area, single heading and high oil content. The selected F5 breeding lines were compared with non-adapted elite sunflower germplasm in a replicated randomized complete block research project using different water treatments comparing fully irrigated (T0), with 75 (T1), 50 (T2) and 25% (T3) irrigation treatments. The comparison between the two types of germplasm showed that drought tolerant breeding lines had comparatively lesser decreases in leaf area, shoot weight and root shoot ratio under the various drought treatments. Leaf area of the drought selected F5 lines were smaller than that of the elite germplasm under controlled irrigated treatments, but they maintained their leaf area under the drought treatments. Several drought resistant promising lines D-2, D-5, and D-27 were identified and showed high leaf area, great root length and increase root to shoot ratio under the highest stressed treatments (T3). Some of the lines could be directly used for the development of drought tolerant hybrids. Combining ability test indicated D-27 (F7) as good general combiner for seed yield plant-1 and oil contents when mated with male line RSİN.82. These hybrids could help to minimize seed yield losses due to water stress and to achieve profitable cultivation of sunflower in arid regions of Pakistan.

Keywords: drought stress, introgression, leaf area, root to shoot ratio, wild species, yield loss

GENETIC STUDIES OF YIELD, IONIC, FIBER AND BIOCHEMICAL ATTRİBUTES IN COTTON UNDER VARIOUS SALINITY LEVELS

Muhammad Tanees Chaudhary [1], Iqrar Ahmad Rana [2], Sajid Majeed [3] & Muhammad Tehseen Azhar [4,]*

[1] Plant Breeding and Genetics University of Agriculture, Faisalabad, Pakistan
[2] Center of Agricultural Biochemistry and Biotechnology/centre of Advanced Studies In Agriculture and Food Security University of Agriculture Faisalabad, Pakistan
[3] Plant Breeding and Genetics University of Agriculture Faisalabad, Pakistan
[4] Department of Plant Breeding and Genetics University of Agriculture Faisalabad, PAKİSTAN

tehseenazhar@gmail.com

ABSTRACT

Genetic studies of yield, ionic, fiber and biochemical attributes in cotton under various salinity levels Muhammad Tanees Chaudharya, İqrar Ahmad Ranab, Sajid Majeeda, Muhammad Tehseen Azhara* aDepartment of Plant Breeding and Genetics, University of Agriculture Faisalabad, Faisalabad-38040, Pakistan bCenter of Agricultural Biochemistry and Biotechnology/Centre of Advanced Studies in Agriculture and Food Security, University of Agriculture Faisalabad-38040, Pakistan *For correspondence: tehseenazhar@gmail.com ABSTRACT Salinity is an abiotic stress that can significantly reduce the crop productivity. The primary purpose of the research was to explore the breeding potential of cotton for salinity tolerance. For this purpose, crossing was made during 1st year between six salt tolerant and three salt sensitive genotypes and were grown in 2nd year under control, 10 dSm-1 and 15 dSm-1. The line × tester mating design was used to find out the genetic components for yield (plant height, number of bolls, boll weight and seed cotton yield), fiber traits (fiber fineness, fiber strength, fiber length and ginning turn out), ionic traits (Na+, K+ and K+/Na+) and biochemical traits (proline, H2O2, POD and CAT). Analysis of variance indicated significant differences among parent and hybrids. The salt stress caused the reduction in all traits except Na+, ginning turn out, H2O2 and proline. Among parents, CİM-595 was the best general combiner for plant height, number of bolls and seed cotton yield under control, 10 dSm-1 and 15 dSm-1. FH-113 was best general combiner for fiber fineness, fiber length, fiber strength, ginning turn out and catalase under control and salt stress conditions. FH-942 had highest GCA effects for K+ concentration, proline and CAT under control and salt stress. FH-942 showed strong antioxidant activity due to its scavenging effect to protect cellular organelles from reactive oxygen species. Antioxidants inhibit or quench free radical reactions mainly based on their reducing capacity or hydrogen atom-donating capacity, their solubility, and chelating properties. FH-942 × FH-326 had positive and significant specific combining ability effects for number of bolls, boll weight, seed cotton yield, fiber fineness, fiber strength and fiber length. The selected hybrid can be utilized in the future breeding programs against salt stress. Keywords: Abiotic stress, salinity, biochemical assays, upland cotton

Keywords: Abiotic stress, salinity, biochemical assays, upland cotton

DIURNAL VARIATIONS OF ESSENTIAL OIL CONTENT AND COMPOSITION OF *Satureja cilicica* P.H. DAVIS UNDER CULTURE CONDITIONS

Hasan Maral

Department of Medical and Aromatic Plants Karamanoğlu Mehmetbey University, Karaman, TURKEY

hasmaral@gmail.com

ABSTRACT

Satureja (Lamiaceae) species are aromatic plants used to produce essential oil and aromatic water in the Mediterranean region of Turkey, and *Satureja cilicica* P.H. Davis is an endemic species for Turkey. This study was conducted to determine the effects of diurnal variability on essential oil (EO) content and components of *Satureja cilicica* in the Ermenek district/Turkey in 2021. During the day, four different harvest times were considered as follows: 7:30 and 10:30 a.m., 01:30 p.m. and 4:30 p.m. at the flowering stage. The aerial parts of harvested plants were dried in the shade. The greatest and least EO contents of *S. cilicica* aerial parts were obtained at 6:00 p.m. (0.61%) and 1:30 p.m. (0.32%), respectively. The results of the analysis revealed that the major components of essential oils of *S. cilicica* are p-cymene (19.24-40.04), carvacrol (16.42-29.59%), thymol (10.04-19.34), γ-terpinene (4.92-12.94 %) and linalool (4-42-6.53%).

Keywords: Endemic, Essential oil, GC/MS, Lamiaceae, Satureja cilicica

ANTIOXIDANT ACTIVITY AND COMPOSITION OF THE ESSENTIAL OILS OF TWO ENDEMIC *Sideritis* SP. FROM TURKEY

Hasan Maral [1,], Musa Türkmen [2], Ayşegül Türk Baydir [3] & Ömer Çeçen [1]*

[1] Department of Medical and Aromatic Plants Karamanoğlu Mehmetbey University, Karaman, TURKEY
[2] Department of Field Crops Mustafa Kemal University, Hatay, TURKEY
[3] Department of Food Technology Afyon Kocatepe University, Afyon, TURKEY

hasmaral@gmail.com

ABSTRACT

The genus *Sideritis* includes approximately 150 species distributed mainly in the Mediterranean region and represented in the Flora of Turkey by 46 species and altogether 55 taxa, 42 of them being endemic. The plants of Sideritis genus contain various types of plant secondary metabolites including predominantly terpenes, flavonoids, iridoids, coumarins, lignans and sterols which are supposed to be responsible for the various biological activities such as antioxidant, anti-inflammatory, antimicrobial, antiulcer, antispasmodic, anticonvulsant and anti-osteoporotic. Plants belonging to Sideritis species have been used since ancient times in folk medicine due to their anti-inflammatory, antirheu matic and antimicrobial properties. This study was carried out to determine the antioxidant activities, essential oil content and composition of endemic *Sideritis hololeuca* Boiss. Et Heldr. Apud Bentham and *Sideritis argyrea* P.H. Davis from Turkey. The essential oil of the plant was obtained by hydrodistillation method for 3 hours using Clevenger apparatus and essential oil components were determined by GC-MS. İt was determined that the essential oil content of *S. hololeuca* was 0.64% and *S. argyrea* was 0.38%. The results of the analysis revealed that the main components of essential oils of *Sideritis* species are β-pinene, α-pinene and trans-caryophyllene. The radical scavenging activity values were obtained in *S. hololeuca* (74.27%) and *S. argyrea* (30.49%).

Keywords: Antioxidant, Endemic, Essential oil, GC-MS, Sideritis sp.

BENCHMARKING DEEP LEARNING AND TRADITIONAL MACHINE LEARNING APPROACHES TO THE EVALUATION OF *Fusarium* INFECTION OF WHEAT KERNELS

Ewa Ropelewska [1,], Kadir Sabanci [2] & Muhammet Fatih Aslan [2]*

[1] Fruit and Vegetable Storage and Processing Department The National Institute of Horticultural Research, India

[2] Department of Electrical and Electronics Engineering Karamanoglu Mehmetbey University, Karaman, TURKEY

ewa.ropelewska@inhort.pl

ABSTRACT

The research was carried out to compare the effectiveness of models built using deep learning and traditional machine learning algorithms to distinguish between *Fusarium*-infected and healthy wheat kernels. The wheat grain was obtained from a farm located in north-eastern Poland. Four hundred and forty naturally infected kernels and four hundred and forty healthy kernels were selected for the analysis. The infected kernels were chosen manually by a specialist based on visible symptoms such as wrinkling and chalky white color with pink discoloration. Both *Fusarium*-infected and healthy kernels were imaged using a flatbed scanner with LED (Light Emitting Diodes) illumination as a light source. The images were acquired at the 800 dpi resolution and saved in the TİFF (Tagged İmage File Format). Then Bitmap İmage files were obtained and converted to the color channels *R*, *G*, *B*, *L*, *a*, *b*, *X*, *Y*, *Z*, *U*, *V*, and *S* to compute 2172 texture parameters for each wheat kernel. The selection of textures with the highest discriminative power was carried out using the Best First with CFS (Correlation-based Feature Selection). Twenty-five attributes were selected. İn the case of distinguishing infected and healthy wheat kernels with the use of deep learning, a BiLSTM model was applied. The traditional machine learning approach involved different algorithms from the groups of Trees, Bayes, Rules, Functions, Lazy, and Meta. The BiLSTM model distinguished *Fusarium*-infected and healthy wheat kernels with an accuracy of 98.11%. The Recall, Precision, F-Measure and MCC (Matthews Correlation Coefficient) values obtained with the BiLSTM model were 0.993, 0.971, 0.982 and 0.962, respectively. İn the case of traditional machine learning algorithms, the highest average accuracy equal to 98.07% was determined for the RBF (Radial Basis Function) Classifier from the group of Functions. The *Fusarium*-infected wheat kernels were correctly discriminated in 98.64%. Whereas the correctness of discrimination of healthy kernels was equal to 97.50%. Time taken to build the model was 0.15 seconds. The satisfactory values of other performance metrics including Kappa statistic of 0.961, mean absolute error of 0.070, root mean squared error of 0.141, and weighted averages of TP (True Positive) Rate: 0.981, FP (False Positive) Rate: 0.019, Precision: 0.981, Recall: 0.981, F-Measure: 0.981, MCC: 0.961, ROC (Receiver Operating Characteristic) Area: 0.994, and PRC (Precision-Recall) Area: 0.994 were determined. Among other traditional machine learning algorithms from different groups, the highest average accuracies of discrimination of infected and healthy wheat kernels were revealed for J48 (97.16%, group of Trees), Bayes Net (97.16%, Bayes), PART (96.82%, Rules), İBk (95.57%, Lazy), and Random Committee (97.27%, Meta). The obtained results confirmed the possibility of distinguishing *Fusarium*-infected wheat kernels from healthy kernels in an objective, fast and non-destructive way using image analysis and machine learning. However, the deep learning-based BiLSTM model distinguished *Fusarium*-infected and healthy wheat

kernels with higher accuracy than traditional machine learning algorithms. The developed procedures can be used in practice for grain screening and detecting infected kernels that are undesirable for further processing.

Keywords: naturally infected wheat kernels; healthy wheat kernels; discrimination; BiLSTM model; traditional machine learning algorithms

EFFECT OF COPPER NANO PARTICLES ON GROWTH AND YIELD OF MAIZE

Abdul Qayyum [1,], Ehtisham Khan Tanoli [1] & Yamin Bibi [2]*

[1] Agronomy The University of Haripur, Pakistan
[2] Department of Botany Pir Mehr Ali Shah, Arid Agriculture University Rawalpindi, Pakistan

aqayyum@uoh.edu.pk

ABSTRACT

Copper (Cu) is known as an essential component, which functions in regulating plant growth and development. Compared to other metals, Cu is comparatively cheaper and universally available. The small size of copper nanoparticles (Cu NPs) facilitates their easy absorption by the plants. Therefore, the use of copper nanoparticles in various agricultural applications is cost effective. İn order to examine the effect of copper nanoparticles on growth, yield and physiology of Maize a field experimented was carried out during Kharif season 2020 at Agriculture Research Farm, The University of Haripur. Randomized complete block design with three replications was used. Maize variety İslamabad Gold was assessed against different applications of Cu NPs (0, 10, 20, 30, 40 and 50 ppm) for days to tasseling and silking, plant height, cob length, kernels rows ear-1, kernels ear-1, crop growth rate and net assimilation rate and 100 grain weight. Crop was harvested in September 2020 and data was recorded for various attributes. Data analyses revealed that application of different concentrations of Cu NPs significantly affect growth and yield of Maize crop. Except days to tasseling and silking all the tested parameters were significantly affected by the application of Cu NPs. The application of nanoparticles at 20 and 30 ppm resulted in enhanced growth and yield of maize while the 50 ppm concentration exhibited the detrimental effects on maize growth and yield. Thus, it was concluded that Cu NPs at 20 and 30 ppm can be employed to maize crop to improve growth and yield maize.

Keywords: Copper nanoparticles; maize; growth; yield.

PHENOTYPIC DIVERSITY IN INDIGENOUS LANDRACES OF *Brassica napus* USING MULTIVARIATE ANALYSES

Abdul Qayyum [1,] & Naushad Ali [2]*

[1] Agronomy The University of Haripur, Pakistan
[2] Department of Plant Breeding & Genetics The University of Haripur, Pakistan

aqayyum@uoh.edu.pk

ABSTRACT

For estimation of variability in *Brassica rapa*, a total of sixty locally collected genotypes including two check cultivars (BSA and Toria A) were collected from brassica diverse locations of Khyber Pakhtunkhwa, Pakistan. These sixty genotypes along with two check cultivars were evaluated for various traits of interests under the field conditions of Haripur, Khyber Pakhtunkhwa. The evaluated genotypes showed significant variations for the studied traits. Recorded data were analyzed for genetic relation of various traits using statistical package Statistica version 7. Cluster analysis divided the total genotypes into five main groups. The first five PCs with eigen values > 1 contributed 40.0%, 50.7%, 59.2%, 66.4% and 73.0% of the variability during the studied period. Based on the morphological characterization, genotypes with the desirable traits can be used in future breeding programs. Genotypes used in the present research showed significant variations for various traits of interests. Utilizing these genotypes in the breeding programs can broaden the genetic background of available germplasm and some can also be directly used as variety through introduction.

Keywords: Gene pool; future breeding programs; indigenous brassica

IMPACT OF DIFFERENT NITROGEN RATES ON THE YIELD AND QUALITATIVE FEATURES OF TOBACCO TYPE BASMAK AND DZEBEL

Valentina Pelivanoska [1,], Biljana Jordanoska Siskoska [2] & Marija Srbinoska [3]*

[1] Agrotechnics of Tobacco Scientific Tobacco Institute, Macedonia
[2] Department of Agrotechnics of Tobacco Scientific Tobacco Institute Prilep, Macedonia
[3] Department of Chemistry of Tobacco, Tobacco Smoke, Residues From Pesticides and Biochemistry Scientific Tobacco Institute Prilep, Macedonia

valentina.pelivanoska@uklo.edu.mk

ABSTRACT

During the period of three year researches (2014-2016) field examination were carried, using standard methodology, with three varieties of the type Basmak: Basmak MK-1, Basmak MB - 1, Basmak MS-1/8, and a variety of the type Dzebel. All varieties were sorted in three variants: un fertilized, fertilized with two nitrogen rates (20 and 30 kg N/ha), and constant amount of phosphorus (40 kg/ha), and potassium (60 kg/ha). According to the results, the best effect on the yield had fertilized varieties, with the 30 kgN/ha, in all variant. The yield was increase of 20,06%, 21,64% and 27,11%, as opposite to the unfertilized variant. The results were statistically processed by analysis of variance and LSD test. İn all fertilized variant was observed statistical significance, compared with check variant. The average purchase price of tobacco was increased by only 2.77%, in the variety Basmak MS-1/8, fertilized with 20 kgN/ha. İn all other variants was observed slight decrease on purchase price, with increasing nitrogen rates. The economic effect expressed by gross income, of all fertilized varieties showed good results. The best gross income was obtained from the variety Basmak MS-1/8 (26,83%) fertilized with 30 kg N/ha, compared with the unfertilized variant. From chemical composition, the contain of nicotine, total nitrogen, content of soluble sugar and mineral matter was tested. İn all varieties was observed increasing content of nitrogen, total nitrogen and mineral matter, and decreased content of the soluble sugar, with increasing nitrogen rates.

Keywords: tobacco, basmak type, yield, chemical composition

EPIGENETIC CHANGES AS AN INDUCER OF DROUGHT TOLERANCE IN PLANTS, REVIEW

Eric Kuopuobe Naawe

Department of Agricultural Genetic Engineering Nigde Omer Halisdemir University, Niğde, TURKEY

eric.naawe@gmail.com

ABSTRACT

Plants develop several mechanisms in response to abiotic stress. Epigenetics change is one such mechanism that refers to a heritable change in chromatin structure that alters gene expression without changing the genetic sequence of the plant. İt can be transferred from generation to generation in the form of epialleles. These changes include small RNAs through the RNAi mechanism, DNA methylation, histones modification. İn the DNA methylation a methyl group is added by the action of cytosine methyltransferases in the DNA sequence. Histones modification involves post-translational modifications involving methylation or acetylation that affect transcription, replication, chromosome condensation/segregation, and DNA repair. RNAi is a sequence specific gene regulation mechanism that acts as a barrier against viruses and regulates gene expression that is mediated by siRNA, miRNA and lncRNA (long noncoding RNA) that are synthesized as 20–30 nucleotide, single stranded molecules from double stranded RNA precursors. The mechanism of epigenetics has an important role in plant response to abiotic stress with no alteration in genomic sequences. These epigenetic changes play an important role in plants' abiotic stress tolerance leading to plants acclimatization, adaptation and evolutionary processes and crop improvement. İn this regard, it is important to assess the epigenetic changes in plants as an inducer of tolerances against abiotic stresses. This chapter elaborates the epigenetic mechanisms that are the inducing sources of drought tolerance in plants, and its application in food security and implications in plant breeding**.**

Keywords: Epigenetic changes, Abiotic stress, Drought, Histone modification, DNA methylation

GENOTYPE BY ENVIRONMENT INTERACTION INFLUENCE ON FUNCTIONAL MOLECULES (A-TOCOPHEROLS AND STEROLS) ACCUMULATION IN SUNFLOWER OIL

Javeria Abid [1,*] *& Saeed Rauf* [2]

[1] *Plant Breeding and Genetics College of Agriculture, University of Sargodha, Pakistan*
[2] *Department of Plant Breeding & Genetics College of Agriculture, University of Sargodha, Pakistan*

javeriaabid236@gmail.com

ABSTRACT

Tocopherols and sterols are non-dietary functional molecules in sunflower oil, which act as antioxidants, reduce cholesterol and improve immunity against diseases. The present study was designed to determine α-tocopherol and sterols contents in 13 high and 2 low oleic acid sunflower hybrids across 2 seasons (spring and autumn) and 4 locations under subtropical conditions of Pakistan. The results showed that α-tocopherol and sterols contents varied across the seasons and locations. High oleic acid hybrids yielded 38% higher α-tocopherol content than low oleic acid hybrids. Hybrids such as H4 and H5 are considered stable due to comparatively close values of α-tocopherol and sterols contents across all 4 locations when compared with standard checks and other hybrids during spring season. Hybrids H8, H4 and H5 also manifested higher magnitude of heterosis for α-tocopherol and sterols contents that may be due to overdominance gene action. Breeding lines such as B.116.P, B.112.P and RH.365 were positive combiners for the studied traits and thus may carry positive alleles for both α-tocopherol and sterols traits.Tocopherols and sterols are non-dietary functional molecules in sunflower oil, which act as antioxidants, reduce cholesterol and improve immunity against diseases. The present study was designed to determine α-tocopherol and sterols contents in 13 high and 2 low oleic acid sunflower hybrids across 2 seasons (spring and autumn) and 4 locations under subtropical conditions of Pakistan. The results showed that α-tocopherol and sterols contents varied across the seasons and locations. High oleic acid hybrids yielded 38% higher α-tocopherol content than low oleic acid hybrids. Hybrids such as H4 and H5 are considered stable due to comparatively close values of α-tocopherol and sterols contents across all 4 locations when compared with standard checks and other hybrids during spring season. Hybrids H8, H4 and H5 also manifested higher magnitude of heterosis for α-tocopherol and sterols contents that may be due to overdominance gene action. Breeding lines such as B.116.P, B.112.P and RH.365 were positive combiners for the studied traits and thus may carry positive alleles for both α-tocopherol and sterols traits.

Keywords: Hybrid vigor, overdominance, functional molecules, oil contents

CLETHODIM HERBICIDE APPLICATION TIMING AND RATE EFFECT ON WEEDY RICE

Rasim Unan [1,] & Kassim Al-Khatib [1]*

[1] Plant Science Department University of California, Davis, Ca, Usa

runan@ucdavis.edu

ABSTRACT

The study was conducted at greenhouse in 2022 to evaluate weedy rice (*Oryza sativa* f. *spontanea* Roshev.) response to application timing and rate of clethodim herbicide. Clethodim was applied at 0, 37.5, 75, 150, and 300 g ai ha-1 when 0, 21, 42 and 63 days after sowing (DAS) corresponding to germination stage (BBCH00), 3-leaf stage (BBCH13), early tillering stage (BBCH20), and stem elongation stage (BBCH30). There was a significant interaction for weedy rice between application time and clethodim rate. The clethodim rate needed to cause 90% weedy rice dry weight reduction (ED90) was 42, 75, 85, and 191 g ha-1 at 0, 21, 42 and 63 days after seeding (DAS), respectively. Weedy rice treated at 0, 21, 42 DAS were more susceptible to clethodim compared to 63 DAS. Although clethodim is not a soil-applied herbicide, it gave successful results during the germination period on weedy rice. This study showed the 3-leaf stage and the early tillering stage are suitable timing for clethodim application.

Keywords: Weedy rice, clethodim, dose response, timing

IMPORTANCE OF COMMERCIAL SILAGE INOCULANTS

İbrahim Ertekin [1,] & İbrahim Atiş [1]*

[1] Department of Field Crops Mustafa Kemal University, Hatay, TURKEY

ibrahim.ertkn@hotmail.com

ABSTRACT

Fermentation of green fodder is a traditional forage storage method that gains importance over hay production and feeding green roughage directly to animals. This fermentation technology is simple and based on the compression and storage of green fodder in an airtight environment. İn this airtight environment, lactic acid bacteria convert the free sugars into lactic acid. The addition of some lactic acid bacteria to the surface of the silage material at the beginning of fermentation affects the fermentation process at a high level. Most biological additives used for silage contain the highest possible amount of homo-fermentative lactic acid bacteria for silage fermentation. On the other hand, there is a tendency towards hetero-fermentative lactic acid bacteria as well as homo-fermentative lactic acid bacteria that promote silage fermentation. *Lactobacillus buchneri* is the most preferred bacterium among hetero-fermentative lactic acid bacteria. İn addition, among the homo-fermentative lactic acid bacteria, *Lactobacillus plantarum* is the most preferred bacteria. İn this review, various information about *L. buchneri* and *L. plantarum* bacteria is presented.

Keywords: Silage, Fermentation, Lactic acid bacteria, inoculant

EFFECTS OF DIFFERENT NITROGEN DOSES ON FORAGE YIELD AND QUALITY OF SOME ANNUAL RYEGRASS CULTIVARS

Muhammed Sait Akbaş [1], Saban Yilmaz [2] & İbrahim Ertekin [2,]*

[1] Department of Field Crops Çay İşletmeleri Genel Müdürlüğü, Rize, TURKEY
[2] Department of Field Crops Mustafa Kemal University, Hatay, TURKEY

ibrahim.ertkn@hotmail.com

ABSTRACT

This study was carried out as a field trial in the vegetation period of 2017-2018, at the Mustafa Kemal University Telkaliş Research and Application Center (Reyhanli/Hatay) under the ecological conditions of Hatay-Turkey. The field trial was laid out according to randomized split block experimental design with 3 replications. Accordingly, there were 5 different nitrogen doses [0 (control), 5, 10, 15 and 20 kg/da)] in the main parcel and 3 different İtalian ryegrass varieties (Hellene, Trinova and Devis) in the sub-parcel. İn order to determine the effect of different N doses on yield and quality of perennial ryegrass cultivars; plant height, stem diameter, fresh forage yield, dry forage yield, crude protein yield, rate of crude protein, crude ash content, neutral detergent fiber (NDF) and acid detergent fiber (ADF) contents and relative feed value (RFV) were examined. Nitrogen fertilizer caused a significant increase in the plant height of all İtalian ryegrass cultivars. İn addition, an increase in fresh and dry forage yields were observed due to the increased nitrogen doses. Crude protein yields and crude protein ratios increased with increasing nitrogen application as well, and the highest values were reached with a dose of 15 kg/da N application. However, the stem diameter of the cultivars was not affected by nitrogen fertilization. İt has been also determined that nitrogen fertilizers have no effect on the crude ash contents, NDF and ADF contents, and RFV values of the İtalian ryegrass cultivars. İt has been concluded from research data that nitrogen fertilizers increase yield and quality of the İtalian ryegrass up to a certain level, but higher nitrogen fertilizer doses (especially N dose at 20 kg/da) decrease the forage yield and quality. Therefore, 5-10 kg/da N dose can be recommended in İtalian ryegrass production under Hatay/Turkey ecological conditions also by considering economic reasons. Besides, cv. Devis of İtalian ryegrass was recommended for the region in terms of plant height, stem diameter, fresh and dry forage yield, crude protein yield and ratio, and NDF and ADF contents. The cv. Trinova can be the second choice for the region. However, the cv. Hellen came into prominence in terms of RFV.

Keywords: Lolium multiflorium, Nitrogen fertilizer, Forage yield, Forage quality, Hatay

EARLY MATURITY TIME RICE VARIETY WAS DEVELOPED FOR THE TEMPERATE CLIMATE CONDITION

Rasim Unan [1,], Serkan Yilmaz [2], Melih Enginsu [2] & Özgür Azapoğlu [2]*

[1] Plant Science Department University of California Davis, USA
[2] Department of Field Crops Black Sea Agricultural Research Institute, TURKEY

rasimunan@hotmail.com

ABSTRACT

Rice (*Oryza sativa* L.) cultivation period is an average of 120-140 days in the temperate climate zone. Varieties which early maturity time, have benefits such as offering early products to the market, warranting yield in delayed sowing time, and avoiding the rains of the harvest period. Early maturity varieties are needed in case of delays in sowing or necessity of re-sowing the field as well. The variety which have early maturity time, was developed by using classical breeding methods. Hybridization and modified bulk method were utilized and yield trials were carried out in the advanced generations. The cultivar was tested according to the randomized blocks design with 5 standard cultivars in 5 locations in 2 years. The variety reaches yield maturity in a short period of 90-110 days, but its grain yield is not high. Genotype (G), Genotype × Environment (GE) bi-plot investigation discipline was utilized to identify the response of genotypes in terms of both flowering and maturity time. İn the GGE bi-plot analysis, the number of days of flowering and maturity time showed that it was earlier than other varieties in all environments. İts grain yield is 6.0-6.5 t ha-1, plant height is 95-100 cm, 1000 grain weight is 23-24 grams, grain length is 7.1-7-3 mm, grain width is 2.5-2,7 mm, whole milled yield is 68-70%, and milled yield is 60-65%. The variety was registered called " İLKEREN " as a reference to its early maturity in 2022 and it was released to the use of farmers.

Keywords: Rice, maturity time, flowering time, early maturity, GGE bi-plot

CLETHODIM HERBICIDE APPLICATION TIMING AND RATE EFFECT ON WEEDY RICE

Rasim Unan [1,] & Kassim Al-Khatib [1]*

[1] Plant Sciences Department University of California, Davis, Ca, Usa

rasimunan@hotmail.com

ABSTRACT

The study was conducted at greenhouse in 2022 to evaluate weedy rice (*Oryza sativa* f. *spontanea* Roshev.) response to application timing and rate of clethodim herbicide. Clethodim was applied at 0, 37.5, 75, 150, and 300 g ai ha-1 when 0, 21, 42 and 63 days after sowing (DAS) corresponding to germination stage (BBCH00), 3-leaf stage (BBCH13), early tillering stage (BBCH20), and stem elongation stage (BBCH30). There was a significant interaction for weedy rice between application time and clethodim rate. The clethodim rate needed to cause 90% weedy rice dry weight reduction (ED90) was 42, 75, 85, and 191 g ha-1 at 0, 21, 42 and 63 days after seeding (DAS), respectively. Weedy rice treated at 0, 21, 42 DAS were more susceptible to clethodim compared to 63 DAS. Although clethodim is not a soil-applied herbicide, it gave successful results during the germination period on weedy rice. This study showed the 3-leaf stage and the early tillering stage are suitable timing for clethodim application.

Keywords: Weedy rice, clethodim, dose response, timing

INFLUENCE OF FERTILIZATION WITH LIQUID ORGANIC FERTILIZER ON THE CHEMICAL COMPOSITION, NUTRITIVE VALUE, YIELD OF CRUDE PROTEIN AND FEED UNITS OF NATURAL AGROPYRON REPENS GRASSLAND

Tsenka Zhelyazkova

Department of Plant Gowing Trakia University, BULGARIA

tsenka.zhelyazkova@trakia-uni.bg

ABSTRACT

The aim of this study was to establish the influence of organic leaf fertilization on the chemical composition, nutritive value, yield of crude protein and feed units of natural *Agropyron repens* grassland in the region of South-Central Bulgaria (305 m altitude). The experiment was carried out with leaf organic fertilizer Naturamin Plus, during the period 2018-2019. The trial was designed by the block method in 4 repetitions and 3 doses of fertilizer were tested: 1500; 2500 and 3500 ml/ha. Results obtained for the yield were statistically processed by ANOVA. Applied leaf organic fertilizer Naturamin Plus promote positive effect on productive parameters of natural Agropyron repens grassland and had no effect on the chemical composition and nutritive value on the harvested biomass. The results demonstrated that yield of dry mass, crude protein and feed units increased significantly by treatment with a dose of 2500 ml/ha - respectively 30.7%, 22.2% and 29.7% more compared to the control.

Keywords: fertilization, natural grassland, productivity, chemical composition, nutritive value

EFFECT OF POST-EMERGENCE APPLIED HERBICIDE CORUM (BENTAZONE + IMAZAMOX) AND ITS MIXTURES WITH LIQUID FOLIAR FERTILIZERS ON THE YIELD STRUCTURE CHARACTERISTICS AND PRODUCTIVITY OF CHICKPEA (*Cicer arietinum* L.)

Tsenka Zhelyazkova

Department of Plant Gowing Trakia University, BULGARIA

tsenka.zhelyazkova@trakia-uni.bg

ABSTRACT

The aim of this study was to determine the effect of herbicide Corum (bentazone + imazamox) applied post-emergence and its mixtures with liquid organic fertilizers Naturamin Plus and Amalgerol Essence on the yield structure characteristics and productivity of chickpea (*Cicer arietinum* L.). The experiment was conducted in the period 2019-2021 in the region of South-Central Bulgaria. The trial was designed by the block method in 4 repetitions and herbicide Corum and its tank-mixtures with liquid organic fertilizers were applied in growth phase (4th leaf) of chickpea. Results obtained for the yield were statistically processed by ANOVA. İt was found that post-emergence applied herbicide Corum (1250 ml/ha) combined with dhe soil-applied herbicide Merlin flex 480 SC (isoxaflutole) - 420 g/ha, provide good control of annual broadleaved weeds in chickpea. Vegetation use of herbicide Corum causes high phytotoxicity on chickpea. Treatment of liquid organic fertilizers Naturamin Plus and Amalgerol Essence with herbicide Corum as tank mixtures increases the selectivity of this herbicide. Technologically the most valuable is the tank mixture of Amalgerol Essence in a dose of 1000 ml/ha with the herbicide Corum.

Keywords: chickpea, herbicides, fertilization, productivity, yield structure characteristics

NEW DROUGHT-TOLERANT SESAME MUTANTS DURING GERMINATION AND FLOWERING STAGES

*Mohamed Kouighat [1,2]. Hafida Hanine [2]. Mohamed El Fechtali [1]. Abdelghani Nabloussi [1]**

[1]University of Sultan Moulay Slimane, Faculty of Science and Technics, Department of Biology, 23020 Beni Mellal, Morocco, FAS

[2] National İnstitute of Agronomic Research, Regional Agricultural Research Center of Meknes, 50000 Meknes, Morocco, FAS

abdelghani.nabloussi@inra.ma

ABSTRACT

İn the context of climate change and water scarcity, it is necessary to develop and use drought-resistant crops. Sesame is an oilseed crop and aromatic plant with high nutritional value. İt is a tropical crop but is also grown in arid and semi-arid environments such as Morocco. Our objective is to evaluate (in two separate experiments) the response of 11 sesame (*Sesamum indicum* L.) mutants M2, along with their wild types, to drought stress at germination and flowering stages. Severe water stress was simulated at the germination stage by applying *in vitro* polyethylene glycol (PEG) at an osmotic potential of -1.2 MPa to sesame seeds. The measured/calculated parameters were germination percentage (GP), mean germination time (MGT), root-to-shoot ratio (RSR), and seedling vigor index (SVİ). At the flowering stage, stress was simulated, in a pot experiment, by suspending and reducing irrigation to 50% of the control from the beginning of flowering until the appearance of the first capsule. Drought tolerance was estimated by analyzing their morphological, physiological, and agronomic responses. The results showed a significant effect of genotype, drought, and interaction on all parameters studied in both the stages. İnterestingly, the mutants 'ML2-5', 'ML2-10', and 'ML2-37' were identified as the most tolerant to severe drought at the germination stage. These mutants also confirmed their drought tolerance at the flowering stage by showing highest productivity and lowest sensitivity index compared to the other genotypes. These mutants could be considered valuable and relevant germplasms for developing drought-tolerant cultivars.

Keywords: Moroccan sesame, mutant, drought stress, flowering stage, germination stage, drought tolerance

THE USE OF THE NITRIFICATION INHIBITOR 3, 4 DIMETHYLPYRAZOLE PHOSPHATE (DMPP) ON PHYSIOLOGIC CHARACTERS IN BEAN (*Phaseolus vulgaris* L.)

Engin Takil [1,] & Nihal Kayan [1]*

[1] Department of Field Crops Eskisehir Osmangazi University, Eskişehir, TURKEY

etakil@ogu.edu.tr

ABSTRACT

The experiments was established during the 2017 and 2018 at the experimental area of the Faculty of Agriculture, Eskisehir Osmangazi University, Eskisehir, Turkey. The experiment was designed as factorial arrangement in the complete randomized block design with four replications. İn this study, rhizobia and non-rhizobia were investigated at different nitrogen fertilizer types and doses (control, 25 kg ha-1 AS, 25 kg ha-1 DMPP, 50 kg ha-1 AS and 50 kg ha-1 DMPP). The effects of year, rhizobia and nitrogen fertilization were significantly for all of the investigated characters. All of the investigated characters were higher in the 2017 than the 2018 except for the canopy temperature. Rhizobia application and 50 kg ha-1 DMPP were positively affected all investigated characters. The most likely reason for the increase of crop yield was that N loss through soil NH3 volatilization was not increased by DMPP application. Benefits for the nitrification inhibitors are increases in yields and reducing the fertilizer use.

Keywords: Bean, DMPP, physiological properties

THE EFFECT OF IODINE PREPARATIONS APPLIED BY DIFFERENT METHODS ON YIELD CHARACTERISTICS OF OATS

Beyzanur Çetinkaya [1,], İlkay Eryaman [2] & İmren Kutlu [3]*

[1] Department of Wildlife Ecology and Management Çankiri Karatekin University, Çankiri, TURKEY
[2] Department of Agricultural Bio-Technology Eskişehir Osmangazi University, Eskişehitr, TURKEY
[3] Department of Field Crops Eskişehir Osmangazi University, Eskişekhir, TURKEY

ikutlu@ogu.edu.tr

ABSTRACT

Although iodine is not an absolute essential nutrient for plants, it is an essential microelement for humans and animals. The most important function of iodine in humans is to control the functioning of the thyroid glands, its deficiency can lead to many negative effects on the organism, especially the decrease in mental functions. Today, it is still unclear whether iodine is an essential micronutrient for plants. However, it is thought to promote plant growth and yield. With this study, it is aimed to investigate whether the yield of oats, whose production and consumption has increased in recent years, can be increased by applying to the seed before planting, to the soil after planting, and to the leaves during the early maturation period of the plants. Two different iodine forms [biologically active iodine (BAİ) and potassium iodine (Kİ)] and three different application methods (seed, soil and leaf) were applied to oats grown in field conditions. İn the study, panicle length (cm), panicle weight (g), number of seeds per panicle (number), grain weight per panicle (g), and grain yield (kg/da) were investigated. According to the research findings, the length of the panicle increased with the application of iodine. Properties that directly affect yield such as panicle weight, number of seeds per panicle and grain weight per panicle increased with the application of BAİ from the soil. The highest yield was obtained from the application of BAİ (366.78 kg/da) from the soil. As a result of the research, it was determined that the application of BAİ from the soil was effective in increasing the yield and improving the yield characteristics of the oat plant. İn addition to basic fertilization in cereal cultivation, iodized fertilization from the soil can contribute to obtaining high-yield products. Since the product containing biologically active iodine will limit the use of chemicals, it can be recommended as an environmentally friendly application.

Keywords: biologically active iodine, potassium iodide, oat, yield component

EFFECTS OF MYCORRHIZA EFFECTIVENESS AND DIFFERENT ADHESIVE AGENTS USED IN BACTERIA INOCULATION PROCESS TO CHICKPEA FOR NODULATION AND SOME SEEDLING GROWTH

Ruziye Karaman [1,], Muharrem Kaya [2] & Cengiz Türkay [2]*

[1] Department of Field Crops Isparta University Applied Science, Isparta, TURKEY
[2] Department of Field Crops Isparta Uygulamali Bilimler University, Isparta, TURKEY

ruziyekaraman@isparta.edu.tr

ABSTRACT

İn this study, the effects of different adhesives agents used in bacteria inoculation and mycorrhiza application on nodulation and some seedling properties of chickpea were investigated. The research was carried out in as pot trial at İsparta University of Applied Sciences, Faculty of Agriculture in 2020. Yaşa-05 chickpea cultivar was used in the study. Seeds were inoculated with *Rhizobium ciceri* using different adhesive agents (sugar, molasses, guar, whey, seaweed, gum arabic). İn the study, 83 g / da Glomus spp. (1x104 w/w) mycorrhiza species were used for each a pot. İn the study, 48 pots of 2.8 lt size and 2 kg soil-peat (1:1) mixture mortar were used in each pot. The experiment was set up in a randomized plot design with 3 replications. İn the experiment, seedling and root length, number of nodules, seedling fresh and dry weight, root fresh and dry root weight properties were investigated. As a result, according to the data obtained from the study, mycorrhiza application with *Rhizobium ciceri* the use of gum arabic and seaweed as bacteria adhesive agents had positive effects on the nodule amount, seedling and root development.

Keywords: Chickpea, Rhizobium ciceri, mycorrhiza, bacterial adhesive agents, nodulation and seedling properties

THE EFFECT OF SOME TREATMENTS ON SEED AND PLANT ON THE AGRICULTURAL PROPERTIES OF FABA BEAN (*Vicia faba* L.) AND THE L-DOPA (L-3, 4-DIHYDROXYPHENYLALANINE) CONTENT

Zehra Gül Oğuz [1,] & Hatice Bozoğlu [1]*

[1] Department of Field Crops Ondokuz Mayis University, Samsun, TURKEY

zehraguloguz@gmail.com

ABSTRACT

İn this study, 2 different doses of acetic acid (AA: 4%, 40%) were applied the seed before sowing; 2 different doses of humic acid (HA1 :2 L da-1 , HA2 :6 L da-1) and nitrogen (N: 5 kg da -1) treatments to the plant in the field were carried out in Strip-Plots Design in Samsun ecological conditions to determine the effects of faba bean agro-morphological, seed quality and L-DOPA content in flowers. According to the findings obtained, it was determined that the seed treatment (ST) had a statistically significant effect on the number of branches, pods, biological yield, seed yield and flower yield, and the 4% AA treatment gave better results compared to the control. HA and N as plant treatments (PT) showed a statistically significant and negative effect on the number of pods, biological yield and seed yield. The statistical effects of the treatments on the L-DOPA transferred to the herbal tea obtained from the flower were not found significant. However, it was determined that the AA treatment to the seed increased the ratio of L-DOPA in flower compared to the control. Therewithal, when the ratio of flowers was increased from 100 mg to 200 mg while preparing tea, there was an increase in the rate of L-DOPA transferred to the tea water.

Keywords: Faba bean, Acetic Acid, Humic Acid, Flower Tea, L-DOPA

CRITICAL PLANT NUTRITIONAL ELEMENT FOR POTATO; POTASSIUM

Ramazan İlhan Aytekin [1,] & Sevgi Çalişkan [1]*

[1] Bitkisel Üretim ve Teknolojileri Bölümü Niğde Ömer Halisdemir Üniversitesi Tarim Bilimleri ve Teknolojileri Fakültesi, Niğde, TURKEY

ramazanilhanaytekin@gmail.com

ABSTRACT

Yield and quality of potato tubers are influenced by many different factors such as soil fertility, weather conditions, plant nutrition and chemical treatments. Among them plant nutrition is one of the most important issues. Potassium (K) is a primary macronutrient for overall plant growth, yield potential, product quality and stress resistance of crops. Potassium is required in large quantities for optimum plant growth and productivity, since it is essential for completion of various physiological and metabolic functions in plants. Potatoes require more potassium than other nutrients for optimum yield and quality. İn addition to the effectiveness of potassium in yield and quality, its role in tolerance to abiotic stress and its biological functions in the plant has become an important issue. Potassium is responsible for many biochemical and physiological processes that play a role in plant growth and development, such as protein synthesis, carbohydrate metabolism, enzyme activation, action-anion balance, osmoregulation, water transport, energy transfer. İn particular, potassium affects the photosynthesis process, the transport of water and nutrients in the plant by affecting the opening and closing of stomata, and potassium has a great importance in maintaining the water balance in the cell and therefore in the plant. İn summary, potassium increases yield and quality in potatoes by positively affecting cell membrane stability, leaf area, root weight and length, dry matter content, plant height, leaf and stem number, water use efficiency, amino acid, starch, chlorophyll and photosynthesis amount. As a result of this information, potassium is an important nutritional element that must be applied to obtain efficient and quality tuber in potatoes

Keywords: Solanum tuberosum, potassium, plant nutrition, quality, yield

EXAMINING THE CHANGE OF PROTEIN CONTENTS AND FIBER COMPONENTS OF HULLESS AND HULLED BARLEY CULTİIARS UNDER VARYING NITROGEN REGIMES

Onur Hocaoğlu

Department of Field Crops Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

onurhocaoglu@gmail.com

ABSTRACT

There has been an increasing interest towards the hulless barley in Turkey due to its quality potential. This research is aimed to evaluate the grain quality and feed potential of 2 hulless (Özen and Yalin) and 6 hulled (Bolayir, Egebeyi, Keser, Larende, Sabribey ve Ünver) barley cultivars in varying nitrogen regimes (0, 9, 18 and 27 kg da-1). Field trials were conducted in 2020-2021 ve 2021-2022 growing seasons in Çanakkale according to split block experiment design with 3 replications. Protein ratio, NDF, ADF, ADL, fiber and organic matter contents were determined with near infrared reflectance spectroscopy. Analysis of variance indicated significant genotype effect for all traits except for ADL. Effect of nitrogen applications on protein ratio were found significant where fiber related traits (NDF, ADF, ADL and fiber content) were not significantly affected by the nitrogen applications. Results indicated that protein ratio and organic matter contents of hulless cultivars were higher and fiber traits were lower when compared to hulled cultivars due to lack of hulls. Keser and Larende cultivars had the highest values in all fiber related traits. Additionally, correlation analysis results showed that fiber related traits were positively related with each other and negatively related with organic matter content. İn conclusion, grain properties of hulless barley cultivars were found to be superior in terms of nutrition and digestibility. Hulless cultivar Yalin were reccomended for Çanakkale ecological conditions.

Keywords: Fiber components, hulless barley, nitrogen fertilizers, protein, Çanakkale

ADAPTIVE AND INTERACTIVE RESPONSE OF POTATO (*Solanum tuberosum*) PLANTS TO BIOTIC STRESS; MORPHO-PHYSIOLOGICAL AND BIOCHEMICAL PERSPECTIVES

Eric Kuopuobe Naawe [1,], Ufuk Demirel [1] & Mehmet Emin Caliskan [1]*

[1] Department of Agricultural Genetic Engineering Nigde Omer Halisdemir University, Niğde, TURKEY

eric.naawe@gmail.com

ABSTRACT

Aside from abiotic stresses, biotic stresses cause a lot of havoc to plant production and productivity. Biotic stress agents such as arachnids, bacteria, fungi insects, nematodes, viruses, and weeds; are living organisms that cause direct nutrient deprivation of their host resulting in the reduction of vigour and death of the host plant. They are a major cause of pre- and postharvest losses in the field of agriculture causing up to a third of yield and nutrient loss. Plants are sessile and lack; the ability to adapt to new diseases, or an adaptive immune system and memorize past infections. Thus, plants have evolutionarily developed a plethora of sophisticated strategies ranging from genetic defense mechanisms, morpho-physiological adaptations, and biochemical mechanisms to combat the effect of biotic stresses. These involve several signal transduction pathways in transcription factors mediation in hormone signaling, secretion of chemicals, and structural and growth cycle modification to confer tolerance or resistance of the plant to the biotic stress factors and give them protection, strength, and rigidity. İn potatoes, several pieces of research have been conducted on the impact of abiotic stress and its response to these stresses on the physiological, morphological, biochemical, and yield and quality traits. However, there is limited knowledge on the morpho-physiological, and biochemical response of potatoes to the impact of biotic stress factors. This review discusses the adaptive and interactive response of potatoes to biotic stresses focusing on the morpho-physiological and biochemical aspects. The application of recent technologies in potato research to improve its tolerance to biotic stresses, and the implications of the morpho-physiological and biochemical responses to potato breeding and future perspectives are also discussed.

Keywords: adaptive strategies, biotic stress, potato breeding, signal transduction, and tolerance

FLAG LEAF OF BREAD WHEAT (*Triticum aestivum* L.) GENOTYPES AND RELATION WITH YIELD COMPONENT UNDER RAINFED CONDITIONS

İrfan Öztürk

Department of Field Crops Trakya Agriculture Research Institute, Edirne, TURKEY

ozturkirfan62@yahoo.com

ABSTRACT

An experiment was carried out to assess flag leaf fresh and dry weight of advanced bread wheat genotypes and their relation with yield and yield components. A total of 25 bread wheat genotypes were tested during the 2017-2018 cycles in four locations in the Trakia region, Turkey. The experiment was conducted in a randomized complete blocks design (RCBD) with four replications. Grain yield (GY), spike number per square meter (SNM), kernel number per spike (KNS), spikelet number per spike (SNS), spike weight (SW), plant height (PH), peduncle length (PL), spike length (SL), flag leaf fresh weight (FLFW), flash leaf dry weight (FLDW) were investigated. The combined ANOVA revealed significant differences among genotypes (G), environments (E) and their interaction (G×E) for grain yield ($p<0.01$). The highest grain yield was performed by G21 (6807 kg ha-1) and G20 (6776 kg ha-1). Both genotypes had also higher yield potential across four environments. Therefore, they were considered stable genotypes. Flag leaf fresh and dry weight in wheat genotypes positively affected spike length, spikelet number per spike, kernel number per spike and spike weight. As the plant density per unit area increased, there was a decrease in flag leaf fresh and dry weight. İncreasing in the spike number per square meter negatively affected and reduced flag leaf fresh and dry weight in wheat genotypes. Results showed that spike weight, flag leaf fresh and dry weight of the wheat genotypes could be used in the selection of wheat breeding study for yield components. The longest spike, the highest number of grains per spike and the number of spikelets were determined in G17, together with the yield above the average. İn addition, G17 had the highest spike weight and flag leaf fresh and dry weight. For this reason, G17 has been determined that can be used in breeding studies due to its agronomic characteristics. The results of the research showed that flag leaf dry and fresh weight could be used for yield components in wheat breeding selection under rainfed conditions.

Keywords: Bread wheat, genotypes, flag leaf, yield component

YIELD AND AGRONOMIC CHARACTERS IN TWO AND SIX-ROWED BARLEY (*Hordeum vulgare* L.) GENOTYPES UNDER RAINFED CONDITIONS

İrfan Öztürk [1,], Remzi Avci [1], Turhan Kahraman [1] & Adnan Tülek [2]*

[1] Department of Field Crops Trakya Agriculture Research Institute, Edirne, TURKEY
[2] Department of Plant Protection Trakya Agriculture Research Institute, Edirne, TURKEY

ozturkirfan62@yahoo.com

ABSTRACT

Barley is one of the main field crops for malt and feeds production. Yield and its component in barley can cause due to various environmental conditions including climate change and soil types. İn the study, it was examined and compared yield and agro-morphological characters in two and six-rowed barley genotypes. The experiment was carried out in Trakia region, in Edirne location, Turkey. This study was conducted with two experiments, with two and six-rowed barley genotypes, each one composed of 36 genotypes in alpha lattice design with three replications in 2017-2018 growing seasons. Grain yield (GY), peduncle length (PL), spike length (SL), kernel number per spike (KNS), spike weight (SW), normalized difference vegetative index (NDVİ) and also, the relationship among those parameters were compared. Spike types in barley have different effects on yield and yield components in various environmental conditions. The results of variance analysis (ANOVA) revealed significant differences ($P<0.01$) among genotypes for all parameters in two-rowed genotypes. According to mean yield and examined traits significant differences ($p<0.01$) were found among genotypes in six-rowed genotypes except peduncle length and normalized difference vegetative index (NDVİ). İn two-rowed genotypes, mean values of grain yield 7837 kg ha-1, peduncle length were 27.96 cm, spike length 7.22 cm, kernel number per spike 23.24, spike weight 1.25 g, NDVİ at Z25 growth phase was 0.57, and Z35 was 0.69. İn six-rowed genotypes, mean values of peduncle length were 27.06 cm, spike length 6.93 cm, kernel number per spike 45.13, spike weight 1.57 g, NDVİ at Z25 growth phase was 0.57, and Z35 was 0.68. Six-rowed barley genotypes had higher grain yield, spike weight and shorter spike length than two-rowed genotypes. The correlation analysis revealed that peduncle length in genotypes positively affected kernel number per spike, spike length and spike weight. The study revealed the existence of genetic differences among accessions as well as differences between two and six-row barley genotypes developed by the barley breeding program.

Keywords: Barley, genotypes, two and six-rowed barley, yield, agronomic traits

DETERMINATION OF AGRICULTURAL YIELD PROPERTIES OF SOME SWEET FENNEL (*FOENİCULUM VULGARE* MILL. VAR. DULCE) POPULATIONS

Seyhan Gündogmuş Çetinkaya [1] & Hülya Doğan [2,]*

[1] Tarim Danişmani Delice Ziraat Odasi, Kirikkale, TURKEY
[2] Plant and Animal Production Bozok University, Yozgat, TURKEY

hulya.dogan@bozok.edu.tr

ABSTRACT

This research was carried out to determine the yield and yield characteristics of some sweet fennel (Foeniculum vulgare Mill. var. dulce) populations obtained from different regions in Yozgat ecological conditions. The experiment was established in Yozgat Bozok University, Faculty of Agriculture, Research and Application Area in the vegetation period of 2019, according to the random blocks trial pattern with 3 replications. İn the study, the emergence of four different sweet fennel populations, branching, flowering, fruit-linking and ripening period, plant height, number of branches per plant, number of umbels per plant, number of umbellet per plant, number of seeds per plant, seed yield per plant, thousand seed weight, biological yield, seed yield, essential oil ratio, essential oil yield were investigated. According to the results of the research, the plant height of fennel is 48.33-59.56 cm, the number of branches in the plant is 5.00-5.96, seed yield is 8.52-13.60 g per plant; one thousand seed weight 3.82-7.435 g biological yield 708.70-1972.00 kg/da seed yield, 67.96-198.43 kg/da essential oil ratio 3- 4.20% essential oil yield 5.35-15.06 L/da was observed. According to the results of the research, it has been concluded that the population of Tokat was found to have outstanding characteristics in terms of seed yield and essential oil yield.

Keywords: Sweet Fennel, Populations, Essential Oil, Seed Yield

DETERMINATION OF SALT STRESS TOLERANCE LEVELS OF SOME LOCAL BEAN (*Phaseolus vulgaris* L.) CULIVARS AT GERMINATION STAGE

Kezban Dinç [1,], Enes Gökhan Yilmaz [1] & İskender Tiryaki [1]*

[1] Department of Agricultural Bio-Technology Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

kezbantrdnc@gmail.com

ABSTRACT

Bean (*Phaseolus vulgaris* L.) is one of the legume plants which is widely cultivated around the world although it is relatively sensitive to salt stress. This study was carried out to determine the tolerance levels of 18 local bean cultivars collected from various locations of Turkey at germination stage. The salt concentration (200 mM NaCİ) which would be the best to reveal tolerance levels of varieties against to salt stress was determined by preliminary experiments. Germination test was conducted with 25 seeds with 4 replications by using completely randomized block design. Seeds were placed on double filter paper in a covered plastic box and were incubated at 25 ± 0.5 °C in darkness. Control seeds of each cultivar were treated with dH2O and were germinated under the same conditions as described before. The seeds showed 3-4 mm radicle extension were counted as germinated and were daily recorded. The germination percentage, germination rate and homogeneity of the seeds were calculated, and the results were analyzed by using the SAS package program. The differences between the means were determined at the 5% significance level using the least significant difference (LSD) method. The results of this study revealed that the local bean cultivars showed significant differences against salt stress in terms of germination parameters examined and that the cultivars which were determined as salt tolerant could be successfully used in such breeding programs.

Keywords: Bean (Phaseolus vulgaris L.), germination, salt stress, NaCİ

CULTIVATION OF DROUGHT RESISTANT MEDICINAL AND AROMATIC PLANTS IN TURKEY

Hülya Doğan

Plant and Animal Production Bozok University, Yozgat, TURKEY

hulya.dogan@bozok.edu.tr

ABSTRACT

İn recent years, global warming, which shows its effect a little more with each passing day, is more noticeable with drought. The fact that plants need the water we need at every moment of our lives as much as we do creates many effects. Drought-resistant plants, deep-rooted and highly branched; İt is the name given to plants that are truly drought-resistant with their very small, robust, and abundantly hairy above-ground organs. Plants in this group have a very high-water absorption power from the soil. İf they lose water; İt is rare because the cuticle layer is thick in the aboveground organs, these organs are covered with a wax layer or hairs, and the stomata are small and sparse. İt is an important issue to identify new herbal products that can be an alternative to field crops, especially for dry agricultural areas, and to determine their new usage areas. Cultivation of medicinal and aromatic plants will contribute to increasing domestic and foreign demand, obtaining high-efficiency and quality standard herbal drugs and plant extracts, and economically in the industrial sector that processes these products. İn this study, information is given about medicinal and aromatic plants that can be considered as an alternative products that can be grown in arid conditions.

Keywords: medicinal plants, drought, stress factors

THE EFFECT OF POLLINATION DISTANCE ON SEED YIELD AND QUALITY TRAITS IN HYBRID CORN SEED PRODUCTION

Özay Yilmaz

Çomü Lisansüstü Eğitim Enstitüsü Tarla Bitkileri Ana Bilim Dali Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

yilmazozay96@hotmail.com

ABSTRACT

Çanakkale has an important place in corn seed production. Seed companies prefer the region primarily. Both the farmer's experience and the suitability of the current climatic conditions make corn seed growing institutional in the region.İn the production of hybrid corn seeds, mother and father lines are used. Generally, the main lines are planted in 6 rows and the father lines are planted in 2 rows. The distance to the father lines in sowing directly affects the seed set. İn the research, 2 different producer fields were used in the areas where 3 commercial varieties were produced, and the studies were carried out with 3 replications in 2020 and 2021. For observations, 10 cob samples were harvested from each trial unit. The data obtained in the research were analyzed with the R-Commander statistical program according to the divided plots experimental design.İn the study, in both experimental years and in the varieties included in the study, the ear weight, the grain yield per ear and the number of grains per ear decreased significantly as the distance from the dam line increased. The highest values were obtained from the main line rows closest to the father lines. Thousand grain weight and hectoliter weight were less affected by pollination distance.

Keywords: corn, seedbed, pollination distance

STUDY OF QUANTITATIVE INDICATORS - NUMBER OF SEEDS PER PLANT, MASS OF SEEDS PER PLANT AND MASS OF 1000 SEEDS, DEPENDING ON WEATHER CONDITIONS, TYPE OF INHERITANCE IN OILSEED SUNFLOWER

Georgi Georgiev

Sunfloweer Breeding Dobroudzha Agricultural Institute, BULGARIA

georgi_d4@abv.bg

ABSTRACT

Sunflower, together with soybean and oilseed rape, amounts to 87% of the oil production worldwide. İt is a main agricultural crop grown on 23 million ha. An important parameter in sunflower breeding is the head diameter. İt is less influenced by genetic factors, and more – by the environmental conditions and the duration of the growth season. The aim of the investigation was to study the variation of the parameter head diameter depending on the environmental changes, the type of inheritance and the heterosis effect in the hybrid combinations. Two-factor dispersion analysis was applied (ANOVA - Analysis of Variation); the inheritance d/a was calculated for F1-generation through the coefficient of Mather and Jinks (1982); the occurrence of heterosis was evaluated according to Omarov (1975). İn the study of eight hybrid combinations, the overdomination of the mass of 1000 seeds was found in hybrid combinations 813A x 100R and 2008A x 100R with a higher value in the mother line. Overmination is the result of gene accumulation in hybrid combinations. When assessing the basis of the ratio (D/A), the four years of the study in four hybrid combinations, a dominant type of inheritance was established with an advantage of the stermination of the mass of 1000 seeds. The indicator seed weight per plant varies very little in six hybrid combinations during the four years of the study, i.e. these combinations are highly adaptable to changing the environmental conditions of this selection-important indicator, which is associated with receiving. The highest values were recorded in the hybrid combinations involving the sterile lines 217A and 2003A. The formation of high yield in sunflower is not only related to the large number of disc florets, but also to their good pollination to obtain maximum effect in seed formation. The number of seeds per planth and the mass per 1000 seeds are complex quantitative indicators that are an important component in the formation of seed yield per unit area. Sunflower breeding is aimed at increasing the total number of seeds per planth, the mass of seeds per plant and the mass per 1000 seeds.

Keywords: sunflower, number of seeds per planth, the mass per 1000 seeds, type of inheritance

MORPHO-BIOLOGICAL PROPERTIES OF SEMI-ORIENTAL TOBACCO VARIETIES

Valentina Pelivanoska [1,] & Karolina Kocoska [2]*

[1] Agrotechnics of Tobacco Scientific Tobacco Institute
[2] Department of Genetics, Selection and Seed Control Scientific Tobacco Institute -Prilep, Macedonia

valentina.pelivanoska@uklo.edu.mk

ABSTRACT

İn recent years, production of semi-oriental tobacco type is almost non-existent. The Department of genetics, selection and seed control at Scientific Tobacco İnstitute-Prilep has been working on maintenance of the existing collection of already created varieties and on creating new varieties. The newly created varieties with their qualitative and quantitative properrties would be used in tobacco production. İn 2019, the quantitative properties of three semi-oriental varieties were examined: O. 9-18/2 check , O. 110 and O. Zlatovrv. These varieties are creations of Scientific Tobacco İnstitute - Prilep. Seedling and field production of the mentioned varieties and lines was performed in the experimental field of STİ-Prilep. The trial was set up using the method of randomized blocks in seven replications at a row spacing from stalk to stalk 50cm×25cm, area of calculated plot (3.25 m2) and total plot area (3.4 m2). The aim of the study was to show the quantitative properties (length of growing period, height of stalk, number of leaves, length and width of true middle and under top leaf) of the two newly recognized semi-oriental varieties of tobacco (O. 110 and O. Zlatovrv) compared to the check variety O. 9-18/2. As a result of intensive breeding of this tobacco type, varieties O. 110 and O. Zlatovrv have their own characteristic morpho-biological properties in comparison to the check variety. These properties are characteristic for the semi-oriental tobacco type.

Keywords: tobacco, semi-oriental, morpho-biological, varieties

DETERMINATION OF YIELD AND SOME QUALITY PROPERTIES OF CHICORY AND SOME FORAGE CROPS MIXTURES AT DIFFERENT HARVEST PERIODS IN THE ESTABLISHMENT YEAR

Mehmet Can [1], Gülcan Kaymak Bayram [1,], İlknur Ayan [2] & Zeki Acar [3]*

[1] Department of Field Crops Ondokuz Mayis University, Samsun, TURKEY
[2] Tarla Bitkileri Bölümü Ondokuz Mayis University Ziraat Fakültesi, Samsun, TURKEY
[3] Faculty of Agriculture Ondokuz Mayis University, Samsun, TURKEY

gulcan.kaymak@omu.edu.tr

ABSTRACT

This study was carried out to determine the yield and some quality characteristics of chicory and some forage crops mixtures at different harvest periods. İt was established in the field of Research and Application Centre of Ondokuz Mayis University Faculty of Agriculture according to the randomized complete blocks design in 2017. Forage mixtures comprised combinations of alfalfa (*Medicago sativa*), white clover (*Trifolium repens* L.), red clover (*Trifolium pratense* L.), birdsfood trefoil (*Lotus corniculatus*), perennial ryegrass (*Lolium perenne* L.) and orchard grass (*Dactylis glomerata* L.) along with chicory as pure stand, binary mixtures (chicory+legume/gramineae) and triple mixtures (chicory+legume+gramineae). Plants were harvested at the grazing maturity and budding period of chicory. During the grazing maturity and budding stage, the highest total green grass and hay yield was determined in the red clover+perennial grass+chicory mixture between 5859.7 - 1148.1 kg/da and 5284.3 – 1318.5 kg/da, respectively. İn the grazing maturity period, the average crude protein, ADF, NDF and NYD contents were determined as 20.1%, 26.6%, 39.2% and 166.5 while, in budding stage, the same values were 17.0%, 31.4%, 41.8%, and 147.0, respectively. According to the results obtained from the study, it can be said that the yield and quality values of triple mixtures were higher than binary mixtures and pure, moreover, the yield and quality values of grazing maturity stage was higher than budding stage. İn this ecological conditions, mixtures of red clover + perennial ryegrass + chicory or red clover + orchard grass + chicory look like more beneficial. But, to make any recommendation the study need to be continued for many years.

Keywords: chicory, harvest stage, mixture, ADF, NDF.

EFFECT OF ALTERNATIVE ROW SPACING AND PLANT DENTSITIES ON FRESH EAR YIELD AND QUALITY OF SECOND CROP SUPER SWEET CORN PRODUCTION

Samet Ata [1,] & İlhan Turgut [2]*

[1] Research and Development of Organic Fertilizer Sütaş Aş, Aksaray, TURKEY
[2] Department of Field Crops Uludağ University, Bursa, TURKEY

sata@sutas.com.tr

ABSTRACT

This study was conducted to increase the yield and quality of super sweet corn cultivation; for Vega Super Sweet Corn Variety two different row spaces (25-45 cm, 70cm) and four different plant densities (15 cm, 20 cm, 25cm, 30 cm) during 2017 and 2018 in Bursa conditions. The research was done according to split plots of randomized bloks with three replications. The factors are row spaces and plant density. Plant height, ear height, ear lenght, ear diameter, ear row number, row grain number, ear grain number, number of ear per plant, fresh ear yield, marketable ear percentage, soluble solid content are investigated. İn the trial ear lenght, ear diameter, ear grain number, number of ear per plant, fresh ear yield and solible solid content are founded important in terms of statistical for row spacing, the other specialities are founded unimportant. For plant density; plant height, ear height, ear diameter, ear row number, ear grain number, number of ear per plant, fresh ear yield, marketable ear percentage, soluble solid content are founded important in terms of statistical and the others are founded unimportant. Ear diameter, ear grain number, number of ear per plant and fresh ear yield are founded important in terms of statistical for row spacing and also plant density. According to research results of super sweet corn production for second crop that the most suitable plant spacing is 20 cm plant density plant for 70 cm row spacing modal, 25 cm plant density plant spacing is for 25- 45 cm row spacing modal are founded in Karacabey conditions.

Keywords: Super sweet corn, alternative sowing pattern, plant density

USE OF NON-INVASIVE METHODS FOR EVALUATION THE EFFECT OF HIGH TEMPERATURE AND ACCLIMATION MECHANISMS ON PHOTOSYNTHETIC PROCESSES OF WHEAT (*Triticum* sp. L.)

Andrej Filaček [1,*] *& Mária Barboričová* [1]

[1] *Department of Plant Physiology Slovak University of Agriculture, Slovenia*

andrejfilacek@gmail.com

ABSTRACT

To deepen our understanding of the complex mechanisms underlying plant response to environmental stimuli, quantitative measurement of plant growth response under different environmental conditions is important. Non-invasive methods play an important role in this. This study aimed to provide physiological evidence for the effects of long-term temperature acclimation on wheat photosynthetic responses to an episode of severe heat stress, specifically targeting genotype and acclimation-related responses observed at the level of PSİİ photochemistry. To test this experimental design, we used three contrasting genotypes of *Triticum sp*. (These, Roter Samtiger Kolbenweizen and ANK32A). Short-term exposure to high temperature led to a significant non-stomatal limitation of photosynthesis. Significant differences between genotypes were eliminated by previous acclimation of plants to elevated temperature. The increase in temperature resistance was associated with a significant increase of parameters derived from fast fluorescence kinetics related to PSİ activity; this finding supports the hypothesis that increased PSİ activity, especially cyclic electron transport, may play a key role in protecting the chloroplast membrane structure from the adverse effects of acute heat stress.

Keywords: wheat, heat stress, acclimation, non-invasive methods

EFFECTS OF ORGANIC FERTILIZERS ON YIELD AND QUALITY OF BLACK CUMIN (*Nigella sativa* L.)

Mehmet Gökçe

Fen Bilimleri Enstitüsü Tarla Bitkileri Eskişehir Osmangazi Üniversitesi, Eskişehir, TURKEY

mhmtgokce@outlook.com.tr

ABSTRACT

İn this research, to determine the effects of different organic fertilizers on yield and quality in plants by 2021 black cumin, as a randomized block design with three replications, was conducted at research station, Faculty of Eskişehir Osmangazi University.İn the research, the Cameli black seed variety, which was cultivated at the EskişehirTransitional Zone Agricultural Research İnstitute, was used as a seed.İn the research, three different materials were used as bat guano, worm fertilizer and organic liquid fertilizer containing amino acids of animal origin, plant height, number of branches, number of capsules, essential oil yield, thousand seed weight, seed yield, number of seeds per pod, grains per plant and number of plants in the plots of the number of properties examined.İn the study, the average plant height in the studied plots was 23.45 - 36.36 cm,the average number of branches is 3.09 - 3.73 pieces/plant, the average number of capsules is 2.91 – 3.91 pieces/plant, the average number of grains in the capsule is 63.27 – 82.73 pieces/capsule,the average weight of a thousand grains is 2.73 – 3.03 g,the average yield per decare is 52.4 - 92.2 kg/da and the essential oil ratio was found to be between 0.08 – 0.20 kg/da.

Keywords: Black cumin (Nigella Sativa L.), Organic fertilizer, Amino acid, Bat fertilizer, Worm fertilizer

BREEDING PROGRESS IN MIXOGRAPHIC CHARACTERISTICS OF WINTER BREAD WHEAT VARIETIES IN TURKEY

Mehmet Tekin

Department of Field Crops Akdeniz University, Antalya, TURKEY

mehmettekin20@gmail.com

ABSTRACT

Studies on breeding progress in a historical set of wheat varieties mainly refer yield and related agronomical traits whereas less attention is paid to the progress in wheat quality. The bread-making quality associated with milling and baking characteristics is extremely important for marketing of wheat products. İt is known that to determine bread-making quality, several prediction methods like the mixograph, based on dough rheological properties, have been used. İn this study, it was aimed to predict the breeding progress in mixographic characteristics of winter bread wheat varieties in Turkey. For this purpose, field trials were conducted with 18 different old and modern bread varieties, released from 1931 to 2014, in randomized complete block design with three replications during the consecutive years (2019 and 2020). Mixographic characteristics such as midline peak time (MPT), midline peak value (MPV), midline peak value (MPV), midline peak width (MPW) and midline peak integral (MPİ) were investigated. İn two-year average, MPT ranged from 2.60 to 5.67 min, MPV from 51.14 to 84.48%, MPW from 13.20 to 23.06% and MPİ from 124.10 to 315.60 %Tq*min. According to results of variance analysis, both variety and year had significant effects on mixographic characteristics. Additionally, it was determined that all mixographic characteristics were associated with the year of release and increased from old to modern bread varieties. MPV (0.16 %/yr), MPW (0.05 %/yr) and MPİ (1.54 Tq*min/yr) had significant and positive coefficients from old to modern bread wheat varieties. The results show that the mixographic characteristics of bread wheat varieties have increased significantly, especially after the 80s and there is a significant genetic gain for mixographic characteristics.

Keywords: Bread wheat, genetic gain, mixograph, variety, year

A PRELIMINARY RESEARCH ON THE USE OF MONOATOMIC SILVER SOLUTION IN TOMATO

Esra Nermin Ertekin [1,], Kamile Perçin Akgül [2], Asli Arslan Kulcan [3], Özlem Şen [4] & Mehmet Ali Topo [5]*

[1] Bitkisel ve Hayvansal Üretim Bölümü Antalya Akev University, Antalya, TURKEY
[2] İletişim Tasarimi Bölümü Antalya Akev Üniversitesi, Antalya, TURKEY
[3] Gastronomi ve Mutfak Sanatlari Bölümü Antalya Akev Üniversitesi, Antalya, TURKEY
[4] Department of Gastronomy and Culinary Arts Antalya Akev Üniversitesi, Antalya, TURKEY
[5] Tekstil Argen Teknik Tekstil Sanayi ve Ticaret Limited Şirketi, Antalya, TURKEY

nermin.kucukors@hotmail.com

ABSTRACT

This study was carried out as a preliminary study to determine the effect of monoatomic silver solution on some fruit characteristics in tomato. Different doses of silver solution (50, 100 and 200 mL L-1) and control (0) application were used in the current study. The study was carried out in a randomized block design with 3 replications in open field. At the end of the study, fruit diameter (mm), fruit weight (g), dry matter content (%), pH and silver content (mg kg-1) properties of tomato fruits obtained from nanoparticle silver applications and control application were investigated. While only the amount of silver in the fruit was affected by the control and silver solution doses (p=0.0004), other properties were not affected. As a result of this study, it was determined that the application of monoatomic silver water did not make a significant difference in some fruit characteristics of tomato fruits. However, since this study is a preliminary study, it is recommended to conduct a comprehensive study and to deal with yield and quality characteristics in a comprehensive manner.

Keywords: Tomato, Monoatomic silver water, Fruit, pH

A COMPARATIVE ANALYSIS OF TURKEY AND MEDITERRANEAN COUNTRIES OF OLIVE CULTIVATION AND THE OLIVE INDUSTRY

Cengiz Türkay [1,], Cenap Yilmaz [2], Filiz Baysal [3] & Hasan Çelen [4]*

[1] Meyvecilik ve Bağcilik Alata Bahçe Kültürleri Araştirma Enstitüsü, Mersin, TURKEY
[2] Horticultural Department Eskisehir Osmangazi University, Eskişehir, TURKEY
[3] Breeding and Genetic Alata Horticultural Research Institute, Mersin, TURKEY
[4] Department of Agricultural Economy Alata Horticultural Research Institute, Mersin, TURKEY

cengizturkay33@hotmail.com

ABSTRACT

The olive plant (Olea europaea L.) is in the Oleaceae botanical family. İt is a type of plant that grows in tropical and warm regions of the world. İt is accepted that olive cultivation started with the first people and it is said that "Olive is the first of all trees". Olive is a plant that can be cultivated in countries with Mediterranean climate characteristics. 97% of the world olive production is made in Mediterranean countries. 98% of the world olive oil production and 88% of its consumption takes place in Mediterranean countries. The countries with the highest production in the world are Spain, İtaly, Tunisia and Turkey, respectively. With the understanding of the nutritional value of olives and olive oil at the consumer level in recent years in Turkey, there has been a rapid increase in the amount of consumption in the domestic market. However, this increase is not at the desired level when compared to the important olive producing countries in the world. Olive cultivation is carried out in 41 different provinces in Turkey. We have 188 million trees in these provinces. There have been positive developments in the olive oil sector in Turkey, especially in the last ten years. However, it was evaluated that even in this state, it could not reach the same level with the leading countries in production, and as a result, this situation negatively affected the quality and export of olive and olive oil.

Keywords: olive, turkey

ASSESSMENT OF SALT AND WATER STRESS TOLERANCE OF TUNISIAN SQUASH (*Cucurbita maxima* DUCHESNE) GERMPLASM

Tarchoun Neji [1,], Saadaoui Wassim [2] & Hamdi Khawla [3]*

[1] Horticulture Sciences High Agronomic İnstitute of Chott Mariem- Sousse University, TUNUSİA
[2] Horticulture Sciences High Agronomic Institute of Chott Mariem, TUNUSİA
[3] Horticultue Sciences High Agronomic Institute of Chott Mariem Sousse -Tunisia

nejitarchoun@yahoo.fr

ABSTRACT

Salt and water stress are considered as the most common abiotic stresses reducing the productivity and fruit quality of crop plants. The present study was carried out to assess the salt and water tolerance of local squash (*Cucurbita maxima* Duchesne) landraces. Different salt (NaCl) and D-Mannitol concentrations of 0, 100, 200 and 300 mM were selected in order to evaluate the response of the study germplasm to salt and water stress based on 12 agronomic parameters and 3 biochemical traits, proline, malondialdehyde (MDA) and chlorophylls. Chlorophyll fluorescence, phenols and flavonoids contents and DPPH activity on shoots and roots were evaluated under water stress conditions. A varied effect of the salt and water stress level was observed among the studied landraces based on germination potential, as well as on growth, physiological and biochemical parameters at seedling stage. Results showed that all landraces were drastically affected at high stress level with a significant variation in their stress response, indicating the existence of considerable genetic variability. Under salt stress, landraces “746” and “747” were the best performing cultivars across stress levels, whereas “1007”, “1008” and “1009” were the most negatively affected. Based on the tested landrace performance, four landraces were selected to be evaluated under salt and water stress based on biochemical level, focusing on the determination of compounds that play a key role in the ability to withstand salt and water stress. The mean MDA content across landraces was generally increased in stressed plants, as compared to the control treatment; the increase was attributed to a peak in MDA content at specific stress levels. İn particular, “746” and “1007” showed the maximum content at 100 mM NaCl, while in landrace “751”, MDA content reached its peak at 300 mM NaCl. İn addition, the response of most landraces to salt stress involved an increase in free proline content, with the exception of “746”, with the maximum content being observed either at 200 mM (“748” and “751” landraces) or at 300 mM NaCl, where only “747” expressed the highest content. Under water stress the highest values of MDA and proline were recorded in roots much more than in leaves with differential effects of D-Mannitol concentrations, while for the biochemical parameters the differences are not significant between the two parts of the plants. The Fv/Fm ratio, an indicator of stress, varies considerably between accessions and different D-Mannitol concentrations. These findings can be extrapolated into efforts to develop more salt and water tolerant squash landraces and exhaust the possibilities of using saline water or soils under changing climate conditions.

Keywords: salinity and water stress; proline; seed germination; MDA; DPPH; Cucurbita sp.; landrace

STUDY ON DIFFERENT CULTIVATION DATES OF PEPPER AS EARLY FIELD PRODUCTION

Dimka Haytova

Horticulture Agricultural University- Plovdiv, Bulgaria

haitova@abv.bg

ABSTRACT

The optimization of agro-technical factors for managing the productivity of vegetable crops is importance. İt is an indisputable fact that in recent decades global warming and global climate change have taken place. İt is related to the adaptation of the terms for sowing and planting of vegetable crops in accordance with the changed ecological environment. Pepper is a vegetable species with high requirements for environmental conditions and especially for temperature and light conditions during its cultivation. Therefore, research is needed to optimize the timing of sowing and planting directly related to climate change. The main aim of the experimental work in this article is to study the different cultivation date in the production of early pepper in field condition. The experiments were carried out in the period 2019-2021, in the experimental field of the Department of Horticulture at the Agricultural University - Plovdiv. Sivria 600 variety was used. The experimental design was based on the block method Three variants of cultivation dates were tested. The results show that early sowing (February) contributes to the formation of better biometric indicators, justifying better vegetative development of plants and build an active photosynthetic leaf apparatus. İn early sowing the plants develop under conditions closer to their biological requirements and there is a better synchronicity between their vegetative development, flowering and fruiting. Higher yield is obtained from plants with the early date of sowing. The difference with the yield from the second sowing date is 26.93%. The same plants also have a 35% higher yield than the first harvest.

Keywords: pepper, *Capsicum annum* L., early field production, productivity, yield

PHENOLOGICAL AND MORPHOLOGICAL DEVELOPMENT OF DIFFERENT CULTIVARS OF PUMPKINS

Dimka Haytova

Horticulture Agricultural University- Plovdiv, Bulgaria

haitova@abv.bg

ABSTRACT

The cultivation of pumpkins in Bulgaria is carried out through long-used in practice varieties and local forms and populations. The new varieties are perceived more as "hobby" crops and are of interest for growing small areas or even as landscaping plants. The main reason for conducting this study is to establish and promote up-to-date scientific information on new cultivars of pumpkins to improving the cultivar list of this vegetable crop. The main aim of the study is to determinate the phenological and morphological development of various cultivars pumpkins. Twelve cultivars with different ecological and geographical origin of the following species: Cucurbita pepo (3) Cucurbita maxima (7) and Cucurbita moschata (2) were tested. The experimental design was based on the block method. The phenological phases were determined. The duration of the interphase periods was determined. Morphological characteristic of the fruits was made. The results of phenological observations give us reason to summarize that in the tested varieties from plant emergence to harvest, the period is between 154 and 174 days, not taking into account differences that clearly distinguish between varieties. The tested samples are characterized by vigorous and harmonious vegetative growth, as a result of which they form an active assimilation apparatus, which is a prerequisite for high plant productivity. The complex characteristics of the fruits of the varieties participating in the experiment - shape, color, fruit weight between 1,395 kg and 5,125 kg, and attractive appearance determine them as suitable for sale on the market for fresh consumption.

Keywords: C. pepo, C. maxima, C. moschata, morphological characteristic, phenological development

PRODUCTIVITY OF DIFFERENT CAPE GOOSEBERRY (*Physalis peruvina* L.) GENOTYPES INFLUENCED BY METEOROLOGICAL CONDITIONS IN SOUTH BULGARIA

Nikolay Panayotov [1,] & Kalinka Kuzmova [2]*

[1] Horticulture Agricultural University-Plovdiv, BULGARIA
[2] Botanic and Agromrteorology Agricultural University-Plovdiv, BULGARIA

nikpan@au-plovdiv.bg

ABSTRACT

The main goal of the present study was to establish the effect of meteorological conditions of five years period on the productivity of cape gooseberry. The experiments were carried in 2015-2019 years with three genotypes of cape gooseberry in Experimental fields and scientific laboratories of Agriculture University – Plovdiv. The plants were cultivated with a seedling, grown in a plastic greenhouse and planting on an open field. İn the stage of botanical maturity, each ripe fruits were harvest and total yield was established. The main factors of the climate for last five years periods that were recorded are the air temperature and the amount of rainfall. Based on them, the main agro-climatic indicators were established during the most important periods of the development of cape gooseberry and they were compared with the obtained yields by years and genotypes. Crucial periods about the dependence on the climatic conditions on the cape gooseberry productivity are flower buds - flowering and fruit sets – fruiting.

Keywords: Climate, genotypes, phenology, rain fail, temperature, yield.

EFFECT OF DIFFERENT FERTILIZATION IN CARROT SEED PRODUCTION ON THE MATHEMATICAL APPROACH OF SEEDLING MORPHOLOGY

Nikolay Panayotov [1,], Velika Kuneva [2] & Alexander Trayanov [3]*

[1] Horticulture Agricultural University-Plovdiv, BULGARIA
[2] Mathematics and İnformatics Agricultural University-Plovdiv, BULGARIA
[3] Horticulture Agricultural University-Plovdiv, BULGARIA

nikpan@au-plovdiv.bg

ABSTRACT

The main goal of this study was to establish the effect of different fertilization regimes, applied during carrot seed production, on the sowing parameters and seedling morphology behaviors. A mathematical approach was used for their group formation – a cluster, correlation and factor analysis as well as assesses the similarity and remoteness of the influence of the studied regimes and their grouping based on main morphological indices of carrot seedlings. The experiments were carried out in 2017 - 2019 at the Experimental field at the Agricultural University – Plovdiv, Bulgaria. The increasing levels of nitrogen, phosphorus and potassium fertilizers in two periods of application – once and twice in variety Tushon were studied. The seed were obtained separately from central, first, second and tertiary umbels. On these seeds as well as on the mixed sample the germination energy, germination, length of embryo root, length of hypostyle, fresh weight of one seedling and dry weight of seedlings were investigated. Higher influence on the sowing parameter was established for twice application of mineral fertilizers. The best seed quality has been observed about seeds from central umbels, followed by these one from first. The higher doses of nitrogen provoked better development of carrot seedlings. The results of the cluster analysis are corresponded with the conclusions about the effect of fertilizer regimes on the sowing qualities. High correlations between some parameters are established. The strongest positive correlation coefficients were recorded between the weight and length of embryo root and hypocotyls. The greatest effect of fertilization regimes into clusters are gave the germination capacity and fresh weight of the seedlings.

Keywords: carrot, correlation, cluster analysis, factor analysis, seedlings, seed

EFFECT OF THE APPLICATION OF ULTRASOUND ON THE SEED QUALITY OF *Caesalpinia pulchirrima* SW. AND THE DEVELOPMENT OF THE SEEDLINGS

Velentin Panchev [1,] & Valeria İvanova [1]*

[1] Horticulture Agricultural University - Plovdiv, BULGARIA

valentin_panchev@abv.bg

ABSTRACT

The aim of the present study was to determine the effect of pre-sowing application of ultrasound on the sowing qualities of seeds of *Caesalpinia pulchirima* Sw. The seeds were treated with ultrasound for 2, 4 and 6 minutes, and the control was untreated seeds. Seeds were placed in the germination chamber The germination energy and germination were recorded. On the day of the last germination count mean germination time, uniformity of germination were calculated as well as the length of embryo root, length of hypocotyls and fresh weight of the seedlings were measured. The highest germination energy and germination was reported after application of 4 minutes. The morphological features of the seedlings were with the best values when 6 minutes sonification was applied. Linear regression between sonification and germination with a high coefficient of determination R2 = 0.92 was established. There is a strong positive correlation between the fresh weight of seedlings with germination and the length of the embryonic root.

Keywords: Ultrasound, sowing qualities, seeds, germination, embryo root,

INFLUENCE OF THE ULTRASOUND TREATMENT ON THE SOWING PARAMETERS OF *Colutea arborescence* L. SEEDS

Velentin Panchev

Horticulture Agricultural Univ̈ersity - Plovdiv, BULGARIA

valentin_panchev@abv.bg

ABSTRACT

The main goal of the present study was to establish the possibilities for improving the sowing qualities of the seeds of *Colutea arborescence* L. after applying different sonication with ultrasound. The seeds were sonicated pre-sowing for 2, 4, 6 and 8 minutes with ultrasound, the untreated seeds were used as a control. Germination energy, germination, mean germination time, uniformity of germination, length of embryo root, length of hypocotyls and fresh weight of seedlings were determined. The highest germination was found after sonification for 6 minutes. The development of seedlings was with the best values when applied 4 and 6 minutes. A linear regression of period for treatment and germination, with high coefficients of determination R2 = 0.90 was found. A strong positive correlation was observed between the fresh weight of the seedling and the length of the embryonic root.

Keywords: seeds, ultrasound, germination, seedling, sowing quality

THE EFFECT OF VARIOUS CONCENTRATION AND DURATION OF NA(OCL)2 TREATMENT ON STERILIZATION, VIABILITY, GERMINATION AND DEVELOPMENT OF *Eulophia bicallosa* (D. DON) HUNT & SUMMERH SEEDS

Woraphat Khankhokkruad

Department of Biology Suranaree University of Technology, THAILAND

nine277@gmail.com

ABSTRACT

Some species in genus *Eulophia* (include *E. bicallosa*) are believed to have medicinal properties and can bring good fortune (ref), that making them become more popular and maybe threatened in the near future. İn order to prepare for that situation, in-vitro seed germination protocol is needed. Since there is no report about in-vitro seed germination for this species and seed sterilization is the first and crucial step for this protocol. So this investigation aimed at studying the effect of various concentration and duration of Na(OCl)2 treatment on viability – germination and development of *E. bicallosa* ‘s seeds. The result indicate that seeds treated with 0.5% Na(OCl)2 for 1 min or 1% Na(OCl)2 for 1 min gave significant highest seed viability (91.95%, 87.37%) and seed germination (91.70%, 83.52%) respectively. However steage2 seed development could not be found in 0.5% Na(OCl)2 for 1 min treatments, but could be found in 1% Na(OCl)2 for 1 min, 0.5% Na(OCl)2 for 5 min, 0.5% Na(OCl)2 for 10 min and 1% Na(OCl)2 for 5 min treatment (3.96%, 3.61%, 1.37%, 0.35%) respectively.

Keywords: Eulophia bicallosa, orchidaceae, germination

METHODOLOGICAL APPROACH FOR ASSEMBLE DATA FROM VEGETABLE CROPS FOR USE IN REMOTE SENSING

Zhulieta Arnaudova [1,], Dimka Haytova [2], Nikolay Panayotov [2] & Slaveya Petrova [3]*

[1] Melioration, Land Regulation and Arophysics Agricultural University, Bulgaria
[2] Horticulture Agricultural University- Plovdiv, BULGARIA
[3] Ecology & Environmental Plovdiv University, BULGARIA

julieta_arnaudova@abv.bg

ABSTRACT

Remote sensing is increasingly used in contemporary methods for observe the biological status of agricultural crops. Early identification of yield problems can significantly help reduce losses and achieve target results and profit. The main aim of this article is to outline the framework of the methodological scientific approach for the range of analytical indicators suitable for assessing the ecobiological status of plants compatible with remote sensing. The present approach includes data on land characteristics, analysis of physicochemical parameters of soil and morphometric characteristics of plants, indicators of biological status of vegetable varieties in the different stages of their development. Based on the results of the studies, the practical significance of remote sensing methods and vegetation indices will be determined. The collected scientific information and establishing the dependencies of the analyzed data and spectral analyzes on remote sensing will be the basis for making of expert decisions for the agronomic management of the vegetable production.

Keywords: vegetables, remote sensing, ecobiological status, vegetation indices

LAND SUITABILITY ASSESSMENT FOR PEPPER CULTIVATION AROUND KATUNITSA VILLAGE, BULGARIA

Zhulieta Arnaudova [1,], Dimka Haytova [2], Nikolay Panayotov [2] & Slaveya Petrova [3]*

[1] Melioration, Land Regulation and Arophysics Agricultural University, Bulgaria
[2] Horticulture Agricultural University- Plovdiv, BULGARIA
[3] Ecology & Environmental Plovdiv University, BULGARIA

julieta_arnaudova@abv.bg

ABSTRACT

Horticulture is one of the most important brunches in Bulgaria. Plovdiv region is a special area of vegetable production. The purpose of this study is to give assessment of the natural local factors - climate, terrain, and soil characteristics for sustainable pepper cultivation in Katunitsa village, Bulgaria by GİS. İn this research were investigated physical land characteristics, especially analysis of physic-mechanical parameters of the soil and terrain characteristics which is very important for crop cultivation. All information is prepared for using of GİS application by converting it into spatial database. The analysis of the created database will be bases for using the main vegetation indices of remote monitoring for the pepper cultivation in the observed region.

Keywords: vegetables, land evaluation, remote sensing, vegetation indices

EFFECT OF GENOTYPE AND PLANT GROWTH REGULATORS ON IN VITRO GERMINATION AND SUBSEQUENT DEVELOPMENT OF ARGAN (*Argania spinosa* L. *skeels*)

Mazri Mouaad Amine [1,], Saida Elmaataoui [2], Koufan Meriyem [2], Radi Hassna [2], Bouchiha Fatima [2], Rham İkram [2], Mohamed Najib Al Feddy [3] & Azenzem Rachid [4]*

[1] De National İnstitute of Agronomic Research, Ur Agro-Biotechnology, Laboratory of Plant Biotechnology, Marrakech, Morocco, Fas
[2] Biotechnology National Institute of Agricultural Research, Fas
[3] Phytobacteriology National Institute of Agronomic Research, Fas
[4] Department of Plant Protection National Institute of Agricultural Research, Fas

m.a.mazri@gmail.com

ABSTRACT

Argan (*Argania Spinosa* (L.) Skeels) is an agroforestry species highly appreciated for its edible oil and other pharmaceutic and cosmetic products. Unfortunately, argan is threatened by many factors such as human activities and overgrazing. Thus, it is important to develop efficient propagation programs to preserve this species, mainly through *in vitro* culture. To date, very few studies were reported regarding argan micropropagation. Herein, we evaluated the effects of genotypes and plant growth regulators (PGRs) on argan micropropagation by seedlings. Mature fruits of argan were collected from two argan genotypes located in the experimental station Melk Zhar of İNRA. The first genotype (GE) has ellipsoid seeds while the second one (GR) has round seeds. After disinfection, the seeds were cultured for one month on a germination medium, consisting of 6 g/L agar dissolved in distilled water. İn order to evaluate the effects of different PGRs on shoot elongation, the seedlings were transferred to semi-solid and half-strength Murashige and Skoog medium (MS/2) supplemented with 0.5, 1 or 2 mg/L gibberellic acid (GA3), or with 1 mg/L indole-3-acetic acid (İAA) and 1 mg/L 6-benzyladenine (BA). As control, a PGR-free MS/2 medium was used. Our results showed that the genotype has a significant effect on seed germination. İn fact, the seeds of GR showed a very low germination percentage with only 12.5%, while those of GE showed a germination rate of 95%. Regarding seedling development, it was found that the use of İAA and BA resulted in the formation of multiple shoots per seedling, while GA3 resulted in the elongation of one shoot. Besides, the seedlings cultured on media supplemented with GA3 exhibited higher shoot development than those cultured on İAA and BA. After 3 months of culture, the highest average shoot length (3.8 cm) was observed when 1 mg/L GA3 was used.

Keywords: Argan; İn vitro; Micropropagation; Plant growth regulators; Seedlings.

IMPACT OF CULTURE MEDIUM, EXPLANTS SIZE AND DENSITY ON SHOOT BUD MULTIPLICATION OF DATE PALM (*Phoenix dactylifera* L.) CV. 16-BİS

Mazri Mouaad Amine [1,], Saida Elmaataoui [2], Bouchiha Fatima [2], Azenzem Rachid [3], Mohamed Najib Al Feddy [4], Radi Hassna [2], Rham İkram [2] & Koufan Meriyem [2]*

[1] De National İnstitute of Agronomic Research, Ur Agro-Biotechnology, Laboratory of Plant Biotechnology, Marrakech, Morocco, Fas
[2] Biotechnology National Institute of Agricultural Research, Fas
[3] Department of Plant Protection National Institute of Agricultural Research, Fas
[4] Phytobacteriology National Institute of Agronomic Research, Fas

m.a.mazri@gmail.com

ABSTRACT

İn Morocco, date palm (*Phoenix dactylifera* L.) is the main component of oasis ecosystems. However, date palm populations have been considerably reduced because of many biotic and abiotic factors. The best method to rehabilitate Moroccan groves is the rapid multiplication of selected genotypes. The use of *in vitro* culture techniques would allow for a rapid propagation. However, their success is highly dependent on the genotype. İn this investigation, we aimed to evaluate the effect of basal medium, explant size and density on organogenesis of the Moroccan cultivar "16-bis". Organogenic cultures were placed on three different media: MS (Murashige and Skoog, 1962), WPM (Lloyd and McCown, 1980) and NM (Nitsch and Nitsch, 1969). İn the first experiment, the effect of four explant sizes on shoot proliferation was evaluated. Organogenic cultures of 2, 3, 4 and 5 buds were cultured individually in jars. Our results showed that 4 buds per organogenic culture was the most suitable for high shoot proliferation with 21.5, 14.7 and 16.3 shoots per explant in MS, WPM and NM, respectively. Afterwards, the effect of four densities on shoot proliferation was studied. Thus, 4-bud-organogenic cultures were cultured onto the same multiplication media as the first experiment at the density of 1, 2, 3 or 4 per jar. The optimum result was obtained at 2 organogenic cultures per jar on MS medium. Shoot buds were then transferred to the elongation and rooting media then to the glasshouse where a survival rate of 80 % was observed.

Keywords: Acclimatization; basal medium; organogenesis; Phoenix dactylifera L.; regeneration.

STUDY OF THE POSSIBILITIES FOR IMPROVING THE SOWING QUALITIES OF SEEDS AND THE VIALITY OF SEEDLINGS FROM CRYPTOMERIA JAPONICA DON. THROUGH PRE-SOWING TREATMENT WITH ULTRASOUND

Valeria İvanova

Plant Production Agricultural University – Plovdiv, BULGARIA

valeriasi1@abv.bg

ABSTRACT

Recently, in the production of planting material from ornamental species of trees and shrubs from seeds, more and more attention is paid to various physical methods aimed at increasing the germination and viability of seeds in difficult to propagate species. One of these methods is pre-sowing treatment of seeds with ultrasound. The present study was conducted to determine the effect of ultrasound on the germination and viability of seeds of ornamental species of Cryptomeria (Cryptomeria japonica D. Don.). The experiments were set in the laboratory of the Department of Horticulture, Agricultural University Plovdiv. The experiment with Cryptomeria was conducted from the end of February to the beginning of August. Variants with 5, 10, 15 and 20 minutes exposure were studied. Untreated seeds were used for control. İndicators related to the growth and phenological manifestations of plants were studied. İt was found that the treatment of seeds with ultrasound affects the sowing qualities of the seeds of the studied specie. Ultrasound treatment has a beneficial effect on germination in Cryptomeria, with the optimal exposure being 20 minutes - so germination increases by 11% compared to control. Recently, in the production of planting material from ornamental species of trees and shrubs from seeds, more and more attention is paid to various physical methods aimed at increasing the germination and viability of seeds in difficult to propagate species. One of these methods is pre-sowing treatment of seeds with ultrasound. The present study was conducted to determine the effect of ultrasound on the germination and viability of seeds of ornamental species of Cryptomeria (Cryptomeria japonica D. Don.). The experiments were set in the laboratory of the Department of Horticulture, Agricultural University Plovdiv. The experiment with Cryptomeria was conducted from the end of February to the beginning of August. Variants with 5, 10, 15 and 20 minutes exposure were studied. Untreated seeds were used for control. İndicators related to the growth and phenological manifestations of plants were studied. İt was found that the treatment of seeds with ultrasound affects the sowing qualities of the seeds of the studied specie. Ultrasound treatment has a beneficial effect on germination in Cryptomeria, with the optimal exposure being 20 minutes - so germination increases by 11% compared to control.

Keywords: Cryptomeria, seed propagation, ultrasound treatment, germination, ornamental plant.

INFLUENCE OF THE APPLICATION OF ULTRASOUND ON THE SEED QUALITY AND THE DEVELOPMENT OF SEEDLINGS OF *Lagerstroemia indica* L.

Valeria İvanova [1,] & Martin Stoilov [2]*

[1] Plant Production Agricultural University – Plovdiv, BULGARIA
[2] Department of Horticulture Agricultural University - Plovdiv, BULGARIA

valeriasi1@abv.bg

ABSTRACT

The use of various physical methods aimed at increasing the germination and vitality of seeds in hard-to-reproduce ornamental species is increasingly applied in nursery practice. One of these methods is pre-sowing seed treatment with ultrasound. The present study was carried out in order to determine the influence of ultrasound on germination and seed viability of the ornamental İndian lilac (Lagerstroemia indica L.) The experiments were carried out in the laboratory of the Department of Horticulture, Agricultural University - Plovdiv. Variants with exposure 5; 10; 15 and 20 minutes were studied. Untreated seeds were used as a control. Characteristics related to plant growth and phenological behaviour were studied. Ultrasonic seed treatment was found to have a positive effect on seed germination and subsequent development of Lagerstremia seedling. Treatment with ultrasound for 5 and 15 minutes resulted in an acceleration of the rate of stem growth, especially in the initial stages of plant development. Stem height and diameter, as well as the number of internodes, were again highest at 5 and 15 min exposure. The number of stem branches is the parameter that is negatively affected by the ultrasound treatment. The 20-minute exposure treatment is not recommended because it negatively affects both the phenological and biometric parameters of the seeds and seedlings.

Keywords: Lagerstroemia indica, ornamental plant, propagation by seeds, ultrasound treatment, germination.

IN VITRO PROPAGATION AND ARTIFICIAL SEED CREATION OF A SELECTED HYBRID OF ROSA DAMASCENA AND ROSA GALLICA SUITABLE FOR ESSENTIAL OIL PRODUCTION

Stefanos Hatzilazarou [1], Stefanos Kostas [2,], Sonia İoannidou [3], Fotios-Theocharis Ziogou [4], Aikaterini-Angeliki Kotoula [4] & Athanasios Economou [4]*

[1] Department of Agricultural Machinery Stefanos Hatzilazarou
[2] School of Agriculture, Department of Horticulture, Lab of Floriculture Aristotle University of Thessaloniki, GREECE
[3] Laboratory of Floriculture, School of Agriculture Aristotle University of Thessaloniki, 546 21 Thessaloniki, Greece
[4] Laboratory of Floriculture, School of Agriculture Aristotle University of Thessaloniki, GREECE
skostas@agro.auth.gr

ABSTRACT

The present study demonstrates an efficient protocol for *in vitro* propagation and production of artificial seeds of a selected rose hybrid, with accession code RDXRG027, derived from a breeding program between *R. damascena* and *R. gallica* and grown for production of rose oil. This hybrid was selected among 32 ones produced from seeds (under controlled pollination) for its high content of the substance 2-phenylethylalcohol (more than 0.25 % w/w of fresh flower petals) and simultaneously its high essential oil production (more than 0.3 % w/w of fresh flower petals). Shoot tip explants, derived from a single greenhouse grown plant of accession code RDXRG027, after surface disinfestation with 0.05% HgCl2 and 1% NaOCl, were cultured on MS nutrient medium. İn a 2-week period the healthy explants were subcultured on MS nutrient medium supplemented with 0, 1, 2 or 4 mg L-1 BAP for multiple shoot formation. The best results (2.5 new shoots per explant, 3.1 cm in length) were achieved when 2 mg L-1 BAP was used. Shoots produced from the multiplication stage were then placed for rooting on MS nutrient medium with 0 or 1 mg L-1 of İBA. The application of İBA increased the rooting percentage up to 70% as compared to the control (53.3%). More than 90% of the rooted plantlets were successfully acclimatized to the greenhouse conditions. As an alternative conservation method, the artificial seed technique was studied. Thus, shoot tips excised from *in vitro* cultures were encapsulated in 2.5% sodium alginate and hardened in 100 or 200 mM of calcium chloride producing solid beads. More than 60% of the produced artificial seeds germinated when placed on MS nutrient medium. İn another experiment, encapsulated shoot tip explants, which were stored at 4°C for a 3-month period, germinated at percentages higher than 10%, whereas the non-encapsulated explants, stored under same conditions, did not survive after the first month of cold storage. The new shoots that were produced from the germinated artificial seeds rooted on MS nutrient medium with 1 mg L-1 İBA and, afterwards, were acclimatized easily to the greenhouse environment, while the transplanting loses were lower that 10%. Part of this study was funded by the "Research - Create - İnnovate", EPANEK, NSRF 2014 - 2020, with co-financing from Greece and the European Union, Project code T1EDK- 5318.

Keywords: 2-phenylethylalcohol, Rosa damascena, Rosa gallica, cold storage, micropropagation

INFLUENCE OF THE APPLICATION OF DIFFERENT LED LIGHTING SPECTRA ON IN VITRO SHOOT MULTIPLICATION OF ROSA DAMASCENA EXPLANTS

Stefanos Kostas [1,], Stefanos Hatzilazarou [2], Parthena Tsoulpha [3] & Athanasios Economou [4]*

[1] School of Agriculture, Department of Horticulture, Lab of Floriculture Aristotle University of Thessaloniki, GREECE
[2] Department of Agricultural Machinery Stefanos Hatzilazarou
[3] Laboratory of Forest Genetics and Plant Breeding, School of Forestry and Natural Environment Aristotle University of Thessaloniki, GREECE
[4] Laboratory of Floriculture, School of Agriculture Aristotle University of Thessaloniki, Greece
skostas@agro.auth.gr

ABSTRACT

Rosa damascena Mill. is an aromatic shrub with important ornamental and economical value, mainly due to high quality of rose oil. Besides the classical propagation methods (cuttings, grafting, layering or budding), the *in vitro* propagation technique was also employed for faster rates of shoot multiplication and large-scale propagation of various genotypes. The substitution of fluorescent lamps with LEDs, apart from the other advantages, gives the opportunity to optimize the lighting spectrum regime in each stage of *in vitro* culture. Thus, in the present study, we compare the fluorescent lamps with three different LED light spectra (blue, red, white) in order to determine the most cost-efficient lighting system for the *in vitro* shoot multiplication of *R. damascene*. Solid MS supplemented with 2 mg L-1 BAP and 0.1 mg L-1 NAA was used as basal nutrient medium. After six weeks of culture, all the explants were reacted and formed new shoots. The best results were noticed when fluorescent lamps as well as blue light spectrum of LEDs were used, formed more than 4.4 new shoots per explant, longer than 2.3 cm. For the assessment of plant growth, chlorophyll (chlorophyll content index, CCİ) and chlorophyll fluorescence parameter (Fv/Fm) were measured with the chlorophyll meter CCM 200 and OS30p+ Rapid Plant Stress Screening Device, respectively. Also, the photosynthetic rate (μmol m-2 s-1) was measured by using the portable gas exchange system LCi ADC Gas Analyzer with small chamber, specific for measurements in tissue cultures. For the chlorophyll content index, no statistically significant differences were found and values ranged from 3.96 in white LED light to 4.08 in blue LED light. On the contrary, for the chlorophyll fluorescence (Fv/Fm), it was found that the fluorescent lamp (0.740) and blue lamp (0.738) resulted in statistically higher rates than white LED (0.677) and red LED lamp (0.673). Similar results were observed in the case of photosynthetic rate (A), where the fluorescent lamp (8.31 μmol m-2s-1) and the blue lamp (8.22 μmol m-2s-1) gave higher rates compared with the white LED (4.64 μmol m-2s-1) and the red LED lamp (3.71 μmol m-2s-1), respectively. İn conclusion, since the application of LEDs in micropropagation can reduce electricity costs from 50-75%, it seems that the blue light spectrum of LEDs was the most cost-efficient system for the *in vitro* multiplication of *R. damascena* explants.Part of this study was funded by the "Research - Create - İnnovate", EPANEK, NSRF 2014 - 2020, with co-financing from Greece and the European Union, Project code T1EDK- 5318.

Keywords: chlorophyll, photosynthetic rate, chlorophyll fluorescence, micropropagation, electricity cost

FOLIAR APPLICATION OF K-IBA ON ROOTING OF VIBURNUM CUTTINGS AND CORRELATION WITH THE PEROXIDASES ACTIVITY

Stefanos Hatzilazarou [1,], Stefanos Kostas [2], Aikaterini-Angeliki Kotoula [3], Fotios-Theocharis Ziogou [3] & Athanasios Economou [3]*

[1] Department of Agricultural Machinery Stefanos Hatzilazarou, Greece
[2] School of Agriculture, Department of Horticulture, Lab of Floriculture Aristotle University of Thessaloniki, GREECE
[3] Laboratory of Floriculture, School of Agriculture Aristotle University of Thessaloniki, GREECE

hatzilaz@agro.auth.gr

ABSTRACT

The effect of the application method of different concentrations (0, 2 or 4 g L-1) of the rooting regulator K-İBA in combination with different concentrations (0, 1or 5%) of the solvent DMSO on the rooting of shoot cuttings of the evergreen *Viburnum tinus* was investigated in relation to the activity of peroxidases. The various solutions were applied either by dipping the cutting base into them for 10 sec or by foliar spraying until the solution was runoff from the leaves. İn the first case, the cuttings were planted after the immersion into the solutions in boxes containing perlite and placed for rooting in the fog system (95% RH), while in the second case the planting preceded the application of the solutions and followed by their placement in the fog system. The experiment was carried out in a greenhouse and was repeated during the four seasons of the year (January, April, June and October) under the natural light of each season. Both the season and the method of application and the concentration of K-İBA affected the rooting of the cuttings. İn summer and autumn, the highest percentages of rooting were observed (100 and 95%, respectively); while in the other two seasons rooting showed lower percentages. The application of DMSO did not affect the rooting of cuttings, whereas the application of K-İBA, in most cases, had a positive effect on the rooting of *V. tinus* cuttings. The foliar application of K-İBA (2 and 4 g L-1) significantly increased the rooting of the cuttings compared to cutting base dipping in summer (100% vs. 40%, respectively), spring (75% vs. 10%, respectively) and winter (65% vs. 25%, respectively), while in autumn, both application methods exhibited a similar rate of rooting (95%). At 0, 1, 3, 7, 14, 21 and 28 days after planting, a sample of shoot portion (0.5 cm long) was cut from the base of the cuttings from all rooting treatments and seasons for the photometric determination of their peroxidases. İn general, an increase in the specific enzyme activity of peroxidases was observed until the 7th or 14th day after planting of cuttings and a decrease thereafter. The application method of K-İBA (dipping or spaying) did not affect the peroxidases activity pattern during rooting. On the contrary, in most cases, the increase in the specific enzyme activity of peroxidases was positively correlated with the subsequent rooting of the *V. tinus* shoot cuttings.

Keywords: adventitious rooting, shoot cuttings, rooting regulator, foliar spraying, DMSO

A QUICK START TO DO-IT-YOURSELF SMART FARMING: AN EXEMPLARY SYSTEM WITH THE INTERNET OF THINGS

İsmail Ağir

Bioengineering İstanbul Medeniyet University, Istanbul, TURKEY

agr.isml@gmail.com

ABSTRACT

Globally emerging concerns such as climate change, carbon footprint, drought, energy crisis, pandemics and finally food supply chain problems have forced mankind to find new solutions. Since agricultural production is vital and the only way to obtain food, it must be carried out efficiently. İn order to protect the health of ecology, sustainability has become the main goal in agriculture as well as everywhere else. Saving the environment and helping it maintain health, preventing pollution, poverty and malnutrition, and increasing agricultural productivity is what the world seeks to achieve today through the Sustainable Development Goals. İn order to increase the crop yield and reduce the total energy, water and fertilizer used, the farmers started to apply state-of-the-art technologies in their farmlands. Consequently, the latest developments in digital technologies such as computing, communication and artificial intelligence have been applied to agriculture with great success and finally digital agriculture (or smart agriculture) has become a trending research and application topic. İn this paper, we propose a system consisting of fundamental sensors and actuators such as solenoid valve, water pump, UV meter, temperature and humidity sensors, barometric pressure sensor, soil moisture sensor, rain sensor and real-time clock module; to provide a quick start to digital agriculture by developing internet of things enabled irrigation control algorithms and weather monitoring tool. We designed the system by choosing commonly used parts that are suitable for do-it-yourself practice. We used an Arduino supported İoT enabled ESP32 microcontroller, which can also perform some machine learning applications over TinyML. We demonstrated an automated water-saving sprinkler prototype where data from meteorological events and soil sensors is successfully recorded and archived in the cloud storage. We used 10 watt photovoltaic solar panels as power source. We designed the body parts of the system with Autodesk Fusion 360 and 3D printed it with eco-friendly PLA material.

Keywords: digital agriculture, precision agriculture, sustainability, automatic irrigation , weather monitoring

SCREENING OF SOME WILD TOMATO ACCESSIONS FOR RESISTANCE TO TWO-SPOTTED SPIDER MITE (*Tetranychus urticae* KOCH)

Aylin Kabaş [1,*] *& Gökhan Erdoğan* [2]

[1] *Vocational School, Organic Agriculture Department Akdeniz University, Antalya, TURKEY*
[2] *Department of Organic Agriculture Akdeniz University, Antalya, TURKEY*

demirelliaylin@hotmail.com

ABSTRACT

The most widely used method of tomato pest management is chemical insecticides which are known to have a strong influence on agricultural production and also people health. The use of resistant plant to control pests is a beneficial method. Among to pests, the two-spotted spider mite (*Tetranychus urticae* Koch) is a significant tomato pest and all commercial varieties of tomato, *Solanum lycopersicum* L., are susceptible this pest. The objective of this study was to screen wild tomato genotypes against *T. urticae*. The experiment was conducted at the Akdeniz University and 17 tomato genotypes which were consisted of 15 wild tomatoes and 2 local varieties were used in experiment. According to no choice method, LA0716, LA1940 (*S. pennelli*) and LA0462 (*S. peruvianum*) were the most resistant and local variety Ayaş (*S. lycopersicum*) was determined as susceptible.

Keywords: Tomato, insecticides, resistance, wild genotype

DETERMINATION OF BUD FERTILITY AND PRUNING TYPE OF SOME TABLE GRAPES

Mustafa Celik

Horticulture Adnan Menderes University, Aydin, TURKEY

mcelik@adu.edu.tr

ABSTRACT

The aim of this research is to determine bud fertility and pruning type of some table grapes , which are Osmanca, Alphonse Lavalle, Superior Seedless, Cardinal, Samanci seedless and Red Globe cvs. (*Vitis vinifera* L.) planted in faculty application vineyards. During the winter pruning, ten one-years-old cane above to 10 bud were pruned for each cultivar. The concerning bud position, flower clusters per shoot were counted on developing summer shoots. Average bud fertility (number of flower clusters /shoots) were ranged between 0.46 and 2.40 depending on cvs. While the highest bud fertility was obtained from Alfonse Lavalle and Cardinal cvs, the lowest bud fertility was taken from Superior seedless. When bud fertility and cluster size considered, it is advised that spur pruning for Alfonse Lavallee, Cardinal and Osmanca cvs, and semi long cane pruning for Samanci seedless and long cane pruning for Superior Seedless and semi long cane or spur pruning for Red Globe cvs.

Keywords: bud fertility, vine, grape, cultivar

DETERMINATION OF THE EFFECT OF DIFFERENT IBA DOSES ON ROOTING OF ROOTSTOCK CANDIDATE CHERRY, SOUR CHERRY AND MAHLEB GENOTYPES ON SOFT CUTTINGS

Erol Aydin [1,] & Ercan Er [1]*

[1] Deparment of Horticulture Black Sea Agricultural Research Institute, TURKEY

aydin.erol@tarimorman.gov.tr

ABSTRACT

This study was carried out to investigate the effect of different İBA (İndole Butyric Acid) concentrations on rooting in soft cuttings of rootstock candidate cherry, sour cherry and mahaleb genotypes in a plastic greenhouse with underfloor heating and fogger unit of Black Sea Agricultural Research İnstitute. 0, 500, 1000 and 2000 ppm İBA was applied to the soft cuttings taken in June. Perlite and perlite-peat (1-1) mixture was used as propagation medium and rooting medium was disinfected with methyl bromide before planting. The study was planned according to a randomized plot design with three replications and 20 cuttings in each replication, and the criteria of rooting rate (%), live cutting rate (%), root length (cm), root diameter (mm), number of roots (pieces) were investigated. İn terms of rooting rate, 08 K 0056 in cherry genotype, 55 V 0004 in sour cherry and 55 M 0055 genotypes in mahleb had the highest rooting rate in both environments.

Keywords: Rootstock, Cutting, Propagation, İBA

A COMPARATIVE STUDY OF THE CUTTINGS ROOTING OF SOME ORNAMENTAL SPECIES IN THE FOG AND AEROPONICS SYSTEMS

Stefanos Kostas [1], Stefanos Hatzilazarou [2,], Marianna Angelaki [3], Elias Pipinis [4] & Athanasios Economou [5]*

[1] School of Agriculture, Department of Horticulture, Lab of Floriculture Aristotle University of Thessaloniki, GREECE
[2] Department of Agricultural Machinery Stefanos Hatzilazarou, Greece
[3] Laboratory of Floriculture, Department of Horticulture Aristotle University of Thessaloniki
[4] Forestry Laboratory, Department of Forestry and Natural Environment Aristotle University of Thessaloniki, GREECE
[5] Laboratory of Floriculture, School of Agriculture Aristotle University of Thessaloniki, Greece

hatzilaz@agro.auth.gr

ABSTRACT

The rooting of leafy shoot cuttings of the ornamental species *Cistus creticus*, *Laurus nobilis*, *Arbutus unedo*, *Syringa vulgaris* and *Spiraea media* was studied, using the rooting regulator K-İBA (potassium salt of İndole-3-butyric acid), in the rooting systems of fog and aeroponics. The most important feature of the fog system is the very small size of the water droplets sprayed on the leaves of the cuttings resulting in the avoidance of excessive water concentration in the rooting substrate which creates rotting problems. İn aeroponics the top of the cuttings is sprayed just like in fogging, while the base of the cuttings is in the air (instead into the substrate as in the fog system), in dark and high humidity conditions created by using a fog sprayer. The cuttings of the above species were placed for rooting, at the most appropriate time according to preliminary research (for *C. creticus* in early December and for all other species in the second fortnight of May), in the fog and aeroponics rooting systems. Prior to placement in the rooting systems, the cuttings were treated with K-İBA by dipping their bases into aqueous solutions at concentrations of 0, 2, 4 or 8 gL-1 (40 cuttings per concentration and species). İn the fog rooting system, the cuttings were placed in plastic boxes containing a mixture of perlite and peat at a ratio of 2:1 (v/v), while in the aeroponics rooting system they were transferred to metal frames supporting opaque plastic with holes where the base of the cutting stuck in the hole by penetrating it to a depth of 3-4 cm. All cuttings remained in the rooting systems for a period of 8-12 weeks, depending on the plant species, and after their removal the percentage of rooting was calculated and the number and length of the produced roots were measured. İt was found that the aeroponics rooting system was more favorable for rooting of shoot cuttings of *C. creticus* (57.5 %) and *L. nobilis* (57.5 %), whereas the fog rooting system was more effective for rooting of the species *A. unedo* (100 %), *S. vulgaris* (80 %) and *S. media* (100 %). Regarding the rooting regulator K-İBA, its application increased the rooting rates in all species tested and in most cases it increased the number and the length of the roots. The most suitable K-İBA concentrations were 2 gL-1 for *C. creticus*, 4 gL-1 for *L. nobilis*, 8 gL-1 for *A. unedo*, 2 and 4 gL-1 for *S. vulgaris* and 2 gL-1 for *S. media*. Part of this work was financed by the "Research - Create - İnnovate" of EPANEK, NSRF 2014 - 2020, with co-financing from Greece and the European Union, Project code T1EDK-03919.**Keywords**: shoot cuttings, rooting regulator, rooting regulator, K-İBA

DETERMINATION OF SOME MORPHOLOGICAL AND BIOCHEMICAL CHARACTERISTICS OF GALICJANKA ARONIA CULTIVAR GROWING IN EDIRNE CONDITIONS

Akgül Taş [1], Selma Kuru Berk [2,] & Müttalip Gündoğdu [3]*

[1] Department of Plant and Animal Production, Seben İzzet Baysal Vocational School Bolu Abant İzzet Baysal University, Bolu, TURKEY
[2] Department of Organic Agriculture Bolu Abant İzzet Baysal University, Bolu, TURKEY
[3] Department of Horticulture, Faculty of Agriculture, Bolu Abant İzzet Baysal University, Bolu, TURKEY

selmakuruberk@gmail.com

ABSTRACT

İn this study, the pomological and biochemical properties of aronia fruit, which is one of the berry types and is rich in antioxidant content, called the 'super fruit' were investigated. The important morphological parameters such as fruit weight (0.97 g), fruit width (12.25 cm), fruit length (11.57 cm), leaf width (5.82 cm), leaf length (8.05 cm) and color parametres such as L (16.86), a (0.48), b (0.25), chroma (0.54) and hue (26.36) values were determined. The amount of water-soluble dry matter was determined as 25.57% and titratable acidity value was 0.21%. Chlorogenic acid (268.144 mg kg-1) was determined as the phenolic compound with the highest amount. Among the organic acids, malic acid (3128.04 mg kg-1) was the most dominant. malic acid was determined as organic acid. İn addition, the vitamin C content was determined as 20,868 mg 100g-1. İn this study, it was determined that aronia fruit can be used as a good source of bioactive phytochemicals in the human diet as a result of the properties examined. İt is thought that determining the quality criteria and biochemical characteristics of the Galicjanka cultivar grown in Edirne conditions may be beneficial in the development of our country's biodiversity and have an important place in the food industry.

Keywords: Aronia, pomology, phenolic compound, vitamin C

DETERMINATION OF THE BIOCHEMICAL CONTENTS OF WHITE AND RED FRUIT PITAYA (*hylocereus* SP.) FRUIT SPECIES

Selma Kuru Berk [1,], Akgül Taş [2] & Müttalip Gündoğdu [3]*

[1] Department of Organic Agriculture Bolu Abant İzzet Baysal University, Bolu, TURKEY
[2] Department of Plant and Animal Production, Seben İzzet Baysal Vocational School Bolu Abant İzzet Baysal University, Bolu, TURKEY
[3] Department of Horticulture, Faculty of Agriculture, Bolu Abant İzzet Baysal University, Bolu,TURKEY

selmakuruberk@gmail.com

ABSTRACT

Pitaya is one of the tropical fruit species that arouses curiosity in terms of appearance and taste and is increasing in popularity day by day in Turkey. İn this study, the biochemical contents of white-fleshed (*Hylocereus undatus*) and red-fleshed (*Hylocereus polyrhizus*) pitaya species grown in Antalya province were investigated. The amount of water-soluble dry matter, pH, titratable acidity, phenolic compounds and organic acids were determined. The most abundant phenolic compound in both fruit types was protocatechuic acid (14.140 mg kg-1: white, 9.498 mg kg-1: red). İt has been determined that the red flesh fruit has higher content of gallic acid, rutin, quercetin, ferulic acid and p-coumaric acid. Organic acid content of white-fleshed pitaya fruit was found to be higher than that of pink. The white-fleshed fruit type had 774,322 mg 100g-1 and the red-fleshed fruit type had 511.146 mg 100g-1 malic acid content. A positive correlation was found between the amount of vitamin C and organic acids, protocatchuic acid, vanillic acid and syringic acid. A negative correlation was determined between citric acid and gallic, p-coumaric and ferulic acid, rutin and quercetin contents. Rutin content was found to be positively correlated with gallic acid, quercetin, ferulic acid and p-coumaric acid content. Consumption of red-fleshed fruit should be increased in terms of phenolic compounds, and white-fleshed fruit should be increased in terms of vitamin C content.

Keywords: Pitaya, white, red, phenolic compound, vitamin C

COLD TOLERANCE RELATED MIRNA EXPRESSION PATTERNS IN CULTIVATED AND WILD TOMATO GENOTYPES

Houtan Vafaeifard [1,], Yasaman Naziri [1], Aylin Kabaş [2] & Hülya İlbi [1]*

[1] Department of Garden Plants Ege University, Izmir, TURKEY
[2] Department of Organic Agriculture Akdeniz University, Antalya, TURKEY

h.vafaeifard@gmail.com

ABSTRACT

The cultivated tomato (*Solanum lycopersicum* L.) is one of the popular vegetables in the world that has been used as a target plant in genetic and molecular breeding studies. As this plant originated from the tropics, it is susceptible to chilling stress. Chilling stress can easily damage its growth and development. İn the present study, The expression level of miRNA 167, miRNA 169, miRNA 172, miRNA 393, and miRNA 397 in wild genotypes of *Solanum habrochaites* (LA 1777) and *Solanum pimpinellifolium* (LA 1579) and cultivated genotypes of *Solanum lycopersicum* cv. Anit F1 and *Solanum lycopersicum* cv. Lice were assessed at 4, 6, and 8 hours after chilling treatment (4°C) via Real-time quantitative PCR to determine if these miRNAs are responsible for controlling the expression of the genes associated with chilling tolerance. Significant upregulation of miRNA 167, 169 and 172, and 397 were observed at different levels of chilling stress in the tolerant genotypes of *S. habrochaites* (LA 1777) and *S. lycopersicum* cv. Anit F1. and also, in *S. pimpinellifolium* (LA 1579) while this level of up-regulation was not seen in *S. lycopersicum* cv. Lice. The observed levels of cold-related miRNA expression in *S. pimpinellifolium* (LA 1579) indicated the tolerance of *S. pimpinellifolium* (LA 1579) and susceptibility of *S. lycopersicum* cv. Lice to chilling stress.

Keywords: miRNA, chilling stress, Real-time PCR, gene expression, tomato

INFLUENCE OF QUINCE ROOTSTOCKS ON VEGETATIVE GROWTH, PHENOLOGICAL CHARACTERISTICS AND FRUIT SET RATIOS IN LOQUAT SAPLING

A.aytekin Polat

Horticulture Department Hatay Mustafa Kemal University, Agriculture Faculty, Hatay, TURKEY

aapolat@mku.edu.tr

ABSTRACT

The aim of the study is to investigate the vegetative growth and phenological characteristics of the loquat cultivar grafted on some quince rootstocks. İn the experiment, 'Hafif Çukurgöbek (HÇG)' loquat cultivar grafted on three Quince rootstocks (BA 29, Quince A = MA, Quince C = MC) was used. The experiment was arranged according to a completely randomized designed with 5 replications and 6 plants were used in each replicate. İn the study, vegetative growth parameters such as annual shoot length, trunk diameter of stock and scion and also structure canopy, phenological observations such as the flowering periods (beginning of flowering, first flowering, full bloom, end of flowering and fruit set dates), and fruit set ratios (percent blossom ratios, % initial fruit set, and % final fruit set) of the cultivar/rootstock combinations were determined. Quince-C rootstock gave higher values in terms of annual shoot length, scion and rootstock diameter compared to Quince-A and BA-29 rootstocks. The differences between the rootstocks in terms of vegetative parameters were found to be statistically significant at 1% level. İn terms of first flowering, fruit set and fruit ripening, BA-29 rootstock was found earlier than the other two rootstocks. According to the two-year average, the flowering rate was determined the highest in BA-29 rootstock, the lowest in MA rootstock. MA rootstock yielded the lowest value in the ratio of fruit harvested, MC and BA-29 gave close values to each other. The data show that BA-29 and MC gives better results than the MA rootstock. However, the study needs to be continued in order to reach a more definite conclusion.

Keywords: Loquat, quince rootstocks, flowering, fruit set

EFFECT OF HAWTHORN (*Crataegus* SPP) ROOTSTOCK ON FRUIT QUALITY IN LOQUAT(*Eriobotrya japonica* LINDL.)

A.aytekin Polat

Horticulture Department Hatay Mustafa Kemal University, Agriculture Faculty, TURKEY

aapolat@mku.edu.tr

ABSTRACT

The aim of the study is to determine the effects of hawthorn rootstocks on fruit quality of the Hafif Çukurgöbek(HÇG) loquat cultivar. İn the study, loquat seedling was also used as a control rootstock. Fruit pomological analysis and yield characteristics of the cultivar/rootstock combinations in the study were determined. İn order to determine the fruit quality, 50 fruits were randomly picked from each cultivar/rootstock combination, and physical measurements and chemical analyzes were carried out with five replicates. Hawthorn rootstock provided two days earliness in fruit harvest (May 17) compared to loquat seedling rootstock. Fruit weight and fruit dimensions were 16.89 g, 32.13 mm and 34.62 mm, respectively, on quince rootstock; İt was determined as 18.32 g, 31.72 mm and 33.67 mm in loquat seedling rootstock. Seed number and seed weight were lower in hawthorn rootstock (3.40 and 4.40 g, respectively) than loquat seedling rootstock (4.02 and 5.25 g, respectively). İn terms of flesh/seed ratio, a higher value was obtained from hawthorn rootstock (2.84) than from loquat seedling rootstock (2.50). The total soluble solid value was determined as 9.40% in fruits grown on hawthorn rootstock and 11.30% in fruits grown on loquat seedling rootstock. Titratable acidity was calculated as 0.34% in hawthorn rootstock and 0.44% in loquat rootstock. However, the study needs to be continued in order to reach a more definite conclusion.

Keywords: Dwarf rootstock, hawthorn, high density, fruit quality, yield

AN EFFICIENT PROTOPLAST ISOLATION PROTOCOL FOR TRANSIENT EXPRESSION IN GRAPEVINE

Gülşen Kolaşinliler [1,] & Hilal Betül Kaya [1]*

[1] Department of Bioengineering Manisa Celal Bayar University, Manisa, TURKEY

g_kolasin@hotmail.com

ABSTRACT

Grapevine (*Vitis vinifera* L.) is one of the most economically and historically important fruit trees worldwide. Besides its wide uses in wine industries, this fruit tree has long been used for production of raisins, juices, fresh fruits, and leaves. Grapes are an important source of secondary metabolites such as the phenolic compounds which are also used for the *cosmetic*, food, and *pharmaceutical* industries. Beneficial effects of grape phenolics on several diseases have been demonstrated in a number of studies. CRİSPR/Cas9 is an effective genome editing tool which can make targeted mutations in plant's genome such as, insertion, deletion, and substitution with high efficiency and specificity. This tool has been extensively used for trait improvement, method development, proof of principles and gene functional analysis in various plants. İn plant genome editing studies, tissue culture is the most challenging step which is time-consuming, labor intensive, and genotype dependent. İnstead of implementing reagents directly to the plants, plant protoplasts provide an alternative strategy for assessing multiple genomes editing reagents rapidly. Protoplasts are cells without cell wall which is removed by specific techniques using enzymes. There are many factors including enzyme combination and concentration, incubation time, plant age, tissue type, centrifugation conditions and shaker speed that influence protoplast isolation, yield, and viability. The aim of this study is to establish a simple and efficient protoplast isolation protocol and to use isolated protoplast for transient expression in grapevine.

Keywords: protoplast isolation, transient expression, CRİSPR/Cas9, grapevine

HEAD PROPERTIES OF SOME ARTICHOKE POPULATIONS

İbrahim Sönmez

Vegetable Production and Breeding Atatürk Central Horticultural Research Institute Yalova, TURKEY

sonmez77@gmail.com

ABSTRACT

Marmara is one of the region that has the most artichoke production in Türkiye. Plant materials were collected from artichoke gardens in the provinces of Balikesir, Bursa and Bilecik located in this region which were selected as a result of survey studies, in 2019-2020. Hopeful plants were marked through observations during plant vegetation and pre harvest assessments. Later on, the sucker-shoots were brought to Yalova Atatürk Central Horticultural Research İnstitute by going to the selected artichoke gardens in these provinces in order to be used in breeding studies. İn this study, head weights (g), head diameter (cm), head heights (cm) and diameter/height ratios were determined with and without artichoke head bracts. Balikesir population's average yield properties were determined as (with bracts) head weight 280.61g, head diameter 9.25 cm, head height 8.41 cm. Bursa population values were 232.67 g, 8.82 cm and 8.22cm and Bilecik ones 155.36 g, 7.57 cm, 7.50 cm, respectively. Artichoke breeding study, which includes these data, continues and it is aimed to determine artichoke clones with superior characteristics.

Keywords: Artichoke, breeding, selection

QUALITY CHANGES IN DIFFERENT PARTS OF FRUITS OF SOME MORPHOLOGICALLY DIFFERENT WATERMELON HYBRIDS

Veysel Aras

Sebzecilik ve Süs Bitkilieri Alata Bahçe Kültürleri Araştirma Enstitüsü, Mersin, TURKEY

varas2001@yahoo.com

ABSTRACT

The production amount of watermelon in the world is 101.6 million tons. Turkey is the second producer country after China. Watermelon is produced 3.49 million tons on an area of 78.179 ha in Turkey. The study was carried out at Alata Horticultural Research İnstitute. İn this study, the fruits of watermelon hybrids with different morphological characteristics were divided into six. The part where the fruits touch the ground was divided into 3 parts and the sun-exposed part was divided into 3 parts and examined in 6 parts in total. The changes in total soluble solid, titratable acid, pH, L and h° values in each part of the fruit were examined. As a result, differences were observed in terms of the properties examined in different parts of the fruit.

Keywords: Watermelon, hybrid, different parts, quality changes,

APPLICATION OF FLUORESCENCE SPECTROSCOPY FOR THE ANALYSIS OF DIFFERENT GARLIC ACCESSIONS AFTER 9 MONTHS' STORAGE IN A WAREHOUSE

Vanya Slavova

Department of Plant Breeding Maritsa Vegetable Crops Research Institute, Plovdiv, Bulgaria

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vania_plachkova@abv.bg

ABSTRACT

The present study aims to establish the application of fluorescence spectroscopy in the comparison of garlic accessions from different branches. The garlic samples were stored in a warehouse, under uncontrolled conditions. This will allow the method to be applied as a non-invasive rapid tool to establish the origin of unknown bulbs during storage. The experimental investigations were carried out locally in the warehouse for 8 accessions, 9 months' storage. The spectral setup for the generation of emission fluorescence spectra is mobile and has applicability in local product quality assessments. A system engineering approach based on the classical principles of modern optoelectronics was applied, during its adjustment (optical setting up). The results of the experiment will be able to be applied to the optimization of the analysis time of garlic samples, in a storage room, under uncontrolled conditions. This will support the breeding process in its initial stages, when it is necessary to qualify a large set of samples in a short time. Application of fluorescence spectroscopy for the analysis of different garlic accessions after 9 months' storage in a warehouse will be an applied tool in breeding programs.

Keywords: Garlic, fluorescence spectroscopy, storage, quality

EFFECTS OF DIFFERENT POSTHARVEST TREATMENTS ON STORAGE DURATION AND QUALITY OF POMEGRANATE CV. HICAZNAR

Sevil Unal [1,] & Ferhan K. Sabir [1]*

[1] Horticulture Department Selcuk University, Konya, TURKEY

sozcelik@selcuk.edu.tr

ABSTRACT

Pomegranate is one of the oldest fruit species with nutritional value and beneficial effects on human health. Pomegranate is grown in large quantities in many subtropical and tropical countries, especially in Mediterranean countries with temperate climates. Pomegranate is rich in folic acid, potassium, phosphorus, iron, antioxidants, vitamin C, polyphenolic substances, alkaloids and flavonoid contents and fiber. Pomegranate, which is perishable after harvest, does not show climacteric properties. Postharvest hot applications, storage at the appropriate temperature, modified atmosphere packaging, storage in controlled atmosphere and surface coating treatments are carried out in order to extend the storage period by preserving the bioactive components and nutritional quality properties of the pomegranates after the harvest. İn this study, the effects of different postharvest treatments [control, Modified atmosphere packaging (MAP), salicylic acid (SA) and UV-C light treatment] on the quality characteristics of Hicaznar pomegranates were investigated during storage. Pomegranate fruits harvested at the stage of commercial maturity were brought to the laboratory of the Department of Horticulture, Faculty of Agriculture, Selcuk University under suitable conditions. The pomegranate fruits were stored at 5 °C and 90% relative humidity. The fruit samples were removed from the storage room at 2nd and 4th month of storage period for physical and biochemical investigations (weight loss, fruit skin color, fruit flesh color, soluble solid content, titratable acidity amount, total phenolic substance amount, total antioxidant activity, ascorbic acid (vitamin C) and anthocyanin amount). As a result of the study, it was determined that the prestorage treatments were effective in maintaining the quality characteristics of pomegranates when compared to the control.

Keywords: Pomegranate, Storage, Quality, Salicylic acid, UV-C, MAP

EFFECTS OF SALICYLIC ACID APPLICATION ON FRESH CUT APPLE SLICES ON QUALITY DURING COLD STORAGE

Sevil Unal [1,] & Ferhan K. Sabir [1]*

[1] Horticulture Department Selcuk University, Konya, TURKEY

sozcelik@selcuk.edu.tr

ABSTRACT

Salicylic acid occurs spontaneously and creates various metabolic and physiological reactions in plants, affecting growth and development. Salicylic acid is known to be effective on controlling losses and maintaining quality by inhibiting ethylene synthesis in horticultural crops after harvest. İn this study, the effects of 4 mM salicylic acid (SA) application on the quality of fresh cut apple slices of Golden Delicious, Granny Smith, Braeburn and Red Chief apple cultivars were investigated during the storage. Fruits harvested at commercial maturity were brought to the Faculty of Horticulture, Faculty of Agriculture, Selcuk University, under suitable conditions. Here, the sliced fruits were immersed in the solution for 3 minutes and after the application, the excess water on the apple slices was removed and then placed in polyethylene bags. The bags were stored at 2°C and 90% relative humidity for 28 days. Physical and chemical analyzes were performed on the samples taken 7 days apart during storage. As a result of the study, it was concluded that the application of 4 mM salicylic acid could be an effective application in extending the storage life of Golden Delicious, Granny Smith, Braeburn and Red Chief apple slices by preserving their quality characteristics during 28 days of cold storage.

Keywords: Fresh cut, quality, cold storage, salicylic acid

VARIETIES AND CHARACTERISTICS OF LETTUCE/SALAD (*Lactuca sativa* L.) RECORDED IN TURKEY

Sıtkı Ermiş

Department of Horticulture Eskişehir Osmangazi Unïversity Faculty of Agrïculture, Eskişehir, TURKEY

seedman37@gmail.com

ABSTRACT

The most significant crop among the leafy vegetables is *Lactuca sativa* L. , most commonly known as lettuce. Lettuce, which is grown as a one-year cool climate vegetable belonging to the Compositae family, has been registered in our country as iceberg, cos, lollo, and butterhead lettuce types. But different types of lettuces registered in recent years, in addition to the number of leaf divisions, thickness and size. The shift in lettuce types that have been authorized for registration through 2022 has been thoroughly investigated with the help of this study. The registered lettuces were also examined in the study in terms of some characteristics, their dendrograms were taken out, and an attempt was made to determine their relatedness to one another. As a result, these descriptors are effective analytical tools for researching the intricate morphological variability of this species and interactions between the varieties.

Keywords: Lettuce, distincness, uniformity, stability, registration

DYNAMIC CONTROLLED ATMOSPHERE STORAGE SYSTEMS AND THEIR EFFECTS ON STORAGE QUALITY

Adem Doğan

Department of Horticulture Akdeniz University, Antalya, TURKEY

dogadem@gmail.com

ABSTRACT

Controlled atmosphere (CA) storage is a commonly used technique, especially in fruits with long-term storage capacity. However, recent progress has provided to use in other horticultural crops. Reducing oxygen level is an effective tool during the postharvest of fruits and vegetables. After understanding the effects of low oxygen levels on fruit physiology, the studies have focused to decrease oxygen to the minimum level that fruits can tolerate. Following this development, low oxygen storage and dynamic controlled atmosphere (DCA) storage techniques have started to use in industrial scale. İn DCA, the oxygen level is kept slightly above the level at which the fruit is stressed. Thus, it is possible to reduce the oxygen level below 1% by dynamically measuring of the stress signal. Based on the tolerance level affected by many factors such as variety, maturity stage, storage temperature, etc., low oxygen reduces respiration rate, ethylene production, ethylene susceptibility, psychological injury, and postharvest losses. Moreover, low O2 increases storage time due to the slowing down ripening and senescence. This study summarizes the commonly used control systems regulating oxygen level and their effects on quality and ripening properties of fruits.

Keywords: DCA, low oxygen, shelf-life, storage, quality

IMPACT OF LATE SPRING FROSTS ON SOME PEAR CULTIVARS

Vahid İslam Avdiu [1,], Bedri Dragusha [2] & Gezim Hodolli [3]*

[1] Pomology and Viticulture University of Prishtina, Faculty of Agriculture and Veterinary, ALBANIA
[2] Department of Viticulture Univeristy of Prishtina, ALBANIA
[3] Pomology and Viticulture Faculty of Agriculture and Veterinary, University of Prishtina, ALBANIA

vahid.avdiu@uni-pr.edu

ABSTRACT

This research paper presents the results of late spring frosts impact to pear cultivars 'Abate Fetel', 'Conference' and 'William', on the rootstock MA. The spring of 2017 in Kosovo has been characterized by low unusual critical temperatures below 0oC degree. İn the experimental as a randomized block system included 45 pear trees (15 for each cultivar). To each plant monitoring and examined some parameters as dynamic of flowering, inflorescence, fruits setting and fruits growing. At the same time was monitoring and examined some meteorological parameters through "Spectrum Weather" station. İn the March – April period, temperature below the 0oC degree has dropped 13 time, with the lowest being - 4.72 oC degrees at the beginning of flowering and - 4.22 oC degrees at the settings and start growth of fruits time. The most resistant cultivar has been shown Conference which has managed to set and grow 40.87 fruits or 2.64%, per pear tree, then the William cultivar has created 36.07 fruits or 2.16% and the susceptible cultivar is shown Abate Fetel witch has managed to create only 3.47 fruits or 0.24% per pear tree. The damages by the frosts was to highs but with differences between the pear cultivars.

Keywords: pear, late spring frosts, damages, flowering

EVALUATION OF CORNUS ALBA TOLERANCE TO AIR POLLUTION IN URBAN CONDITIONS

Tamara Chadzinikolau [1,] & Magda Formela-Luboińska [1]*

[1] Department of Plant Physiology Poznań University of Life Sciences, POLAND

tamarisch2@gmail.com

ABSTRACT

Because of the significant deterioration of air quality in recent years, urban vegetation is increasingly exposed to the harmful effects of various pollutants that can interfere with many physiological processes and cause changes in plant morphology. İt is the means of transport that mainly emit many dangerous compounds, including heavy metals, nitrogen oxides, and particulate matter. The research includes issues concerning tolerance mechanisms of *Cornus alba* shrubs to air pollution. The study was conducted on plants growing close to public transport in the Polish city (Poznań) at the end of the growing season. The accumulation of micro-dust impurities on leaf blades was measured. İt turned out that the shrubs effectively kept the dust between the hairs, and the epicuticular wax layer enhanced their deposition. The response of plants to air pollutants was assessed by the air pollution tolerance index (APTİ), described by cell sap pH, total chlorophyll content, ascorbic acid content, and relative water content. This index's value determines plants' tolerance to pollutants because individual biochemical and physiological parameters determine the plant's adaptation to the environment and thus determine the sensitivity or resistance of a species to environmental stress factors. Based on the obtained results, the tested shrubs can certainly be recommended for urban plantings to reduce air pollution.

Keywords: Cornus alba shrubs, Micro-dust impurities, Air pollution tolerance index (APTİ)

FRUIT QUALITY CHARACTERISTICS OF SOME APPLE VARIETIES CULTIVATED IN ORDU ECOLOGY

Serkan Uzun [1,], Umut Ateş [2], Tarik Yarilgaç [2] & Burhan Öztürk [2]*

[1] Department of Crop and Animal Production Düzce University, TURKEY
[2] Horticulture Department Ordu University, TURKEY

serkan.uzun28@hotmail.com

ABSTRACT

This study carried out six different apple cultivars grown in Ordu coastal ecology to determine some physical and biochemical properties. Within the scope of the study, fruit weight, fruit size, firmness, color characteristics, SSC, titratable acidity, and vitamin C values of Mondial Gala, Jeromine, Fuji, Granny Smith, Red Chief, and Scarlet Spur apple cultivars were investigated. İn the study, fruit weight and fruit size were higher in Scarlet Spur (251 g) and Red Chief (240 g) cultivars, while the highest fruit firmness was determined in the Mondial Gala (73.05 N) cultivar. İn addition, the highest SSC content was found in Fuji (12.53 %), while the vitamin C content was found in Scarlet Spur (18.60 mg 100 g-1). As a result of the research, it can be stated that Scarlet Spur and Red Chief varieties come to the fore in terms of features that directly affect the market value of products, such as fruit weight and fruit size.

Keywords: Malus domestica, Color Characteristics, Cultivars, Firmness, SSC, Vitamin C

DETERMINATION OF SOME QUALITY PARAMETERS OF STANLEY AND PRESIDENT PLUM VARIETIES CULTIVATED IN ORDU ECOLOGY

Umut Ateş [1], Burhan Öztürk [1], Tarik Yarilgaç [1] & Serkan Uzun [2,]*

[1] Horticulture Department Ordu University, TURKEY
[2] Department of Crop and Animal Production Düzce University, TURKEY

serkan.uzun28@hotmail.com

ABSTRACT

This study was carried out to determine some fruit quality characteristics of Stanley and President plum (*Prunus domestica*) cultivars grown in Ordu. Within the scope of the study, fruit weight, fruit dimensions, firmness, color, soluble solids content, titratable acidity, and vitamin C properties of fruits were determined. According to the research findings, the Stanley cultivar had significantly higher fruit weight and fruit size values than President cultivar. Similarly, while the titratable acidity content and vitamin C values of the Stanley variety were higher, the soluble solids content of the President variety was found to be higher. As a result of the research, it was found that the Stanley plum cultivar grown in Ordu province ecological conditions has superior characteristics in terms of important fruit quality parameters such as fruit firmness, fruit size, and biochemical characteristics.

Keywords: Prunus domestica, Color characteristics, Firmness, SSC, Vitamin C

EFFECTS OF WATER STRESS APPLICATIONS ON MORPHOLOGICAL AND PHYSIOLOGICAL CHANGES IN SOME HAZELNUT VARIETIES

Ayşenur Bektaş [1,], Damla Çil [2], Meryem Nur Şenel [3], Emin Taylan [4], Merve Şekerli [1], Ahmet Aygün [5] & Aslihan Cantürk [6]*

[1] Breeding Findik Araştirma Enstitüsü, Turkey
[2] İslah ve Genetik Bölümü Findik Araştirma Enstitüsü (Tagem), Turkey
[3] Yetiştirme Tekniği Findik Araştirma Enstitüsü, Turkey
[4] Breeding Findik Araştirma, Turkey
[5] Department of Agricultural Bio-Technology Kocaeli University, TURKEY
[6] Toprak ve Su Kaynaklari Karadeniz Araştirma Enstitüsü, TURKEY

aysnrkndmr@gmail.com

ABSTRACT

This study was carried out in a high tunnel established on the grounds of Hazelnut Research İnstitute in order to determine the morphological and physiological effects of limited irrigation practices on Allahverdi, Çakildak, Foşa, Mincane, Okay28 and Tombul varieties and C. colurna hazelnut. The study was established in a randomized plot design with 3 replications and 5 plants in each replication. The plants were planted in 12 liter pots containing a 2:1:1 mixture of garden soil, sand and peat. İn the study, 3 different irrigation levels were applied (S1= Bringing the missing moisture to the field capacity, S2= Applying 50% of the water given to S1, 25% of the water given to S3=S1); Morphological and physiological changes were determined in plants under stress with these applications. İn the study, plant height, plant stem diameter, shoot length, plant fresh root weight, leaf area values, leaf proportional water content, electrolyte leakage, chlorophyll density, stomatal conductivity values were examined. And also; nutrient content and proline, mda analyzes are carried out. As a result of the analyzes made in terms of irrigation applications; Foşa variety with the highest irrigation amount was applied between 13.20 and 6.65 liters/pot. Then, respectively, 12.03-7.53 liters/pot for Çakildak variety, 11.97-4.17 liters/pot for C. colurna species, 9.60 to 6.45 liters/pot for Okay 28 variety, respectively. Mincane (7.97-5.89 liters/pot), Tombul (8.97-5.33 liters/pot) and Allahverdi (10.00-4.29 liters/pot) varieties were statistically in the same group and the most İt has been observed that they have low water requirements.

Keywords: hazelnut, water stress, drought

SEASONAL FRUIT GROWING OF KIWIFRUIT

Melekber Sülüşoğlu Durul [1,*] *& İsmail Efe* [2]

[1] *Agricultural Faculty Kocaeli University, TURKEY*
[2] *Meteorology Ministry of Agriculture and Forestry, TURKEY*

melekber_s@yahoo.com

ABSTRACT

Hayward cultivar is one of the most important commercial kiwifruits (*Actinidia deliciosa*). İt is a woody fruit that grows in shrub or tree form in tropical and subtropical regions. İt is widely grown in all countries that have favorable ecological conditions, namely İtaly, France, the United States, South Africa, Chile, İtaly, and Turkey. İn its homeland, China, the average winter temperature is 0_°C, the annual average is 20–22 °C, and annual precipitation is 750 mm. İdeal conditions are an average daytime temperature of 4.5 °C in winter and 13.30–13.9 °C in summer, 130–163 mm average annual precipitation, and 76–78% relative humidity. This study was combained to determine the seasonal progres on growing habit of kiwifruits. Together with, kiwi vines age effect was also evaluated. The trial was carried out in an orchard in Kocaeli, Turkey, 2.8 km from the sea at an altitude of 6 m (35°27.6′ N). Fruit measurements (width, thickness and length) were taken throughout the growing season and draw growing lines. The kiwifruit growth curve was characteristically a double sigmoid that reflects two growing phases, fast and slow. Kiwifruit development was affected by many factors such as temperature, light. Plant age was also a factor that affects fruit quality based on how the accumulation of dry substance and sugar vary with age. Age also affected the fruit size and weight.

Keywords: Kiwifruit, growing lne, Kocaeli, fruit growing

FUTURE FRUITS: CURRANT AND GOOSEBERRIES

Melekber Sülüşoğlu Durul [1,] & Hüseyin Şahin [2]*

[1] Agricultural Faculty Kocaeli University, TURKEY
[2] Natural Science İnstitution Kocaeli University, TURKEY

melekber_s@yahoo.com

ABSTRACT

Berries are an increasingly important fruit group in the world while have just known inTürkiye. Currant and gooseberry have an important place in this fruit group. Wild forms of these fruits also common in forest area in Turkey and in the world. This natural populations creates a rich source of genes for scientific research and studies. Today, global warming is an increasing crisis that emerges as a strong situation day by day. İt is necessary to spread the culture of resistant species, which can be succeeded to grow with more limited opportunities in the future. These berries are important for human nutrition with their rich vitamin C and antioxidant activities. İt is important to provide the necessary level of knowledge in terms of breeding. For the future of these fruits, first, it is expected to be widely introduced, to spread modern cultivation methods and to solve marketing problems. Generally, large quantities are processed to frozen or dried fruit, or concentrated fruit juice. A very small amount is consumed as fresh. İn the review article presented here, the studies on currant (black, red and white) and gooseberry fruits in Turkey and in the world were discussed, and the problems and solutions in the cultivation of these fruit species were evaluated.

Keywords: Ribes rubrum, Ribes grossulara, breeding, fruit, cultivation

PHYSIOLOGICAL AND MORPHOLOGICAL CHANGES IN TOMATO PLANTS INFECTED WITH TOMATO LEAF CURL VIRUS

Muhammad Ahmad Zeshan

Plant Pathology University of Sargodha, PAKISTAN

muhammad.ahmad@uos.edu.pk

ABSTRACT

The main objective of the study was to evaluate the effects of TLCVD on growth and yield parameters of tomato plants including their height, no. of fruits, intermodal distance, weight of healthy and infected leaves, no. of leaves and no. of branches. The presence of virus was confirmed by the biological assays such as whitefly mediated inoculation and leaf patch grafting. Growth and yield parameters of both healthy and diseased plants were compared to assess the losses. Leaf area was measured by using leaf area meter while vernier caliper was used for the fruit size. Leaves and fruits were weighed by using electric balance. Plant height was taken by measuring tape. Membrane stability index and electrolyte leakage was calculated by the method of Sairam (1994) and Sullivan and Ross, 1979, respectively. All the aforementioned growth and yield parameters were significantly reduced in infected plants as compared to healthy plants. Plant height, no. of fruits/plant, no. of branches, intermodal distance, no. of leaves/plant etc. decreased in diseased plants. Average electrolyte leakage of healthy leaves was 23% while 94% EL leakage recorded in infected leaves. The membrane stability index of healthy leaves was 61% that reduced to 44% in infected leaves. Average leaf surface area of infected leaves reduced to 5.23 cm^2 as compared to 6.33 cm^2 of healthy plants. TLCV infection interrupted the plant physiology considerably due to which all plant parts and physiological factors that contribute towards yield and quality of produce were greatly affected resulting in heavy yield losses.

Keywords: Virus, Resistance, Screening, Membrane damage, Fruits

EVALUATION OF THE EFFICACY OF SOME ENTOMOPATHOGENIC FUNGUS ISOLATES AGAINST TOMATO LEAF MINER TUTA ABSOLUTA (MEYRICK) LARVAE [LEPIDOPTERA: GELECHIIDAE])

Tadesse Kebede Dabsu [1,] & Orkun Baris Kovanci [2]*

[1] Bitki Koruma Bursa Uludag University, TURKEY
[2] Department of Plant Protection Bursa Uludag University, TURKEY

tadk89@yahoo.com

ABSTRACT

Tomatoes leaf miner (Tuta absoluta) is one of the most important constraints to tomato production. The use of entomopathogen fungi would be a cost-effective solution to control any pest. However, the pathogenicity and virulence difference among entomopathogenic fungi, Beauvaria and Metarhizium isolates and concentrations are not widely well investigated. The objectives of this study were therefore initiated to test the pathogenicity of some entomopathogenic fungus isolates against Tuta absoluta. The experiments were conducted at Bursa Uludag University, Turkey and Kulumsa Agricultural research center, Ethiopia laboratory commencing from 2021 to 2022. Tuta absoluta adults were collected and were reared on tomato seedling in growth chamber. The third instar larvae of Tuta absoluta were inoculated with four Ethiopia EPF isolates (B1, PPRC-56, M1 and M2) and four EPF Turkish isolates (AK-10, AK-14 AK-11 and AK-12) at different conidia concentrations (0, 106, 107,108,109 and 1010 conidia/ml) in a factorial experiment arranged in completely randomized design with three replications. Mortality rate assessment data was conducted and analyzed. The analysis of variance for mortality percentage revealed significant variations ($p<0.05$) among EPF species isolates and conidia concentrations. The results revealed that Beauvaria bassiana isolates were found to show the highest mortality rate 70% to 81%, the lowest LC50, 1.87x104 to 9.79x104 conidia/ml, LC95, 5.68x108 to 1.10x1011 conidia/ml and shortest incubation period LT50 ,3.6 to 5.7 days , highly virulent against Tuta absoluta and should be preferred to be used. Metarhizium anisopliae include M1, M2, AK-11 and AK-12 were determined as moderately virulent against Tuta absoluta having mortality rate 46 to 63 %, the highest LC50, 1.36x106 to 4.94x107 and LT50, 4.3 to 8 However, among all isolates "Metarhizium anisopliae AK-12 " showed the least mortality 46 %, has the highest LC50 value, 4.94x107 followed by "Metarhizium anisopliae AK-11. Hence, the effectiveness of Beauvaria bassania isolates were more than Metarhizium anisopliae . Results also revealed that among EPF concentrations 1x1010 is the most effective dose rate while 1x106 is the least effective to kill larvae. As the current work revealed the potential variation among EPF species isolates and conidia concentrations effectively against Tuta absoluta, further isolates that showed moderately virulent should be further evaluated against Tuta absoluta.

Keywords: Beauvaria bassania , isolates, Metarhizium anisopliae Tomato, ,Tuta absoluta

SEASONAL INCIDENCE OF PREDATORY MITES (ACARI) ON SOME RABI VEGETABLES IN RELATION WITH DIFFERENT ABIOTIC FACTORS

Bilal Saeed Khan [1,], Ali Hussan [2], Muhammad Hamid Bashir [3], İrfan Ashraf [4] & Karim Yar Abbasi [4]*

[1] Entomology Department of Entomology, University of Agriculture, Faisalabad, Pakistan
[2] Entomology University of Agriculture, Faisalabad, Punjab, Pakistan
[3] Entomology University of Agriculture, Faisalabad, Pakistan
[4] Entomology University of Agriculture, Pakistan

bilalentomologyuaf@gmail.com

ABSTRACT

Predatory mites belong to subclass Acari of the class Arachnida. Predatory mites are present everywhere along with plant-feeding mites on different vegetation and field crops. İn present trial, the study was conducted on population dynamics of predatory mites on different vegetables. The vegetables like okra, luffa guard, chillies, cauliflower and brinjals were cultivated at large scale in Pakistan, that are attacked by different insect pest species. Due to high economic importance of these vegetable crops, the study was planned to monitor the population dynamics of predatory mites in relation to different abiotic factors during the period of August to November, 2021. The information collected showed that the maximum predatory mites was population was observed during 2nd week of October on luffa guard (12.16 per leaf basis) and minimum population was recorded during 4th week of November on cow pea (0.40 per leaf basis). The populations of predatory mites were changed according to change in abiotic conditions. One of the most important weather parameters was temperature that affect the population of predatory mites as compared to others factors like humidity and rainfall. Relative humidity has a positive correlation as 0.49 and rainfall showed negative correlation as -0.10, while maximum & minimum temperature also showed a negative correlation as -0.35, -0.49 against the predatory mite's population in different vegetables.

Keywords: Vegetable crops, abiotic factors, predatory mites, Acari

THE PROTECTIVE EFFECT OF SALVIA OFFICINALIS AQUEOUS EXTRACT ON HAEMATOLOGICAL PARAMETERS IN WISTAR RATS.

Kahalerras Labiba [1,] & Chouabia Amel [2]*

[1] Department of Biology University of Badji Mokhtar-Annaba, Algeria
[2] Department of Biology University of Badji Mokhtar-Annaba, Laboratory of Animal Ecophysiology, Algeria

labiba.kahalerras@gmail.com

ABSTRACT

Cypermethrin (Cyp) is an insecticide commonly used on many agricultural crops. This work aims to determine the effect of sub chronic exposure to cypermethrin on the haematological profile of male *Wista*r rats. At the same time, the ability of *Salvia officinalis* leaves aqueous extract, an annual medicinal plant, to prevent the changes induced by cypermethrin. The experiment involved thirty male rats weighing 240 mg / kg body weight (bw) divided into six groups of five rats each: a control group (C): received tap water, a positive control group: treated with sage leaves aqueous extract (*Salvia officinalis*) at 0.5g / kg bw, a group treated with cypermethrin at 8.33 mg / kg bw (İ1), a group treated with a second dose of cypermethrin at 25 mg / kg bw (İ2), a group treated with the combination of the first dose of cypermethrin and leaves aqueous extract of sage (0.5g / kg bw + 8.33 mg / kg bw) (ESİ1) and the final is treated with the combination of the second dose of cypermethrin and the leaves aqueous extract of sage (0.5g / kg bw + 25 mg / kg bw) (ESİ2), by gavage for four weeks. Our results have shown that cypermethrin administered orally to rats causes hemolytic anemia characterized by a decrease in hematological parameters which are; red blood cells (RBC); haemoglobin (Hb); and haematocrit (HCT). İn fact, cypermethrin caused, an increase in the number of lymphocytes (LYM), white blood cells (WBC), and blood platelet concentration (PLT), granulocyte (GRA) and monocyte counts (Mono). However, supplementation with sage (*Salvia officinalis*) led to an adjustment in haematological parameters changes to levels close to those of the control rats. These results displayed that the aqueous extract of *Salvia officinalis* leaves leaves reduces the disturbances caused by this insecticide through to their antioxidant properties.

Keywords: Cypermethrin, Salvia officinalis, antioxidant properties, haematological parameters, Rats.

PHENOTYPIC AND MOLECULAR CHARACTERIZATION OF THE PANTOEA SP. AND KOSAKONIA SP. ISOLATED FROM THE ONION FIELDS IN ESKİŞEHİR, TURKEY

Zahide Özdemir [1,] & Emine Şenay [1]*

[1] Department of Plant Protection Aydin Adnan Menderes Üniversitesi, TURKEY

zozdemir@adu.edu.tr

ABSTRACT

A group of yellow bacteria were consistently isolated from the onion plants collected from the onion fields in Eskişehir, during the harvest period of 2017. İsolations were done from the bulb, neck and leaves. Phenotypic tests were applied and the all the yellow bacteria were grouped as oxidative/ fermentative Enterobacteriacae family member species of the *Pantoea* sp. and *Kosakonia* sp. The *Pantoea* species were classified into the two initial groups as indole positive and –negative strains as the main phenotypic test in discrimination of the *Pantoea agglomerans* and *P. ananatis*. Molecular characterization of the bacterial strains was based on the 16S rRNA and *rpo*B gene sequencing. Genomic fingerprinting of the strains was done using REP-PCR. The sequence analysis of bacterial 16S rRNA gene revealed the two members of *Pantoea* species among the isolated yellow bacteria. Later on *rpo*B sequence analysis revealed the three species of *Pantoea* sp.; *Pantoea agglomerans*, *P. ananatis*, *P. vagans* and *Kosakonia cowanii*. Phylogenetic analysis based on the *rpo*B gene sequence also revealed two groups within the *Pantoea ananatis*. The REP-PCR fingerprints had distinct pattern at species level confirming *rpo*B sequence information. The pathogenicity tests on onion cut slices have shown that *Pantoea ananatis* moderate-weak pathogen and *P. agglomerans* strains were moderately pathogenic or non-pathogenic. The *Kosakonia cowanii* strains were found weak or non-pathogen. To our knowledge, this is the first report of the *Pantoea* and *Kosakonia* species isolated from the onion plants grown in Turkey.

Keywords: Kosakonia sp., onion, Pantoea sp., phenotypic characterization, REP-PCR, rpoB gene

EFFECT OF BROOMRAPE ON BIOMASS ACCUMULATION AND DISTRIBUTION IN SUNFLOWER

Maria Duca [1,], Steliana Clapco [1] & İon Gisca [2]*

[1] Center of Functional Genetics Moldova State University, Moldova
[2] Agroselect Moldova State University, Moldova

mduca2000@yahoo.com

ABSTRACT

Parasitic weeds supply their demand of water, carbon and nutrients from host plants, severely affecting the crop growth, biomass partitioning and causing major yield losses. The impact exerted by parasite depends on the host and parasite species/genotypes, particularities of their interaction, developmental stage, as well as environmental factors. İn the most of cases the degree of damage to the host is dependent on attack intensity. İn this regard, the effect of broomrape (*Orobanche cumana* Wallr.) populations on biomass production and distribution in sunflower was investigated. The experiments were performed under controlled conditions, in greenhouse, using a sunflower hybrid susceptible to broomrape (Performer) and fourteen populations of *O. cumana* with different level of aggressivity. The results indicate that *O. cumana* infestation significantly reduced the biomass accumulation in host plants (by about 20.4-57.1% lower than in uninfested control). No significant correlations were found between this parameter and the intensity of the attack, but it strongly correlated with the amount of biomass of parasitic plants per host plant (r=-0.53). The parasite strongly reduced the host aerial biomass (by 32.0-58.7% compared to the control), high negative correlations (r = -0.52) between this parameter and the intensity of the attack being observed. İnfection also suppressed the accumulation of root parasite biomass (by about 32-49.0%). İn addition, it has been established that the combined biomass of the pathosystem (total biomass of host and parasite) was significantly less than that of the uninfected plants. Thus, biomass losses can be only partially explained by parasitic sink activity and, also, may be due to the negative effects on host photosynthesis. Moreover, *O. cumana* changed the biomass allocation patterns. The values of the shoots: root ratio was lower compared to uninfested control, indicating on the distribution of biomass preferentially to underground part of the host plant, which is the unique point of parasite attachment, in detriment of the aerial parts. These results are in agreement with previous reports regarding other root parasites.

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Keywords: sunflower, broomrape, biomass, biomass distribution, attack intensity.

EFFECTS OF DIFFERENT HERBICIDE APPLICATIONS ON GROWTH PARAMETERS IN CORN (*Zea mays* L.)

Seyda Akbaş

Department of Bioengineering Marmara University, Istanbul, TURKEY

akbaseyda@gmail.com

ABSTRACT

Corn *(Zea mays L.)* is a warm climate grain belonging to the poaceae family (Poaceae) Corn plant, which is used both as a human nutrient or animal feed, and as a raw material for many products in industry, ranks first among the cereals produced. World corn production has maintained its level of 1.1 billion tons in the last 5 market years. İn Turkey 68% of the cultivation areas of corn in our country, whose production and usage amount has increased, consists of grain and 32% silage cultivation areas. Weeds compete with maize for water, light, mineral nutrients and location, as well as a host for diseases and pests. Corn plants are overly sensitive to weeds during its early development period. Especially if the process from the germination period to the 4-6 leaf stage is not professionally managed and the plant competes with weeds, its yield decreases up to 37%. During the weed control process, the application should be prevented from damaging the corn plant. Herbicides can also affect the metabolism of our target plant and cause phytotoxic effects on it, such as delay in emergence, delay in reaching various growth stages such as tasselling, silking or maturation of the grain. Rather than delaying it can directly inhibit plant growth and photosynthesis and cause plant discoloration, necrosis, deformation, thereby affecting maize yield. İn this study, the effects of different dosages (normal and double) of licensed 3 post-emergence herbicides with different active ingredients 40g/l nicosulforon , 480 g/l mesotrione, and 220g/l dicamba+ 50 g/l nicosulforon , which were determined according to the classification made by HRAC (Herbicide Resistance Action Committee) observed.Plant materials 6 different inbred lines (ADK-448, ADK-451, ADK-455, ADK599, MAE-9301, and ADK-310) provided by Sakarya Maize Research İnstitute. The yield and pollination success of the corn observed with the new technology Machvision machine which has never been used before in our country. The herbicide resistance performance of corn varieties to minimize yield losses determined in this study, and this information will set a light for future breeding programs to produce herbicide resistant hybrids and new varieties in our country.

Keywords: Hercide, corn, maize, (Zea mays L.), active ingredients, yield, growth parameters, phytotoxicity,sustainability

THE EFFECT OF TWO ELICITIN GENES DSRNA SPRAYING ON THE SEVERITY OF THE LATE BLIGHT ON POTATO PLANTS

Artemii İvanov [1,] & Tatiana Golubeva [1]*

[1] Department of Plant Protection İnstitute of Cytology and Genetics Sb Ras, SIBERIAN

a.ivanov2@g.nsu.ru

ABSTRACT

Late blight is a destructive plant disease, which is responsible for billions of dollars loss worldwide. İts cause is Oomycete *Phytophthora infestans*. Fungicides remain the most effective way to combat it, however being harmful to the environment. Spray induced gene silencing seems to be a promising alternative. İt involves double-strand RNA (dsRNA) spraying to silence a certain gene *via* the RNA interference (RNAi) pathway. Being highly specific, the method allows one to choose any gene with known sequence as a target for silencing, also sharing the application technique with conventional fungicides. The question of spray-induced gene silencing (SİGS) effectiveness against *P. infestans* is now on the scope of researchers, who are looking for the optimal application parameters, and trying different genes as targets. İn this work we measured how dsRNA spraying affects the pathogen virulence on Solanum tuberosum plants. We chose two P. infestans genes as targets, *inf1* and *inf4*. Former gene's product is involved in the necrosis induction, while later is active in the early stage of infection, and is shown to promote the severity of it. Two plasmids, containing *inf1* and *inf4* genes fragments, were constructed on the L4440 vector basis. A RNase İİİ-knockout *E. coli* strain HT115 was transformed with them to produce dsRNA. The potato plants for the experiment have been growing for 6 weeks. Each group of plants was either sprayed with water, one or both gene dsRNA. All plants were infected with *P. infestans* zoospores after 24 h after the treatment. Each leaf of a living plant was inoculated once, following 5 days incubation under high humidity conditions. The İmage J tool was used for the disease area measurement. Preliminary results showed the effectiveness of the proposed method of protecting *Solanum tuberosum* plants from late blight. The work was supported by a grant from the President of the Russian Federation for state support of young Russian scientists (МК-4311.2022.5) The authors are both affiliated with the İnstitute of Cytology and Genetics SB RAS and Novosibirsk state university, Russia.

Keywords: Phytophthora infestans, RNAi, exogenous dsRNA

EFFECT OF DIATOMACEOUS EARTH ON STORED PRODUCT PEST *Oryzaphilus surinamensis* L. (COL: SILVANIDAE)

Hilal Susurluk

Science and Technology Application and Research Center Bursa Uludag University, Bursa, TURKEY

hilalsusurluk@uludag.edu.tr

ABSTRACT

Oryzaephilus surinamensis L. (Coleoptera: Silvanidae), an important stored product pest, is a pest that causes high product losses if not controlled. On the other hand, diatomaceous earth is an odorless, non-staining, micron-sized soil consisting of unprocessed and fossilized algae. Since it is natural, it has a very low toxic effect on the environment and mammals. İt is known that diatomaceous earth has an insecticidal impact against many pests in the field of plant protection. The gradual withdrawal of active ingredient-based synthetic chemicals from pest control has led to a re-evaluation of natural powders such as diatomaceous earth for a new, effective, and sustainable control. İn this study, the insecticide effect on *O. surinamensis* was investigated by making use of some characteristic features of diatomaceous earth. For this purpose, diatomaceous earth was mixed homogeneously into raisins and wheat, which are among the main product damaged by *O. surinamensis*, under laboratory conditions. Glass jars with lids (4.5 x 9.5 cm) were used for the experiment. After placing the product and diatomaceous earth mixture in g diatomaceous earth/kg product into the jars, twenty *O. surinamensis* adults were placed and the lids were closed. A single dose (0.03 g diatomaceous earth / 30 g product) was used for each product and 3 replications were applied. The experiment was carried out at 25 ± 2°C temperature and 70% humidity conditions and repeated 2 times. The insecticidal effect of diatomaceous earth on adults was evaluated after 24, 48, 72, and 96 hours. When the effect of diatomaceous earth on *O surinamensis* adults fed on raisins and wheat was evaluated; The LT50 and LT90 (hours) values were found to be 35.680 and 97.942 hours for raisins and 26.535 and 70.508 hours for wheat, respectively. No death was observed in the control groups during this period. Diatomaceous earth was found to high effect in controlling *O. surinamensis* in wheat and raisins.

Keywords: Oryzaphilus surinamensis, Diatomaceous Earth, İnsecticide Effect

ERWINIA PERSICINA, A SOFT ROTTING BACTERIUM ISOLATED FROM SYMPTOMATIC PLANT PARTS OF CELERY, GARLIC AND SUGAR BEET IN TURKEY

Murat ÖZTÜRK

Yozgat Bozok University, Faculty of Agriculture, Department of Plant Protection, Yozgat, Turkey

murat.ozturk@bozok.edu.tr

ABSTRACT

Several bacterial pathogens are causative agents of soft rot disease in plants. Erwinia persicina is a member of the Enterobacteriaceae family that has been associated with soft rot diseases in several host plants. In 2019, pectinolytic bacterial colonies were obtained from soft-rotted garlic cloves (collected from Taşköprü town, Kastamonu province), sugar beet roots (collected in Sorgun city, Yozgat province), and from watery-wet necrotic areas on leaves of celery (collected in Gevye city, Sakarya province). The purified white and mucoid bacterial colonies on King's B medium were Gram-negative, facultative anaerobic, oxidase-negative, catalase-positive, hydrolyzed gelatin, tolerated 5% NaCl, and macerated the potato tuber slices. PCR analysis revealed no specific PCR products with primers Y1/Y2 and ADE1/ADE2 targeting Pectobacterium and Dickeya spp., respectively. The MALDI-TOF MS analysis showed that the strains belonged to E. persicina. In addition, PCR assay was performed using the primers gapA-7-F/gapA-938-R, and the obtained 932 bp PCR products were sequenced using Sanger technology. Blastn analysis was performed to compare the partial gapA sequences (Genbank accession numbers: OP329415-OP329417) with the available DNA sequences in the NCBI Genbank database. The highest nucleotide similarity was found for the complete genome of E. persicina strain B64 (Genbank accession number: CP022725.1). The similarity was 97.3% for strain Krv6.5 (from celery), 100% for strain Gr6.3 (from garlic), and 100% for strain P52.5 (from sugar beet). The closest species identity was found for E. rhapontici with 95.5% nucleotide similarity.

Key words: Erwinia persicina, bacterial pathogen, gapA gene, soft rot

FUNGAL DIEASES IN LAVENDER (*Lavandula spp.*)

Jannat Khan [1,] & Nuray Özer [1]*

[1] Department of Plant Protection Namik Kemal University, Tekirdağ, TURKEY

cennet-han@windowslive.com

ABSTRACT

Lavender (*Lavandula spp*.) is a plant that draws attention worldwide as an aromatic and ornamental plant especially, and is used for many different purposes. İt is preferred because of its ability for adaptation to different climatic and soil conditions, and for resistance to drought and diseases. However, the studies from different countries showed that fungal diseases caused by *Phytophthora spp., Fusarium spp., Septoria lavandulae, Rhizoctonia solani, Botrytis cinerea, Sclerotinia sclerotiorum, Phoma lavandulae* and *Phomopsis lavandulae* caused significant losses in lavender. *L. angustifolia, L. stoechas, L. pubescens, L × intermedia, L. × allardii, L. dentata* and *L. hybrid* are among the lavender species which these diseases appeared. İn this review, the symptoms of fungal diseases reported in different lavender species and some morphological characteristics of the fungal species are mentioned in the light of the current literature.

Keywords: Lavanta, Lavandula spp., fungal diseases

WHICH PLANT SPECIES IS MORE SUITABLE FOR THE CONTROL OF TETRANYCHUS URTICAE WITH AMBLYSEIUS SWIRSKII?

Pinar Hephizli Göksel [1,] & N. Alper Kumral [1]*

[1] Department of Plant Protection/ Graduate School of Natural and Applied Science Uludağ University, Bursa, TURKEY

pinar.hephizli@tarimorman.gov.tr

ABSTRACT

Two-spotted spider mites, *Tetranychus urticae* (Koch) (Acari: Tetranychidae) causes very high economic losses in vegetable cultivation. The predatory mite, *Amblyseius swirskii* Athias-Henriot (Acari: Phytoseiidae), is commercially used for biological control of *T. urticae* as well as thrips and whiteflies, around the World. Since the leaves, petioles and stems of vegetable plants are covered with glandular or unglandular trichomes, the predatory performance, development, survival and fecundity of the predatory mite are negatively affect from these plant defence structures. This tritrophic interaction in vegetable plants leads to complication for biological control of *T. urticae*. The aim of this study was to compare the biological parameters of a native strain of *A. swirskii* when feeding on *T. urticae* adults on different vegetable species such as tomato, pepper, eggplant, cucumber and bean. The observations on the development, survival, oviposition and life table parameters of *A. swirskii* were carried out under controlled laboratory conditions with a 16 h light : 8 h dark photoperiod at 27 ± 1°C and 70 ± 5% RH. Also, functional and numerical responses of *A. swirskii* were determined under same laboratory conditions. As a results of this study, *A. swirskii* was able to develop successfully from egg to adult stage through their entire life cycle on *T. urticae* in all plant species. But, our findings suggest that tomato and pepper were more suitable hosts for *A. swirskii* feed on *T. urticae* compared other vegetable species. This study was a part of Doctoral thesis of the first author and funded as a research project (TAGEM/BSAD/A/20/A2/P5/2043) by TAGEM.

Keywords: Biological control, life tables, Phytoseiidae, predator, tritrophic interaction, vegetables.

RESEARCH OF RESISTANCE OF WESTERN FLOWER THRIPS, FRANKLINIELLA OCCIDENTALIS (PERGANDE) (THYSANOPTERA: THRİPİDAE) POPULATIONS TO DIFFERENT INSECTICIDE GROUPS

Duygu Demiröz [1,] & N. Alper Kumral [2]*

[1] Department of Plant Protection Uludağ University, TURKEY

duygu.demiroz@tarimorman.gov.tr

ABSTRACT

Frankliniella occidentalis [(Pergande) (Thysanoptera:Thripidae)], also known as Western flower thrips, harms vegetables and ornamental plants in our country, is a difficult pest to control. Especially in confined areas such as greenhouses, producers apply insecticides intensively and frequently in order to have a short-term effect on this pest. İt has been shown that *F. occidentalis* develops resistance to insecticide classes from different groups in many agricultural products. Due to the failure of the control as a result of resistance development, overdosing and frequent spraying is performed, which increases the product cost. This also causes other problems such as environmental pollution and the impact of pollinators. Resistance to pesticides in pests directly affects productivity in agricultural production. This study will be carried out in greenhouses in different provinces in Aegean Region (İzmir and Manisa) which is known to used plant protection products (PPP) intensively. The resistance status of *F. occidentalis* populations against synthetic pyrethroid, carbamates and spinosyn group insecticides (spinosad, spinoteram, acrinathrin, %50 formetanate hydrochloride) will be determined by capsule dipping bioassay. This doctoral thesis work was carried out by Uludağ University Faculty of Agriculture, Department of Plant Protection that is carried out under the supervision of Prof. Dr. N. Alper KUMRAL.

Keywords: Frankliniella occidentalis, insecticide resistance, bioassay studies.

CRITICAL TIME FOR WEED REMOVAL IN CORN AS INFLUENCED BY PLANTING PATTERN AND HERBICIDES

Marija Nedeljkovic [1,], Sava Vrbničanin [2], Dejan Nedeljkovic [3], Dragana Bozic [3] & Stevan Knezevic [4]*

[1] Weeds Science Faculty of Agriculture İn Belgrade, Serbia
[2] Weed Science University of Belgrade - Faculty of Agriculture, Belgrade, Serbia
[3] Weed Science University of Belgrade - Faculty of Agriculture, Serbia
[4] Agronomy and Horticulture University of Nebraska Lincoln, Serbia

dejanbrus@gmail.com

ABSTRACT

Weeds are strong competitors due to their ability to adapt to changing environmens. Therefore, it is very important to create such conditions in agrophytocenoses so that the crops have a competitive advantage over weeds. This can be achieved among other things, by the optimal planting rate of crops and timely weed control. For timely weed control, it is very important to know the critical period in crop development when it must be free of weeds, and this is a key link in establishing a system of integrated crop protection against weeds. The objective of this project was to define the critical time for weed removal (CTWR) in two corn planting systems.Therefore, field experiments were conducted from 2015 to 2017 in the Southern Banat (north east Serbia), to evaluate the effects of two planting pattern (standard and twin-row) with and without PRE-applied herbicides on CTWR in corn. The studies were laid out in a split-plot arrangement with two main plots: (i) standard rows system (SRS) 70cm wide and (ii) twin rows system (TRS) 50cm wide rows. Each main plot divided into two sub-plots, one with PRE herbicide, and second without PRE herbicide application, and there were also seven weed removal timing as sub-sub-plot within each sub-plot. For PRE herbicides tank-mix were utilized (S-metolachlor (1.44 kg a.i. ha-^{1}) + terbutylazine (0.75 kg a.i. ha-^{1})).İn the case of corn production under standard planting model in the variant without PRE herbicides, CTWR were at early stages of corn (V1-V2 stages), while in variant with PRE herbicide were delay to V4 to V10 growth stage. However, under twin row planting model without PRE herbicides, CTWR were V2 growth stage, which is early then were in variant with PRE herbicide (V3 to V11 growth stage), for the respective planting patterns, years, and localities.

Keywords: corn, CTWR, planting pattern, crop density, grain yield, PRE herbicides.

DISEASE AND PEST MANAGEMENT IN EDIBLE GRAPE LEAF PRODUCTION

Damla Zobar [1,], Mehmet Ali Şenol [2], Ahmet Semih Yaşasin [3], Ali İzzet Torçuk [3] & Mehmet Ali Kiraci [2]*

[1] Department of Plant Protection Viticulture Research Institude, Turkey
[2] Department of Agricultural Economy Viticulture Research Institude, Turkey
[3] Department of Horticulture Viticulture Research Institude, Turkey

damlaozyigit@msn.com

ABSTRACT

The universal value of the vine leaf, which has a special place in the Turkish cuisine culture, is gradually increasing. Products produced using different grape varieties and growing techniques have gained a place in the food market. Problems experienced due to pesticide residues during its introduction to the market necessitated the correct production model and processing studies. This study was carried out on edible grape leaves of the geographically indicated 'Yapincak' grape variety of Tekirdağ province in 2018-2019. For the purpose of production model optimization, disease and pest management was studied on 12 different production models. Production models; 3 leaves (Y3) - 100% grape harvest (Ü100), Y3-Ü75, Y3-Ü50, Y3-Ü25, Y5-Ü100, Y5-Ü75, Y5-Ü50, Y5-Ü25, Y7-Ü50, Y7-Ü25, was designed as leaf (Y9) and grape harvest only. Even in vineyards with conventional agricultural practices, it is difficult to control diseases [Powdery mildew - *Uncinula necator* (Schw.) Burr.; Downy mildew - *Plasmopara viticola* (Berk. & M.A.Curtis) Berl. & De Toni] and pests [Grape vine bud mite - *Colomerus* (=*Eriophyes*) *vitis* Pgst.; European grapevine moth - *Lobesia botrana* Den.et Schiff.] and they can cause high economic losses. These factors make the production of edible grape leaves, which can be used with limited preparations due to food safety, even more difficult. İn this study Sulfur, Copper, Metrafenone, Penconazole and *Bacillus thuringiensis var. aizawai strain* ABTS-1857 were used for the control of diseases and pests. İt was used in accordance with the harvest times in the production models (7-10 days). Climatic factors (precipitation, humidity, temperature) made a difference in the number of applications over the years. Leaf (Y9) and grape-only harvesting models were more successful in controlling diseases and pests than the leaf + grape combinations. İt has been observed that defoliation processes provide better aeration of the vines, therefore, fungal disease development is less. When the project data is evaluated in terms of economy, Y7-Ü50 model came to the fore. On the other hand, in terms of disease and pest management, the combination of Y5-Ü50 was found to be more applicable as a result of this study.

Keywords: Viticulture, Vitis vinifera L., Yapincak, Grape leaf, Plant protection

FARMER FIELD SCHOOLS- AN INQUIRY BASED LEARNING APPROACH TO PREPARE FARMERS FOR FUTURE CHALLENGES

Manzoor Soomro

Eco Science Foundation Economic Cooperation Organization Science Foundation (Ecosf)

manzoorhsoomro@gmail.com

ABSTRACT

Feeding the ever-growing population and the related industry around the world, means harnessing the food and agriculture (raw material) systems more effectively and efficiently to ensure sustainable agricultural & industrial development and food security. Agriculture production influences availability as well as diversity of diet. The improvement in crop-livestock productivity and diversity increases farm incomes; reduces consumer prices and enhances diverse food and industrial supplies. Agriculture also stimulates rural development which is realized in the form of an increased supply of raw materials for the processing industries, workforce employment, and productive infrastructure development at the community level. A sustainable agriculture ensures food security for all in such a way that the economic, social and environmental basis for generating food security and economic development for future generations is not compromised. Hence the fundamental rights of every human being can be protected if provided with sufficient quality food that is healthy, affordable, safe and culturally acceptable. To ensure the sustainable agricultural development and food security, there are a number of stakeholders responsible; and one of the key stakeholders is the producer- the farmer. With the current boom of disruptive technologies such as Artificial İntelligence (Aİ) in every sector including agriculture, the capacity of the producer/farmer in dealing with diverse challenges, is a prerequisite- rather vital. Thus, the education of farmers in understanding the science of crop production, crop nutrition & protection, animal husbandry & production, the science of climate change and use of technologies, is essential to enable them (farmers) to remain competitive sustainable producers. Farmers work in the crop fields and animal farms; and any education/training programmes must go to the farm for hands-on learning, rather than taking farmers to the walled environments of institutions for educating them just theoretically. They must be educated and made skilful through an inquiry based and hands-on learning method. The best hands-on method so far recognised worldwide, has been the season-long Farmer Field School (FFS); whereby 25-30 farmers facilitated by expert facilitators come together to work in groups and discuss their crops and pest management. They work like scientists, observing their crops pass through different stages of growth and what scientific processes take place during the crop/animal growth till maturity, what factors and how they affect crop growth, what nutrition and inputs etc. are required? They set up experiments, collect data, make analyses in groups and take data-based decisions. FFS process not only makes the farmers experts of their crops livestock but also empowers them to take key decisions by themselves for crop management. İt also leads to community organization and the participants become better managers of their personal matters and community issues as well as the agro-ecosystem and the services it provides. This presentation will highlight the FFS as an inquiry-based

learning approach and touch upon the principles and important aspects of FFS as well as the convenience it provides for farmers' practical learning, empowerment and leadership skills. İt will also highlight the fast-growing use and importance of disruptive technologies in agriculture and the need for the farming community to develop their skills to handle new technologies.

Keywords: Farmers, FFS, Agriculture, Climate Change, Food Security, Pest Management, İPM

THE BEST4SOIL DATABASES: A UNIQUE DECISION SUPPORT TOOL FOR THE PLANNING OF SOUND CROP ROTATIONS

Vincent Michel [1,], Leendert Molendijk [2], Paulien Van Asperen [2], Miguel De Cara [3], Günther Weinlinger [4] & Harm Brinks [5]*

[1] Plant Production Systems Agroscope, Germany
[2] Nematology Wageningen University & Research, Germany
[3] Department of Plant Protection İfapa, Germany
[4] Ceo 7Reasons Gmbh, Germany
[5] Department of Field Crops Delphy, Germany

vincent.michel@agroscope.admin.ch

ABSTRACT

Healthy soils are of major importance for the future of the European horticultural and agricultural crop production. Newly developed best practices and sound crop rotations permit to maintain, improve or re-establish soil health in Europe. The Horizon 2020 Network Best4Soil (www.best4soil.eu) promotes four best practices for the improvement and re-establishment of soil health. They are the application of compost and organic amendments, the cultivation of green manures and cover crops, the anaerobic soil disinfestation (ASD), and the (bio)solarisation. İn addition to these four practices, Best4Soil especially stresses the implementation of sound crop rotations to reduce the threat of soil borne diseases caused by plant parasitic nematodes and fungal plant pathogens. For this purpose, Best4Soil created two decision support tools in form of databases with information on the host status, potential damage and multiplication abilities of soil borne nematodes and pathogens for 29 vegetables including strawberry, 20 arable crops and 21 green manure and cover crops. The nematode database includes information on 31 plant parasitic nematode species. İn the pathogen database, 135 fungal and 2 bacterial pathogens are listed. This list includes also ***forma specialis*** for two ***Fusarium*** species and anastomosis groups for ***Rhizoctonia solani***. With the help of the two databases, growers and advisers can establish sound crop rotations to minimise the risk of an infection by soil borne nematodes and pathogens. The databases offer also assistance for the diagnostic of soil borne diseases. İn this context, the so-called “wikis” i.e., background information on specific crop x nematode or pathogen combinations that are linked to the databases, are most helpful. The databases are published in 22 languages and will be operational for at least five more years after the end of the Best4Soil project i.e., until March 2027. With adequate funding, for example by sponsoring, the databases will be operational above this date.

Keywords: decision support tool, databases, soilborne pathogens, plant parasitic nematodes, strawberries, vegetables, green manures

DETERMINATION OF RESISTANCE TO ALS INHIBITOR HERBICID IN WILD MUSTARD IS A PROBLEM IN WHEAT FIELDS IN AMASYA AND ÇORUM PROVINCES

Nagehan Çil Turgut [1,], Hüsrev Mennan [2] & Emine Kaya Altop [2]*

[1] Ziraat Mühendisi/Bitki Koruma/Herboloji Karadeniz Tarimsal Araştirma Enstitüsü Müdürlüğü, Turkey
[2] Department of Plant Protection Ondokuz Mayis University, TURKEY

nagehan.cil@tarimorman.gov.tr

ABSTRACT

The method commonly used to solve the weed problem in wheat production areas in our country is the chemical control method. Herbicides, which are increasingly used for weed control in wheat fields, can cause many problems besides the benefits they provide.The most important of these problems is the herbicide resistance, which is defined as the reduction or disappearance of the herbicide's ability to control the population of the target weed species. Amasya and Çorum provinces in the Middle Black Sea Region in terms of both cultivation area and production area are the provinces where wheat agriculture is concentrated in the region. Wild Mustard (*Sinapis arvensis* L.) is important and common among weeds encountered in wheat production areas. İn the fight against Wild Mustard in wheat production areas, chemical control is intensely carried out with herbicides that inhibit ALS (Acetolactate synthase) enzyme. İt is known that resistance to this group of herbicides which are used extensively can develop in a short time. İn this study, resistance status of the piercer against ALS enzyme inhibitor herbicides, which are used extensively in wheat production areas of Amasya and Çorum provinces, was determined between 2015-2020. As a result of the field studies carried out for this purpose; İn Amasya and Çorum Provinces, 92 insane populations collected from wheat production areas were collected and the coordinates of the seed fields were determined. F2 offspring were obtained by planting the collected crazy populations in the greenhouse. The F2 populations obtained were subjected to N(dose) screening test with herbicides containing mesosulfuron-methyl+iodosulfuron-methyl sodium active substances under greenhouse conditions. Dose response trials with 8 different doses were established under greenhouse conditions in order to determine the resistance status of the populations with suspicion of resistance as a result of the screening test. As a result of the greenhouse works; mesosulfuron-methyl+iodosulfuron-methyl sodium in 16 populations.

Keywords: Wild Mustard (Sinapis arvensis L.), herbicide resistance, ALS, wheat

DETERMINATION OF HERBICIDE RESISTANCE WITH MESOSULFURON-METHYL + IODOSULFURON-METHYL-SODIUM ACTIVE SUBSTANCE OF WILD MUSTARD IS A PROBLEM IN WHEAT CULTURES OF SAMSUN PROVINCE

Nagehan Çil Turgut [1,], Hüsrev Mennan [2] & Emine Kaya Altop [2]*

[1] Ziraat Mühendisi/Bitki Koruma/Herboloji Karadeniz Tarimsal Araştirma Enstitüsü Müdürlüğü, Turkey
[2] Department of Plant Protection Ondokuz Mayis University, TURKEY

nagehan.cil@tarimorman.gov.tr

ABSTRACT

Wheat, which is of great importance in human nutrition, must be effectively combated against diseases, pests and weeds in order to increase the yield and quality of the product in its cultivation.Herbicides are used extensively in the fight against weeds. Herbicides are economical and require less labor. However, the use of herbicides with the same mechanism of action for many years in a row in the same field causes the development of resistance mechanism in weeds. For this reason, in terms of the sustainability of our country's agriculture, the use of herbicides and the control of weeds reveal the necessity of establishing some strategies and managing this process. For this purpose, the resistance status of 36 wild mustard (Sinapis arvensis) collected from Samsun province in the wheat cultivation areas was investigated against the active substance mesosulfuron-methyl+iodosulfuron-methyl-sodium, which is one of the ALS enzyme inhibitor herbicides. The collected wild mustard populations were subjected to the herbicide 2N (dose) screening test with mesosulfuron-methyl+iodosulfuron-methyl-sodium active substance under greenhouse conditions. New generation offspring were obtained in the greenhouse from populations with suspected resistance. İn order to determine the resistance status of the obtained new generation populations, dose effect trials were conducted with 8 different doses of herbicide. As a result of greenhouse works; İn Samsun province, resistance against mesosulfuron-methyl+iodosulfuron-methyl-sodium was determined in 6 populations.

Keywords: Wild Mustard (Sinapis arvensis L.), herbicide resistance, ALS, wheat, mesosulfuron-methyl+iodosulfuron-methyl-sodium

EVOLUTION OF THE IMPACT OF LEUCOPTERA SCITELLA ON APPLE ORCHARDS FROM BISTRITA AREA IN NORTHERN ROMANIA

Rosu-Mares Smaranda

Department of Plant Protection Fruit Research and Development Station Bistrita, ROMANIA

smaranda.boila@usamvcluj.ro

ABSTRACT

The pear leaf blister moth has been a constant presence in the ecosystems represented by apple orchards since the beginning of the intensive cultivation of this fruit tree species in Romania. *Leucoptera scitella* Zell. is a insect pest widespread throughout Eurasia where it is considered native. Multiannual monitoring by pheromone traps and visual observations on damage caused by Leucoptera scitella Zell., in orchards in northern Romania shows an important variability in both adult male catches of this species and the impact that this microlepidopter has on tree foliage. İf in the firs year of the experiment the catches were a few hundred individuals during the summer, in the following years the catches droped under 100 adult males/trap/year. As a consequence the impact on the foliage of apple orchards also decreased. Monitoring of the pest *Leucoptera scitella* was done in the period 2019-2021 in an apple orchard treated with conventional insecticides and an untreated orchard. İn the years 2020-2021 the damages produced were sporadic even in the untreated orchards in this area. Similar results obtained in the two types of ecosystems suggest that the reduction of the impact of this pest on trees has other causes than those related to insecticide treatments applied in orchards and is rather related to the specific climate of the year.

Keywords: leaf damage, multiannual monitoring, pear leaf blister moth, pheromone traps,

SUNFLOWER THEME IN PAINTING

Melihat Tüzün [1,] & Kübra Yildiz [1]*

[1] Painting Fine Art Faculty, TURKEY

melihattuzun@trakya.edu.tr

ABSTRACT

From past to present, the artist has questioned both what is and what is behind the existing in the universe, which is in eternity and obscurity. İn this process, the artist chose to reshape his work with his own subjective thought. İn this context, the artist reflected his work by feeding from nature, and nature has been a very important factor in the development of the artist and the formation of his art. Sunflower paintings are evaluated in still life (still life) or landscape painting, one of the types of painting art, according to the way they are handled. Sunflowers, as the artist's source of inspiration and inspiration, take place in the works of artists both as a subject and as a material.İn this process, the artists not only imitated the theme, but also used surrealistic expressions that reflected their emotions more intensely. İn the 20th century, in the paintings of Claude Monet, Gustav Klimt, Egon Schille and Guido Borelli, especially by Van Gogh, very influential paintings on the Sunflower theme appear. İn this study, the works of Van Gogh, Egon Schiele, Gustav Klimt, Claude Monet, Egon Schille and Guido Borelli will be researched, analyzed and analyzed by using the qualitative research method. Sunflower theme will be the subject of the research as an area where the artists covered in the research are fed.

Keywords: Sunflower, Painting, Art, Theme

POPULATION DENSITY OF APHIDS ON SOME HYBRİD CULTIVARS OF SUNFLOWER (*Helianthus annus* L.) AT DIFFERENT DEGREE OF WEEDING

Lilyana Koleva

Department of Plant Protection University of Forestry, BULGARIA

liljanakoleva.lk@gmail.com

ABSTRACT

The cultivated sunflower is one of the main oil-bearing crops in the world and it is determined in Bulgaria as the main strategic crop. The aphids of sunflower are one of the factors that reduce the yield and quality of the production. The investigations were carried out in 2020-2021 in training trial field Vrazhdebna of the Forestry University, Sofia (42°70'76.1"N, 23°43'73.1"E). The following hybrid cultivars 'Dracaris CLP', 'Coloris CL', 'Accordis CLP' and 'İn Sun CLP' The plant were tested. Studies were carried out under field conditions by observing and reporting the natural infestation of experimental plant material by existing local populations of aphids. The species composition of aphids was determined, with the dominant species *Aphis euonymi* Fabricius и *Sipha (Rungsia) maydis* Passerini. The data collected for the observation period showed different degrees of attack (0 – 7). The studied hybrid cultivars 'Dracaris CLP' and 'Coloris CL', were strongly attacked by aphids, with the highest degree reported in (7.6 ± 0.1 and 6.7± 0.1 resp.) and the lowest (4.1 ± 0.3) in the 'Accordis CLP'. Aphid infestation was not reported in the hybrid 'İn Sun CLP'. The relationship between degree of weeding and the attack by aphids was strong (R= 0.61– 0.74). The obtained results give reason to conclude that the hybrid cultivars have different host suitability to aphids and their degree of attack may be influenced by the degree of weeding.

Keywords: sunflower, aphids; host suitability; weeding

Echinochloa SPP. IN RICE FIELDS IN BIGA, TURKEY

Buse Ezgi Kurban [1,] & Ahmet Uludag [1]*

[1] Department of Plant Protection Çanakkale Onsekiz Mart University, Agriculture Faculty, TURKEY

buseezgikurban@gmail.com

ABSTRACT

The Biga district of the Çanakkale Province of Turkey is an important agricultural hub for many crops such as rice. Weeds are the foremost problems in rice production. *Echinochloa* spp. are considered as the number one weed in rice fields because they have several species and lower taxons, large distribution and heavy densities, some herbicide resistant populations, and higher competitive and hybridization ability. Furthermore, here is no consensus on taxonomy of *Echinochloa* spp.. Such a multifaced problem requires proactive approach to be managed of which ecology and biology of crop and weeds should be known in detail. This study is carried out in Biga from July to September 2021 to find out species in relation to ripening times. According to plant and seed morphology three *Echinochloa* species were identified using morphological characters excerpted from several Echincohloa identification keys. İt was diagnosed as 30 plants *Echinochloa crus-galli*, five plants *Echinochloa oryzoides*, and one *Echinochloa colona*, which the latter has not been reported from rice fields in Biga. İdentified lower taxons of Echinochloa cruss-galli were 20 *E. crus-galli* var. *crus-galli*, six *E. crus-galli* var. *mitis*, one *E. crus-galli* var. *praticola* and one *E. crus-galli* var. *Breviseta*. This presentation is prepared from the masters thesis of Buse Ezgi KURBAN.

Keywords: Echinochloa crus-galli, Echinochla colona, Echinoloa oryzoides., Lower taxon, Proactive approach

WEEDS AND THEIR MANAGEMENT IN SUNFLOWER FIELDS IN PAŞAELİ, TURKEY

Çağnur Çam [1], Feyza Aykan [2], Mert Yikilmaz [3] & Ahmet Uludag [4,]*

[1] Plant Protection Çanakkale Onsekiz Mart University, TURKEY
[2] Plant Protection Çanakkale Onsekiz Mart University, TURKEY
[3] Plant Protection Department Çanakkale Onsekiz Mart University, TURKEY
[4] Department of Plant Protection Çanakkale Onsekiz Mart University, Agriculture Faculty, TURKEY

ahuludag@yahoo.com

ABSTRACT

European part of Turkish territory, called Paşaeli, is an important sunflower growing area of Turkiye with half of production. A field study was carried out in three provinces of Pasaeli, the Edirne, Tekirdağ and Kirklareli to find out weeds and weed management methods in June, July and August of 2019. Five fields were chosen from a village of each province. The number of weed species were 9, 14 and 26 for Edirne, Tekirdağ and Kirklareli, respectively, out of 36 species. Wheat-sunflower rotation is the main system with some exceptions. Tillage after harvest and soil preparation with a second-class equipment in late March-early April are the main cultivations. Machine hoeing and herbicides are main weed control methods although it chances among provinces. Due to use of imidazolinone (herbicide) resistant varieties İmazamox is the most common herbicide followed by ACCase herbicides to control grass weeds. Xanthium strumarium was the most common weed in all observations but higher densities were found in August. İt is concluded that more species in Kirklareli is result of less weed control implementation (only once herbicide) and less species in Edirne is result of more weed control implementation including mechanical control.

Keywords: Edirne, Kirklareli, Tekirdağ, İmidazolinone resistant sunflower, mechanical control, ACCase

DETERMINATION OF RESISTANCE IMPROVING POTENTIAL OF BEMISIA TABACI (GENN.) (HEMIPTERA: ALEYRODIDAE) GENETIC GROUPS AGAINST CYANTRANILIPROLE

İsse Hassan Ali [1] & Utku Yükselbaba [1]*

[1] Department of Plant Protection Akdeniz University, İnstitute of Natural and Applied Sciences, TURKEY

uyukselbaba@akdeniz.edu.tr

ABSTRACT

The cotton whitefly *Bemisia tabaci* (Genn.) is one of several major insect pests that inflict widespread crop damage. Middle East-Asia Minor (MEAM1) and Mediterranean (MED) genetic groups are the two most invasive and damaging cryptic species of *B. tabaci*. İn the study, it is aimed to determine the resistance development potential in *B. tabaci* MED and MEAM1 groups against cyantraniliprole. İn addition, multiple resistance development potential in MED and MEAM1 to acetamiprid, pyriproxyfen, and spirotetramat were also determined. Cyantranilprole was applied to first instar stage of *B.tabaci* by systemic uptake method. Acetamiprid, Pyriproxyfen and Spirotetramat was applied by leaf dipping method to adults, eggs and second instar stages of *B. tabaci* respectively. After determining the LC50 values of *B.tabaci* MEAM1 and MED against to the mentioned insecticides, each group was selected six times separately with cyantraniliprole. The İnitial LC50 of MEAM1 and MED were determined as 0.298 mg a.i /l, and 0.283 mg a.i /l, respectively. After selection, The LC50 of MEAM1 and MED were observed as 0.508 mg a.i /l and 0.368 mg a.i /l respectively. Resistance ratios in MEAM1 and MED were found as 1.7 and 1.3-fold respectively. According to the findings obtained in the study, it was determined that *B. tabaci* MEAM1 and MED had developed a very low resistance to the cyantraniliprole. A multiple resistance development was observed in *B.tabaci* MED against pyriproxyfen while it was not found in MEAM1. There was no multiple resistance observed in MEAM1 and MED against acetamiprid and spirotetramat. The study revealed that in *B. tabaci* MEAM1 and MED genetic groups have a slight resistance development with cyantraniliprole when selected six times. However frequent use of Cyantraniliprole should be avoided. Resistance screening studies in *B. tabaci* populations to cyantraniliprole should be carried out regularly. The obtained data will be a useful reference for future monitoring and management of insecticide resistance.

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Keywords: biotype, diamide, insecticide, resistance, tobacco whitefly

EVALUATION OF EFFICACIES OF SOME FUNGICIDES IN CONTROL OF ROOT AND CROWN ROT DISEASE ON THE COOL-SEASON TURFGRASSES

İrfan Sürer [1,] & Necip Tosun [2]*

[1] Satiş-Pazarlama Verim Gübre A.ş., TURKEY
[2] Department of Plant Protection Ege University, Izmir, TURKEY

irfan.surer@hotmail.com

ABSTRACT

In this study, efficacy trials was conducted with some plant protection products against root and crown rot disease, which is common in cool-season turfgrasses. The materials of the research consist of isolates of *Rhizoctonia solani* and *Fusarium* which were isolated from turfgrass, cool-season turfgrass species and three fungicides one of which is biological and the others are chemical fungicides. The trial was established randomized as split plot with four replications. Two factors were considered fungicide applications and turfgrass species. Evaluation of the trial was based on the severity of the disease and the efficacies of fungicides. As to the results of the research, the evaluations of the plant protection products and turfgrass species on disease severity were found statistically significant. The efficacies of application x species interactions on disease severity were determined also significant statistically within all measurements. As a result of the study, three fungicides as [*Bacillus subtilis* (Serenade SC), boscalid + pyraclostrobin (Signum WG), prochloraz + tebuconazole (Zamir 400 EW)] used in the trial resulted in promising on the disease control.

Keywords: Turfgrass, root and crown rot, biological fungicide, chemical fungicide.

STUDIES ON THE NEW PEST CEUTORHYNCHUS SUTURALIS FABRICIUS (COLEOPTERA: CURCULIONIDAE) IN ONION FIELDS IN BURSA AND BALIKESIR PROVINCES

İrfan Sürer [1,] & Nimet Sema Gençer [2]*

[1] Satiş-Pazarlama Verim Gübre A.ş., TURKEY
[2] Department of Plant Protection Uludağ University, Bursa, TURKEY

irfan.surer@hotmail.com

ABSTRACT

İn this study, distribution of *Ceutorhynchus suturalis* Fabricius and larvae population density were investigated under laboratory and field conditions in Bursa and Balikesir provinces. Surveys were carried out once a week or two weeks from April to August. *C. suturalis* was known onion pest in some European countries. First time it was determined on *Prunus domestica* in Tekirdağ but for the first time it was determined in onion field in Balikesir and Bursa provinces. İn field, first larvae were seen at the mid of April and begining of May and larvae were seen at the end of June. İn Manyas and Susurluk (Balikesir) larvae population density was 3.6, 2.6 larvae / plant and in Yenişehir and Karacabey (Bursa) 1.8, 1.6 larvae/ plant, respectively.

Keywords: Ceutorhynchus suturalis, new pest, onion, population density

THE FLORISTIC DIVERSITY OF KRASTA PARK, ELBASAN, ALBANIA

Ermelinda Gjeta [1,], Jonathan Titus [2], Priscilla Titus [3], Marjol Meço [4], Nikoleta Kallajxhiu [4], Silvana Turku [4] & Alma Gjerani [4]*

[1] Department of Biology University of Elbasan "Aleksander Xhuvani ", Albania
[2] Department of Biology Suny Fredonia, Albania
[3] Stella Niagara Preserve Manager The Western New York Land Conservancy, Albania
[4] Department of Bioloqy University of Tirana, Albania

ermelindagjeta@live.com

ABSTRACT

Krasta park is in a pine forest hill located at the eastern part of Elbasan. Over 5.6 km of its area around Krasta peak is used for many years as a leisure park, which is under the administration of Elbasan municipality. Nearly fifty years before some of its surfaces were used for *Morus sp.* and pine or other coniferous species plantation, as well as some areas were used as military places, where now are found the remains of bunkers and other places used for military training. This park is very interesting for its floristic composition and vegetation, as it has a diversity of habitats and ecological areas, where can be found wild rare floristic species and ruderal, invasive, nonnative species, as well as new species for Albanian flora. İn different areas such as calcareous outcrops, wet places, scrubs, meadows etc. we have found and identified 294 plant taxa, such as: *Fritillaria messanensis ssp. gracilis* (Ebel) Rix, *Sternbergia lutea* (L.) Ker Gawl. ex Spreng., *Ornithogalum sp., Carex sp., Allium chamaemoly* L. etc. We have analyzed the family abundance, their life form and chorological spectrum, as well we have recorded data on their ecological distribution.

Keywords: flora, park, floristic diversity, chorology, life form

COLCHICUM TRIPHYLLUM AND *Hyacinthella leucophaea* SSP. ATCHLEYI, SHEBEIK NATIONAL PARK, ALBANIA

Ermelinda Gjeta [1,], Marjol Meço [2], Alfred Mullaj [3], Ermelinda Mahmutaj [3], Ajola Mesiti [3], Ornela Poçi [4], Bajram Kullolli [4] & Alma Gjerani [2]*

[1] Department of Biology University of Elbasan "Aleksander Xhuvani ", Albania
[2] Department of Bioloqy University of Tirana, Albania
[3] Flora and Fauna Research Centre University of Tirana, Albania
[4] Regional Agency of Protected Areas, Elbasan National Agency of Protected Areas, Albania

ermelindagjeta@live.com

ABSTRACT

Shebenik National Park is situated in the eastern part of Albania and has a rich flora. Ruen area is located in the south-eastern part of this national park, next to the border with the North Macedonia. During the field trips compiled in this area, we found a population of *Colchicum triphyllum* Kunze, that is the second location of this species in Albania and *Hyacinthella leucophaea subsp. atchleyi* (A. K. Jacks. & Turrill) K. Perss & Jim Perss., as a new subspecies for the country flora and a new location to the species as well. The Albanian flora has present five taxa of *Colchicum* genus, without including here the recently founded. The first location of *C. triphyllum* is reported and ecologically described as present from the southern part of Albania. For the genus *Hyacinthella* Albanian flora comprises only two species, *H. leucophaea* and *H. dalmatica* (Baker) Chouard. İn this article are given data on the distribution and ecology for the two above mentioned species. Their occurrences and extended distributions in Albanian territory contributes in enriching the floristic diversity and values of this country.

Keywords: flora, national park, location, distribution, ecology, Shebenik, Albania

LEACHING OF NICOSULFURON USED IN MAIZE CAUSED BY HEAVY RAINFALL

Ahmet Tansel Serim [1,], Ünal Asav [2] & İstem Budak [3]*

[1] Department of Plant Protection Bilecik Şeyh Edebali University, TURKEY
[2] Department of Plant Protection Gaziosmanpaşa University, TURKEY
[3] Weed Science Plant Protection Central Research Institute, TURKEY

ahmettansel.serim@bilecik.edu.tr

ABSTRACT

Nicosulfuron used in maize fields to control weeds may leach to underground water sources due to heavy rainfall and contaminate them. Using underground water contaminated by nicosulfuron is limited because it can injure sensitive crops. The leaching potency of nicosulfuron applied in maize fields in Ankara, Turkey was investigated using simulation studies for 3 years. The herbicide was used at the recommended rate (50 g active ingredient/ha) using a backpack compressed-CO2 sprayer mounted Teejet flat fan nozzles (XR 11002VS) and calibrated to deliver 195 l/ha. The first and second simulations were applied after 1 day after treatment (DAT) and 20-21 DAT with a total of 50 mm rainfall+ irrigation, respectively. The soil samples were collected from the simulation fields using a driller 0, 1, 4, 7, 14, 28, 56, and 128 days after the simulation (DAS), and transferred to the laboratory. Buckwheat (*Fagopyrum esculentum* Moench) bioassay was carried out to determine the herbicide residue in soil samples. The results showed that the residues were found in the first two layers in the first years while they were only in the first layer in the following years. The days, 4, 14, and 28, were important for herbicide degradation in the soil layers. İn the first year, the last residue was detected 56 DAS, but were found 28 DAS in the successive years. This research was supported by The Scientific and Technological Research Council of Turkey, project number: 115O331.

Keywords: Herbicide, bioassay, buckwheat bioassay, degradation

TOP FERTILIZER TYPE AND MINOR ADJUSMENTS IN TIMING CONTRIBUTE TO SUSTAINABLE NITROGEN MANAGEMENT IN MAIZE

Emin Bülent Erenoğlu [1,] & Bekir Yalçindağ [1]*

[1] Department of Soil Science and Plant Nutrition Çukurova University, TURKEY

ebulenterenoglu@cukurova.edu.tr

ABSTRACT

As it is known, the increasing population, together with the agricultural areas that do not increase or even decrease in places, create significant pressure on Earth's ecology. For this reason, reaching the highest plant yields with the minimum input is one of the most critical issues of today's agriculture. İn the present, a one-year field trial was conducted using maize (*Zea mays* L. cv. DeKalb DKC6761) under field conditions. Control plots received only phosphorus (P) and potassium (K) as base nutrients in the experiment. İn contrast, the Sufficient (optimal) and Low (75% of optimum) Nitrogen (N) plots, in addition to those, were fertilized with 91 kg N ha-1, corresponding to 27% of the total optimum N. Additional N was applied using urea, calcium ammonium nitrate (CAN) and/or ammonium sulfate (AS) fertilizers to reach the optimum or 75% of the optimum on the 25th and/or 50th day after emergence as top fertilization. After harvest, total grain yield, dry matter yield, and N, P, and K nutritional status of these materials were determined. Statistically significant differences were found between treatments. İn terms of grain yield, nitrogen use efficiency, and economic gain, the treatment in which half of the N was applied with urea 25 days after emergence and the other half with CAN 50 days after emergence at optimum N rate came to the fore. This treatment was followed by the applications of N at Sufficient N rates as Urea/AS (25 days after emergence half of N as urea, the other half 50 days after emergence as AS) and Urea/- (all N as urea 25 days after emergence) applications. Thus, using the right dose, the right time and the right sources for a sustainable crop production and the world, we can minimize the effects of agricultural production, such as corn, where excess fertilizer is needed, on the ecosystem.

Keywords: fertilizer, nitrogen, maize, use efficiency

BIOGAS FACILITY-BASED ORGANIC/ORGANOMINERAL FERTILIZERS CAN CONTRIBUTE TO SUSTAINABLE NUTRIENT MANAGEMENT

Emin Bülent Erenoğlu [1,], Mahmoud Emad Morsy [1] & Kübra Dilan Hacirüstemoğlu [1]*

[1] Department of Soil Science and Plant Nutrition Çukurova University, TURKEY

ebulenterenoglu@cukurova.edu.tr

ABSTRACT

Considering future world food consumption, increases in population, urbanization, and income levels, and changes in the rate of poverty in the population over time are the main socio-economic factors that lead to increased food demand. İn addition to all these, when the contractions and fluctuations in production that will occur as a result of global warming are included, it is seen that a very complex equation awaits us. By 2050, the world population is estimated to be around 9 billion 300 million. Based on the year 2010 when the world population was 6 billion 900 million, this corresponds to an increase of approximately 35%. This increase means that the need for food security and healthy nutrition for more people must be met. During this time, it is estimated that the need for food will increase by 70%. This increase means more plant production. And we have to achieve all these increases in limited production areas, under the threat of global climate change and variability, the effects of which are already being seen. Considering the limited land resources in order to provide the balance of nutrients in the soil and to respond to the increase in the need for food, the use of more fertilizers in agricultural production in the future is an absolute necessity. According to the calculations, while the amount of nutrients removed from the soil on a global scale was 230 million tons in 1997, the amount of fertilizer used in the same year was found to be 130 million tons. Since the amount of nutrients currently removed from the field is higher than the total amount of fertilizer used, it is inevitable that the fertility of the soils will decrease over time. For this reason, the use of additional nutrients is an absolute necessity both to protect the fertility of the soils and to be prepared for the possible increase in food requirements in the future.

Of course, during the use of these nutrients for plant production, the approach of applying the right food source in the right dose, at the right time, to the right place should be adopted, and environmental awareness should be sustainable for the economies and social lives of producers and related sectors. This approach refers to a set of scientific practices that are accepted on a global scale, known as 4D Precision Food Management. The right source of nutrients here includes not only mineral (chemical) fertilizers, but also all farm and urban organic wastes. According to promising preliminary results, biogas facility-based organic materials might be useful sources for sustainable nutrient management and plant production. The current study aims to contribute to the knowledge in this field by using the original and literature sources.

Keywords: biogas facility, nutrient management, organic fertilizer, organomineral fertilizers

ASSESSMENT OF SPREADING OF DIFFERENT TYPES OF GRANULATED ORGANIC FERTILIZERS

Raimonda Zinkevičienė [1,], Eglė Jotautienė [2], Algirdas Jasinskas [1], Egidijus Šarauskis [1], Zita Kriaučiūnienė [3], Kristina Lekavičienė [4] & Vilma Naujokienė [1]*

[1] Faculty of Engineering, Department of Agricultural Engineering and Safety Vytautas Magnus University, LITHUANIA
[2] Agricultural Engineering and Safety Vytautas Magnus University, LITHUANIA
[3] Agroecosystems and Soil Sciences Department, Senior Researcher Vytautas Magnus University, LITHUANIA
[4] Department of Agriculture Engineering and Safety Vytautas Magnus University, LITHUANIA

raimonda.zinkeviciene@vdu.lt

ABSTRACT

With increasing soil degradation and the high cost of mineral fertilizers, the use of organic fertilizers in agriculture is becoming more important to maintain soil humus levels. Recently, new fertilizers such as granulated manure, meat and bone meal pellets, and other organic fertilizers have been introduced in addition to traditional organic fertilizers. The granulation and use of organic materials in agriculture have been more common in organic or small farms, but can also be used successfully in conventional farming in combination with mineral fertilizers. The aim of the study: is to investigate the precision spreading processes of organic fertilizers of different flowability, and to determine the influence of the technological parameters of the fertilizer spreading machines on the uniformity of the spreading of organic fertilizers of different flowability. During the study, the spread of two types of tested fertilizers on the soil surface was performed. İt was found that bone meal granules were spread on the soil surface more evenly (Gaussian g2 7.11) than the spread of manure (Gaussian g2 7.11). To further improve the evenness of the granular fertilizer spread in the manure spreader, it is necessary to increase the number of cross conveyor belts and to keep the body under load at all times to have a smooth and even granule supply. Meanwhile, the uniformity of manure spreading is influenced by the fact that the manure particles are much larger and heavier, which makes it easier to spread them over a wider area during spreading.

Keywords: organic fertilizers; uniformity; granulated meat and bone meal, manure.

EFFECTS OF KITCHEN WASTE COMPOST AND CHEMICAL FERTILIZER APPLICATION ON LETTUCE (*Lactuca sativa* L.) PLANT GROWTH

Serhat Gürel

Department of Soil Science and Plant Nourishment Uludağ University, Bursa, TURKEY

sgurel@uludag.edu.tr

ABSTRACT

New approaches in plant production gain importance due to the accumulation of organic residues and the problems caused by agricultural inputs that are used extensively in traditional methods. For this purpose, materials such as plant and animal wastes and compost are widely used. İn this study, the effects organic and chemical fertilizer source on the essential nutrient content, nitrate accumulation and the growth of lettuce plant (Lactuca sativa L.) were investigated. The experiment was carried out according to the randomized plots experimental design under greenhouse conditions, with 2 chemical fertilizer applications (with or without chemical fertilizer), 1 compost material (kitchen waste compost), four different doses (0, 8, 16, 24, 32 g kg-1) and 3 replications. For 15 kg pure N da-1 as chemical fertilizer, 15-15-15 (N:P2O5:K2O) fertilizer was used. Overall, kitchen waste compost (KWC) applications increased plant growth and nutrient content. However, the most significant increases occurred in the trial subjects where chemical fertilizer and KWC were applied together. The use of KWC together with chemical fertilization increased the plant height, wet weight and dry weight, as well as nitrate (NO3) accumulation, nitrogen (N), calcium (Ca) and magnesium (Mg) content in the plant more than KWC. While the highest plant height values were found in 32 g kg-1, 24 g kg-1 of chemical fertilizer and KWC medium in wet and dry weight, the highest N content and nitrate (NO3) accumulation were obtained at 16 g kg-1 dose. As a result, compost applications were effective in nutrient concentrations when used with chemical fertilizers and nitrate accumulation remained at acceptable values.

Keywords: Lactuca sativa, kitchen waste, compost, plant growth, fertilizer, nutrition

DETERMINATION OF AGRICULTURAL USES OF ORGANIC AND ORGANOMINERAL FERTILIZERS OF PRODUCED IN BIOGAS FACILTY: "A CASE STUDY IN SÜTAŞ A.Ş."

Samet Ata [1,], Bariş Bülent Aşik [2] & Özlem Kaner [3]*

[1] Research and Development of Organic Fertilizer Sütaş Aş, TURKEY
[2] Department of Soil Science and Plant Nutrition Bursa Uludag University, TURKEY
[3] Research and Development Sutaş Aş., TURKEY

sata@sutas.com.tr

ABSTRACT

İn this study, it was aimed to determine the effect of organic fertilizers formed as a result of fermentation in biogas plants fed with organic vegetable and animal wastes on the yield and soil properties of sunflower plants. Solid fermented organic fertilizer (SFOF), liquid fermented organic fertilizer (LFOF), organomineral fertilizer (6 10 6) (OMF) and chemical fertilizer (CF) applications were included in the research conducted under field conditions. Fertilizer applications were used as two doses. İn the study, the effect on yield and nutrient uptake was determined. İn addition, soil samples were taken from the parcels after harvest and the changes in some properties were determinated. According to the data obtained; İn organic fertilizer applications, the highest yield was obtained from the second doses of SFOF, LFOF, OMF and CF applications. The applications positively affected the yield and the amount of nutrients uptake from the soil. According to the results of the soil analysis, significant effects were determined on the pH, EC, organic matter and nutrient content of the soil.

Keywords: Sunflower, Organic fertilizer, organomineral fertilizer, solid fermented fertilizer, biogas plant, plant growth, soil properties

THE IMPORTANCE OF SOIL FERTILITY FOR SUSTAINABLE YIELD AND QUALITY MANAGEMENT IN AVOCADO CULTIVATION IN TURKEY

Hüseyin Ok [1] & İsmail Emrah Tavali [2,]*

[1] Faculty of Agricultural Sciences and Technologies International University of Cyprus, TURKEY
[2] Department of Soil Science and Plant Nourishment Akdeniz University, TURKEY

emrahtavali@gmail.com

ABSTRACT

Avocado is a fruit that was grown for many years in the "Alanya and Gazipaşa microclimates" on the Antalya coastline, as well as in Finike and Kumluca. This fruit, which was grown as a few trees in rural settlements in these regions in the past, is now grown as enclosed gardens both in family businesses and in the agricultural industry. One of the most important problems related to avocado cultivation in the region is the difficulty of finding seedlings with the correct name and disease-free certification. İndeed, the performance of seedling rootstocks (produced from seeds) against the restrictive factors in the soil is very low. At this point, taking measures to protect soil fertility is of great importance. Because, in the soils of the region, especially lime and groundwater elevation, low organic matter (low humus with low microorganism diversity and activity), lack of useful nutrients, low cation-anion exchange capacity, bad texture and structure, slope, little depth, etc. such negative factors prevail. Agronomic practices without taking these factors into account will not be able to bring soil fertility to the desired levels and will cause an increasing decrease in yield and quality in avocado gardens. Accordingly, an avocado garden should not be built without soil and water analysis. İn addition, according to the analysis results, regular organic and chemical fertilization should be done using modern irrigation systems. İf necessary, terracing or embankment should be done according to the land structure. On the other hand, using certified clone rootstocks, it should be ensured that the negative conditions in the soil are minimally affected. İn addition, breeding studies should be carried out regarding productivity and quality in avocados, and the total yield should be increased by focusing on not only winter but also summer varieties. As with other tropical fruit varieties, it should be ensured that both the maintenance of soil fertility and the supply of residual-reliable fruits to the market by adopting good agriculture and / or organic agriculture model in avocado cultivation.

Keywords: agronomy, humus, organic matter, lime, tropical fruit growing

EFFECTS OF DIFFERENT MAIZE STRAW MATERIAL APPLIED IN THE SOIL ON CORN YIELD PARAMETERS

Hamza Negiş [1], Cevdet Şeker [1] & Raziye Koçkesen [1,]*

[1] Department of Soil Science and Plant Nourishment Selçuk University, Konya, TURKEY

raziyekocksn@gmail.com

ABSTRACT

Adding an organic carbon source to soils not only improves the general quality of soils, but also positively affects yield parameters. İn this study, 1, 2, 4 tons of ground corn straw (CS), corn green parts (CGP) and corn compost (CO) were applied to the soil as an organic carbon source. Cob sampling was done from each plot before harvesting from the corn plant that completed its vegetation. Length (cm), weight (g), diameter (mm) and number of grains (piece) were determined in the cob samples taken. When the results were examined, the maximum increase in the number of grains was obtained with the highest application of CGP. The differences in cob diameter size were statistically significant, and all doses of the applications increased significantly compared to the control. The increases in cob weight were the highest doses of the applications compared to the control, respectively, according to CS, CGP and CO; there was an increase of 91.72%, 109.82%, 134.02%. The difference in cob length measurements were statistically significant, but no big differences were found between the applications. The increase in cob length was determined at the highest dose of CO and was determined as 3.1% compared to the control. When the results are examined, the evaluation of these carbon source materials, which are disposed of in various ways and cannot be used in agriculture in any way, should be used widely both to increase soil and product quality and to sustainable soil health in our agricultural lands by bringing them into the soil without harming the environment.

Keywords: Corn yield parameters, Compost, Corn straw, Corn green part

EFFECT OF BIOCHAR ON THE FERTILITY OF A CALCAREOUS SOIL SITUATED IN A SEMI -ARID REGION

Boudjabi Sonia

Etres Vivants Université De Tebessa, ALGERIA

soniabeida@yahoo.fr

ABSTRACT

The management of agricultural land to increase the stocks of nutrients in the soil is a problem that is constantly raised. Among the possible strategies that improve soil fertility is the use of mineral or organic fertilizers. Biochar, is a carbon-rich material that it used as an amendment to improve soil fertility. This study focuses on the evaluation of the impact of biochar on the physicochemical properties of a calcareous soil. Three doses of biochars were applied (DO = 0 g MSof biochar, D1 =20g / MS of biochar pot et D2= 60g/pot MS of biochar). The results showed an increase in the pH (7.77) and Electrical conductivityC 1369 µS/cm). an improvement in nitrates (7.36 mg/g of soil); then total carbon (2.83%) and the moisture (8.81%) of the soil also a strong accumulation in the active limestone (3.60%).

Keywords: Biochar, nitrates, pH, moisture , limestone

EFFECTS OF KITCHEN WASTE COMPOST AND CHEMICAL FERTILIZER APPLICATION ON LETTUCE (*Lactica sativa* L.) PLANT GROWTH

Serhat Gürel

Department of Soil Science and Plant Nourishment Uludağ University, Bursa, TURKEY

sgurel@uludag.edu.tr

ABSTRACT

New approaches in plant production gain importance due to the accumulation of organic residues and the problems caused by agricultural inputs that are used extensively in traditional methods. For this purpose, materials such as plant and animal wastes and compost are widely used. İn this study, the effects organic and chemical fertilizer source on the essential nutrient content, nitrate accumulation and the growth of lettuce plant (Lactuca sativa L.) were investigated. The experiment was carried out according to the randomized plots experimental design under greenhouse conditions, with 2 chemical fertilizer applications (with or without chemical fertilizer), 1 compost material (kitchen waste compost), four different doses (0, 8, 16, 24, 32 g kg-1) and 3 replications. For 15 kg pure N da-1 as chemical fertilizer, 15-15-15 (N:P2O5:K2O) fertilizer was used. Overall, kitchen waste compost (KWC) applications increased plant growth and nutrient content. However, the most significant increases occurred in the trial subjects where chemical fertilizer and KWC were applied together. The use of KWC together with chemical fertilization increased the plant height, wet weight and dry weight, as well as nitrate (NO3) accumulation, nitrogen (N), calcium (Ca) and magnesium (Mg) content in the plant more than KWC. While the highest plant height values were found in 32 g kg-1, 24 g kg-1 of chemical fertilizer and KWC medium in wet and dry weight, the highest N content and nitrate (NO3) accumulation were obtained at 16 g kg-1 dose. As a result, compost applications were effective in nutrient concentrations when used with chemical fertilizers and nitrate accumulation remained at acceptable values.

Keywords: Lactuca sativa, kitchen waste, compost, plant growth, fertilizer, nutrition

PREDICTION OF AGGREGATE STABILITY OF CULTIVATED FIELDS USING SOME SOIL PROPERTIES

Coşkun Gülser

Department of Soil Science and Plant Nourishment Ondokuz Mayis University, Samsun, TURKEY

cgulser@omu.edu.tr

ABSTRACT

İn this study, the relationships between water stable aggregates (AS) and basic soil properties were determined using 178 surface soil samples (0-20 cm) taken from cultivated agricultural fields araound Samsun Turkey. After analyzing AS, clay, silt, sand contents, soil reaction (pH), electrical conductivity (EC), organic matter (OM) content and exchangeable cations (Ca, Mg, K, Na) of the soil samples, linear regression models using stepwise analyses in SPSS program were done between water stable aggregates and some soil properties. The water stable aggregate stability values varied between 2.01% and 79.14% with a mean of 23.50%. While AS values had significant positive correlations with OM (0.514**), clay (0.495**), Ca (0.171*) and K (0.157*) contents, they gave significant negative correlations with pH (-0.312**), silt (-0.312**) and sand (-0.242**) contents. To predict AS values, 6 linear regression models were produced by stepwise analyses. The R2 values of the linear regression equations varied between 0.514** obtained using only OM as a variable and 0.805** obtained using the variables of OM, silt, clay, pH, K and EC. The values of AS can be predicted using the linear regression equation including less variables such as OM, silt, clay and pH with an R2 of 0.779**. İt was determined that OM, clay and silt contents are the most effective soil properties on water stable aggregates incultivatedfields.

Keywords: Aggregate stability, soil properties, linear models, prediction

EFFECT OF CARROT AND COWPEA POWDER INCORPORATION ON THE NUTRITIONAL QUALITY OF BISCUITS

Aijaz Soomro [1,], Aimal Khan [2], Tahseen Fatima Miano [2], Nizamuddin Depar [3], Asadullah Marri [2] & Shahzor Gul Khaskheli [2]*

[1] İnstitute of Food Sciences and Technology Sindh Agriculture University Tandojam, PAKISTAN
[2] İnstitute of Food Sciences and Technology Sindh Agriculture University, Tandojam, PAKISTAN
[3] Soil Science Division Nuclear İnstitute of Agriculture Tandojam, PAKISTAN

ahsoomro@sau.edu.pk

ABSTRACT

The study was carried out to develop biscuits with the incorporation of carrot and cowpea powder at the İnstitute of Food Sciences and Technology, Sindh Agriculture University, Tandojam, Pakistan. The sample were prepared with various percentages of carrot and cowpea powder. That includes: T0: 100% wheat flour (control), T1: 90% wheat flour (WF), 5% cowpea Powder (CF), 5% Carrot Powder (CP), T2: 80% WF, 10% CF, 10% CP and T3: 70% WF, 15% CF, 15% CP. The results revealed that the variation in the physico-chemical characteristics and sensory quality of biscuits was significantly ($P<0.05$) associated with the flour, carrot and cowpea powder ratio. The incorporation of carrot-cowpea powder supplementation resulted in a significant increase in protein, fat and ash contents of the biscuits. The biscuit width, thickness and weight also increased significantly. The sensory analysis also revealed significant differences ($P<0.05$) amongst all treatments. İt is concluded from the research that, biscuits prepared with 70% wheat flour, 15% cowpea flour, and 15% carrot powder had a significant impact on biscuit quality.

Keywords: Nutritional quality, Biscuits, Carrot powder, Cowpea powder

EFFECTS OF STORAGE CONDITIONS ON QUALITY AND SHELF-LIFE OF UNRIPE PAPAYA (*Carica papaya* L.) FRUIT

Shahzor Gul Khaskheli [1,], Shaista Soomro [2], Aijaz Soomro [3], Aasia Akbar Panhwar [4] & Ashfaque Ahmed Khaskheli [5]*

[1] İnstitute of Food Sciences and Technology Sindh Agriculture University, Tandojam, PAKISTAN
[2] 1İnstitute of Food Sciences and Technology Sindh Agriculture University, Tandojam, PAKISTAN
[3] İnstitute of Food Sciences and Technology Sindh Agriculture University Tandojam, PAKISTAN
[4] Sau İfst
[5] Department of Food Science and Technology Hamdard University Karachi, Pakistan

sgkhaskhali@sau.edu.pk

ABSTRACT

The study was conducted during the 2020-21 at the "İnstitute of Food Sciences and Technology, Sindh Agriculture University, Tandojam", to evaluate the effects of storage conditions on the quality and shelf-life of unripe papaya (*Carica papaya* L.). For this purpose, different treatments were used, stored, and coded as T1 (control without packaging, 22±2°C), T2 (cardboard box room temperature, 22±2°C), T3 (LDPE room temperature, 22±2°C), T4 (cardboard box refrigerator temperature, 7 ±2°C), and T5 (LDPE refrigerator temperature, 7±2°C). Results reveled that the maximum pH (4.74) was recorded under T5, the maximum total soluble solids (TSS) (5.37 °Brix) was recorded under T4. While the lowest moisture (%), reducing sugar (%), total sugar (%), (7.86 %), (2.21 %), (3.92 %), were recorded respectively under T5. The lowest titratable acidity (TA) and pH value were recorded (0.30 %), (4.15) under T2. Maximum moisture (%) and titrable acidity was recorded on 7th day of storage, (12.59%), (0.91), Whereas maximum Ascorbic acid (mg/100g) were seen on 14th day of storage (2.46 mg/100g), respectively. Unripe papayas had received the highest color score, 5.72 under T5 , followed by score of color 3.9**0** was recorded under T1 respectively. Highest texture score 5.86**,** aroma score 5.88 and overall acceptability scores 5.72 **were** recorded under T5**.** Hence, it can be concluded that T5 (LDPE refrigerator temperature), 7±2°C has the potential to prolong the storage life till the 28 days and preserve valuable attributes of papaya, apparently this treatment inhibits of ripening and senescence process of papaya.

Keywords: Unripe papaya; storage conditions; temperatures; shelf-life

THE EFFECT OF NATURAL, CONVECTIVE, AND MICROWAVE DRYING TECHNIQUES ON COLOR, PROTEIN AND MINERAL COMPOSITION OF PARSLEY LEAVES

İlknur Alibas [1,] & Aslihan Yilmaz [2]*

[1] Department of Biosystem Engineering Bursa Uludag University, TURKEY
[2] Biosystems Engineering Bursa Uludag Universitesi, TURKEY

ialibas@uludag.edu.tr

ABSTRACT

İn the study, parsley leaves, harvested from a local agricultural enterprise in Bursa Nilufer and adjusted to be 20 ± 0.02 g in each drying experiment, dried until from 83.03% ± 0.20 initial moisture content to 8.62% ± 0.20 final ones using natural drying, convective drying at 50C, and microwave drying at 300 and 400 W techniques at 4200, 420, 47.5, and 13 minutes, respectively. The brightness and hue angle closest to fresh parsley leaves were measured at 300 and 900 W. However, the values closest to the fresh product in terms of greenness, yellowness, and Chroma were determined at 900 W, followed by the dried products at 300 W. On the other hand, the closest results to the fresh product in terms of total color difference, browning index, and whitening index were obtained in leaves dried at 300 W rather than 900 W, where the best results were obtained in terms of color criteria. The products dried by natural drying and convection drying at 50°C led to negative results in terms of both color criteria and indexes indicating the color change. The highest total chlorophyll content was measured in dried parsley leaves at 300 W, followed by 900 W. Natural and convective drying resulted in similar losses in total chlorophyll content. İn terms of total protein content, the closest results to fresh parsley leaves were obtained at 300 W, followed by microwave drying at 900 W, convective drying at 50 °C, and natural drying, respectively. The closest results to fresh in terms of phosphorus, calcium, magnesium, iron, copper, and manganese were measured in dried products at 300 W. Potassium and sodium closest to fresh was determined in natural dried products, followed by 300 W. However, it was observed that all drying methods had a similar effect on the zinc content. On the other hand, samples dried at 900 W resulted in significant losses in phosphorus, potassium, and sodium, while the highest losses in calcium, magnesium, and iron were measured in naturally dried leaves. Similar results were obtained for samples dried by all methods except 300 W for copper and manganese. As a result, it was seen that microwave drying at 300 W is the most applicable method for drying parsley leaves, both in terms of shortening the drying time and obtaining quality parameters close to the fresh product.

Keywords: Parsley, drying, color, chlorophyll, mineral.

INFLUENCE OF SUNFLOWER SEED CHARACTERISTICS ON THE INCREASE OF OIL TEMPERATURE DURING COLD PRESSING PROCESS

Tanja Lužaić [1,], Nada Grahovac [2], Nada Hladni [3], Sandra Cvejić [4], Siniša Jocić [3] & Ranko Romanić [1]*

[1] Department of Food Preservation Engineering University of Novi Sad, Faculty of Technology Novi Sad, Serbia
[2] Laboratory For Nutritional Quality İnstitute of Field and Vegetable Crops, National İnstitute of The Republic of Serbia
[3] Department of Plant Breeding and Genetics İnstitute of Field and Vegetable Crops, National İnstitute of The Republic of Serbia
[4] Department of Breeding and Genetics İnstitute of Field and Vegetable Crops, National İnstitute of The Republic of Serbia
tanja.luzaic@tf.uns.ac.rs

ABSTRACT

According to practical experience from production, as well as according to available literature data, the temperature of the oil at the outlet of the press in the process of cold pressing should generally not exceed 50°C. Higher temperatures can accelerate oxidative changes, reduce the content of important minor components, but also lead to changes in the sensory characteristics of the oil. However, in the cold pressed oil production, higher temperatures often occur. The oil temperature depends on the type and characteristics of raw material, as well as the pressing conditions. Cold pressed sunflower seed oil is becoming more common in the diet, and today there are hybrids that differ significantly in seed characteristics. İn this paper, the moisture and oil content, geometric (length, width and thickness), gravimetric (equivalent diameter, surface area, seed volume, sphericity), general characteristics (hull content, thousand seed weight, true density, bulk density, porosity) and seed firmness were investigated. The sunflower seeds were pressed under the same conditions: screw press (Mikron, Temerin, Serbia), drive motor power: 2.2 kW, serial number: 119, design capacity 25 - 30 kg/h, frequency: 33 - 34 rpm. Before the begining of the pressing process, the press was heated to the operating temperature (80 - 100°C). The adjusted nozzle diameter was 10 mm. İn the tested samples, the temperature ranged from 44 to 70°C. Correlation examination confirmed significantly affect of all tested seed characteristics on the oil temperature ($p < 0.001$), except the seed moisture content, where no significant correlation was found ($R = -0.21$). The oil temperature at the output of the press has the greatest positive effect on the thousand seed weight ($R = 0.90$), followed by the equivalent diameter, surface area, seed volume ($R = 0.87$) and seed length ($R = 0.84$). Bulk density (-0.87), true density (-0.82) and oil content (-0.77) have the greatest negative impact.

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Keywords: sunflower, seed characteristics, cold pressed oil, oil temperature

GREEN ALGERIAN ALGAE ULVA LACTUCA PROTECTS AGAINST OXIDATIVE STRESS INDUCED BY HIGH FAT DIET/LOW DOSE STREPTOZOTOCIN, IN WISTAR RATS

Labbaci Fatima Zohra [1,], Belkhodja Hamza [2] & Boukortt Farida Ouda [3]*

[1] Biology Laboratory of Clinical and Metabolic Nutrition. Faculty of Natural and Life Sciences. Université Oran 1 Ahmed Ben Bella, Oran, Algeria
[2] Department of Biologq Laboratory of Bioconversion, Microbiology Engineering and Health Safety, University of Mascara, Algeria
[3] Department of Biology Laboratory of Clinical and Metabolic Nutrition. Faculty of Natural and Life Sciences. Université Oran 1 Ahmed Ben Bella, Oran, Algeria

labbaci.fatimazohra@yahoo.fr

ABSTRACT

The present research aimed to evaluate the phytochemical composition and the antioxidant effect of green algae *Ulva lactuca* and its hydroethanolic extract, in type 2 diabetic rats (TD2).T2D was induced in rats by high fat diet (HFD) for 5 weeks, followed by intraperitoneal injection of streptozotocin. The diabetic rats were divided into three groups submitted to HFD combined or not with 1% algae (HFD-Alg) or 1% of its extract (HFD-Ext), for 4 weeks. The phytochemical screening of the hydroethanolic extract revealed the presence of total polyphenols, flavonoids, tannins, phlorotanins, saponins and terpenoids. However, alkaloids were not detected. Moreover. The total phenol, flavonoid, and tannin contents were found to be 20mg ±2.43 EAG/g, 1.50 mg±0.96/QE/ g, and 1.47mg/CE/g dry weight, respectively. When compared to untreated rats, we found that diabetic rats had higher serum, erythrocytes, lipoproteins and tissues TBARS and hydroperoxydes levels. On the other hand, carbonyls were increased in serum and tissue. Besides, the antioxidant enzymatic activity of SOD, GSH-Px, CAT and GSSH-Red was decreased by 28%, 54%, 20% and 77%, respectively. İn the HFD-Alg or HFD-Ext *vs* HFD groups, a decrease in TBRAS at all levels, serum content, lipoproteins (VLDL and HDL2) and tissue (muscle and kidneys) hydroperoxyde and in serum and tissue carbonyls (liver, muscle and kidneys) was noted. İn addition, GSH-Px and CAT activity increased by (83% and 26%; 233% and 43%, respectively). However, an increase in heart SOD (88% and 73%), muscle GSH-Px (175% and 150%) and muscle GSSH-Red (109% and 42%) and kidney (41% and 64%) respectively was recorded.

İn conclusion, ingestion of green algae or its extract corrects the abnormalities caused by oxidative stress via decreasing lipid and protein peroxidation and improving the activity of antioxidant enzymes.

Keywords: Ulva lactuca, Phytochemical screening, High fat diet, type 2 diabetes, Oxidative stress, Antioxidant activity, Rats.

ANTIBIOTICS IN HONEY- ANTIMICROBIAL RESISTANCE RISK

Manjola Kuliçi [1,], Sonila Çoçoli [2] & Arbenita Hasani [3]*

[1] Department of Food and Biotechnology Agricultural University of Tirana, ALBANIA
[2] Public Health Department Agriculture University of Tirana, ALBANIA
[3] Food Technology and Biotechnology, Corresponding Author University Hasan Prishtina, Albania

mkulici@ubt.edu.al

ABSTRACT

The use of antibiotics is among the most frequently cited factors in pollinator population decline, and their use poses a risk to bees and consumers. Many research shows that residues of antibiotics in honey originate from improper beekeeping practices than the environment. İn this context, this paper aims to assess the beekeeping practices regarding antibiotics, specifically the knowledge of the risk posed by antibiotics. A structured online questionnaire was developed with beekeepers having bee-stabilized parks distributed in a wide geographical area in Albania. The results showed that many beekeepers (56.6%) use antibiotics for bee treatment. The majority of beekeepers (69.7%) are not aware of drug-resistant infections that may come from the consumption of honey obtained from hives treated with antibiotics. The results also showed that 37.4% of beekeepers use antibiotics without following the labelled instructions. About 40% of beekeepers obtained information on the İnternet or other uncontrolled sources regarding the source of information on antibiotics use. These findings suggest a lack of knowledge on antibiotics among the beekeepers in Albania. Also, the potential antimicrobial resistance risk among consumers. This is an important food safety issue that needs to be tackled by Albania's food safety and quality policy.

Keywords: Keywords: Honey, antibiotics, antimicrobial resistance, Albania, food safety

MELLIFEROUS PLANTS- THE CASE STUDY OF ALBANIA

Manjola Kuliçi [1,] & Arbenita Hasani [2]*

[1] Department of Food and Biotechnology Agricultural University of Tirana, ALBANIA
[2] Food Technology and Biotechnology, Corresponding Author University Hasan Prishtina, Albania

mkulici@ubt.edu.al

ABSTRACT

Bee is an inexhaustible source of value, is a biological indicator for nature, pollinate of plants and manufacturing of some products in the hive such as honey, royal milk, pollen, propolis, bee venom. Recognition of mellifer species has a great importance for the beekeeper, it helps them in identifying sources used for production of honey, in orientation of adequate pasture for bees, for their rational use. The variety of plant species that are grazed by bees is so wide that the overview presented in this paper aims to create a panorama on the possibility of grazing bees, to be at the service of beekeepers who apply migratory beekeeping. These data have indicative character because the real production depends on many factors: soil, climate, seasonal performance, humidity etc. The period when the research is conducted is April-June 2021 which coincides with the active period of beekeeping. The collection of information was done through online questionnaires, observation and discussions with beekeepers, about the melliferous plants in the places where their parks are located and based on the mellifer classification of plants according to melissopolenic analysis of honey (Pignatti (1982) and E. Crane (1975), which can fluctuate for areas with large geographical differences, and in our case apply to the Mediterranean region. The analysis of the results show that the in interest for beekeeping is maintenance of main existing melliferous pastures as Trifolium spp, Thymus, Prunus L, Robina pseudoacacia L, Carduss L, and various medicinal plants, which are the pride of our honeys, and the increase of them harmonized with general human interest. İn central and southern Albania there is no pasture predominance, the pasture is more diverse. Additional melissopaynological studies are needed to complete the panorama of melliferous plants in Albania.

Keywords: bee, melliferous plants, climatic zone

COMPARATIVE STUDY OF HONEY PRODUCTION PRACTICES AND HONEY QUALITY IN DIFFERENT AREAS IN TIRANA DISTRICT

Manjola Kuliçi [1,] & Arbenita Hasani [2]*

[1] Department of Food and Biotechnology Agricultural University of Tirana, ALBANIA
[2] Food Technology and Biotechnology, Corresponding Author University Hasan Prishtina, Albania

mkulici@ubt.edu.al

ABSTRACT

Honey is the natural product made by one of our planet's most important species *Apis mellifera*. Nowadays, the quality of honey is the most determining issue and some of the reasons why honey samples differ in quality are processing (honey production practice) and storage conditions. This study was focused on comparison of processing conditions of honeys produced in beekeeping households and Honey Production İndustry. İn addition, a qualitative evaluation has been made for ten honey samples produced with these two technical practices to determine their quality. Closely observations in beekeeping households spread in 20 different locations during different periods of honey harvest are performed. For the household surveys, field observations and semi-structured interviews were used as the primary tool for data collection. At the same time, sensorial and physicochemical analyses for honey samples were performed in the University honey laboratory. Five honey samples were randomly collected, directly at five different bees stabled colonies in some areas of Tirana (Albania): (1-Dajt, 2-Tufin, 3-Babrru, 4-Sauk, 5-Vaqarr), and the other five industrial honey were randomly collected in the main markets of Tirana, selecting samples from producers and packers in the country as well as imported samples. Attributes analysed included different monofloral and polyfloral honey. All physicochemical parameters analysed were: soluble dry matter, invert sugar, humidity, free acidity, pH, electrical conductivity and HMF (5-hidroksimetilfurfural). Physiochemical properties were determined using the Harmonised Methods of the İnternational Honey Commission. Results show that market honey samples, produced with advanced equipment and techniques, differed significantly for some of the analysed parameters (humidity, acidity, pH, HMF). İndustrial honeys were less rich in minerals and may have been heat treated as in some of them the HMF values do not comply with the permitted European Standard. This study supports consumer preferences for honey produced under artisanal conditions, the parameters of which turned out to be very satisfactory. There is a need for practical oriented training on honey harvest for the beekeepers also, there is a need to enhance equipment and services in traditional beekeeping and credit provision needs to be facilitated to supply accessory equipment.

Keywords: honey, honey production practices, honey quality

ANTI-PROLIFERATIVE, ANTI-MICROBIAL AND ANTI-QUORUM SENSING ACTIVITIES OF *APIUM* SP., *MYOSOTIS* SP., *VERONICA* SP.

Ülkü Zeynep Üreyen Esertaş[1], Nebahat Ejder[2], Saliha Ekşi[2]*

[1]Karadeniz Technique University, Faculty of Medicine, Department of Microbiology, Trabzon, Türkiye

[2]Recep Tayyip Erdogan University, Faculty of Medicine, Department of Microbiology, Rize, Türkiye

biyolog_ulku@hotmail.com

ABSTRACT

In this study, antimicrobial, anti-quorum sensing and anti-proliferative potentials of methanol and ethyl acetate extracts obtained from the flowers of *Veronica* sp., *Apium* sp., *Myosotis sp.* grown in Rize and its environs were investigated. Anti-proliferative effects of extracts against ARPE-19, HT-29, A-549, CRL-2923, HeLa cells were investigated by MTT (3-(4,5 Dimethylthiazol-2-yl)-2,5-Diphenyltetrazolium Bromide) method. Anti-microbial effects against various Gram positive and Gram negative bacteria groups and *Candida albicans* were studied by the agar well method. Anti-quorum sensing effects against *Chromobacterium violaceum* ATCC 12472, *Chromobacterium violaceum* VIR07, *Chromobacterium violaceum* CV026, *Chromobacterium violaceum* ATCC 31532 strains were determined soft agar method. In addition, pyocyanin pigment inhibition was tested using *Pseudomonas aeruginosa* PAO1 strain. According to the results obtained, *Veronica* sp. and *Apium* sp. were determined that methanol and ethyl acetate extracts showed antibacterial activity at various rates. Anti-bacterial activity was detected in methanol extracts of *Myosotis* sp. at various rates, while antibacterial activity was not observed in ethyl acetate extracts. It was determined that the extracts did not show anti-fungal and anti-quorum sensing activity. According to the antiproliferation results of the extracts on the cells, it was found that 600 µl/ml ethyl acetate extract showed selective cytotoxic effect in HT-29 cells ($p < 0.05$). In line with these results, *Apium* sp. and *Myosotis* sp. It has been observed that the plants do not contain much potential in terms of antibiotic active substance. It was determined that the efficacy potential of *Veronica* sp. was higher. According to the results of the study, it is seen that the plants need more detailed scanning.

Keywords; Anticancer, Antiquorum sensing, *Veronica* sp., *Apium* sp., *Myosotis* sp.

DARK CHOCOLATE WITH CARLINA ACANTHIFOLIA ROOTS: IMPACT ON PHYSICAL PROPERTIES, NUTRITIONAL POTENTIAL AND SENSORY PROPERTIES

Emine Saralieva [1], Emin Eminov [2], Raina Hadjikinova [3], Nadezhda Petkova [4,], İvanka Petrova [5] & İvan İvanov [6]*

[1] Organic Chemistry and İnorganic Chemistry University of Food Technologies, Plovdiv
[2] Department of Organic Chemistry and İnorganic Chemistry University of Food Technologies, Bulgaria
[3] Department of Tobacco, Sugar, Vegetable and Essential Oils, Faculty of Technology University of Food Technologies, Plovdiv, Bulgaria
[4] Organic Chemistry and İnorganic Chemistry University of Food Technologies – Plovdiv, Bulgaria
[5] Department of Tourism and Culinary Management University of Food Technologies Departament, Bulgaria
[6] Organic Chemistry and İnorganic Chemistry Univeristy of Food Technologies, Plovdiv, Bulgaria

petkovanadejda@abv.bg

ABSTRACT

The innovative formulations of dark chocolates enriched with 0.5%; 1.5% and 2.5 % flour from the roots of *Carlina acanthifolia were* designed in order to improve the nutritional value of the product. The aim of the present research was to evaluate the influence of added *Carlina acanthifolia* flour on rheological, textural, nutritional properties, antioxidant activity and sensory characteristics of designed dark chocolate. The results showed that 2.5 % enriched chocolates had an increased content of inulin, and slight increase of total lipids and antioxidant potential (361,6 mM Trolox equivalent/g). The levels of total phenols, flavan-3-ols and proanthocyanidins content remained constant in all investigated samples. Moreover, an increase of *Carlina acanthifolia* flour concentration lead to increase in viscosity and the reduction of the hardness and volume mean diameter in enriched chocolate. Regarding the value of the plastic viscosity according to Casson fluid model, no significant differences were observed between the chocolate samples. The addition of flour significantly affected some sensory attributes, especially the nutty, floral, spicy aroma and roughness of dark chocolate. The added *Carlina acanthifolia* flour did not impair the color and most of the sensory characteristics of resulting dark chocolates.The pure dark chocolate (control sample) and dark chocolate with 1.5% added flour of *Carlina acanthifolia* were with the highest scores for overall acceptance.

Keywords: Dark Chocolate, Carlina Acanthifolia, Physical Properties, Nutritional Potential, Sensory Properties

HEAVY METALS IN FISH EGGS OF RED MULLET AND EUROPEAN HAKE

Enkeleda Ozuni [1,], Pellumb Zalla [2], Albana Munga [3] & İlir Dova [4]*

[1] Department of Morphofunctional Modules Agricultural University of Tirana, ALBANIA
[2] Mofphofunctional Modules Agricultural University of Tirana, Faculty of Veterinary Medicine, ALBANIA
[3] Morphofunctional Modules Agricultural University of Tirana, Faculty of Veterinary Medicine, ALBANIA
[4] Cinical Modules Agricultural University of Tirana, Faculty of Veterinary Medicine, ALBANIA

enkeleda.ozuni@ubt.edu.al

ABSTRACT

This study determined the content of heavy metals in eggs of Red mullet (*Mullusbarbatus*) and European hake (*Merlucciusmerluccius*) with different weight. The content of heavy metals in fish eggs was performed by using atomic absorption spectrophotometer (AAS). The analysis showed statistically significant differences on mercury (Hg) concentration in fish species with different weight (Red mullet: $p < 0.001$, European hake: $p = 0.028$), while lead, cadmium and chrome where not detected. According to the results the concentration levels of mercury resulted to be within permissible levels for human consumption by EC legislation.

Keywords: Heavy metals, fish eggs, Red mullet, European hake

ANTIOXIDANT ACTIVITY OF TUNISIAN PUMPKIN BY-PRODUCTS: A RESPONSE SURFACE METHODOLOGY APPROACH

Zar Kalai Feten [1], Yeddes Walid [1], Hammami Majdi [1], Ben Mansour Rim [1], Falleh Hanen [1], Barros Lilian [1], Tarchoun Neji [2] & Ksouri Riadh [3,]*

[1] Lpam Cbbc, Tunusia
[2] Horticulture Sciences High Agronomic İnstitute of Chott Mariem- Sousse University, Tunusia
[3] Laboratoire Des Plantes Aromatiques Et Médicinales Centre De Biotechnologie, Tunusia

ksouri.riadh@gmail.com

ABSTRACT

Pumpkin is a summer squash cultivar that is round with smooth, slightly ribbed skin and is most commonly dark yellow to orange. This fruit has been ranked among the most consumed foods in the world. Actually, the world consumption of pumpkins and squash represents 602 kilos per second, with a world production of 26 million tons per year. Usually, only the flesh of this fruit is consumed, which induces a massive amount of unused biomass. The valorisation of its by-products would be interesting in the circular economy in food industries. İn this context, the present study aims to optimize the extraction of antioxidants from pumpkin by-products (*Cucurbita maxima* var. karkoubi, Tunisian variety) using an experimental design as to intensify their phenolic composition and to increase their antioxidant capacity. The response surface methodology approach using the D-optimal design appropriately estimated the optimized values for the extraction parameters: solvent concentration, time, and temperature. The antioxidant potential was evaluated by measuring the phenolic compounds content and the antiradical efficiency. Different combinations of extraction factors were tested in order to obtain the optimal bioactive substances yield/efficacy. After performing the statistical analysis, the optimal parameters for extracting antioxidants from the seeds were: 10% alcohol for 23 min and at 55°C and the peels in 13% alcohol at 43°C for 47 min. The contents of phenolic compounds were comprised between 13 and 18 mg EAG/g DW for the seeds and peels, respectively. DPPH radical inhibition percentages obtained were close to 100% at 1 mg/ml. These results confirm the nutritional potential of these co-products and explain the convergence in their valuation in several areas.

Keywords: Tunisian pumpkins, phenols, DPPH test, by-products parts, RSM approach

THE INFLUENCE OF CONVENTIONAL AND ORGANIC GROWING CONDITIONS ON PHENOLIC ACIDS, FLAVONOIDS AND ANTIOXIDANT ACTIVITY

Nadezhda Petkova [1,], Samanta Kuzmanova [1], Tatyana Bileva [2], Ekaterina Valcheva [3], Galya Dobrevsa[5], Neli Grozeva [4] & Vladislav Popov [5]*

[1] Organic Chemistry and İnorganic Chemistry University of Food Technologies – Plovdiv, Bulgaria
[2] Agroecology & Environmental Protection 1Agricultural University, Bulgaria
[3] Department of Agroecology and Environmental Protection, 4000 Plovdiv, Bulgaria Agriculture University Plovdiv, Bulgaria
[4] Viticulture & Fruit Growing Agricultural University, bulgaria
[5] Department of Agroecology and Environmental Protection Agriculture University Plovdiv, BULGARIA

petkovanadejda@abv.bg

ABSTRACT

The effect of growing conditions on phenolic acids, flavonoids content and antioxidant capacity in apple fruit of Florina variety was studies. Antioxidant activity was evaluated using four assays (DPPH, ABTS, FRAP and CUPRAC), based on different mechanisms. The current research demonstrated that apple fruits grown from organic conditions yielded significantly higher total phenolics and antioxidant activity than fruits from the conventional conditions. Nine phenolic acids (gallic, p-coumaric, chlorogenic, vanillic, caffeic, syringic, salicylic and ferulic) and four flavonoid representatives (quercetin, rutin, catechin and epicatechin) were found in the analyzed fruits. Hisperitin, quercetin and kaempferol were below the detection limit. The amounts of chlorogenic acid were the highest in apples grown in biological sward orchards. However, The amounts of epicatechin and epicatechin, vanillic, salicylic and caffeic acids dominated in conventionally grown apples. The highest correlation was found between total polyphenols and antioxidant activity by two methods based on different mechanisms (DPPH and FRAP). A high correlation dependence was observed between total monomeric anthocyanins and the FRAP method. The best correlation was found for total polyphenols and DPPH and the FRAP method, with a lower correlation for ABTS and the CUPRAC method. As a result of the organically grown conditions, the quality of the fruits of the Florina apple variety is improved based on the accumulation of bioactive compounds with antioxidant activity.

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Keywords: apples, antioxidants, organical and conventional growing conditions, polyphenolic acids

DESIGN OF FUNCTIONAL BISCUITS ENRICHED WITH DANDELION AND ROSE PETALS

Emin Eminov [1,], Nadezhda Petkova [2], Mima Todorova [3], Mariya Gerdzhikova [3] & Neli Grozeva [4]*

[1] Department of Organic Chemistry and İnorganic Chemistry University of Food Technologies, Bulgaria
[2] Organic Chemistry and İnorganic Chemistry University of Food Technologies – Plovdiv, Bulgaria
[3] Department of Crop Production, Faculty of Agriculture Trakia University, 6000 Stara Zagora, Bulgaria
[4] Department of Biology and Aquaculture Trakia University, Faculty of Agriculture, 6000 Stara Zagora, Bulgaria

emin.9@abv.bg

ABSTRACT

Dandelion roots and rose petals are rich sources of polyphenols and dietary fibers. The aim of the current study was to design functional butter biscuits enriched with dandelion root flour and rose petals and to evaluate their nutritional potential and antioxidant activity. The percentage of substitution of wheat flour with dandelion varied from 1 to 5 %. The moisture, ash content, lipids, protein, carbohydrates, total phenol and flavonoids and antioxidant activity of dandelion flour and prepared biscuit were determined. As the substitution of dandelion for wheat flour increased, the darkening of the color, specific alter taste and decrease in crispness were detected from the sensory evaluation. The total polyphenol and flavonoids content increased by the percentage increase of dried dandelion root and rose petals additions. Total fructan content also increased with the addition of dandelion flower, as online content reaches 1.6 % dry weight. The antioxidant activity of biscuits increased with increase in rose petal and dandelion flour addition. İt was found that dried dandelion roots can be a recipe additive for butter biscuits with and without rose petals. However, due to their specific smell and bitter aftertaste, the level of this additive should not exceed 3 g 100 g flour. The sensory evaluation revealed that the most favorite biscuits were the biscuit with 2% dandelion flour, followed by biscuits with 2,5% rose petals and 2% dandelion flour. The current research demonstrated designed of functional butter biscuits enriched with dietary fibers and polyphenols, due to the dandelion flour and rose petals incorporated in them.

Keywords: biscuits, dandelion, rose petals, antioxidant activity, fructans

SENSORIAL CHARACTERISTICS OF FETA CHEESE MADE BY DIFFERENT COAGULANTS

Yassine Zine-Eddine [1,], Kzaiber Fouzia [2], Oussama Abdelkhalek [3] & Boutoial Khalid [4]*

[1] Department of Process Engineering Higher School of Technology, Sultan Moulay Slimane University, Beni Mellal, Morocco, Fas
[2] Process Engineering Sultan Moulay Sliman University, Fas
[3] Laboratory of The Engineering and Applied Technologies Higher School of Technologie, Fas Sultan Moulay Slimane University, Beni Mellal, Morocco, Fas
[4] Process Engineering Sultan Moulay Slimane University, Fas

zineeddine.yassine95@gmail.com

ABSTRACT

Feta cheese is one of the world's most popular types of pickled cheese. İn 1988, the Greek government drafted and submitted to FAO/WHO an international standard for Feta cheese made from sheep's or goat's milk or a combination of the two. İt has been produced in Greece since Homeric times. İn 2008, there was a significant increase in the number of new feta cheese products, particularly in Africa, the United States, and Greece. Global production of feta-type cheeses is currently around 109 kg/year, accounting for about 7% of total global cheese production, indicating the high demand for feta cheese. İn recent years, much emphasis has been placed on developing rennet substitutes. Proteolytic enzymes from plants, animals, bacteria, and fungi have been studied, but only a few appear to have significant potential as calf rennet substitutes. The most commonly used microbial coagulants are proteases derived from Rhizomucor miehei, Rhizomucor pusillus, and Cryphonectria parasitica; the first of these, R. Miehei, has been used as an alternative to animal rennet for nearly 40 years. Although many plants have been studied as potential coagulants, only a few have been confirmed suitable for commercial cheese. Thistle (Cynara cardunculus L.) extract is the most well-known vegetable coagulant. This study aimed to determine the sensory properties of Feta cheeses made from goat's milk and coagulants of microbial and vegetable origin. İn terms of color, the types made by the plant-based coagulant were less white than those made by the microbial-based coagulant. Also, Feta made with the plant-derived enzyme was significantly less hard. Adding that plant-based Fetas were the easiest to chew. İt should also be noted that the acid taste and smell have always been more intense in vegetable Feta than in microbial ones. Regarding acceptance, vegetable Feta cheeses were the least accepted.

Keywords: Feta cheese, Coagulant, Vegetable coagulant, Microbial coagulant

POTENTIAL USE OF PROBIOTICS AND PREBIOTICS ON COVID-19 INFECTION MANAGEMENT

Vildan Akdeniz [1,] & Ayşe Sibel Akalin [1]*

[1] Department of Dairy Technology Ege University, İzmir, TURKEY

vildankucukakdeniz@gmail.com

ABSTRACT

İt is known that coronaviruses caused pandemics in the history of the world occasionally. The COVİD-19 pandemic, which is an infectious disease identified in 2019, has changed the world panorama depending on countless economic, political, social and especially health consequences. İt affects the human respiratory tract's epithelial cells, leading to a proinflammatory cytokine storm and chronic lung inflammation. Diet and microbiota of human have already gained importance with recent studies, but they have become even more important with COVİD-19 infection. İt is considered that a balanced diet with foods containing probiotics, prebiotics, and immune enhancing micronutrients such as vitamins, minerals and polyphenols could reduce the risk of COVİD-19 infection. Probiotics are live microorganisms which confer health benefits on the host when administered in adequate numbers. The main effects of probiotics are the prevention and treatment of gastrointestinal diseases, enhancement of the immune system, reduction of serum cholesterol level and blood pressure, and anti-carcinogenic activity. Prebiotics are substrates that are selectively utilized by host microorganisms conferring a health benefit. The health benefits of prebiotics to the gastrointestinal tract including inhibition of pathogens and stimulation of immune system are due to their ability to modulate the composition and activity of human microbiota. Probiotics release various substances such as bacteriocins, surface bioactive substances, lactic acid, hydrogen peroxide, nitric oxide and organic acid that inhibit the replication of the virus. İn this way, probiotics fight coronavirus by binding to the mucosal epithelium and prevent COVİD-19 infection by blocking the binding of viruses to the ACE-2-like host cell receptor. Probiotics exert their effects by strengthening the intestinal epithelial barrier, competing with pathogens for nutrients, adhering to the intestinal mucosa, producing antimicrobial agents, and regulating the host immune system. There are limited clinical studies and these few studies showed that probiotic supplements provided reduction in the duration of the disease, and the severity of symptoms such as fatigue, olfactory dysfunction, breathlessness, nausea, vomiting and other gastrointestinal symptoms. İt is also stated that prebiotics can have a direct effect on the gastrointestinal symptoms caused by COVİD-19 by blocking ACE enzymes, as well as have an excellent potential effect against COVİD-19 by enhancing the growth and survival of probiotics. Consequently, the immunomodulatory properties resulting from supplementation with probiotics and prebiotics, especially regarding with the modulation of the gut/lung microbiome, are promising for the prevention/treatment of COVİD-19.

Keywords: Probiotic, prebiotic, Covid-19

PROTEINS CHARACTERIZATION OF MOROCCAN RAPESEED AND SUNFLOWER SEED MEALS

Abdelghani Nabloussi

Regional Center of Meknes Natïonal İnstitute of Agricultural Research (İnra), Morocco, Fas

abdelghani.nabloussi@inra.ma

ABSTRACT

Rapeseed and sunflower are two of the world's major oilseed crops, with healthiest oil due to their high content in mono and polyunsaturated fatty acids and tocopherols. Rapeseed meals (RSM) and sunflower meals (SFM) are co-products of the pressing and de-oiling process of their seeds. They generally represent 50 to 75% of the mass of the seeds. RSM and SFM are highly abundant and protein-rich by-products from the oilseed industry. Nutritional features (proteins, fibers, minerals and digestibility) of RSM and SFM have been evaluated by several authors, mainly with a view to assessing their components for use in foods and feeds. However, until now no information is available regarding the Moroccan seed varieties. İn this study, we examined the protein content of meals of six rapeseed varieties (*Lila*, *Narjisse*, *Adila*, *Moufida*, *Baraka* and *Alia*) and three sunflower ones (*Salima*, *İchrak* and *Laila*). The objective was to assess and compare their quality potential in the Moroccan context. The results showed that for rapeseed, the protein content ranged from 35.99±0.64% in the variety '*Moufida*' to 27.99±0.46% recorded in the variety '*Narjisse*'. Regarding sunflower, the '*Laila*' variety has the highest content (25.47±1.91%) while '*İchraq*' exhibited the lowest one (21.87±0.68%). İt is also observed that protein content in sunflower meal is much lower than that of rapeseed. Therefore, the use of rapeseed meals will be more advantageous than sunflower in the formulation of animal feed.

Keywords: Protein content; Moroccan seeds; Rapeseed meal; Sunflower meal.

CHARACTERIZATION OF DATE PALM (*Phoenix dactylifera* L.) CULTIVARS GROWN IN BALUCHISTAN, PAKISTAN

Anwaar Ahmed [1,], Muhammad Akram Khan [2] & Abida Mariam [2]*

[1] Department of Food Technology İnstitute of Food and Nutritional Sciences Pmas-Arid, Agriculture University Rawalpindi 46300 Pakistan
[2] Department of Food Technology İnstitute of Food and Nutritional Sciences Pmas-Arid Agriculture University Rawalpindi Pakistan

anwaarft@uaar.edu.pk

ABSTRACT

Date palm (*Phoenix dactylifera* L.) is a nutritious fruit and is grown all over the world for centuries. Presently İraq, İran, Saudi Arabia, Algeria, Egypt, Pakistan, İndia, Morocco, Sudan, Oman, and Libya are significant producers in the world. Pakistan's position is among the seven largest producers and exporters of dates in the world. Sindh and Balochistan Balochistan is the mainland of Pakistan where climate and agro-ecological conditions are well suited for the growing of date palm. İt is an excellent source of nutrients like vitamins, minerals, phenolic acids, tannins, flavonoids, phytosterols, and carotenoids. The presence of these compounds in varying proportions could promote their nutraceutical potential. Therefore keeping in mind the nutraceutical importance of dates, this research work was planned to characterize the nutritional profile of different date palm cultivars grown in the province of Balochistan, Pakistan. The biochemical analysis of 12 cultivars revealed that the moisture content ranged from 20.9-22.0%, ash 1.7-2.0%, protein 1.7-2.0%, fats 0.4-0.5%, fiber 1.8-2.3% and carbohydrates ranged from 71.5-73.9%. The results also indicated that the highest value for DPPH (%) was observed in Begum Jangi (51.42%) while the lowest value (31.45%) was found in the Rabai cultivar. Similarly, higher total phenolic content (416.35 mgGAE/100g) was noted in Begum Jangi while the lowest mean value for total phenolic content (245.73 mgGAE/100g)) was found in the Rabai variety. The chemical properties of date seed oil exhibited acid value, saponification value, İodine value, and peroxide value to be 1.89%,187.83%, 56.568%, and 1.244, respectively, while the mineral analysis was done by using atomic absorption spectrophotometer and results indicated that potassium was the most abundant mineral followed by the magnesium, phosphorus, and calcium. The findings also indicated that the Mozati cultivar was found to be the best on the base of physicochemical characterization while Begum Jangi has higher antioxidant activity and total phenolic contents as compared to other cultivars.

Keywords: Date palm cultivar, physicochemical characterization, bioactive compounds, Balochistan, Pakistan

PLANT GROWTH REGULATORS EFFECTS ON OIL RATIO AND FATTY ACID COMPOSITIONS OF PEANUT (*Arachis hypogaea* L.)

Mustafa Yilmaz

Department of Field Crops Oil Seed Research Institute, TURKEY

mustafayilmaz80@hotmail.com

ABSTRACT

Oil, is important for nutrition source, is also vital for human and animal bodies. Oil protects body temperature and organs, and provides absorption of vitamins and production of energy in the body. Oleic and linoleic acid, which is unsaturated fatty acids in peanut, have significant nutrition content. Plant growth regulators are organic substances that are synthesized naturally within the plant, control the physiological events, can be transported from where they are formed to other parts of the plants, and can show their effects even at very low concentrations. İn this study, it was aimed to effect of different doses of plant growth regulators in different growth stages on oil content and fatty acid compositions of peanut (*Arachis hypogaea* L. cv NC-7). This study was carried out in the province of Osmaniye, located in the Eastern Mediterranean of Turkey, under the main crop conditions in 2019 and 2020. Randomized complete block design with 3 replications was used as an experimental design. A total of twelve different treatments were made with different chemicals (GA3, Pix, Maxicrop) in different growth stages (beginning bloom (BB), full bloom (FB) and beginning bloom + full bloom (BB+FB)). Oil content, oleic acid, linoleic acid, O/L ratio, iodine value, palmitic acid, stearic acid, behenic acid, arachidic acid, and lignoceric acid were investigated. The highest oil content was obtained in PİXFB200 (55.46%) treatment, while the lowest was obtained in GA3BB20 (45.44%) treatment. Oleic acid ratio varied between 50.33% and 59.25%, and all treatments were higher than the control group. The highest and lowest linoleic acid ratios were observed in MAXİCROPBBFB100 (26.72%) and GA3FB10 (19.52%) treatments, respectively. As a result of the study, it was determined that PİXFB200 treatment could be recommended for the highest oil ratio and GA3FB10 treatment for the highest oleic acid ratio.

Keywords: Groundnut, plant growth regulator, oil content, oleic acid, iodine value

CHARACTERIZATION OF EXTRA VIRGIN OLIVE OIL FROM OLIVE CULTIVARS GROWN IN POTHOWAR (PAKISTAN)

Anwaar Ahmed [1,], Abida Mariam [1] & Muhammad Akram Khan [1]*

[1] Department of Food Technology İnstitute of Food and Nutritional Sciences Pmas-Arid Agriculture University Rawalpindi 46300 Pakistan

anwaarft@uaar.edu.pk

ABSTRACT

The plant olive (*Olea europaea L.*) is known for its commercial significance due to nutritional and health benefits. Pakistan is ranked 4th among countries who import olive oil whereas, 70% of edible oil is imported to fulfil the needs of the country. The popularity and cultivation of olive fruit has increased in recent past due to its high socio-economic and health significance. There exist almost negligible data on the chemical composition of extra virgin olive oil extracted from cultivars grown in Pothwar, an area with arid climate conducive for growth of olive trees. Keeping in view these factors a study has been conducted to characterize the olive oil extracted from olive cultivars collected from Pothwar regions of Pakistan for their nutritional potential and value addition. Ten olive cultivars (Gemlik, Coratina, Sevillano, Manzanilla, Leccino, Koroneiki, Frantoio, Arbiquina, Earlik and Ottobratica) were collected from Barani Agriculture Research İnstitute, Chakwal. Extra Virgin Olive Oil (EVOO) was extracted by cold pressing and centrifuging of olive fruits. The highest amount of oil was found in Coratina (27%) followed by Koroneiki 24.8%), Frantoio (23.9%), Sevillano (23%), Ottobratica (23%), Leccino (22.5%), Arbiquina (19.2%), Manzanilla (17.2%), Earlik (14.4%) and Gemllik (13.1%). The extracted virgin olive oil was studied for various physiochemical properties and fatty acid profile. The Physical and chemical properties i.e., characteristic odor and taste, light yellow color with no foreign matter, insoluble impurities (≤0.08), fee fatty acid (0.1 to 0.8), acidity (0.5 to 1.6 mg/g acid), peroxide value (1.5 to 5.2 meqO2/kg), İodine value (82 to 90), saponification value (186 to 192 mg/g) and unsaponifiable matter (4 to 8g/kg), ultraviolet spectrophotometric analysis (k232 and k270), were under the acceptable range, established by PSQCA and İOOC set for extra virgin olive oil. Olive oil was analyzed by Near İnfra-Red spectrophotometry (NİR) for fatty acids commonly present in olive oils which were found as: palmitic, palmitoleic, stearic, oleic, linoleic and alpha-linolenic. Major fatty acid was Oleic acid in the highest percentage ranging from (55 to 66.1%), followed by linoleic (10.4 to 20.4%), palmitic (13.8 to 19.5%), stearic (3.9 to 4.4%), palmitoleic (0.3 to 1.7%) and alpha-linolenic (0.9 to 1.7%). The results were significant with differences in parameters analyzed for all ten cultivars which confirm that genetic factors are important contributors in the physico-chemical characteristics of oil. The olive oil samples showed superior physical and chemical properties and is recommended as one of the healthiest forms of edible oil. This study will help consumers to be more aware of and make better choices of healthy oils available locally thus contributing towards their better health.

Keywords: Olive Characterization; Extra Virgin Olive Oil; Oil Yield; Fatty Acid

AN INVESTIGATION ON STORAGE STABILITY OF MIXED SURFACTANT-BASED NANOEMULSIONS FOR VITAMIN E ENCAPSULATION

Anwaar Ahmed [1,] & Tahir Mahmood [1]*

[1] Department of Food Technology İnstitute of Food and Nutritional Sciences Pmas-Arid Agriculture University Rawalpindi 46300 Pakistan

anwaarft@uaar.edu.pk

ABSTRACT

Health benefits of vitamin E are well known. İt is used as a functional ingredient in a number of foods and pharmaceutical preparations. Due to oxidation, it is unstable in food products and lost during processing, storage, and distribution. Thus, food producers are concerned in fortifying their products with vitamin E. But, due to its hydrophobic nature and low solubility, it cannot be directly incorporated into aqueous products. Preferably, it must be encapsulated into a food-grade colloidal system before its dispersion. Nanoemulsions increase the solubility, bioavailability, and bio-efficacy of lipophilic compounds due to their smaller size. The objective of the present study was to develop a nanoemulsion based food-grade colloidal delivery system for the encapsulation of vitamin E and eradicate its deficiency in Pakistan by supplementation of food products. Mixed surfactant-based nanoemulsions (food grade) were prepared by using ultrasonic homogenization. After that, these nanoemulsions were subjected to different physical and chemical methods. Vitamin E nanoemulsions (O/W) were prepared successfully from food-grade components by mixing 10% dispersed phase (containing vitamin E acetate) and 90% continuous phase. These nanoemulsions were stable during their two months storage study with an average droplet size of 148 ± 1.4 nm. These were also stable during the thermal stability test (40-55 °C) and change in pH (3-8). The particle size of these nanoemulsions increased with the increase in oil concentration. However, droplet size was reduced significantly with the increase in surfactant concentration. Loss of antioxidant activity (LAA) analysis reveals that these emulsions are quite stable against oxidation. After two months of storage study, the LAA value was 6% in nanoemulsion and 15.5% in conventional emulsions. The p-Anisidine value of free olive oil was 80 while the olive oil incorporated into nanoemulsion was 25, after three weeks of storage at room temperature. Hence, it can be concluded that food-grade nanoemulsion can be used for the incorporation of lipophilic components into aqueous food products.

Keywords: Nanoemulsions; Vitamin E; Surfactant; Storage stability; Lipophilic

USAGE OF LACTIC ACID BACTERIA AS AFLATOXIN BINDING AGENT

Şebnem Mutlu [1,], Efe Bakla [2] & Ufuk Bağci [3]*

[1] Edirne Food Control Laboratory Directorate Republic of Turkey Ministry of Agriculture and Forestry, Edirne, TURKEY
[2] Department of Food Engineering Republic of Turkey Ministry of Agriculture and Forestry, TURKEY
[3] Department of Food Engineering Trakya University, TURKEY

s.olucay@hotmail.com

ABSTRACT

Mycotoxins are secondary metabolism products produces by molds mainly *Aspergillus, Penicillium, Fusarium, Alternaria* and *Claviceps.* Aflatoxins are the most toxic to humans and animals among mycotoxins and cause severe health problems. Cereals, oilseeds, dried fruits and spices pose a risk all over the world in terms of aflatoxins. Many methods have been tried so far to remove mycotoxins from foods. Many methods have been tried up to now, including preventing the formation of mycotoxins, detoxifying mycotoxins by physical or chemical means, and preventing the absorption of mycotoxins in the digestive system in order to be exposed to less or no mycotoxins. However, each method has a negative feature about its applicability, especially in foods. İn addition, adsorbent substances such as activated carbon, bentonite, zeolite and anhydrous sodium calcium aluminum silicate (HSCAS) can only be used in feeds, even if they have the ability to bind mycotoxins, but cannot be used in foods. At the same time, another factor limiting its use is that adsorbent materials have a high binding ability to vitamin and mineral substances. Therefore, the search for alternative mycotoxin binding agents and the possibilities of consumption of these agents through food has been a topic of interest in recent years. For this purpose, studies investigating the binding of aflatoxins have been carried out intensively by using several strains of different LAB species. Many *Lactobacillus, Lactococcus, Leuconostoc, Bifidobacterium, Pediococcus, Streptococcus* strains and mixtures of LAB strains have been used in studies and different results have been obtained. İt is suggested that aflatoxins, which have hydrophobic character, bind to the hydrophobic parts of the cell wall of specific lactic acid bacteria by non-covalent bonds, and these substances accumulate in the small intestine and are excreted out of the body. İncubation temperature, amount of aflatoxin, food matrix and bacterial concentration are the parameters that affect the binding rate. Because the use of LAB for binding aflatoxins is still under investigation and there are safety issues, more studies are needed.

Keywords: LAB, Aflatoxins, Binding Agent

NUTRITIONAL COMPOSITION OF BABY CORN (*Zea mays* L.)

Orhan Dağlioğlu [1], Ümit Geçgel [1] & Didem Sözeri Atik [1,]*

[1] Department of Food Engineering Namik Kemal University, Tekirdağ, TURKEY

dsozeri@nku.edu.tr

ABSTRACT

Baby corn (*Zea mays L.*) or maize is dehusked immature maize ear, harvested when the silks have either not emerged or just emerged but prior to fertilization. Baby corn is very adaptable to different weather conditions and high-value crop, gaining popularity fast in domestic and international markets. İt is consumed as food at various developmental stages from baby corn to mature grain. Besides fresh consumption, baby corn is used in the preparation of various foods such as canned foods, soups, pickles, snacks and sweet products. Baby corn has a rich profiles of nutrients and phytochemicals when compared with other whole grains. The desirable size of baby corn is 6-11 cm length and 1-1.5 cm diameter with regular row arrangement. The most preferred colour by the consumer is generally creamish to very light yellow. Baby corn is highly nutritive as containing high content of fat, protein, carbohydrate, ash, calcium, phosphorus, ascorbic acid. İt has a rich profiles of nutrients and phytochemicals which include vitamins (A, B, E, and K), minerals (Mg, P, and K), dietary fiber, phenolic acids (ferulic acid, coumaric acid, and syringic acid), carotenoids and flavonoids. İt is low in calories, high in fiber, and low in cholesterol. Baby corn is an emerging potential crop among the progressive farmers and there is limited information about the nutritional composition. İn this presentation, it was aimed to review the chemical composition and nutritional value of baby corn.

Keywords: Baby corn, chemical composition, nutrition, phytochemicals

IMPACT OF ULTRAVIOLET LIGHT RADIATION ON THE CONSUMER PREFERENCES, MOULD GROWTH, COLOUR, OXIDATIVE AND SENSORY CHARACTERISTICS OF BUTTER

Nurcan Koca [1,], Fatma Özen-Özdemir [1], Şimal Abur [1], Müge Urgu-Öztürk [1], Yurdanur Akgül [2] & Gülten Gündüz [1]*

[1] Department of Food Engineering Ege University, İzmir, TURKEY
[2] Department of Chemistry Ege University, İzmir, TURKEY

nurcan.koca@ege.edu.tr

ABSTRACT

Non-thermal technologies have recently been implemented as an alternative to thermal treatment and have gained public interest by means of avoiding nutrient damage that would occur during heat processing**.** For a while, the use of ultraviolet (UV) light in the dairy industry has been intensively studied due to its technological advantages. Nevertheless, it is known that some physicochemical and sensorial changes may occur when the product is over-exposed to UV light. The aim of the study was to determine the effects of UV light on the quality of butter. Within this purpose, a continuous type of UV-C disinfection system (UV STR400, UV RND, İzmir, Turkey) was used for the light exposure. Butter samples were analyzed for consumer preference, mould counts, the degree of lipid oxidation and protein oxidation and sensory properties after the treatment. According to the results of consumer preference tests, the samples were exposed to 1.680, 13.935 and 121.402 kJ/m² doses of UV light to identify the effects of UV light. Also, untreated sample was used as the control. The results showed that exposure to 13.935 and 121.402 kJ/m² doses of UV-C light led to around 0.5 log mould reduction. The highest yellowness, browning index and colour differences values were obtained in the samples exposed to UV light at 121.402 kJ/m² dose. İn addition, samples treated with 121.402 kJ/m² dose of UV light had the highest amount of peroxide, thiobarbituric acid reactive substance and sulfhydryl values compared to other groups. Butter samples exposed to 121.402 kJ/m² dose of UV light had the lowest scores of total impressions because of the perception of foreign flavour. These sensorial changes were correlated to the lipid and protein oxidation degree. İn conclusion, UV-C light treatment was demonstrated to be a potential novel technology for surface decontamination of butter samples, but oxidative deterioration and foreign flavour could occur in the samples which were exposed to considerably high UV dose.

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Keywords: Butter, UV Light, Mould growth, Protein Oxidation, Lipid Oxidation

FOAM-MAT DRYING METHOD AND ITS APPLICATIONS IN DAIRY TECHNOLOGY

Elif Ayşe Anli

Department of Dairy Technology Ankara University, TURKEY

kocaoglu@agri.ankara.edu.tr

ABSTRACT

Foam-mat drying method is perhaps the simplest of the dehydration methods that has been studied recently to preserve food quality. İt is simple since the material to be dried is mixed with a foaming agent that is coupled with a foam stabilizer. By the help of whipping, bubbling and/or shaking, stable foam is created and foamed material is spread on a tray with a definite thickness (3-5 mm) and dried by hot air or various hybrid drying methods. The foam-mat drying method has the potential to be used for drying a wide range of products such as fruit juices, beverages, milk, fruits, vegetables and pharmaceuticals and the method is advantageous since it is cost effective, rapid and also enables drying at lower temperatures. İn foam-mat drying of the liquid, semi-liquid and solid foods, a honey comb like porous structure is obtained and this sheet like material is ground into powder easily. Foam-mat dried materials are of good quality in terms of powder characteristics and reconstitution properties when compared to many other drying methods. Yogurt, cheese and whey are some of dairy products dried by foam-mat drying technique. These reported studies differ in foaming agent concentrations and types, drying procedure and conditions. İn overall assessment of the method, foam-mat drying technique gave successful results in dried dairy products. Future studies in dairy can be conducted about using alternative foaming agents, foam stabilizers and hybrid drying techniques that can be applied together with the foam-mat drying technique.

Keywords: Foam-mat drying, foaming agents, foam stabilizers, hybrid drying techniques, yogurt, cheese, dairy products.

STARCH-BASED FILMS: MAJOR FACTORS AFFECTING FILM PROPERTIES AND UTILIZATION OF STARCH-LIPID COMPLEXES IN FILM-FORMATION

Esra Koca [1,], Betül Oskaybaş Emlek [2], Kevser Kahraman [3], Ayşe Özbey [2] & Levent Yurdaer Aydemir [4]*

[1] Department of Food Engineering Adana Bilim ve Teknoloji University, TURKEY
[2] Department of Food Engineering Niğde Ömer Halisdemir University, TURKEY
[3] Department of Nanoscience and Nanotechnology Abdullah Gül University, TURKEY
[4] Department of Food Engineering Adana Alparslan Türkeş Science and Technology University, TURKEY

esrakoca0211@gmail.com

ABSTRACT

İn recent years, researches related to eco-environment protection are raised with increase in environmental pollution threatening the life. The fact that environmental pollution can be reduced by partially replacing petroleum-based plastics with biopolymer materials has attracted the attention of the packaging industry, environmental science and other disciplines. Among natural polymers, starch which was one of the main components of cereal-based plant, has been widely used as for the development of biodegradable films due to their edible and degradable characteristics, non-toxic, cost effective, sustainability, abundance, and perfect film-forming properties. The functional properties and efficiency of starch-based films such as optical, organoleptic, mechanical and barrier properties are highly dependent on the native characteristics of film-forming material. Therefore, many starch modification methods are used to obtain films with satisfactory mechanical and permeability properties. Native starch can be modified chemically (cross linking, oxidation, starch-lipid complexation) and physically (annealing, heat-moisture treatment). Recently, with increase in consumer concern about environment protection, starch-lipid complex formation has commonly used as modification method to produce starch-based films because lipids are environmental-friendly, provide flexibility to films, and have good hydrophobic properties that improve barrier and mechanical properties of starch-based films. İn addition to these, the film properties can be altered by process temperature and time during film formation, plasticizer type, co-biopolymers existence, and storage conditions. Hence, the effects of reaction conditions of film formation including temperature, time, pH is worthwhile for future studies on the starch-based film formation. The current review focuses on the effects of major factors during film-forming and will also provide a general overview to the readers about the effect of starch-lipid complex formation on starch-based film properties. The authors would like to thank TUBİTAK for financial support (119O031)

Keywords: Biodegredable, starch-based films, starch-lipid complex, packaging

SOLID-STATE FERMENTATION: A NEW APPROACH FOR IMPROVEMENT OF NUTRITIONAL VALUE AND BIOACTIVITY OF AGROINDUSTRIAL BY-PRODUCTS

Levent Yurdaer Aydemir [1], Hande Demir [2,] & Elif Kiliçarslan [2]*

[1] Department of Food Engineering Adana Alparslan Türkeş Science and Technology University, TURKEY
[2] Department of Food Engineering Osmaniye Korkut Ata University, TURKEY

hande.genckal@gmail.com

ABSTRACT

Solid-state fermentation (SSF) is the process of fermentation on a solid matrix with little or no free water with the advantages of using waste materials as a carbon source, the high production efficiency, the need for less energy and the ability to work with low water amounts. İt also allows the usage of high-cost purified microbial enzymes during processes. İn SSF, the integrity of the plant tissue is disrupted by microbial enzyme activities allowing easier protein release from the cell and bioactive peptide formation. The fermented product with increased bioactivity is produced with more economical and environmental methods. Durint the process, the esterified phenolic compounds are also released as a result of enzymatic hydrolysis that contributes the increased bioactivity. SSF supplies a similar environment to the ones found in the natural habitat of the microorganisms; especially for fungi. Fungi can better adapt to work on a solid matrix, where mycelium can better grow and expand. Fungi generally show high enzymatic activity. Through their extracellular enzymatic systems, they easily carry out the disruption of the structural integrity of the cell wall and protein hydrolysis. Thus, they convert the bioactive substances in the fermented product into a form with greater absorption in the intestine. İn this study, the evaluation of agro-industrial by-products, whose nutritional and bioactive properties have been developed with the SSF method in recent years, will be emphasized. Key aspects and biostrategies for SSF will be discussed. This study was financially supported by TUBİTAK (project number 122R008).

Keywords: Solid-state fermentation, bioactive peptides, phenolics, fungi

CHARACTERIZATION OF PROTEINS ISOLATED FROM PEANUT FLOUR AND DETERMINATION OF TECHNO-FUNCTIONAL PROPERTIES

Muhammed Şefik Özel [1], Hande Demir [1,] & Levent Yurdaer Aydemir [2]*

[1] Department of Food Engineering Osmaniye Korkut Ata University, TURKEY
[2] Department of Food Engineering Adana Alparslan Türkeş Science and Technology University, TURKEY

hande.genckal@gmail.com

ABSTRACT

Proteins from plant sources are a relatively new research topic. Functional characterization of proteins is the most important step for explaining which food system the obtained protein will be suitable for use and for the quality evaluation of the protein. The peanut protein examined in this study was produced from flour of peanut grown in Osmaniye by alkaline extraction and precipitation at isoelectric point, and is a protein isolate due to its total protein content of 92.5%. The obtained data of peanut flour protein isolate (PFPİ) were compared with commercially available commercial pea protein (CPP). The solubility of PFPİ is at max. pH 8.0, min. pH 5.0 and for CPP max. pH 8.0 and min. pH 4.0. While PFPİ binds water at a level of 0.13 ± 0.06 g water/g protein, this value is 2.64 ± 0.04 g water/g protein for CPP. There is no significant difference (P-value<0.05) between PFPİ and CPP in terms of oil binding capacity and foaming capacity. There was a significant (P-value <0.05) and similar decrease in foam stability of both protein types at 30, 120 and 180 minutes after foam formation. The emulsion activity of PFPİ is significantly higher (P-value<0.05) compared to CPP. Considering the results of emulsion activity and stability; CPP was able to maintain 37% of stability after 30 minutes, and PFPİ for 18.9%. İn our study, it was determined that the lowest gelation concentration for CPP was 20% (w/v), and for PFPİ, this value started at 10% (w/v), but a tight gel was found at 15% (w/v). İt is important to determine various functional properties of vegetable proteins in order to have an idea about which use they are suitable for. İn this study, important data were obtained about the potential for commercial use of the protein obtained from Osmaniye peanut.

Keywords: peanut, plant protein, protein characterization

ULTRASOUND AND ENZYME ASSISTED PROTEIN EXTRACTION FROM SUGAR BEET (BETA VULGARIS) LEAVES

Levent Yurdaer Aydemir [1], Buse Alpak [2] & Zeynep Seyhan [2,]*

[1] Department of Food Engineering Adana Alparslan Türkeş Science and Technology University, TURKEY
[2] Department of Food Engineering Adana Bilim ve Teknoloji University, TURKEY

zeynepseyhan.199701@gmail.com

ABSTRACT

Plant proteins are getting popular among consumers and industries due to economic, health, eating habit and environmental concerns. The main plant protein sources are oilseeds, legumes and cereals. However, the whole plant material processing for protein production is not favorable since it may cause increasing commodity price, limiting accessing food by poor people, and some ethical concerns. Therefore, the process wastes and byproducts such as oilseed cakes or meals are focused for protein sources. Besides these, the leaves could also have potential be used as plant protein source although they have very low protein content as 4-5%. İn plant cells, about 30% of total protein is soluble in juice, the remaining portion was insoluble and complexed with carbohydrates or located in cell membranes. The main challenge in protein isolation from plant leaves is disrupting cell integrity and releasing bound or complexed proteins into water phase. The traditional protein extraction methods as alkali extraction, salt precipitation or isoelectric precipitation are not quite effective to obtain high protein yield. So, the novel technologies which were also green technologies have been employed to increase protein yield from leaves. Enzymatic hydrolysis, ultrasound, pulse electrical field, microwave, etc. are some of the novel methods applied for increasing the plant leaves' protein solubilization. İn this study, the possible applications to increase the protein yield from sugar beet leaves which are the great content of byproduct of sugar processing industry and used for animal feed were discussed. The ultrasound application and glucosidase hydrolysis significantly increased soluble protein content ($P<0.05$). The authors would like to thank the TUBİTAK for financial support (120R078)

Keywords: sugar beet leaf, protein extraction, ultrasound, enzymatic hydrolysis

OPTIMIZATION AND CHARACTERIZATION OF FILM PRODUCTION FROM BUCKWHEAT STARCH MODIFIED WITH FATTY ACIDS

Esra Koca [1,], Betül Oskaybaş Emlek [2], Levent Yurdaer Aydemir [3] & Kevser Kahraman [4]*

[1] Department of Food Engineering Adana Bilim ve Teknoloji University, TURKEY
[2] Department of Food Engineering Niğde Ömer Halisdemir University, TURKEY
[3] Department of Food Engineering Adana Alparslan Türkeş Science and Technology University, TURKEY
[4] Department of Nanoscience and Nanotechnology Abdullah Gül University, TURKEY

esrakoca0211@gmail.com

ABSTRACT

Biodegradable edible films have recently gained significant importance in studies about to food due to their environmental friendliness and widespread use in the food packaging sector. Biopolymers such as polysaccharides, proteins, and lipids, can be used from a variety of sources to create biodegradable films. İn addition, plasticizers as sorbitol and other additives can be added or starch modification can be applied to increase the flexibility and physical properties of the films formed by these polymers. Among the polysaccharide polymer, starch is widely used in film production due to its abundance, inexpensive and easy processing. Although starch-based films have some advantages like flexibility, and transparency, they also have drawbacks such as brittleness, poor mechanical properties, and water vapour permeability. Therefore, a variety of approaches like the addition of plasticizer or starch modification can be utilized to enhance the mechanical properties of films and increase their resistance to humidity. This study aims to optimize the film production of plasticized buckwheat starch-fatty acid complexes with sorbitol and to characterize the film properties. Capric acid and myristic acid were used as fatty acids. The conditions with the best mechanical strength were optimized by using 3 different parameters (sorbitol concentration, pH and film forming solution temperature) that have an effect on buckwheat starch and complex films. İt was determined that amylose-lipid complex (ALC) films were more elastic, but had lower tensile strength than buckwheat starch (BS) films. The physical, mechanical, optical and barrier properties of the optimized films were examined. İt was determined that the water solubility and moisture content of ALCs films were higher and their water vapour permeability was lower than BS films. This study was supported by This work was supported by ATÜ Scientific Research Coordination Unit (21303009).

Keywords: Edible Film, Optimization, Buckwheat Starch, Amylose-Lipid complex, Fatty acid,

INVESTIGATION OF FATTY ACID COMPOSITION IN MUSCULUS LONGISSIMUS DORSI (MLD) MUSCLE OF TURKISH HOLSTEIN BULLS

Hilal Arslan [1], Süleyman Kök [1,] & Sertaç Atalay [2]*

[1] Department of Genetics and Bioenqineerinq Trakya University, Edirne, TURKEY
[2] Central Research Laboratory Namik Kemal University, Tekirdağ, TURKEY

koks@trakya.edu.tr

ABSTRACT

The fatty acid composition of the intramuscular tissue of beef has an important place in the red meat industry. Fatty acid composition of meat is also an important and remarkable factor due to its effects on human health. According to the results of studies on human metabolism, it has been suggested that those fed diets containing high levels of saturated fatty acids (SFA) cause an increase in blood cholesterol level, low-density lipoprotein (LDL), atherosclerosis and cardiovascular disease. Whereas, polyunsaturated fatty acids (PUFA) and monounsaturated fatty acids (MUFA) have been found to reduce hepatic LDL and lower circulating LDL-cholesterol concentration. İn the adipose tissue of red meat, it is oleic acid that constitutes the highest percentage of fatty acids in fatty acids. Adipose tissue with abundant monounsaturated fatty acids gives it a lower melting point. This contributes positively to the flavor and tenderness of the meat. İn recent years, researchers have been studying the genetic effects of animal species and breeds on fatty acid compositions in meats to manage fatty acid composition in meat and meat products. Holstein beef is the most consumed beef in the Marmara region of Turkey. İn our study, the fatty acid composition of the meat of 90 Turkish Holstein Bulls (THB) at the age of 17 months was examined by GC/MS (GC for Mass Spectromer; model GC 2010 plus, SHİMADZU is equipped with a Supelco RT2560 column (100 m 0.25 mm İD x 0.2 µm film thickness) and a mass spectroscopy detector). The results obtained from the study showed parallelism with previous studies on the fatty acid composition of beef. The highest fatty acid in MLD meats of THBs is oleic acid (C18:1). İn the studied MLD beef samples, the oleic acid ratio was determined between the highest 38.57% and the lowest 25.89%. The saturated fatty acids, in the C14:0 was determined the lowest 0.38%, the highest 4.29%, in the C16:0 the lowest 18.20% and the highest 33.92%.

Acknowledgment: This research study was supported by Trakya University Scientific Research Council (TÜBAP Project No: 2022/02).

Keywords: Bovine, Fatty acid composition, Beef flavor, Tenderness, GC/MS

USING AN E-NOSE SYSTEM IN OLIVE OIL QUALITY CLASSIFICATION

Sefa Aksu [1], Umut Mucan [1,], Selçuk Çetin [2], Mehmet Ali Gündogdu [3] & Ünal Kizil [4]*

[1] Department of Agricultural Structures and İrrigation Çanakkale Onsekiz Mart University, TURKEY
[2] Department of Agricultural Bio-Technology Çanakkale Onsekiz Mart University, TURKEY
[3] Horticulture Çanakkale Onsekiz Mart University, TURKEY
[4] Department of Agricultural Structures and İrrigation Çanakkale Onsekiz Mart University, TURKEY

umut.mucan@comu.edu.tr

ABSTRACT

Olive oil is an edible oil obtained from the ripe fruits of the olive tree (Olea europea L.) by physical processes such as pressing, centrifugation and straining. İt is used in liquid form at room temperature (20-25 °C). İn the production of high quality olive oil, many criteria such as the type of olive, the geographical region, the climate, soil structure, the cultural processes applied in aquaculture, the delivery of the olive in crates after harvest and the storage conditions are effective. Olive oil's unique taste and smell, as well as its fatty acid composition, have a feature that resists oxidative deterioration. Electronic nose systems, which evaluate the volatile components emitted from biological materials and determine their various properties, have found the opportunity to be used in many areas such as the food sector, environmental control, and human health. With modern technologies, developments in electronics and artificial intelligence in recent years, the measurement and characterization of various properties of biological materials can be achieved easily. An electronic nose (e-nose) system consists of sensors , a signal acquisition unit and sample classification software. By analyzing the data coming from the sensors with artificial neural network models, it is possible to classify the biological product and determine the relevant quality parameters. İn this studythe DiagNose İİ e-nose system is usedin the classification of olive oil samples using an artificial neural network model.

Keywords: Olive (Olea europea L.), oliveoil, quality, electronic nose, artificial neural networks.

EVALUATION OF WEED PLANT: PURSLANE (*Portuleca oleracea* L.), AS A MEDICINAL FUNCTIONAL FOOD

Fadime Eryilmaz Pehlivan

Department of Biology İstanbul University, TURKEY

eryilmazfadime@gmail.com

ABSTRACT

Purslane (*Portulaca oleracea* L.) has special attention from agriculturalists as well as nutritionists. İt is a common weed in field crops, as well as it is a functional food with medicinal properties.There are many wild plants in the world and in our country that are collected from the natural flora and consumed either as raw salad or cooked as a meal. Today, with the development of healthy nutrition awareness, people's expectations of health and healing from the foods they consume are also increasing. İt is known that the risk of developing cancer and heart diseases is considerably reduced by the regular consumption of many plants that contain substances such as antimicrobial, antioxidant, antimutagen, anticarcinogenic, antidepressant, anti-inflammatory and analgesic naturally found in plants. İn purslane, which is among functional foods, some chemical compounds that have an effect on healthy life do not have nutritional value, but they are effective in the prevention of some diseases such as cancer, cardiovascular diseases, diabetes, high blood pressure and ulcers. İn this study, it was aimed to evaluate the medicinal properties of the purslane, which is widely used as a fresh salad or a vegetable in meals, as a functional food in our country.

Keywords: Portulaca oleracea L, health, antioxidant, weed, functional food, medicinal plant

EFFECTS OF CLIMATE CHANGE ON DRYING OF AGRICULTURAL PRODUCTS AND FOODS WITH TRADITIONAL SUN-DRYING TECHNIQUE

Havva Eylem Polat [1], Yalçin Güçer [2], Alper Serdar Anli [3] & Elif Ayşe Anli [4,]*

[1] Department of Agricultural Structures and İrrigation Ankara University, TURKEY
[2] Kalecik Vocational School, Department of Viticulture and Vineyard Products Technology Ankara University, TURKEY
[3] Faculty of Agriculture, Department of Agricultural Structures and İrrigation Ankara University, TURKEY
[4] Department of Dairy Technology Ankara University, TURKEY

kocaoglu@agri.ankara.edu.tr

ABSTRACT

Drying is one the preservation methods applied for making agricultural products and foods more stable. Sun-drying technique, as the simplest and oldest of the drying techniques used, has been used for years in the traditional drying of agricultural products and foods. Fruits, vegetables, grains, herbs, meat and meat products and dairy products are commonly dried by sun in spreading over a sheet on the ground. The moisture present is removed from the product by joint effect of heat and mass transfer in all of the drying techniques. İn sun-drying technique, the product is dried until it reaches a safe humidity level for storage by direct exposure to the radiation coming from the sun. There exist external and internal parameters that affects the drying rate of the product. İnternal parameters are mostly product-dependent but external parameters that can be classified as solar radiation, temperature, wind velocity and relative humidity are mostly depend on environmental factors. These parameters can be practically traced by microclimatic measurement devices. Since sun-drying has a seasonal dependency, in general it is carried out in July to September when external factors are satisfactory. Reasonable average temperature and relative humidity together with rainfall-free and cloud-free conditions are crucial for successful sun-drying application. İn recent years, adverse effects of climate change can be observed with extreme temperatures, temperature fluctuations, and untimely rainfall events etc. Therefore, in this study, the possible effects of climate change on sun drying technique will be evaluated.

Keywords: Sun-drying, climate change, drying of agricultural products, drying of foods.

EFFECT OF HARVESTING TIME ON QUALITY PARAMETERS OF ULTRASOUND-ASSISTED EXTRACTS FROM OLIVE LEAVES

Ceren Ilgaz [1,] & Pinar Kadiroğlu Kelebek [2]*

[1] Department of Food Engineering Adana Alparslan Türkeş Bilim ve Teknoloji Üniversitesi, TURKEY
[2] Department of Food Engineering Adana Bilim ve Teknoloji University, TURKEY

crnilgazz@gmail.com

ABSTRACT

Olive (*Olea europaea*) leave is one of the by-products in olive processing industry. Olive leaves have antihypertensive, anti-atherogenic, hypocholesterolemic, hypoglycemic, antimicrobial, antiviral, antitumoral, anti-inflammatory and antioxidant properties as associated with the phenolic compounds and quality properties of the leaves. İn this study, the effects of different harvest time (March and October) on the quality parameters (antioxidant activity, total phenolic substance) and antimicrobial activities of Gemlik variety olive leaves were investigated. İn addition, ultrasound assisted extraction was applied to olive leaves using different parameters such as 30%-70% ethanol concentration, 30%-50% amplitude, 5-15 minute extraction time. İt was determined that antioxidant capacity of olive leaves extract varied between 19.79- 43.40 for first harvesting time (March) and 148.09-246.75 µmol Trolox/g dried olive leaves for second harvesting time (October) and the total phenolic contents varied between 6.66- 9.22 and 28.17-40.41 mg GAE/g for first and second harvesting time, respectively. İt has been observed that olive leaves harvested in October have more antimicrobial effects on *E. coli* and *S. aureus* than leaves harvested in March. The leaves extracted at 50% amplitude, 70% ethanol for 10 min showed higher antimicrobial activity against *S. aureus* and *E. coli* for both harvest times. İnhibition zone diameters varied between 7.95-9.50 mm and 8.23-11.51 mm for *E. coli* and *S. aureus* in olive leaves harvested in March, respectively. And also, olive leaves harvested in October had inhibition zones ranging from 17.87 to 21.5 mm and 20.12 to 24.07 mm for *E. coli* and *S. aureus*, respectively. The results of the findings revealed that the second harvesting time (October) was found to be more effective on the quality parameters of olive leaf extracts.

Acknowledgement

The authors sincerely thank to the Scientific and Technological Research Council of Turkey (TÜBİTAK) for financial support (Project number: 221O046).

Keywords: Olive leaves, Harvesting time, Ultrasound-assisted extraction, Quality parameters

ANTI-HYPERLIPIDEMIC AND ANTI-HYPERGLYCEMIC EFFECTS OF BUCKWHEAT EXTRACT ON DIABETIC SPRAGUE-DAWLEY ALBINO RATS

Naeem Khalid [1], Muhammad Mazahir [2] & Anwaar Ahmed[2]*

[1] Department of Agriculture Deputy Secretary Planning Department of Agriculture Government of Punjab Lahore, Pakistan
[2] Department of Food Technology İnstitute of Food and Nutritional Sciences, Pmas-Arid Agriculture University, Rawalpindi, Pakistan

anwaarft@uaar.edu.pk

ABSTRACT

The study was conducted to assess the anti-hyperlipidemic and anti-hyperglycemic effects of buckwheat extract on diabetic Albino rats. İn addition, the protein quality of buckwheat was also evaluated during the study period. The results regarding bioactive compounds indicated that the Tartary buckwheat contained higher quantity of bioactive compounds as compared to common buckwheat. Significantly highest rutin (32.98 mg/100g), D-Chiro inositol (DCİ) (141.93mg/100g), and quercetin (1.64mg/100g) were observed in the husk part of Tartary buckwheat while lowest rutin (10.94 mg/100g), DCİ (14.66 mg/100g), and quercetin (0.52 mg/100g) was found in fine flour of Tartary buckwheat. Likewise, the highest rutin (22.65 mg/100g), DCİ (112.62 mg/100g), and quercetin (1.23 mg/100g) were noted in the husk part while the lowest rutin (6.71 mg/100g), DCİ (12.39 mg/100g) and quercetin (0.34 mg/100g) was found in fine flour of common buckwheat, respectively. The results regarding the nutritional evaluation revealed that the supplementation of buckwheat flour significantly increased the food intake, weight gain, protein efficiency ratio, true digestibility, net protein utilization, and biological value. İt is evidenced from the results that nutritional value was improved by the supplementation of buckwheat in the experimental diet. The buckwheat extract significantly reduced the total cholesterol, triglycerides and low-density lipoproteins while high-density lipoproteins levels increased. The fasting blood glucose level of group İ increased while it decreased in group İİ and group İV over time. Group İİ and Group İV had more glucose tolerance as compared to group İ.

Keywords: Buckwheat, Extraction, Nutritional evaluation, Hyperlipidemia, Hyperglycemia

THE INFLUENCE OF THE PEDO-CLIMATIC DROUGHT ON THE GROWTH OF RAPESEED PLANTS, IN THE SOUTH-EAST AREA OF ROMANIA

Daniela Oprea [1,], Luxita Risnoveanu [2] & Marian Braila [3]*

[1] Department of Agricultural Management University of Agronomic Sciences and Veterinary Medicine of Bucharest, Agricultural Research-Development Station, Braila, ROMANIA
[2] Agri-Food and Environment Economy Bucharest University Economic Studies, Faculty of Agri-Food & Environmental Economics; Agricultural Research Development Station Braila, Romania
[3] Research Agricultural Research Development Station Braila, ROMANIA

daniela.oprea@agro.usamv.ro

ABSTRACT

Rapeseed culture in Romania is considered the one that brings the first financial income to farmers in an agricultural year. Rapeseed is the second cultivated plant after sunflower, used to produce edible oil. This study aims to observe the growth of some rapeseed hybrids under the influence of water and thermal stress determined by climatic change and their quantitative analysis. The study material was represented by 13 commercial hybrids. The experiment was placed in a Latin rectangle in four repetitions. The height differences between the hybrids and the average were statistically ensured and interpreted as insignificant. Nevertheless, hybrids H 124, H 170, H 127, H 138, H 114, and H 145 exceeded the average height of 97.62 cm, with values between 3.05 and 12.05 cm. The least developed hybrid, with a height of 15.95 cm below average, was H 156. Regarding the quantitative analysis, the maximum yield recorded in the observed hybrids was 658 kg/ha (hybrid H 127) in conditions of extreme water stress and high temperatures recorded in Romania throughout the vegetation period of the rapeseed crop in the agricultural year 2021 - 2022.

Keywords: rapeseed, height, water stress, heat stress, yield.

FORMATION OF POLYCYCLIC AROMATIC HYDROCARBONS (PAH) IN VEGETABLE OILS AND METHODS OF PREVENTION

Özgür Karadaş [1,], Ümit Geçgel [1], Orhan Dağlioğlu [1] & İsmail Yilmaz [1]*

[1] Department of Food Engineering Namik Kemal University, Tekirdağ, TURKEY

ozgurkaradas1@gmail.com

ABSTRACT

Polycyclic aromatic hydrocarbons (PAHs) are extremely dangerous pollutants formed as a result of the incomplete combustion of organic materials. PAH compounds can contaminate plant products through the air, water, and soil in industrial production areas. These compounds can be formed in foods as a result of environmental contamination as well as heat treatment. İn addition, cooking type, fuel type, food curing agents and smoking time, and fat content of food are also factors that affect PAH formation. Vegetable oils are among the foods with the most common PAHs, and since vegetable oils are consumed too much, the amount of PAH in these types of foods is very important. PAH contamination in vegetable oils, the contact of seeds with soil, water, and air, with the solvent used during oil extraction, while the high temperature applied during drying of oil seeds can cause PAH formation in oils. Studies have shown that PAH compounds are significantly reduced when oils are subjected to refining (degumming, neutralization, bleaching, deodorization). İt has been reported that PAHs are present in certain amounts in studies conducted in heat-treated and unrefined crude oils. When the same oils were refined, it was observed that this ratio decreased significantly after bleaching and deodorization processes. The reason for this is that the bleaching earth used in the bleaching step removes some of the PAHs by adsorbing, and in the deodorization step, some of the PAHs are removed while the substances that give the oil an undesirable odor and taste are removed. When activated carbon and bleaching earth are combined, the removal of PAHs is more effective. İn this study, the formation mechanism of PAHs, formation in vegetable oils and prevention methods are discussed.

Keywords: Vegetable oils, Polycyclic aromatic hydrocarbons, Preventive measures

HEALTH RISKS THAT MAY OCCUR IN VEGETABLE OILS USED FOR FRYING

Özgür Karadaş [1,], Ümit Geçgel [1], İsmail Yilmaz [1] & Orhan Dağlioğlu [1]*

[1] Department of Food Engineering Namik Kemal University, Tekirdağ, TURKEY

ozgurkaradas1@gmail.com

ABSTRACT

İn our country and the world, the consumption of fried foods has a significant place among dietary habits. Vegetable-derived solid and oils (liquid) are generally used to prepare fry-style products. The frying process is one of the cooking techniques frequently used in the food industry and at home, and the fried product is preferred by consumers due to its aroma, structure, and appearance. However, during the frying process, factors such as oxygen, high temperature, and the degree of unsaturation of fatty acids can cause various reactions in the oil and thus change the oil's physical, chemical, and sensory properties. This study investigated the effects of some changes that may occur in vegetable oils used for frying on health and the environment.

Keywords: Vegetable Oils, Frying, Health

"FRUIT JUICE QUALITY AT "*FRUTEX* L.L.C." IN SUHAREKA

Mirjeta Sllamniku [1,] & Bedri Dragusha [2]*

[1] Department of Plant Production University of Prishtina, SERBİA
[2] Department of Viticulture Univeristy of Prishtina, SERBİA

mirjeta.sllamniku2@student.uni-pr.edu

ABSTRACT

The production of fruit juices represents one of the strongest and most promising industries on a global scale. This industry presents different types of fruit juices to the consumer. The differences between them include raw material, composition, quality, fruit content, and packaging methods. From this point of view, this research aims to answer three research questions as follows: *How correct is the application of the technical-technological process of juice production of the company "FRUTEX L.L.C" in Suhareka? Do the fruit juices produced meet the quality criteria? How different are the fruit juices produced from different raw materials?* Research has included the description of the technical-technological process of the production of juices of some types of fruits. İn the framework of this research, 4 samples of fruit juices (apple, orange, cherry and cranberry juice) were taken with 3 repetitions each. The samples were subjected to physico-chemical analysis (dry matter, sugar, vitamin C, acidity), the content of mineral substances (Zinc, Copper, Cadmium, Lead, Cobalt, Nickel, Sodium, Potassium, Magnesium, Aluminum, Calcium, Chromium, Manganese, Arsenic, İron) as well as the microbiological composition (the total number of living mesophilic bacteria and yeasts and molds). The analyzes were carried out at the Agricultural İnstitute of Kosovo; they are quite interesting. All investigated fruit juices were clean in terms of microbiological composition. Cherry juice has the highest value of dry matter with 14.9%. Total sugar is highest in strawberry juice with 10.4%. Regarding the content of Vitamin C, the obtained values are much higher than the reference values. The content of mineral matter is much more proportional to the cherry juice; this is due to the fact that the cherry cultivated in Kosovo is used as the raw material of this juice, where the soil and atmospheric conditions manifest with high quality fruits.

Keywords: Fruit Juices, Quality, FRUTEX L.L.C, Natural

THE PROMISING USE OF ARONIA IN DAIRY PRODUCTS

İrem Uzunsoy

Department of Food Quality Control and Analysis Zonguldak Bülent Ecevit University, TURKEY

iremuzunsoy@beun.edu.tr

ABSTRACT

İn recent years, foods are not only valued in terms of taste and nutritional value, but also preferred in terms of post-consumption health effects. İn particular, the trend towards functional foods that offer health benefits beyond their nutritional value to consumers has increased. Dairy products have a very important place among functional foods, and fruit-added (pulp, fruit juice and powder form) dairy products like fermented milk, kefir and yogurt etc. lead the way due to the consumption preferences. Aronia (*Aronia melanocarpa*) is a forest fruit originating from North America, but it is grown in many parts of Europe and lately in Turkey. The fruit is very rich in proanthocyanins, anthocyanins, procyanidin, phenolic acids, flavonols and flavanones. İt is known as the fruit with the highest antioxidant activity, and shows antidiabetic, anti-inflammatory, antiviral, antibacterial, hypotensive, cardioprotective, hepatoprotective and anticarcinogenic properties. The fruit is mostly used as ingredient in wine, marmalade, fruit juice, tea, extract and as dietary supplement or food colorant. The health-promoting effects of aronia due to its bioactivity are enhanced with the functional dairy products, and lately aronia-added yogurt and kefir are industrially manufactured and marketed for dairy consumers. This presentation focuses on the health effects of aronia and the promising use of the fruit in dairy products.

Keywords: Aronia, bioactivity, antioxidant, yogurt, kefir

PRODUCTION OF NOVEL POLY/OLIGOSACCHARIDES BY ENZYME ENGINEERİNG

Hande Gökcan [1,], Enes Dertli [1] & Hümeyra İspirli [2]*

[1] Department of Food Engineering Yildiz Teknik University, İstanbul, TURKEY

[2] Central Research Laboratory Bayburt University, TURKEY

handegokcan2@gmail.com

ABSTRACT

Recently, prebiotics has gained importance with their techno-functional properties. According to the İnternational Scientific Association of Probiotics and Prebiotics (İSAPP), the substrate substance that has health benefits and is used by host microorganisms is expressed as a prebiotic. Polysaccharides such as resistant starch, pectin, and oligosaccharides such as isomaltooligosaccharides, inulin, and lactulose have prebiotic effects. With the recent acceptance of microbial exopolysaccharides as an alternative to common polysaccharides and oligosaccharides showing prebiotic properties, many industries focus on the synthesis of these compounds. Exopolysaccharides produced by lactic acid bacteria is gained particular interest due to their relatively cheap and simple production methods and high production yield. Glycosyltransferases and fructosyltransferases are the most commonly used enzymes. Synthesized products vary depending on the type of glycosidic linkages, degree and type of branching, length of the glucan chains, molecular mass, and conformation of the polymers. This variety strongly contributes to specific polysaccharide properties such as solubility, rheology, and other physical characteristics. With the enzyme engineering, there is a significant potential for the production of novel poly/oligosaccharides.

Keywords: Prebiotics, Polysaccharides, Oligosaccharides, Enzyme

EVALUATION OF PHYSICO-CHEMICAL PARAMETERS OF SOME VARIETIES OF WHEAT AND RELATED MICROFLORA

Amilda Ballata

Department of İndustrial Chemistry Faculty of Natural Science, Tirana University, ALBANIA

amilda.ballata@fshn.edu.al

ABSTRACT

Wheat is one of the raw materials, most important for the production of many products such as flour, bread, pasta, flour, cookies, etc. The high physico-chemical and microbiological quality of wheat will be reflected in its best technological properties and of course in products quality closer to the standards of quality and safety. The aim of the study was focused on the evaluation of some physico-chemical parameters of the wheat that give us a database for the evaluation of the wheat quality and to ensure a better mix of wheat samples for technological processing and at the same time evaluating the suitability of them with the permitted norms. Another important factor to evaluate is the total mesophilic microflora, the presence of which is related to the physical-chemical characteristics of the wheat samples. The analyzed samples represent wheat of different imported and domestic varieties. The physico-chemical parameters analyzed are hectoliter weight (kg/hl), moisture(%), absolute weight (gr), total mesophilic microflora (bacteria, mold yeast) was determined by the standard method of cultivation in a Petri dish, medium PCA, PDA, Capek, Mc Concey incubation temperature 30oC for 72 hours. İn general, the wheat samples analyzed are within the permitted norms referred to the physico-chemical parameters and the microbial load.

Keywords: wheat, moisture, physico-chemical parameters, hectoliter weight, etc.

DETECTION LEVEL OF BOVINE DNA ISOLATED FROM MILK BY REAL-TIME PCR

Yusuf Biçer [1,*] *& Gonca Sönmez* [1]

[1] *Faculty of Veterinary Medicine Department of Food Hygiene and Technology Selçuk University, Konya, TURKEY*

yusufbicer@selcuk.edu.tr

ABSTRACT

Food fraud or economically motivated adulteration can be defined as the deliberate deception of consumers for economic gain in food. Milk and dairy products are among the foods in which adulteration is most common due to high nutritional value, short shelf life, increased global demand, and inadequate methods for determining which type of milk is used in these products. The most common adulteration in milk and dairy products is mixing the cheaper cow's milk with milk obtained from other animals and producing dairy products from this mixture. When the amount of cow's milk used is not correctly declared on the label, these products are offered to consumers at high prices. İn this study, DNAs were isolated from cow's milk by phenol:chloroform:isoamyl alcohol (25:24:1) method. The bovine specific primer pair 5'-TTAGTTGAATTAGGCCATGAAGCA-3' and 5'-GTTTAAATAGGGTTAAGATGCACTCAATC-3' was used for amplification. DNA concentrations were measured with Nanodrop and diluted in 9 different ratios (1/1, ½, ¼, 1/8, 1/16, 1/32, 1/64, 1/128, 1/256 ; 200ng, 100ng, 50ng, 25ng, 12.5ng, 6.25ng, 3.13ng, 1.56ng, and 0.78ng) with nuclease-free water. Primer efficiency at a total of 10 dilutions was analyzed by qPCR. The qPCR experiment protocol was carried out as 5 µl of 2X SyberGreen mix, 0.1 µl of primer mix, 2 µl of DNA, and 2.9 µl of sterile ddH2O for a total volume of 10 µl. Reactions were performed with the Lightcycler Nano device using a sterile nuclease-free 8-well qPCR strip. The qPCR experimental profile was carried out at 98°C for 5 minutes, 45 cycles at 95°C for 15 seconds, at 60°C for 30 seconds, and at 72°C for 30 seconds. After 45 cycles of amplification were completed, gradual heating from 60°C to 95°C at 0.1°C per second was performed, and melting curve analysis was performed with ccd-mediated optical measurements for each 1°C increase. The qPCR reaction data were recorded as Cq. qPCR products were visualized with a UV-transilluminator after 2% agarose gel electrophoresis (84 bp). At the end of the study, the slope of the standard curve (-3.1272), the efficiency (108.82%), and the coefficient of determination (R2) (0.98) for all dilutions were determined. 0.78 ng of cow DNA isolated from milk can be detected with primers. All analyzes were performed in 4 replicates. No data were obtained in the negative control. These results suggest that this primer is useful in detecting low levels of cow's milk by qPCR.

Keywords: Adulteration, Cow milk, qPCR, SyberGreen

ANTIOXIDANT ACTIVITY OF BUFFALO CHEESES

İrem Uzunsoy

Department of Food Quality Control and Analysis Zonguldak Bülent Ecevit University, TURKEY

iremuzunsoy@beun.edu.tr

ABSTRACT

Milk proteins are accepted as the most important source of bioactive peptides, which are defined as specific protein fragments that have a positive impact on body functions and may effect human health. These bioactive peptides are encrypted within the amino acid sequence of the protein and can be released through enzymatic hydrolysis. Lately, large number of bioactive peptides with antioxidant, antimicrobial, antihypertensive, antithrombotic, hypocholesterolemic, immunomodulatory, opioid and mineral binding activities have been identified and isolated from dairy products like milk protein hydrolysates, fermented dairy products and cheese. Among them antioxidative peptides are of special interest due to their important function in controlling the oxidative processes in the human body, and most of them are formed during cheese production. Since buffalo milk and cheese draw attention with their high antioxidant content, and are increasingly becoming the subject of research, this presentation focuses on the antioxidant activity of buffalo cheeses.

Keywords: Bioactivity, antioxidant, buffalo, cheese

INACTIVATION OF S. BOULARDII INOCULATED IN PHOSPHATE-BUFFERED SALINE AND SOUR CHERRY JUICE BY HIGH HYDROSTATIC PRESSURE COMBINED WITH FREEZING

Figen İdrisoğlu [1,*] *& Sami Bulut* [2]

[1] *Department of Food Engineering İnstitute of Science, Turkey*
[2] *Food Engineering Department Faculty of Engineering, Turkey*

figidrisoglu@hotmail.com

ABSTRACT

İn this study, the effect of high hydrostatic pressure at low temperatures on the inactivation of *Saccharomyces boulardii* in a low acid food was investigated. Yeast inactivation was studied in phosphate buffered saline (PBS) and sour cherry juice by employing a-6 min pressure treatment at 250 MPa and 5°C. *S. boulardii* was inoculated in PBS (pH 7.0 and 3.2) and sour cherry juice (pH 3.2) at a level of about 10^8 cfu/ml. Samples were prepared by packing about 10 ml of inoculated suspensions in sterile stomacher bags by using a heat sealer and then were frozen at -20 ℃ for overnight. Unfrozen samples were kept at 4°C. Freezing and then thawing caused 1.76 log cfu/ml reduction in number of *S. boulardii* in PBS (pH 3.2). The effect of freezing and then thawing was determined as 0.61 log cfu/ml in cherry juice. Freezing before pressurization increased inactivation of *S. boulardii* in both PBS and sour cherry juice. Pressurization of frozen (-20°C) cherry juice resulted in inactivation of up to 4.76 log cfu/ml in *S. Boulardii*., whereas only 3.03 log cfu/ml log reduction was obtained in unfrozen samples pressurized under the same conditions. As for the PBS (pH 3.2), 2.91 and 3.16 log cfu/ml reductions were observed in non-frozen and frozen suspensions, respectively. At higher pH of PBS (pH 7.0) pressurization of frozen samples resulted 2.91 log cfu/ml reduction, while the reduction non-frozen samples remained at 2.23 log cfu/ml.

Keywords: high hydrostatic pressure, freezing, S. Boulardii, sour cherry juice

FOOD SECURITY IN ALGERIA: ISSUES AND CHALLENGES

Zoubir Sahli

Agroalimantaire University of Blida, ALGERIA

sahlizbir@gmail.com

ABSTRACT

More than thirty years ago, when the First North African Colloquium on the Food Question was organized, all the participants had in mind the serious problem of the food deficit and its corollary, the food security of the populations. During this great meeting, an uncompromising inventory was made both in terms of food demand and supply. The worries about an uncertain future and the risks involved were - already then - sufficiently great. The findings were more or less in the same direction and the issue of food security was posed with the same insistence and using the same approaches. Faced with growing demand, a country like Algeria often struggled to ensure a sufficient supply, particularly of basic food products. The analyze carried out by product sector have thus clearly demonstrated the gap, sometimes impressive, which existed between the needs expressed by the populations on the one hand and the availability of local products on the other. This gap has often been filled by massive and costly recourse to imported products on the world market. This gap was significant when it comes to high consumption products such as wheat. The analyze also showed a fairly strong disarticulation of the segments of the different sectors, despite significant state interventionism in terms of regulation and support of producer and consumer prices. We were therefore faced with a situation of strong food dependence and fairly strong extroversion of the agri-food sectors. Since then, Algeria has adopted a real "food policy" aimed at ensuring that all Algerians reach acceptable food and nutritional levels. Thus, the food intake of the average Algerian has been significantly improved, it has completely doubled over the last half-century, with a sharp increase in calorie-rich products (multiplication by 2.1 in the share of caloric products: cereals , starches, sugar and fats, and by 3 on the part of products rich in animal proteins (essentially milk and poultry products). This dynamic also led to a reduction in the risks of food deficits, the sharp decline in the prevalence of malnutrition. On the supply side, we see the establishment of the conditions for a revival of production, through agricultural development programs which have had – however – rather limited results and often little likely to reduce the gap between food demand and supply. This communication concerns the case of Algeria; a country confronted with a strong food dependence but which, over the last twenty years, has implemented the milestones of a real policy of agricultural and rural renewal in order to achieve a minimum of food security. We will try in this paper to trace for Algeria the contours of its agri-food situation by examining successively the question of food demand and its evolution, the levels of satisfaction of the needs of the populations, as well as the question of the agricultural supply in the in view of the recent measures to revive agricultural sectors and products. We will also try to discuss the issue of food dependency

Keywords: Algeria, Food security, World market, Agricultural policy, Agrifood sector

FACTORS AFFECTING MARKET PARTICIPATION: A CASE STUDY OF SMALLHOLDER FARMERS IN THE EHLANZENI DISTRICT, MPUMALANGA PROVINCE IN SOUTH AFRICA

Phokele Maponya

Farmer Support, Training and Commercialisation Agricultural Research Council, SOUTH AFRICA

maponyap@arc.agric.za

ABSTRACT

This paper highlighted the factors affecting market participation by small holder farmers in Ehlanzeni District. Project assessment was conducted in Ehlanzeni District by Agricultural Research Council (ARC) in collaboration with the Department of Agriculture, Land Reform and Rural Development (DALRRD) with an attempt to identify market needs and access in the district. A total of (110) smallholder farmers with 884 beneficiaries participated in the study and were from the following local municipalities: Thabachweu (20), Bushbuckridge (36), Mbombela (19), Umjindi (6) and Nkomazi (29). Quantitative and qualitative designs were used as a detailed questionnaire written in English, with a focus group discussion, a stakeholder's discussion and field observations as part of the data collection. A purposive sampling technique was used to select one hundred and ten (110) smallholder farmers in order to cover uniformity and homogenous characteristics such as infrastructure requirements, skills availability, production challenges, agricultural training needs, water source needs, educational level, market availability and other factors. Data was coded, captured, and analysed using Software Programme for Social Science (SPSS) version 21. The following analysis were conducted: Descriptive and Univariate Regressions. The results showed positive association among the following variables: age, educational level, farming experience, land size, land acquisition, farming fulltime, agricultural training and market participation. İt is evident that interventions should be implemented focusing on identified factors in order to improve market participation by smallholder farmers and community growers in the Ehlanzeni district. The study recommends that for holistic market participation among smallholder farmers in Ehlanzeni District, the government and other policy makers should increase the knowledge, experience and marketing skills of smallholder farmers and community growers to enhance food security and improve sustainable livelihoods.

Keywords: Market Participation, Smallholder Farmers, Community Growers, Ehlanzeni District, Mpumalanga Province and South Africa

AGRICULTURAL TRAINING CHALLENGES FACED BY THE SMALLHOLDER FARMERS IN THE ZULULAND DISTRICT, KWAZULU NATAL IN SOUTH AFRICA

Phokele Maponya

Farmer Support, Training and Commercialisation Agricultural Research Council, Afrika
maponyap@arc.agric.za

ABSTRACT

Agricultural training plays a strategic role in improving the competitiveness and the productivity of the agricultural sector. Hence, smallholder farmers need training to be able to obtain good agricultural production and produce good agricultural products in order to satisfy the market and household food security. İn addition, an assessment was conducted in the Zululand District by the Agricultural Research Council (ARC) in collaboration with the Department of Agriculture, Land Reform and Rural Development (DALRRD) to address some of the smallholder farmers training needs. This study aimed at identifying the agricultural training challenges faced by smallholder farmers in the Zululand district, Kwazulu Natal in South Africa. The following objectives were followed: To identify the socio economic characteristics of the smallholder farmers and To identify and describe the training challenges faced by the smallholder farmers. A representative sample consisting of 50 smallholder farmers with 418 beneficiaries was taken and visited in the following seven local municipalities: Mahlabathini (14%), Abaqulusi (16%), Dumbe (20%), Pongola (32%) and Nongoma (18%). Quantitative and qualitative design were used for a detailed questionnaire written in English. Stakeholder's discussion and field observations were also part of the data collected. A purposive sampling technique was used to select fifty (50) smallholder farmers, in order to cover uniformity and homogenous characteristics such as infrastructure requirements, skills availability, production challenges, agricultural training needs, water source needs, educational level and others. Data was coded, captured and analyzed with the software Statistical Packaged for Social Sciences (SPSS version 24). Descriptive and Univariate analysis were conducted. The results indicated that 76% of the smallholder farmers received various training before ARC intervention. The smallholder farmers further indicated that the training received previously was not enough as it occurred for few days (1 – 5 days) with no after intervention/training monitoring and limited practical demonstrations, hence the following agricultural training challenges were identified: Soil Preparation, Seed Sowing, Pests and Diseases, Marketing, Harvesting, Transplanting and Post-Harvest Storage. Furthermore, the Univariate analysis showed a high level of positive association among Pest and Diseases (Dependent variable) and the following İndependent variables: Water source, Crops planted, Land size, Education and Farming experience. The model fit was predicted by the r2 at 0.937 (94%) and is always between 0 and 100%. İn general, the higher the r2, the better the model fits the data and the better interaction between dependent and independent variables. İt is thus concluded and recommended that the transfer of agricultural knowledge to support smallholder farmers should be a priority for the government especially the seven training challenges identified by smallholder farmers. Smallholder farmers should therefore, be trained in line with the seven training challenges identified by the study.**Keywords**: Smallholder Farmers, Agricultural Training, Zululand District, Kwazulu Natal and South Africa

AWARENESS OF THE WATER CRISIS IN AGRICULTURE

Selma Demirtaş [1] & Metin Göksel Akpinar [1,]*

[1] Department of Agricultural Economy Akdeniz University, TURKEY

mgoksel@akdeniz.edu.tr

ABSTRACT

n this study, the variables related to the producer's perception, attitudes and behaviors related to water use awareness, water saving and water crisis awareness in the sustainability of agricultural activities were investigated. İn the study, micro data obtained by face-to-face survey method from 120 producers in different geographical locations in the rural area of Antalya province were used. Simple descriptive statistics and K-hi-square test were used in the analysis of the data. According to the results obtained, a statistically significant relationship was found between the domographic characteristics of the producers and the level of water awareness. Similarly, differences were determined in the producer segments in terms of the level of knowledge on agricultural irrigation. The results require orientation with different tools based on producer characteristics in the construction of public marketing policy for the development of water use awareness and sensitivity in agricultural activities.

Keywords: Agriculture, Water, Producer, Awareness, Chi-square test

THE ROLE OF RURAL WOMEN IN ENSURİNG FOOD SECURITY: AN EVALUATION FOR TURKEY

Beyza Tunç [1,] & Nevin Demirbaş [1]*

[1] Department of Agricultural Economy Ege University, İzmir, TURKEY

beyzatunc.ege@gmail.com

ABSTRACT

Despite the constraints due to some reasons, such as traditions affecting gender discrimination in agriculture, women are one of the essential factors for rural economy and rural development, especially in terms of labor-intensive activities. Rural women have an important role in the agricultural sector for the supply of available, accessible, usable and sustainable food at the global level, as well as in Turkey. For this purpose, studies are carried out in different scopes in every country so that rural women can maintain and increase their socio-economic conditions. The aim of this study is to evaluate the current situation regarding the role of rural women in the agricultural sector in terms of their contribution to food security in Turkey. For this purpose, studies on rural women in Turkey, the activities of organizations related to rural women and the policies followed on rural women were examined. İn addition, the contribution of studies aimed at increasing the share of women in agricultural employment and thus empowering rural women economically on food security has been evaluated and recommendations on the subject have been included.

Keywords: Food Security, Rural Woman, Women's Cooperative, Turkey

EVALUATION OF NO-TILLAGE AGRICULTURE WITHIN THE SCOPE OF FOOD AVAILABILITY FOR TURKEY

Beyza Tunç [1,] & Nevin Demirbaş [1]*

[1] Department of Agricultural Economy Ege University, İzmir, TURKEY

beyzatunc.ege@gmail.com

ABSTRACT

The issue of the availability of sufficient food to meet the food needs of the growing world population is increasing its importance with the climate crisis and possible famine periods. The importance and diversity of agricultural practices applied to protect and improve the soil destroyed by negative environmental conditions is also increasing. The no-till farming method, which is one of these applications, has come to the fore in recent years in terms of minimizing soil destruction and loss, positive effect on yield and reducing costs. The aim of this study is to evaluate the economic results of no-till agriculture, which is a technical method in terms of its relationship with the availability dimension of food security by conducting a literature search. İn line with the purpose of the study, the literature comparing no-till farming and different tillage methods in Turkey has been researched. The technical results of the obtained literature were evaluated in terms of their direct effects on the farmer income, reducing the production costs and the efficiency effects on the production amount. Suggestions on the subject are also included in the study.

Keywords: Food security, Availability, Regenerative agriculture, No-till farming, Yield, Production Cost

FORECASTING OF DEMAND OF WATER IN LIBYA FOR AGRICULTURE

Jamal Ali Mohamed Ehdadan

Department of Agricultural Economy Benghazi University, TURKEY

ehdadan82@yahoo.com

ABSTRACT

One of the main objectives of econometric modelling is to predict what is going to happen in the future; forecasting means that the model will solve its endogenous variables beyond the originally utilised set of data. This forecasting exercise needs the.predetermined variables of the model for the forecasting period. The major constraint on Libya's agriculture sector is water because of low rainfall, scarce renewable water resources, and increasing water demand because of increasing population. Most Libyan farms depend on bore-wells. Libya is mostly arid and semi-arid and covers a total of 1,759,540 square kilometres . The cultivable area of the Libyan state is estimated to be about 2.2 million hectares, that is 1.2% of the total area . Groundwater is the main source of fresh water in the country, more than 80% of agricultural production is from irrigated lands.Due to growing competition between the agricultural and industrial sectors and the higher economic value in urban and industrial uses of high -quality fresh water supplies, as result of the increasing demand for water, wastewater has increasingly become the most predominant low cost and reliable alternative to conventional irrigation water in many countries, especially arid and semi -arid regions .Before the discovery of oil, the Libyan economy was characterized by its dependence on the agriculture sector . Oil was discovered in Libya in the late nineteen- fifties High oil revenues provided an appropriate environment for the financing of all development projects, including agricultural projects. Although the Agriculture in Libya has the financial and nature potential to make the agriculture sector more effective it is confronted by many challenges that prevent its effective development to investigate to impact of changing agriculture policy approaches on Libyan agricultural performance,The problem of water in Libya is caused by the increasing demand for fresh water. The groundwater supply is limited. The water supply will become more problematic with rapidly increasing population and low rainfall. After discovery of fresh groundwater in the deserts of southern part of the country

Keywords: Libya Forecasting water

CONTRIBUTIONS OF LIVESTOCK MARKETS TO THE MUNICIPAL BUDGETS IN THE REPUBLIC OF BENIN

Oscar Akouegnonhou [1,] & Nevin Demirbaş [1]*

[1] Department of Agricultural Economy Ege University İzmir, TURKEY

oscarak1989@gmail.com

ABSTRACT

Like many African countries, Benin has adopted the decentralization system as its mode of state management. İt is in this perspective that after the decentralization, the municipalities have acquired the full power to mobilize resources to be independent from the central administration. İn view of this, resources are mobilized at the local level to contribute to the revenues of the municipal administration. The financial resources mobilized for this purpose by municipalities include the Local Development Tax (TDL). Market infrastructure, including livestock markets, also contributes to the TDL. Livestock markets, through TDL, contribute to the financial mobilization of municipalities of Benin. İn this study, primary data were collected from Self-Managed Livestock Markets (MBA) and Traditional Livestock Markets (MT) of Gogounou, Nikki, Bassila, Matéri, Savè and Kétou municipalities in the Republic of Benin. The MTs are the oldest livestock trading system in the study area. The MBAs are the modern livestock markets where transactions are under strict control. İn both livestock markets, cattle, sheep and goat are traded. The results showed that the MBAs contributed 12.74%, 5.22%, 8.25%, 3.12%, 2.86%, and 8.46% respectively to the annual municipal budgets in Gogounou, Nikki, Bassila, Matéri, Savè, and Kétou. However, MTs in the same municipalities contributed to the municipal budgets 1.43%, 0.52%, 0.54%, 0.56%, 0.36%, and 0.28% respectively. Given the economic importance of livestock markets in the municipalities of Benin, it is imperative to make substantial investments to increase their potential. This would increase the financial autonomy of these municipalities.

Keywords: self-managed livestock markets, traditional livestock markets, Local Development Tax, municipal budget, the Republic of Benin

CURRENT SITUATION OF THE RED MEAT SECTOR IN BENIN: PROBLEMS AND SOLUTION RECOMMENDATIONS

Oscar Akouegnonhou [1,] & Nevin Demirbaş [1]*

[1] Department of Agricultural Economy Ege University, İzmir, TURKEY

oscarak1989@gmail.com

ABSTRACT

The red meat sector is one of the Benin government's leading projects, as it contributes significantly to food and nutritional security and to the creation of jobs and income. Red meat is produced by cattle, sheep and goat mainly from the pastoral farming system. The cost of the production system is one of the lowest in the world. However, meat on the market remains expensive and inaccessible on a regular basis for most households. İn view of this problem, a thorough and complete analysis is essential for a necessary and rapid reaction of the local sector to remain viable and competitive. This study aims to establish the current state of the red meat sector in Benin in order to be able to propose solutions to optimize it and ensure its viability and sustainability.

Keywords: Red meat, livestock, pastoral farming system, food security, Benin

DETERMINATION OF BIOREMEDIATION POTENTIALS AND PLANT GROWTH-PROMOTING PROPERTIES OF BACILLUS SPECIES ISOLATED FROM THE RHIZOSPHERE OF DACTYLORHIZA URVILLENA BELONGING TO THE ORCHIDACEAE FAMİLY

Ülkü Zeynep Üreyen Esertaş [1,], Emel Uzunalioğlu [2], Arif Bozdeveci [2] & Şengül Alpay Karaoğlu [2]*

[1] Department of Medical Microbiolgy Recep Tayyip Erdoğan University, TURKEY
[2] Department of Bioloqy Recep Tayyip Erdoğan University, TURKEY

biyolog_ulku@hotmail.com

ABSTRACT

İndustrial activities have been one of the biggest factors of environmental destruction by affecting natural resources for decades. Heavy metals, which are one of the greatest dangers especially for the biosphere, can be found in industrial waste. This heavy metal accumulation in water and soil has become a global health threat. Alternative processes are needed in the fight against heavy metal pollution. Bioremediation activity, which is defined as the removal process of environmental pollutants through microorganisms and plants, has gained great importance in recent years. İn our study, the tolerance potentials of *Bacillus* species isolated from the rhizosphere of *Dactylorhiza urvillenana* in the Ovit plateau of Rize province to metals such as copper, lead, zinc, iron and silver were investigated. İn addition, plant growth promoting İndole Acetic Acid (İAA) production, phosphate dissolution, ACC (1-Aminocyclopropane-1-Carboxylate) deminase production were determined. Our results showed that *Bacillus* species have high bioremidant potential and plant growth promoting properties. İt is planned to use these strains as cheaper and more effective methods in field studies of lands with heavy metal pollution.

Keywords: Bacillus, Bioremediation, Cu tolerance, PGPB

DETERMINANTS OF WHEAT SHORTAGE IN SUDAN USING ARDL MODEL

Sara Elnasikh

Argricultural Economics and Rural Development Omdurman İslamic University, BANGLADESH

saraelnasikh@oiu.edu.sd

ABSTRACT

This paper employed the ARDL approach in order to investigate the short and long-run determinants of wheat shortage in Sudan over the period 1998 to 2020. The results of ARDL bound test showed that the value of computed F-statistic exceeded the upper bound value, which means the equations were statistically significant at 1%, Further, empirical results of long-run and short-run revealed that planned area and imported wheat price were a determinants in short run while in long run Khartoum population was determinant of shortage in wheat.

Keywords: ARDL Model; food prices; Food Security; food accessibility

PROSPECTS OF ORANGE-FLESH SWEETPOTATO, FACTORS AFFECTING ADOPTION AND STRATEGIES TO BREAK ADOPTION BARRIERS; AN APPROACH TO FIGHTING HIDDEN HUNGER IN SUB-SAHARAN AFRICA

Eric Kuopuobe Naawe [1,], Olivet Delasi Gleku [2], Sani İbrahim [2] & Mehmet Emin Caliskan [3]*

[1] Department of Agricultural Genetic Engineering Nigde Omer Halisdemir University, TURKEY
[2] Agricultural Genetic Engineering Nigde Omer Halisdemir University, TURKEY
[3] Department of Agricultural Genetic Engineering Nigde Ömer Halisdemir University, Faculty of Agricultural Sciences and Technologies, TURKEY

eric.naawe@gmail.com

ABSTRACT

Food security is the access to sufficient, safe, and nutritious food physically, socially, and economically at any given time to meet the dietary and food preferences or needs of an individual for active and healthy living. Hidden hunger is an age-old global pandemic whose effects are especially severe in developing nations. Hidden hunger is not the absence of food but the deficiencies in the required microelements levels for the well-being of the human system. Hidden hunger is termed the silent killer because its signs of undernutrition and hunger are not visible yet its negative and lifelong consequences for health, productivity, and mental development are so devastating. Sub-Saharan Africa records the highest level of hidden hunger that threatened human health and well-being. Among the consequences of hidden hunger include compromised immune systems that make the victim prone to diseases and infections. Pragmatic and innovative ways to curtail the impact of hidden hunger globally include the designing and breeding of crop varieties that are mineral nutrient-rich and available for consumers to fight this silent killer called hidden hunger. The success of breeding orange-flesh sweet potato has been one such pragmatic and innovative approach by breeders to curtail the impact of hidden hunger. Orange flesh sweet potato is a nutritionally rich sweet potato variety that is the precursor of vitamin A based on its high beta carotene content and the high iron content in the green leaves and had hence been earmarked as a prospective crop in the fight against hidden hunger. This review assesses the prospects of orange flesh sweet potato in the fight against hidden hunger, the prevalence of hidden hunger, factors affecting the adoption of orange flesh sweet potato, and the strategies to break the adoption barriers in sub-Saharan Africa.

Keywords: breeding, hidden hunger, Sub-Saharan Africa, orange-flesh sweet potato, vitamin A

AN EVALUATION ON MEASUREMENT METHODS OF LIFE SATISFACTION IN RURAL AREAS

Fırat Aslan [1], Göksel Armağan[2]

Department of Agricultural Economy Adnan Menderes University, TURKEY

firataslan0991@gmail.com

ABSTRACT

Happiness, a concept as old as the history of humanity, has been one of the subjects on which thinkers and scientists have focused the most since ancient times. The aim of this study is to evaluate the scales that can be used to determine the satisfaction level (rural happiness) of those living in rural areas. Happiness, which has been discussed extensively in the world especially after the 1970s, and on which studies have increased; İt has become an important subject on which philosophy, medicine, psychology, sociology, economics and agricultural science also concentrate. Happiness has been accepted as an important welfare criterion in the world in recent years and has taken its place as a macroeconomic indicator. A multidimensional investigation of the life satisfaction and/or happiness of those living in rural areas will make rural happiness more explicable. İn this study, national and internationally accepted indicators (such as World Happiness Report, Gross National Happiness İndex, Human Development İndex, Life Satisfaction Scale, Happiness Economics Determinants, Oxford Happiness İnventory, TURKSTAT Life Satisfaction Survey, Rural Happiness Paradox and Rural Development İndicators) for rural happiness measurement will be evaluated. Measuring the life satisfaction of people living in rural areas will make important contributions to the solution of the rural development problem.

Keywords: Happiness, Rural Area, Rural Happiness, Sustainable Agriculture

INVESTIGATION OF THE EFFECT OF THE COVID-19 PROCESS ON THE AGRICULTURAL SECTOR: AYDIN PROVINCE EXAMPLE

Berivan KOYUNSEVER Gizem Nur ÖZDEMIR* Selin DEVECIOĞLU* Fırat ASLAN** Gökhan ÇINAR***

Department of Agricultural Economy Adnan Menderes University, TURKEY

firataslan0991@gmail.com

ABSTRACT

The covid-19 epidemic, which started in Wuhan city of China's Hubei province in December 2019 and spread all over the world, affected all sectors, especially health. The epidemic triggered the contraction of production, domestic trade and foreign trade in many different sectors. Especially in the agricultural sector in Turkey, problems have arisen in terms of supply, sharing and accessibility. This study was conducted to examine the effects of the pandemic on farmers working in the agricultural sector. For this, a face-to-face survey study was conducted with 100 farmers carrying out their activities in Aydin. According to the findings, it was determined that the farmers had difficulties in finding workers, supplying inputs and selling products, and the costs increased in this period. A significant portion of the farmers stated that they could easily obtain a permit to go out. 37.0% of the farmers stated that they delayed the harvest. The study can guide policy makers to solve the problems encountered in the agricultural sector in times of crisis.

Keywords: Agriculture, Farmer, Pandemic, Production

OPPORTUNITIES FOR ENERGY USE OF STRAW AND OTHER AGRICULTURAL PRODUCTS IN BULGARIA

Rositza Mikova

İuzhap İnstitute of Agricultural Economics - Sofia, Agricultural Academy, BULGARIA

rositzamikova@abv.bg

ABSTRACT

One of the main goals of the energy strategy of the Republic of Bulgaria is to reduce emissions of harmful and greenhouse gases released into the atmosphere. İt is necessary to increase the share of renewable energy sources, including energy obtained from biomass from agriculture, thereby contributing to environmental protection and sustainable development of society. Therefore, the present study examines the raw material potential for the production of straw and other agricultural products in the six planning regions in Bulgaria. The following scientific methods were used in the research: comparative analysis and statistical analysis, expert evaluation. The results of the analysis of the conducted research show that a sufficiently large amount of solid waste is generated annually in agriculture in our country, and burning it turns out to be a rational solution in the production of thermal energy for thermal energy, both for individual consumers and in more large headquarters.

Keywords: biomass, energy, bioeconomy, straw, sunflower stalks

UTILIZATION OF WASTE BIOMASS FROM ANIMAL PRODUCTS - STATUS AND PROSPECTS

Rositza Mikova

İuzhap İnstitute of Agricultural Economics - Sofia, Agricultural Academy, BULGARIA

rositzamikova@abv.bg

ABSTRACT

The standard production of energy in power and heat plants is based on the combustion of fossil fuels such as coal, oil and natural gas. A major disadvantage of these fuels is the fact that natural reserves are decreasing and energy needs are increasing. Harmful emissions released into the atmosphere during the burning of fossil fuels are also a serious problem, which creates significant environmental problems. These are some of the reasons to look for possible suitable energy alternatives to fossil fuels. One of them is the use of biomass for the production of so-called biofuels. For this, in the present study, an evaluation of the possibility of processing waste from animal waste and its use in the biogas sector was made. The results of the research show that agriculture has enough potential to ensure sustainable biogas production.

Keywords: biomass, biogas, anaerobic digestion system, bioeconomy

A SOCIO-ECONOMIC STUDY ON THE INTERNATIONAL POTENTIAL AND COMPETITIVE CONDITIONS OF RICE PRODUCERS IN THE THRACE REGION: SAMPLE OF IPSALA DISTRICT

İpek Atilgan Helvacioğlu [1,], Tuna Şener [2] & Cem Tokatli [3]*

[1] İpsala Vocational School Trakya University, TURKEY
[2] Department Foreign Trade Trakya University, TURKEY
[3] Department of Laboratory Technology Trakya University, TURKEY

ipekhelvacioglu@trakya.edu.tr

ABSTRACT

Rice is an important product consumed as one of the main nutrients throughout the world. İt is preferred as one of the basic nutrients also in Turkey, and rice consumption is increasing from year to year in Turkey. Along with the increasing demand for rice, there is an increase in rice imports. Turkey meets the need of rice with a high proportion of import. When the international potentials of domestic rice producers are examined, it is seen that their relations are oriented towards imports. Due to the high amount of imports, domestic producers have to compete with foreign enterprises in the domestic market as well as in international markets. The domestic rice producers in Turkey need to be aware of their international potential and develop competitive strategies in order to cope with tough competitive conditions. For this purpose, 100 Keşan Chamber of Commerce and İndustry (represents İpsala, Enez and Keşan districts.) members who participated in the research were asked questions to learn their international potentials and competition strategies. Thrace region is the leader at the rice production in Turkey, and most of the rice producers are located in Edirne. Therefore, data obtained from the sample of the study provides current information about the positions of the rice producers in Turkey. With the study, it has been tried to analyse the international economic potential of the rice producers in Meriç Plain and bring out a socio-economic review about competition conditions in the sector. İn this study we see that, even though rice producers in Meriç plain mostly do not think the competition in the sector is increasing tightly, they are aware of the trouble and getting necessary actions in order not to lose their positions in the sector.

Keywords: Rice, Production, Competition, İmport, Economic Potential

EXAMINATION OF STUDIES RELATED TO COVID 19 EFFECTS ON AGRICULTURE SECTOR BY BIBLIOMETRIC ANALYSIS METHOD

Emre İnalpulat [1,] & Sibel Tan [1]*

[1] Department of Agricultural Economy Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

emreinalpulat@gmail.com

ABSTRACT

İn this research, it was aimed to reveal the impacts of Covid-19 pandemic, which has started in 2020, on the agricultural sector, in a systematic and comprehensive way. To achieve this aim, scientific publications including the purpose of determining the pandemic effects were examined by bibliometric analysis method. The database consisted of scientific publications from Scopus or Web of Science. The data, which were obtained by examination of mentioned publication database were illustrated with the visual mapping technique. Therefore, the research provides an opportunity to evaluate the impact of Covid-19 on the agricultural sector from a general perspective. Visual network analysis was performed using the VOSviewer 1.6.15 package program as a research method.

Keywords: Agriculture, Bibliometric analysis, Covid-19, Visual mapping, VOSviewer

ANALYSIS OF PRICE CHANGES OF MILK IN THE REPUBLIC OF NORTH MACEDONIA DURING THE GLOBAL HEALTH, ENERGY AND ECONOMIC CRISIS

Katerina Bojkovska [1,], Kristijan Veljanovski [2], Nikolche Jankulovski [2] & Goran Mihajlovski [2]*

[1] Faculty of Biotechnical Sciences - Bitola St. Kliment Ohridski University, Macedonia
[2] Faculty of Biotechnical Sciences - Bitola, North Macedonia St. Kliment Ohridski University, Bitola, North Macedonia

katerina.bojkovska@uklo.edu.mk

ABSTRACT

This paper analyses the changes in the prices of Macedonian milk in different bigger retail chains in the Republic of North Macedonia during the period from 28 February 2022 to 31 March 2022. The period is crucial for analysis because the relationship between the prices of milk and dairy products in the various trade chains at the time when the prices were frozen and their movement after the unfreezing was analyzed. The research was conducted in 4 market chains and was included two Macedonian producers of milk. Based on the movement of milk prices throughout the researched period, trends were determined and price variations between producers and trade chains were described. All prices are expressed in Macedonian denars. The established milk prices are shown in tables. Price variations (expressed as % between highest and lowest prices) are shown using a chart. At the beginning of December 2021, the government of the Republic of North Macedonia made a decision to freeze the prices of basic food products, including milk and milk products. The prices that were on the 1st of December 2021, in wholesale and retail trade, were considered the highest. The military-political situation in the world and the unfreezing of the prices of basic products on March 1, 2022 in North Macedonia was best felt in the markets. The government's measure to unfreeze prices and freeze margins up to 5% for wholesale trade and up to 10% for retail trade for several products protected merchants from losses, but not citizens from a new price shock. İnstead of a reduction as calculated by the government, with the new measure there is an increase in food prices. As a result of all the turbulences that are happening in the world, the already high prices are contributing to become even higher and the life of the citizens is becoming more and more expensive. The unbalanced standard of living is the biggest problem faced by the Macedonian citizens.

Keywords: milk price, changes, health crisis, energy crisis, economic crisis

DETERMINATION OF DECISION CRITERIA FOR CHEMICAL USE IN AGRICULTURAL ENTERPRISES

Orhan Eroğlu [1,] & Zeki Bayramoğlu [2]*

[1] Department of Business Administration Selçuk University, Konya, TURKEY
[2] Department of Agricultural Economy Selçuk University, Konya, TURKEY

orhaneroglu.zm@gmail.com

ABSTRACT

Within the scope of the study, the process for the importance of the decision in the supply of foodstuffs of agricultural enterprises is aimed. All of the accounting records of agricultural enterprises in agriculture were made for their procurement within the scope of the study. İnformation on all of the chemical inputs and comprehensive comprehensive inspection information according to the research results. İn the products examined, 32.38% from the payments of the material fee; total business controls were 15.59%. Materials not delivered per decare in the examined facilities were examined and it was determined that they were not grown for use. The AHP method was used in the course of the decision in the procurement of the relevant package materials. Unstable involved in the study; İt can be quality, price, continuity, popularity, availability, substance, maturity. İt has been determined that 3 criteria from the target from the call from AHP are quality, popularity and price. İt can be explained by the fact that it is next to the first, that the enterprises are in the products that have quality products in growing better quality products, and that the expenses in the purchasing process are paid. Detailed suggestions about the supply of chemical inputs or the problems in agricultural enterprises in enterprises.

Keywords: Chemical İnput, İnput Supply, AHP Method, Decision Criteria

PERCEIVED IMPACTS OF COVID-19 LOCKDOWN ORDER ON LIFESTYLE BEHAVIOUR AMONG AGRARIAN COMMUNITIES OF SABON GARI, KADUNA STATE – NİGERIA

Cornelius Michael Ekenta

Agricultural Extension and Rural Development Ahmadu Bello University, NIGERIA

cmcekenta@gmail.com

ABSTRACT

The study carried out in Sabon Gari Local Government Area of Kaduna State examined the impact of COVİD-19 lockdown order on the change in lifestyle behaviour of adult males, adult females and youths. Multi stage sampling technique was used to select 375 respondents for the study. Primary data were generated through the administration of structured questionnaire while generated data were analyzed with the use of descriptive statistics presented on table and graphs and logit regressions analysis. The formulated hypothesis was tested with t-test statistics. Socio-economic characteristics of the respondents shows that adult males (56%), adult females (46%) and youths (42%) attained tertiary education. Also, the use of social media was more among youths (78%), adult males (67%) and adult females (60%) while WhatsApp was the prevalent social media application used by youths (52%), adult females (48%) and adult males (38%). Perception on the change in lifestyle behaviour shows that there was increase in sleep during the day among the youths (97%), increase in the use of social media among youths (90%), increase in domestic violence as perceived by adult female (98%) and increase in the use of drugs among youths (80%). Result further revealed that across the categories, change in lifestyle behaviour was influenced by level of income, participation in social group, access to social media and the type of social media application used. The tested hypothesis shows that there is no significant difference in the change in lifestyle behaviour among males and females during COVİD-19 lockdown order. İt was concluded that the lockdown order impacted on the lifestyle behaviour of the respondents. İt was recommended that lockdown orders should not be stretched over a long period of time but done in short term phases.

Keywords: Agrarian, Behaviour, Communities, Perceived, Lifestyle, Kaduna

COVID-19 AND AGRICULTURAL PRODUCTION: A STATISTICAL REVIEW OF THE EVIDENCE FROM NIGERIA

Cornelius Michael Ekenta

Agricultural Extension and Rural Development Ahmadu Bello University, NIGERIA

cmcekenta@gmail.com

ABSTRACT

Nigeria depends of agriculture and agricultural products in sustaining the economy Over 70% of Nigerians are employed directly or indirectly in the agricultural sector The sector provides raw materials for local industries, employment, provides food and income for the local economy and serves as a foreign exchange earner through the exportation of agricultural products. The discovery of crude oil in the late 1950s dwindled government attention to on agriculture. This has left the Nigerian economy with shortage of food production to feed the growing population. The agricultural business environment in Nigeria is frustrated by series of inhibiting factors; poor income, inadequate access to loan and credit facility and insufficient legislations and government policies. The incidence of Corona Virus Disease (COVİD-19) presented new dimension of challenges. The outbreak of the virus placed restrictions such as isolation, quarantine and total lockdown that will invariably affect agricultural output. Research is being conducted in the academic world focusing on the pandemic. This research lends contribution in this regard to ascertain the effects of the pandemic on agricultural production. This research adopted a desktop approach in reviewing the documents of National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN), Federal Ministry of Agriculture and Rural Development (FMARD), online statistical repositories and literature used as secondary sources of data. The review mad conclusion and recommendations based on the empirical review.

Keywords: Production, Review, Statistical, Evidence, Nigeria

RURAL COMMUNITY DEVELOPMENT THROUGH INCLUSIVE GROWTH

Anila Afzal

Agricultural Extension Pmas Arid Agriculture University Rawalpindi, PAKISTAN

anilaafzal@gmail.com

ABSTRACT

According to İMF "İf Women farmers have the same access as men to productive resources such as land and fertilizers agriculture output in developing countries can increase by 2.5 percento4.0percent." The inclusive growth can only be brought about by active and persistent interventions by Businesses, Governments and Local Communities. Any of these players can take centre stage depending on socio economic dynamics. However, if the businesses take the lead, the value is created across multiple stakeholders bringing a much needed sustainability and stability in the communities through inclusion of vulnerable segments of society. İn Agri societies , women are vulnerable despite being part and parcel of the value chains. However their contribution is invisible and somewhat easy to ignore. İn the agricultural households women create an invisible impact by performing the usual chores of life. İn those households, life rotates around women so the changes brought about by businesses shift the gender equilibrium. Gendered vulnerability is based on three major conditions,Gender Division of Roles and Responsibilities, gender attitudes and gender behaviours.The gendered division of labour makes women responsible for domestic responsibilities such as cooking, cleaning, caring for children, tending to livestock and doing small household chores. Women are less visible, they are not represented in institutions at national and local level and have far less say in decision making compared to men. Women are more employed in informal sectors where they lack safety nets, limited or no salaries and lack of rights which decrease their ability to adapt. So women's vulnerability is further enhanced they don't know own or traditionally do not acquire productive assets which can potentially help them increase their incomes. Agricultural modernisation and development facilitates poverty alleviation and improved food security. But, despite the dominance of female labour in agricultural production, widespread evidence from both Asia and Africa indicate that agricultural development does not guarantee equitable distribution of benefits to rural females. Socio-cultural norms and practices and legal and institutional structures restrict female land ownership, access to credit, to extension and markets, and to cash incomes from farm produce. Such constraints on female participation in decision-making and market access also lower farm productivity and output. Food insecurity is a world problem tackled by governments and communities through following measures, Managing food supply through removing tariffs and banning exports, managing food demand by providing aid to vulnerable population in order to make food accessible to them, managing food prices by providing direct aid to farmers in terms of subsidies and reduced input prices.The question is do these measures work? Unfortunately, the answer is no. Not only these measures pose a burden on national exchequer but also are not sustainable in the long run. For example, since last many decades European Union is spending around half of its budget on food subsidies and agricultural support, but they failed to turn things around. As a matter of fact, food insecurity has always been considered an

economic problem and naturally the government looked for an economic solution to this so called economic problem. İn order to come up with a lasting solution the poverty must be looked in a different perspective. Poverty is more of a social problem than an economic one. This paper will be different from conventional food security projects because we try to address the problem through social measures and develop a framework to curb poverty and food insecurity through social measures and empowerment of women.

Keywords: Community development, Gender, inclusive growth, Agricultural Extension

DETERMINANTS OF WHEAT FOOD GAP IN SUDAN WITH A FOCUS ON DEVELOPMENT POLICY AND FOOD ACCESSIBILITY AND AVAILABILITY

Sara Elnasikh

Argricultural Economics and Rural Development Omdurman İslamic Uniïversity, SUDAN

saraelnasikh@oiu.edu.sd

ABSTRACT

This paper employed the ARDL approach to cointegration in order to investigate the short and long-run determinants of wheat food gap in Sudan over the period 1998 to 2020. The results of ARDL bound test showed that the value of computed F-statistic exceeded the upper bound value, which means the equations were statistically significant at 5%, Further, empirical results of long-run and short-run revealed that planned area in the Gezira scheme and imported wheat price are a determinants in short run while in long run Khartoum population is determinant of wheat food gap.

Keywords: ARDL Model; Food Security; Shortage; Sudan and Wheat.

DEVELOPMENT OF ORGANIC AGRICULTURE IN THE WORLD AND IN TURKEY

Süheyla Ağizan [1], Kemalettin Ağizan [2,] & Zeki Bayramoğlu [2]*

[1] Department of Organic Agriculture Management Selçuk University, Konya, TURKEY
[2] Department of Agricultural Economy Selcuk University, Konya, TURKEY

agizankemalettin@gmail.com

ABSTRACT

The rapid increase in the world population has increased the need for food and intensive chemical inputs have been used in agricultural enterprises in order to obtain more output in a short time. Although this situation causes the deterioration of the ecological balance and the reduction of natural resources, the fact that approximately 1/3 of the population experiences hunger has not been able to solve the food security problem. Therefore, it is necessary to develop alternative agricultural systems that will produce enough to meet the needs of the population without disturbing the ecological balance, without polluting the environment. Organic (ecological) agriculture, which is one of the alternative production systems developed within this framework, has started a new period of structural change in the production process. While this structural change is gaining momentum due to the high level of healthy living awareness in countries, the development process of organic agriculture needs to be analyzed in order to improve the process and make better use of the opportunities. İn this study, it is planned to reveal the difference of the organic agriculture sector from other agricultural systems and to compile the developments and emerging opportunities in the process. Thus, by discussing the opportunities that arise in response to the developments in organic agriculture, suggestions will be developed to increase the competitiveness of the new world order and to ensure the sustainability of production.

Keywords: organic agriculture, ecological agriculture, sustainable agriculture

QUALITY OF AGRICULTURAL LANDS FOR GLOBAL FOOD SUPPLY SECURITY

Zuhal Karakayaci [1], Süheyla Ağizan [2,] & Zeki Bayramoğlu [1]*

[1] Department of Agricultural Economy Selçuk University, Konya, TURKEY
[2] Department of Organic Agriculture Management Selçuk University, Konya, TURKEY

suheyla.agizan@selcuk.edu.tr

ABSTRACT

Population growth, unequal distribution of resources, climate change, waste, food losses, etc. These issues have become a global problem by threatening food supply security. Ending poverty and solving the problem of hunger are among the top priorities in the United Nations' Sustainable Development Goals. With these goals, the importance of ensuring the self-sufficiency of the country is emphasized. Self-sufficiency in terms of food; İt is the balancing of production and consumption in the country (without external dependence). However, there are some obstacles in the countries' inability to provide food sufficiency. These; climate change, population growth, international migration, limited agricultural lands and water resources, migration of the population working in agriculture to the city due to low income and price fluctuations in the agricultural sector, loss of productivity, high input prices, high risks, implementation of wrong agricultural policies. . Agricultural lands and water availability, which are among these factors, are the main production factors that affect the agricultural production potential. İn this direction, it is aimed to compare the food supply security of 10 countries (including Turkey) with the highest agricultural production value according to FAO data. İn the comparison, evaluations will be made by considering the products with the highest production amount in terms of product groups in Turkey. Production potentials of selected products in countries, foreign trade statistics, land structures, water resources and self-sufficiency in food supply will be discussed in comparisons. İn addition, the increase in production and the change in per capita consumption will be examined, assuming that all dry agricultural lands are irrigated. Secondary data will be used in the study and policies will be developed to improve the quality of agricultural lands in ensuring the food supply security of the countries.

Keywords: food supply security, sustainability, agriculture land, water resources, consumption

FATTY ACID PROFILE AND ANATOMICAL FEATURES OF THE TUNISIAN CAKILE MARITIMA FRUIT

Kahlaoui Samiha [1,], Hana Bokri [2], Abir Haddada1 [3], Wissal Saadellaoui1 [3], Fethia Harzallah-Skhiri [4], Karim Hosni [5] & Sondes Stambouli-Essassi1 [6]*

[1] Laboratory of Biodiversity, Biotechnology and Climate Changes Faculty of Sciences of Tunis Universite of Tunis El Manar, Tunisia
[2] Biodiversity, Biotechnology and Climate Change Laboratory (Lr11Es09), University of Tunis El Manar, Tunisia
[3] Laboratory of Biodiversity, Biotechnology and Climate Change Faculty of Sciences of Tunis, University of Tunis El Manar, Tunisia
[4] Laboratory of Bioresources: İntegrative Biology and Valorization (Lr14-Es06), High İnstitute of Biotechnology of Monastir, University of Monastir, Tunisia
[5] Laboratory of Natural Substances National İnstitute For Research and Physicochemical Analysis, Techno National İnstitute For Research and Physicochemical Analysis, Technological Center of Sidithabet, 2020 Tunis, Tunisia
[6] Laboratory of Biodiversity, Biotechnology and Climate Change (Lr11-Es09) Faculty of Sciences of Tunis, University of Tunis El Manar, Manar İi, 1060 Tunis, Tunisia

sameh_kahlaoui@yahoo.fr

ABSTRACT

This study reported the fatty acid composition and the anatomical features for the fruits of *Cakilemaritima* subsp. *maritima*Scop. collected from two sites located at the coastal part of North Tunisia (Bizerte and Soliman). Anatomical investigations characterized the indehiscent siliqua of Soliman population. Transverse sections through fresh fruit show a large number of prismatic crystals located at the three first layers of the mesocarp, which parenchyma was characterized by the presence of large amounts of starch grains and solitary oil drops. A particular anatomical structure is identified at the valves junction. The endocarp is a thin tissue composed of 2-3 layers of small lignified wall cells and one layer of tangentially elongated and thin cells surrounding the seed. Moreover, the fruit oil from both populations are characterized by their richness in unsaturated fatty acids, particularly monounsaturated ones. The major identified fatty acids with GC/MS analysis of fatty acid methyl esters for Bizerte and Soliman populations are oleic (20.20 ± 1.42 and 23.9 ± 2.87%, respectively), erucic (20.82 ± 1.60 and 22.04 ± 2.65%, respectively) and linoleic (24.09 ± 2.47 and 21.34 ± 2.76%, respectively) acids.

Keywords: Cakile maritima, fatty acid, anatomical features

PHENOTYPIC AND GENOTYPIC CHARACTERIZATION OF LISTERIA MONOCYTOGENES ISOLATED FROM CHEESES PRODUCED IN THE REGION OF ALGERIERS

Lynda Abdellaoui

Veterinary Science Saad Dahleb Blida University, Algeria

lyndabdellaoui5@gmail.com

ABSTRACT

Listeria monocytogenes causes invasive syndromes with the high mortality rates in specific population groups. Cheeses have been frequently involved in epidemics around the world. The objective of this study was to assess the prevalence of *L. monocytogenes*, study its serotyping and antibiotic resistance in the samples collected at different stages of cow milk cheese production in three production units located in the Algiers region. A total of 385 samples of dairy products were analyzed using the standard procedure EN İSO 11290-1, and the *L. monocytogenes* isolates were serotyped by polymerase chain reaction. The overall prevalence was 5.2% (20/385). The highest prevalence was in the hard cheese processing unit (3.12%) followed by the pressed cheese production unit (1.82%) and the soft cheese production unit (0.26%). Among these isolates, four serotypes identified, serotypes 4b (50%) and 1/2b (35%) are the most dominant followed successively by serotypes 1/2a (10%) and 4c (5%). Depending on the step of production, 11 strains of *L. monocytogenes* are isolated from packaged grated cheese, seven strains from the raw milk, one strain during refining and ½ b strain has been isolated bya surface swabbing. İn conclusion, the presence of serotypes 4b, 1/2b and 1/2a of *L. monocytogenes* in the samples is of great concern to public health as these serotypes can cause listeriosis in humans.

Keywords: Listeria monocytogenes, cow, listeriosis, milk, prevalence, serotypes.

PHYLOGENETIC ANALYSIS OF POTATO VIRUS S FROM TURKEY

Şerife Topkaya

Department of Plant Protection Tokat Gaziosmanpaşa Universty, TURKEY

serife.topkaya@gop.edu.tr

ABSTRACT

PVS is one of the most common viruses to infect potatoes. While mild symptoms are seen in plants infected with PVS, severe symptoms are observed in successive infections with other viruses. There have been very few studies on PVS in Turkey, and in this study, virus infected potato samples collected from different provinces were analyzed molecularly for screening of PVS. A total of 300 leaf samples were collected from potato fields from potato production areas in Bolu, Afyon, Kayseri, and Niğde provinces of Turkey during the 2020 summer growing season. The presence of PVS in the samples collected was assessed by molecular methods usig RT-PCR method with PVS specific primers. As a result of RT-PCR studies to determine the presence of PVS, 35 samples (13.2%) were found to be infected with PVS. phylogenetic analysis were performed using coat protein sequences of 14 PVS infected samples from different provinces. The nucleotide sequences of PVS isolates were compared with references PVS isolates derived from GenBank. PVS isolates were grouped into two major clusters, one of which included PVS ordinary strains (PVSO), and the other contained PVS Andean strains (PVSA). All Turkish PVS isolates were grouped into the PVSO cluster. Results of the current study also showed that the PVS prevalence in some areas in Turkey could actually be rather high, and the agronomic impact of the virus should not be underestimated.

Keywords: Afyon, Bolu, Potato, Phylogenetic tree, virus

MOLECULAR MARKERS FOR GENETIC DIVERSITY AND CHARACTERIZATION STUDIES IN *Orobanche* spp.

Behiye Banu Bilgen

Tarimsal Biyoteknoloji Tekirdağ Namik Kemal Üniversitesi, Tekirdağ, TURKEY

bbilgen@nku.edu.tr

ABSTRACT

The broomrapes (*Orobanche* spp.) are holoparasitic plants, devoid of roots and chlorophyll, completely dependent on their hosts. *Orobanche* is a large genus of parasitic, herbaceous plants that are mainly found in the Northern Hemisphere. They are mainly located in the Mediterranean-basin, North Africa, Southwestern Asia, and some other regions with Mediterranean type climate. Five of *Orobanche species are considered important agricultural pests (O. crenata, O. cernua, O. cumana, O. ramosa, O. aegyptiaca). They particularly choose Asteraceae,* Solanaceae, Fabaceae, Umbelliferae, and Cucurbitaceae. Some molecular markers, such as random amplified polymorphic DNA, amplified fragment length polymorphism, cpDNA diagnostic markers, inter simple sequence repeats, and microsatellites have been successfully used for genetic diversity and characterization studies in *Orobanche* species. This study focuses on the use of various molecular markers that reveals the genetic diversity of broomrapes in different regions. Based on the studies in the literature, it is necessary to deepen the studies by using more populations and effective molecular markers belonging to the distribution area of the species in order to understand and reveal events such as global genetic characterization and diversity, distribution and evolutionary mechanism of race formation.

Keywords: Broomrape, Genetic Diversity, Molecular Markers, Races

GENETIC VARIATION FOR VARIOUS MOLECULES RELATED TO IMPROVE SUNFLOWER NUTRITIONAL VALUE

Javeria Abid

Plant Breeding and Genetics University of Sargodha, College of Agriculture Sargodha, PAKISTAN

laibaabid656@gmail.com

ABSTRACT

Sunflower seed quality has been dictated by several traits including oil content, fatty acid profile and presence of functional molecules such as α-tocopherol and sterols. İn this study, sunflower germplasm was screened for various sunflower seed quality traits over two years. İntroduced accessions such as NOVİSAD.62, RH.347, and USSR Luch were found to have superior quality traits including α-tocopherol, sterol and high oleic acid. İntrogression breeding lines D.22, D.26 and D.4 obtained from crossing wild germplasm (H. argophyllus) contained superior levels of traits such as oil contents, α-tocopherols and low seed chlorogenic acid. Selected lines may be utilized for development of hybrids with better oil quality rich in functional molecules which may help to improve human immune systems. Correlation analysis showed a positive relationship between oleic acid, tocopherol and sterol and thus simultaneous selection for these traits will be possible. Peroxide value oil was significantly negatively correlated with oleic acid, showing that high oleic acid oil may have better oxidative stability at high temperatures.

Keywords: α-tocopherol, sterol, peroxide, oxidation, breeding, climate change Abbreviation: KTA -Kernel to achene ratio

GENETIC CHARACTERIZATION OF MOROCCAN APPLES (MALUS DOMESTICA BORKH.) CULTIVARS USING SSR MARKERS

Abdelmajid Haddioui [1,], Youssef Khachtib [1], Said Bouda [1] & Hasna Zinelabidine [1]*

[1] Faculty of Sciences and Technics Sultan Moulay Slimane University, Morocco, Fas

ahaddioui@yahoo.fr

ABSTRACT

The apple is the most common and culturally important fruit crop of temperate areas. Morocco is one of the world's important apple production countries. However, little is known about the genetic diversity organization in the local germplasm. İn this study, our interest has focused on the use of the technique SSR (*Simple Sequence Repeat*) to explore the molecular polymorphism and characterize 27 apple genotypes collected from different locations in Morocco. To meet these objectives, the use of 26 primers allowed the revelation of 195 polymorphic markers. The results obtained for the average number of alleles per locus (7.5), effective number of alleles (4.62), Shannon information index (1.66), expected heterozygosity (0.76), observed heterozygosity (0.74) and polymorphism information content (0.76) showed a moderate level of polymorphism, which suggests that Moroccan apple cultivars exhibit genetic diversity. The principal coordinate analysis and hierarchical classification suggested the presence of four well defined groups. Furthermore, strong genetic differentiation between these four groups was also detected (FST = 0.28). Most of the individuals segregated into the four groups showing a membership coefficient greater than 0.80, which indicates their better genetic integrity. A parentage analysis, however, shows that cultivars from the four regions are minimally hybridized. After comparing SSR profiles and genotypes names, we conclude that the problem of homonyms and/or labeling errors appear in the studied cultivars. Additionally, some cultivars with the same name are grouped in different clusters suggesting the existence of possible homonymy. Lastly, the present work confirms the usefulness of SSR markers for the elimination of duplications and characterization of diversity and hybrid characters of apple genotypes in Morocco.

Keywords: Malus domestica, SSR markers, genetic diversity, cultivars, Morocco

ENZYME ANTIOXIDANT SYSTEM EVALUATION OF STEVIA MICROPROPAGATED WITH PEPTIDOMIMETICS AS A SILVER CARRIER

Maria Geneva [1,], Maria Petrova [1], Kamelia Miladinova-Georgieva [3], Elisaveta Kirova [1], Lyubomir Vezenkov [4], Daniela Tsekova [4] & Mariana Sichanova [5]*

[1] Plant-Soil İnteractions İnstitute of Plant Physiology and Genetics, Bulgarian Academy of Sciences, Bulgaria

[3] Regulators of Plant Growth and Development İnstitute of Plant Physiology and Genetics, Bulgarian Academy of Sciences, Bulgaria
[4] Department of Organic Chemistry University of Chemical Technology and Metallurgy, Bulgaria

[5] Plant-Soil İnteractions İnstitute of Plant Physiology and Genetics, Bulgarian Academy of Sciences, BULGARIA

boykova2@yahoo.com

ABSTRACT

İn the medicinally important Stevia (*Stevia rebaudiana* Bertoni; Family Asteraceae) leaves are synthesized sweet diterpene glycosides, which are the main source of a highly effective caloric-free sweetener. Conventional methods of stevia propagating are limited due to the poor viability of the seeds, the need for a long time to germinate them, the low germination rate and the poor rooting ability of vegetative cuttings. To respond to the growing demand for this powerful medicinal plant with a reduced population, and to help preserve it, the study was focused on the development of a suitable alternative biotechnological method for its reproduction, such as micropropagation. The aim of the present report describes a protocol for clonal propagation by direct organogenesis from nodal explants of *Stevia rebaudiana* Bert., using nanofibers, formed by newly synthesized low molecular weight peptidomimetics carriers of the biologically active agent silver ion. During *in vitro* propagation in tubes, plants are in harmful environmental conditions high humidity, high plant growth regulators content and low light, consequently. Under stress conditions in plant tissues are multiplied the generation of reactive oxygen species such as superoxide, hydrogen peroxide and hydroxyl radicals, which may cause cell damage. To mitigate and repair the damage, plants possess enzyme and non-enzyme mechanisms that detoxify reactive oxygen species. Therefore, experiments were conducted for the comparison of the enzyme antioxidant capacity and stress markers of *in vitro* propagated stevia plants in Murashige and Skoog (MS) media supplied with 1, 10, 50 100 mg L-1 nanofiber formed from peptidomimetics as a carrier of Ag ions (NF-1%Ag). İt was found that when plants were micropropagated in MS medium with BAP the content of proline and malondialdehyde decreased. İn general NF-1%Ag application to the MS medium at all studied concentrations caused an additional decrease in the content of the lipide peroxidation marker malondialdehyde compared with the control plants. From the decreasing of the hydrogen peroxide content in stevia plantlets cultivated in MS media with NF-1%Ag, and the respective increase of the enzymes with antioxidant potential (SOD, CAT,

APX) could be concluded that NF-1%Ag reduced oxidative stress in plantlets during *in vitro* propagation.

Acknowledgement: This study was conducted with financial support from National Science Fund at the Bulgarian Ministry of Education and Science, Project КП-06-Н56/8 12.11.21.

Keywords: Stevia rebaudiana Bertoni, in vitro propagation, peptidomimetics

APPLICATION OF PEPTIDOMIMETICS AS A CARRIER OF SILVER FOR GROWTH ACCELERATION OF STEVIA IN VITRO PLANTS AND ASSESSMENT OF ANTIOXIDANT ACTIVITY

Maria Petrova [1,], Maria Geneva [1], Mariana Sichanova [1], Kamelia Miladinova-Georgieva [2], Elisaveta Kirova [1], Lyubomir Vezenkov[2] & Daniela Tsekova [3]*

[1] Plant-Soil İnteraction İnstitute of Plant Physiology and Genetics, Bulgarian Academy of Sciences, Bulgaria
[2] Regulators of Plant Growth and Development İnstitute of Plant Physiology and Genetics, Bulgarian Academy of Sciences, Bulgaria
[3] Department of Organic Chemistry University of Chemical Technology and Metallurgy BULGARIA

marry_petrova@yahoo.com

ABSTRACT

Stevia rebaudiana Bertoni (Asteraceae) is a natural sweetener due to the rich content of steviol glycosides in the leaves. The high health benefits of stevia necessitate the development of effective methods for its cultivation. The application of nanoparticles in plant biotechnology provides tools to enhance plant growth and yield, improve the production of biologically active compounds, eliminate microbial contaminants in *in vitro* cultures, and increase plant tolerance to various stress conditions. The effect of nanofibers formed by peptidomimetics enriched with 1% silver (NF-1%Ag) in MS nutrient media at different concentrations (1, 10, 50, 100 mg/l) on the growth and metabolites with antioxidant power content of *in vitro* micropropageted *S. rebaudiana* plants was tested. The addition of 50 mg/l NF-1%Ag in MS medium was optimal for accelerating growth, elongation (mean FW 0,371 g; average length 8.39 cm) and rooting (42.9%) of *in vitro* plantlets. The shoots grown on MS media supplemented with 1 to 100 mg/l NF-1%Ag showed higher total antioxidant activity measured by radical scavenging capacity (DPPH method) than control plants. İn contrast, the ferric reducing antioxidant power (FRAP method) and the total flavonoid content do not show a positive relationship with the rate of growth and production of water and lipid-soluble metabolites with antioxidant potential. The highest antioxidant activity levels measured by DPPH and FRAP methods were recorded in *in vitro* plants cultured on MS medium supplemented with 10 mg/l NF-1%Ag - 90.944 and 79.041, respectively. The adding of 50 mg/l NF-1%Ag to the MS medium caused the highest total flavonoid content, water- and lipid-soluble metabolites with antioxidant capacity in stevia plantlets. The highest content of total phenols (4.170 mgGA/g) was obtained in plantlets grown on a nutrient medium supplemented with 100mg/l of NF-1%Ag. The study demonstrates the benefits of using nanofibers to accelerate the growth and antioxidant potential of Stevia *in vitro* plants.

AcknowledgementsThis study was conducted with financial support from National Science Fund at the Bulgarian Ministry of Education and Science, Project КП-06-Н56/8 12.11.21.

Keywords: Stevia, in vitro cultivation, nanofibers

DETERMINATION OF THE GENETIC RELATIONSHIP BETWEEN DIPLOID AND TRIPLOID BANANA VARIETIES BY FLOW CYTOMETRY AND SIMPLE SEQUENCE REPEAT (SSR) ANALYSIS

Filiz Baysal [1,], Sevinç Sürer [2] & Atilla Ata [3]*

[1] Breeding and Genetic Alata Horticultural Research İnstitute, Mersin, TURKEY
[2] Department of Vegetables and Ornamental Plants Alata Horticultural Research İnstitute, Mersin, TURKEY
[3] Vegatebles and Ornamental Plants Alata Horticultural Resarch İnstitute, Mersin, TURKEY

flzbysl1313@gmail.com

ABSTRACT

Banana is an important crop in tropical and subtropical regions, where it has many wild species. İn this study, ploidy levels of commercial Grand Nain and Dwarf Cavendish, local Azman, Erdemli Yerli, and Küllü Erdemli Yerli, wild F4 (*Ensete ventricosum* the Abyssinian Banana), F5 (*Ensete glaucum* the Snow Banana), and F3 (*Ensete glaucum* the Yunnan banana) varieties were determined through flow cytometry. Also, genetic relationships among varieties were assessed by ten Simple Sequence Repeats (SSR) markers. Of the F3, F4, and F5 varieties obtained from seeds, F4 and F5 were determined as diploids, while F3 was determined as spontaneous triploid. Others were triploid. Genetic similarities of banana varieties were between 0.3750 and 0.8814 based on SSR molecular markers. According to the dendrogram formed by the Unweighted Pair Group Method With Arithmetic Averages (UPGMA) analysis, varieties were collected in three main groups and 'Dwarf Cavendish' was the most distinct from the others. İn conclusion, there is a high genetic variation among banana varieties grown in Turkey. Determining the degree of genetic relationship of diploids with the other varieties will be beneficial, especially in terms of their use in future breeding studies.

Keywords: banana, ploidy, molecular markers, NTSYS

THREE NOVEL GENOTYPES DETECTED IN IGFBP-3 GENE IN ANATOLIAN WATER BUFFALOES

Yusuf Ozsensoy [1], İnanc Baral [1,] & Haki Kara [2]*

[1] Department of Veterinary Genetics Cumhuriyet University, TURKEY
[2] Department of Veterinary Pharmacology & Toxicology Cumhuriyet University, TURKEY

inancbaral@gmail.com

ABSTRACT

Anatolian water buffalo is the only water buffalo breed in Turkey. The "Water Buffalo Breeding by Breeders Project" was initiated nationwide, including Sivas, to increase the buffalo numbers. The aim of this study was the investigation of İntron-2, Exon-2 - İntron-3, and Exon-3 regions of the meat-yield related İGFBP-3 (İnsulin-like Growth Factor Binding Protein-3) gene in Anatolian water buffaloes for gene polymorphisms by using restriction endonucleases (RE) of *TaqI*, *MspI*, and *HaeIII*. The DNA isolation was performed by Phenol/Chloroform method from 151 blood samples. The obtained DNA isolates were amplified with the İGFBP-3 gene region specific primers. The resulting PCR products were digested with REs, then were separated by the 3% agarose gel electrophoresis method, and alleles of each RE were determined. Results revealed two genotypes of AA (98.68%) and AC (1.32%), and two alleles of A (0.99) and C (0.01) for the Exon-2 - İntron-3 region digested by *HaeIII*. *TaqI* digestion of the İntron-2 region revealed three genotypes of AA (7.94%), AB (3.97%), and BB (88.10%), and two alleles of A (0.10) and B (0.90). *MspI* digestion of the Exon-3 region revealed only AA genotype and A allele. Overall, *HaeIII* digestion revealed insignificant polymorphism (P>0.05); *MspI* digestion revealed monomorphism (P>0.05); *TaqI* digestion revealed significant polymorphism (P<0.001) for their respective regions in the İGFBP-3 gene in Anatolian water buffaloes. Gene polymorphisms in the İGFBP-3 gene regions were investigated for the first time in Anatolian water buffaloes. Additionally, three novel genotypes for the İGFBP-3 gene (one from *HaeIII*, and two from *TaqI*) were determined for the first time. The observed frequency of the newly detected B allele from the *TaqI* digestion was found as very high compared to the other allele. This research was supported by the Scientific Research Project Fund of Sivas Cumhuriyet University under project number of V-051.

Keywords: Anatolian Water Buffalo; İGFBP-3; PCR-RFLP; Sivas; TaqI.

THE CHARACTERIZATION AND INDUSTRIAL APPLICATIONS OF THERMOPHILIC B-XYLOSIDASE OF THE GENUS GEOBACILLUS

Ebru Albayrak [1], Hasan Murat Velioğlu [1] & Yusuf Sürmeli [1,]*

[1] Department of Agricultural Bio-Technology Namik Kemal University, Tekirdağ, TURKEY

ysurmeli1985@gmail.com

ABSTRACT

β-xylosidase enzymes hydrolyze the β-1,4-D-xylan and xylobiose to produce the D-xylose from nonreducing end. They are classified in various glycoside hydrolase (GH) families (GH1, GH3, GH5, GH30, GH39, GH43, GH51, GH52, GH54, GH116 ve GH120) according to the similarities of their sequence and the structures of catalytic clefts. The β-xylosidase enzymes synergistically act on hemicellulose, which is the second largest portion of the lignocellulosic material after cellulose, for its complete degradation with the other hemicellulase enzymes. β-xylosidases are of great interest for many industrial processes including biobleaching process of paper pulp, the increasing of animal feed digestibility, fruit juice clarification, the production of xylooligosaccharides and the production of fermentable sugar from lignocellulosic material. Since thermophilic β-xylosidase enzymes have high activity and stability at high temperatures, they are favourable for those industrial applications. Thermophilic β-xylosidase enzymes are produced especially by bacteria and fungi. Among these, the genus Geobacillus, which thrives in extreme area (e.g. hot springs, volcano, geothermal region) having high temperature, is an important microbial source of thermophilic hydrolase enzymes including β-xylosidase. İn the present work, the production, characterization and industrial applications of thermophilic β-xylosidase enzymes from Geobacillus species have been examined.

Keywords: β-xylosidase, Geobacillus, thermophilic enzymes

SHORTENING THE GENERATION TIME IN CONFECTIONARY SUNFLOWER BY USING SPEED BREEDING

Hümeyra Yaman [1], Gülden Çetin Özkan [2,], Meryem Sağkol [2], Ersin Akşor [3] & Oğuzhan Aydin [3]*

[1] Director of The İnstitution Field Crops Central Research İnstitute, TURKEY
[2] Biotechnology Research Center Field Crops Central Research İnstitute, TURKEY
[3] Department of Agricultural Bio-Technology Field Crops Central Research İnstitute, TURKEY

gulden.cetinozkan@tarimorman.gov.tr

ABSTRACT

Sunflower is used as a confectionary and oil. İts use as a cookie is quite common both in our country and in different countries of the world. Sunflower, containing high protein and low carbohydrate, high in unsaturated fat, rich in minerals, vitamins, antioxidants and phenolic substances, is an important food source for human nutrition. Although the confectionery sunflower production in Turkey varies from year to year, it constitutes 10-15% of the total sunflower production. Day by day, depending on consumption, the cultivation of sunflower for confectionary is also increasing. There is a need for varieties suitable for the regions in order to increase the production of sunflower for confectionarys in Turkey. Therefore, the necessity of speeding up the researches on the sunflower confectionery arises and it is possible to reach the desired varieties in a shorter time by shortening the breeding period with biotechnological methods. The aim of this study is to shorten the time between generations by increasing the daily light exposure time and light intensity of sunflower populations. As a result of classical breeding studies, one generation progress can be achieved in a year. With this study, both the prolongation of the daily light exposure time of the plants and the early seed harvest were achieved, and as a result, a generation was advanced within 82 days. Morphological and physiological changes in the plants were observed by keeping the lighting intensity and duration different in the climate room. With this study, speed breeding techniques were started to be used in sunflower. By integrating these techniques into classical breeding studies, sunflower varieties with desired properties will be developed in a shorter time.

Keywords: Confectionary sunflower, Speed breeding, Photoperiod, Generation

RNA SEQUENCING ANALYSIS OF SALT AND DROUGHT TOLERANCE IN GAMMA-INDUCED SOYBEAN (*Glycine max* L. MERR.) MUTANTS

Alp Ayan [1,], Sinan Meriç [1], Tamer Gümüş [1], Özge Çelik [1] & Çimen Atak [1]*

[1] Department of Molecular Biology and Genetics İstanbul Kültür University, TURKEY

a.ayan@iku.edu.tr

ABSTRACT

Glycine max (L.) Merr, is one of the most planted industrial oil seed crops. İt has numerous uses as food, feed, and raw materials for different industries. However, low genetic variation in cleistogamous soybean plant requires intensive breeding programs for trait development. Salinity and drought are the two main osmotic stresses which are mainly caused by emerging global warming effects. Based on the genotype, plants present susceptibility, tolerance, or resistance to these abiotic stress factors. Since the genetic and physiological mechanisms for salt and drought tolerance is multigenic, complex and unclarified in full extend yet, research on inducing variability among present varieties through different approaches continues. As relatively fast, flexible, cheap, and viable method, mutation breeding, which induces random genetic variations significantly, is widely used in crop science. İn this present study, 90 mM NaCl and drought tolerant SM1 and SM3 soybean mutants, which were induced from S04-05 variety and selected among 12000 gamma irradiated (100, 150, 200, and 250 Gy) seeds, were selected for RNA sequencing analysis. 57147 genes belonging to soybean reference genome were tested by using İllumina RNA-Seq transcriptome profiling. İn untreated S04-05 original variety 35284 genes were successfully evaluated and 5064 differentially expressed genes (DEGs) were identified under salinity treatment, while 4156 of 36356 successfully tested genes in SM1 and SM3 mutants presented differential expression under salinity treatment. Likewise, 33579 genes were tested, and 5524 genes were found significantly altered under drought treatment, while in drought treated SM1 and SM3 mutants 4420 of 44613 tested genes presented differential expression. As a result, photosynthesis, and carbohydrate metabolic processes related DEGs were found the main contributors to prolonged survival of both mutants under extreme conditions. The molecular information about the DEGs of both salinity and drought tolerant mutants and susceptible original S04-05 variety obtained in this study could be valuable to improve soybean cultivars even further against both stresses.

Keywords: RNA-seq; salinity, drought, mutation breeding, Glycine max

HEMOPHILIA DISEASE TREATMENT UTILIZING FROM CRİSPR/CAS9 SYSTEM

Eniada Reçi [1,], İna Gjymenga [2] & Endi Zykollari [3]*

[1] Department of Biotechnology University of Tirana\Faculty of Natural Sciences, ALBANIA
[2] Department of Biotechnology Faculty of Natural Sciences University of Tirana, ALBANIA
[3] Bioteknology University of Tirana, ALBANIA

eniadareci@gmail.com

ABSTRACT

CRİSPR is a technology that can be used to edit genes and, as such, will likely change the world.The essence of CRİSPR is simple: it's a way of finding a specific bit of DNA inside a cell. After that, the next step in CRİSPR gene editing is usually to alter that piece of DNA. However, CRİSPR has also been adapted to do other things too, such as turning genes on or off without altering their sequence. CRİSPR is already widely used for scientific research, and in the not too distant future many of the plants and animals in our farms, gardens or homes may have been altered with CRİSPR. İn fact, some people already are eating CRİSPRed food. The CRİSPR gene editing tools include a "guide" that locates the mutated sequence in the CFTR gene(provides instructions for making a protein called the cystic fibrosis transmembrane conductance regulator), a template with the correct segment of DNA letters, and "scissors" that break the patient's DNA at the site of the mutation. Mouse models of the disease were used to confirm this approach. The clotting factor İX was removed from the DNA of these mice. Then, they built a two-vector RNA sequence, where vector 1 expressed the SaCas9 gene driven by a liver-specific promoter, as the liver is where factor İX is produced, and vector 2 contained an RNA sequence that targeted a region at the 5-prime end of exon 2 of the mouse factor İX gene and a partial human factor İX cDNA sequence, for more potency and accuracy. This vector 2 inserted the human sequence of factor İX into the mouse genome. Electroporation of CD34+ hematopoietic stem and progenitor cells is performed obtained from healthy donors, with CRİSPR-Cas9 targeting the BCL11A erythroid-specific enhancer. Approximately 80% of the alleles at this locus were modified, with no evidence of off-target editing. After undergoing myeloablation, two patients - one with TDT and the other with SCD - received autologous CD34+ cells edited with CRİSPR-Cas9 targeting the same BCL11A enhancer. We will analyze how crisper works in the diseases mentioned above and how much can such a construct be achieved . This study provides convincing evidence for efficacy in a hemophilia mouse model following in vivo genome editing by CRİSPR/Cas9. The findings demonstrated that the hemophilia phenotype in mice was corrected by specific genome editing with a double vector treatment. Furthermore, these benefits lasted more than four months. Overall, these findings suggest using CRİSPR/Cas9 method as an effective way to treat hemophilia in humans. On the other hand, treating a disease like CF that affects the lungs and other internal organs is much more difficult because it is very hard to get the gene editing tools into lung cells, a process called gene delivery. Gene editing for CF is currently being tested in cells and animals, and it will be a number of years before it can be safely tested in people.

Keywords: CRİSPER, gene editing , DNA, Hemophilia

THE INVESTIGATION OF PHYLOGENETIC RELATIONSHIPS OF BACTERIAL NEUTRAL PAPAIN CYSTEINE PROTEASES

Helin Altan [1], Hasan Murat Velioğlu [1] & Yusuf Sürmeli[1]*

[1] Department of Agricultural Bio-Technology Namik Kemal University, TURKEY

ysurmeli1985@gmail.com

ABSTRACT

Proteases break the peptide bonds of proteins to form amino acids and short peptides. Based on the difference of catalytic amino acids, these enzymes are divided into five categories as serine protease, cysteine protease, aspartate protease, metalloprotease and threonine protease. Among the proteases that make up 60% of the enzyme sales in the world, papain cysteine protease is one of the most widely used enzyme families for the meat tenderizing process in the food industry, and they generally work at a neutral pH (pH 5-8). Papain cysteine proteases are generally obtained from plants. However, recently, with the development of omics technologies, large number of bacterial whole genome sequences have been rapidly accumulated, thus it has been determined that these bacterial sequences include many papain cysteine protease enzyme sequences. The sequences from bacterial whole genome data automatically annotated in UniProt/TrEMBL database as unreviewed data. The aim of this study is to investigate the phylogenetic relationship of six bacterial papain cysteine protease enzymes having neutral theoritical pİ derived from unreviewed amino acid sequences of UniProt/TrEMBL database using the MEGA11 program. Further analyses are planned to perform multiple sequence alignments, three-dimensional structure models and molecular docking analyzes of these enzymes.

Keywords: MEGA11, Papain, Cysteine protease, Meat tenderization

CHARACTERIZATION OF OSTZF8 GENE ENCODING TANDEM CCCH ZINC FINGER PROTEIN FOR

İbge The University of Agriculture Peshawar, PAKISTAN

janasad@aup.edu.pk

ABSTRACT

Oryza sativa is a commonly consumed crop on which more than 3 billion people depend globally. The aim of this study was to characterize OsTZF8 gene by applying different techniques of reverse genetics to determine its role in tolerance to abiotic stresses. OsTZF8 gene was overexpressed in rice indica variety Swat-1 and japonica variety Nipponbare. Significant sequence homologies between the Tandem Zinc Finger (TZF) proteins of rice with different plants were observed through phylogenetic analysis which suggested that these plants TZF proteins might have similar functions. The putative OsTZF8 promoter region possesses many cis-acting elements like ABRE, ARF, LTRE, MYB and MYC which are known to function in abiotic stress tolerance. For OsTZF8 promoter analysis, transgenic rice plants having pBİ P OsTZF8 :GUS construct were generated which showed histochemical GUS activity in its aerial parts under drought stress conditions. Genomic DNA from transformed indica and japonica transgenic lines was extracted and confirmed through PCR. Japonica OsTZF8-OX transgenic line were used for further characterization. RT-PCR analysis of cDNA indicated that OsTZF8 was over-expressed in transgenic lines compared to the endogenous OsTZF8 gene. For the evaluation of subcellular localization of OsTZF8 protein, OsTZF8-GFP construct, driven by the ubiquitin promoter (pGreen-Ubi-OsTZF8:GFP), was transiently expressed in rice protoplast. Subcellular localization of OsTZF8 was observed predominantly in the nucleus after ABA treatment. Under different senescence inducing conditions such as ABA, ethephon and jasmonic acid, delayed leaf senescence was observed in the leaf fragments of japonica OsTZF8-OX transgenic lines compared to control. For the evaluation of the role of OsTZF8 gene in abiotic stress tolerance, salt and drought stress experiments were conducted. After salt stress treatment, japonica OsTZF8-OX transgenic line #2, #6, #7 and #11 exhibited 29% (14/48), 27% (13/48), 27% (13/48) and 25% (12/48) survival rates, respectively compared to 33% (16/48) in control 1 and 35% (17/48) in control 2. İn case of drought stress treatment, japonica OsTZF8-OX transgenic line #2, #6, #7 and #11 displayed 71% (34/48), 67% (32/48), 69% (33/48) and 67% (32/48) survival rates, respectively compared to 35% (17/48) in control 1 and 33% (16/48) in control 2. After salinity stress, japonica OsTZF8-OX transgenic line #2, #6, #7 and #11 showed relatively high ion leakage i.e. 69.3%, 71.25%, 71.3% and 70.1% respectively compared to 63.8% in control 1 and 66% in control 2. On the contrary, after drought stress treatment, japonica OsTZF8-OX transgenic line #2, #6, #7 and #11 revealed low ion leakage i.e. 59.7%, 62.75%, 62.4% and 60.7% ion leakage in comparison to 73.07% in control 1 and 77.3 % in control 2. The chlorophyll content of the top four leaves of japonica OsTZF8-OX transgenic line

#2, #6, #7 and #11 were higher in comparison to the control. Two independent japonica OsTZF8-OX transgenic line #7 and #11 were used for microarray analysis. Compared to control, 695 genes revealed 2.0-fold or greater changes in OsTZF8-OX transgenic lines. Out of 695 genes, 189 genes were up-regulated and 506 genes were down-regulated in microarray analysis of japonica OsTZF8-OX rice. Among the microarray identified stress linked pathways genes, certain genes were related to stomata, chlorophyll, reactive oxygen species, and abiotic stresses. Real time PCR analysis of four genes of japonica OsTZF8-OX transgenic line #7 and #11 revealed that OsPEAMT2 and OsADF11 genes were up-regulated while OsİRO3 and OsTAZ genes were down-regulated compared to control plants which validates our microarray analysis. İn conclusion, RT-PCR analysis, microarray study, qRT-PCR analysis, stress treatments, ion leakage, and chlorophyll analysis revealed that over-expression of OsTZF8 gene has a significant role in conferring tolerance to drought stress in rice.

Keywords: OsTZF8, Phylogenetic, Transformation, Callus, PCR, Salt stress, Drought stress, GUS, GFP, Microarray, Real time PCR

AN ENVIRONMENTALLY FRIENDLY AND EFFICIENT METHOD FOR THE PRODUCTION OF UNIQUE CARBOHYDRATES: MUTANT GLUCANSUCRASE ENZYME ENGINEERING

Hümeyra İspirli [1,] & Enes Dertli [2]*

[1] Central Research Laboratory Bayburt University, TURKEY
[2] Department of Food Engineering Yildiz Technical University, TURKEY
humeyra_ispirli@hotmail.com

ABSTRACT

İn recent years, the production of unique carbohydrates with cheap, environmentally friendly and effective methods for use in different fields such as health, pharmaceuticals and cosmetics, especially in food technology, has gained great importance. Among these unique carbohydrates are exopolysaccharides (EPS) produced by Lactic Acid Bacteria (LAB) and oligosaccharides obtained as a result of the breakdown of polysaccharides found in natural sources, and oligosaccharides, which are generally produced by the addition of sugar monomers such as fructose, galactose and glucose by unique enzymes to different sugar acceptors. There is an increasing interest in the use of microbial EPSs due to their functional properties such as viscosity increasing, structure regulating, water binding properties and pseudoplastic structure even at very low concentrations. İn this context, glucansucrases attract attention as important tools for the production of a wide variety of functional carbohydrates with different types of linkages, size, branching and physicochemical properties from simple substrates. These enzymes are extracellular proteins that catalyze the synthesis of α-gluco-oligo/polysaccharides and glycosides with physico-chemical properties different from sucrose. Structurally, glucansucrases consist of 4 regions: the N-terminal end, which begins with a signal peptide, followed by the N-terminal variable region, a highly conserved catalytic or sucrose binding domain, and the C-terminal region consisting of a series of tandem repeats. The most structurally important part of glucansucrases is their catalytic region, which is responsible for their ability to form glucans in which they produce more than one glycosidic bond, and glucansucrases are capable of producing glucans in different structures depending on the differences in their catalytic regions. Recently, studies have been carried out to change the structure of polysaccharides synthesized by changes made on certain amino acids in the catalytic region of these enzymes. İt is thought that as the level of knowledge about the crystal structures of glucansucrases increases, the number of operations that can be performed with these enzymes and the possibilities of their use in the production of functional components will expand accordingly. Studies so far have shown that mutations in glucansucrases cause an increase or decrease in the molecular weight of the produced glucan, change the water solubility of glucan polymers, change the total activity of the enzyme or even stop it completely. Studies on this subject are of great importance in terms of revealing that even limited changes in amino acids in the catalytic region of the enzyme can change the qualities of the product produced and studies on the subject are still very limited and there has not been enough study on the roles of amino acids in some regions and motifs of glucansucase enzymes. Structural characterization of glucansucrases is of great importance in terms of understanding the functions of these enzymes.

Keywords: mutant glucansucrase, oligosaccharides, polysaccharides

MOLECULAR FACTORS AFFECTING CHICKEN MEAT QUALITY AND FLAVOR

Emine Toparslan [1,] & Demir Özdemir [2]*

[1] Department of Agricultural Bio-Technology İnstitute of Natural and Applied Sciences, TURKEY
[2] Department of Agricultural Biotechnology Faculty of Agriculture, Akdeniz University, Antalya, TURKEY

eminetoparslan@gmail.com

ABSTRACT

İntensive poultry production is agricultural sub-sector that has gained popularity since the late 1940s and is growing the fastest today, with the intense industrialization of food production. Following this rapid development, the consumers have more interested in chicken meat products. These products are mostly derived from industrial poultry production, which is characterized by high growth rate and high breast meat yield. On the other hand, in recent years, many quality flaws (white striping, wooden breast, etc.) have appeared that damage the integrity and composition of the muscles, particularly the fillet.Several solutions have been explored to alleviate these faults, but they have proven insufficient. İt is believed that the most effective strategy is to switch to slow-growing breeds with poor meat output. İn recent years, customers have prioritized animal health and welfare, free-range poultry (including organic production systems), and later slaughter age. Moreover, they have been tended to the chicken meat products has unique taste such as geographical indication products, local delicacies etc. that contain natural flavor. This alterations in consumer demands directs the breeders to alternative poultry production systems. İn this context, it is aimed to highlight the importance of some chicken breeds by determining and improving their meat quality characteristics, especially in developed countries. İn line, many studies have been conducted to determine the biological pathways that regulate the meat quality and flavor of chickens. Some molecular investigations on genes involved in chicken meat quality problems and taste are summarized in this review.

Keywords: Chicken, Meat Quality and Flavor, Molecular Mechanisms

OBTAINING HAPLOID PLANTS BY IRRADIATED POLLEN CULTURE IN OIL CROPS

Nesrin Karaca Sanyürek [1], Hümeyra Yaman [2], Gülden Çetin Özkan [3,], Meryem Sağkol [3] & Ersin Akşor [4]*

[1] Department of Food Engineering Munzur University, TURKEY
[2] Director of The İnstitution Field Crops Central Research İnstitute, TURKEY
[3] Biotechnology Research Center Field Crops Central Research İnstitute, TURKEY
[4] Department of Agricultural Bio-Technology Field Crops Central Research İnstitute, TURKEY

gulden.cetinozkan@tarimorman.gov.tr

ABSTRACT

The effects of climate change resulting from global warming are increasing day by day. A sustainable agriculture program should be planned in order for human beings to continue their vital activities under these conditions. Low yield and quality factors in agricultural products, which are a big problem today, should be added to these agricultural programs quickly. İn order for agriculture to adapt to changing climatic conditions and to sustain it, it is essential to breed suitable varieties for their purpose. İn plant breeding programs, haploid plant production is of great importance in order to shorten the breeding period. Obtaining pure lines in plants requires a labor-intensive work program and a long process. Obtaining one hundred percent homozygous pure lines is a key point for the improvement and development of products. Haploid plants with a single set of chromosomes have become a valuable resource in cultivar breeding. Dihaploid plants that are homozygous at all loci by doubling of their chromosomes can be propagated by seed and reach full homozygosity in a single generation. İn traditional methods, it takes 6-7 years to reach homozygosity. Dihaploidization methods provide significant advantages in terms of bringing pure lines into agriculture by obtaining homozygosity in a short period of time such as one year. Biotechnological methods used with technology and knowledge considerably shorten the duration of these studies. Anther culture and irradiated pollen technique are among these methods. At the same time, these techniques are an excellent resource for gene mapping, cytogenetic research, and evolutionary studies. İrradiated pollen culture was applied to many oil plants and pure lines were obtained. The fact that these methods are being developed day by day guides the researchers. İn order to quickly close the vegetable oil deficit in our country, Turkish agriculture needs to use biotechnological methods and increase genetic diversity.

Keywords: Biotechnology, pure line, dihaploidization

MICROPROPAGATION OF IN VITRO GERMINATED PAULOWNIA TOMENTOSA PLANT

İbrahim Uz [1,], Hayat Topcu [1] & Sefer Demirbaş [1]*

[1] Department of Agricultural Bio-Technology Namik Kemal University, Tekirdağ, TURKEY

ibrahimuz@nku.edu.tr

ABSTRACT

Paulownia (*Paulownia tomentosa*) is a fast-growing tree species belonging to the Paulowniaceae family and is widely cultivated in China and Japan. The wood of the paulownia tree is used in the production of furniture, pulp and coal, as well as the extracts obtained from the leaves, flowers and fruits are used in the pharmaceutical and cosmetic industry. Commercial propagation of paulownia tree is done by seed and cuttings. Due to the low germination performance of paulownia seeds and the limited propagation by cuttings, the production of seedlings by micropropagation method comes to the fore. İn this study, micropropagation of paulownia seeds germinated *in vitro* and transfer to outdoor conditions were carried out. During the surface sterilization of the seeds, 70% ethanol and 5% commercial bleach were used. After the seeds were rinsed with sterile distilled water, they were transferred to nutrient medium containing 0 MS and germinated, and at the end of 30 days, approximately 18% germination occurred. Shoots obtained from germinated seeds were used as explants in the regeneration study. İn the regeneration study, 6-benzylaminopurine (BAP) was used as a cytokinin in the range of 1 to 4 mg/L. 0.1 mg/L gibberellin (GA) and 0.1 mg/L indole-3-butyric acid (İBA) were added to medium containing BAP. The shoot number and shoot length values were determined 30 days after the culture. The highest shoot growth was observed in the medium containing 4 mg/L BAP + 0.1 mg/L GA + 0.1 mg/L İBA, and the highest shoot length was determined in the medium containing 3 mg/L BAP + 0.1 mg/L GA + 0.1 mg/L İBA. Plants rooted in a medium containing 1 mg/L İBA were subjected to the 21-days acclimatization stage, and then all seedlings were successfully transferred to garden.

Keywords: Paulownia, Chinese poplar, Regeneration, BAP, Seedling

EFFECT OF DIFFERENT SEASONS AND COLD TREATMENTS OF NODAL SHOOT EXPLANTS ON IN VITRO CULTURE ESTABLİSHMENT OF HAZELNUTS (C*orylus avellana*)

Merve Şekerli

Breeding and Genetics Hazelnut Research Institute, TURKEY

mervesekerli@gmail.com

ABSTRACT

The season of collecting explants influences contamination rates and growth response in micropropagation of hazelnut (*Corylus avellana*). The aim of this study was to determine the effects of different explant collection dates on contamination and bud sprouting. Nodal explants of two field-grown hazelnut cultivars, Tombul and Çakildak were used to establish cultures *in vitro*. Explants were collected in five different time periods of 2021 and 2022: T1; November to December T2; January to February, T3; May to June, T4; July to August and T5; September. İn addition, dormant buds collected in T1 and T2 were used for cold pre-treatment studies. Firstly, bud cultures were prepared aseptically and were stored at +4 °C for 1, 2, 3 and 4 weeks. Explants exposed to the pre-cold applications were then transferred to controlled conditions (23 ± 2°C, 16-hour photoperiod) and observed regularly. Buds collected in T4 gave the best response for both cultivars (Tombul; 75%, Çakildak: 85%) while dormant explants, collected in T1 were unresponsive in culture and only 20%**,** and 17% of buds were sprouted for Tombul and Çakildak, respectively. The highest percentage of contamination was observed in T1 (Tombul: 88%, Çakildak: 82%) and T2 (Tombul: 90%, Çakildak: 85%) periods while explant collected during the summer (T4) showed the lowest contamination (Tombul: 52%, Çakildak: 42%). Compared to the control group, it was found that achieved bud break percentage was higher and the contamination percentage was not different in the cold pre-treated buds.

Keywords: Corylus avellana, Hazelnut, Micropropagation, nodal segments

S GENE APLICATIONS IN PLANT BREEDING

Rabia Busenaz Kaya

Department of Agricultural Bio-Technology Niğde Ömer Halisdemir University, TURKEY

rabiabsnz@gmail.com

ABSTRACT

Biological stress factors such as viruses, bacteria and microorganisms that cause disease in the organism are called as pathogens. Pathogens can cause serious injury in crop plants. Disease management is provided by pesticides which damage the environment and human health. These applications are not suitable for sustainable agriculture. Because plants improve resistance against the pesticides. There is great importance to improve resistant cultivar against diseases. Plants improve defense mechanisms such as resistance, susceptibility, and tolerance to avoid damage of pathogens. All plant genes that facilitate infection and promote pathogen-host compatibility are considered S genes. Thus, mutation or loss of an S gene inhibits host recognition and its metabolic and structural needs, such as nutrient uptake, limiting the pathogen's ability to cause disease. Thus, the plant provides broad-spectrum and long-term defense against pathogens. Recently, genome editing technologies have developed rapidly and have become a powerful tool to increase pathogen resistance in plants. RNA interferase, TALEN and CRİSPR-Cas systems are some of these technologies. The use of these technologies by targeting S-genes will be a modern and effective method to develop resistant cultivars against biotic stress factors. İn this review study, the mechanism and types of S genes were clarified and application of S genes in improving agricultural production were mentioned.

Keywords: Crispr, Genome Editing Technologies, Pathogens, S Genes, Agricultural Production

INVESTIGATION OF THE STONE FRUIT ROOTSTOCKS IN TISSUE CULTURE CONDITIONS

Rabia Busenaz Kaya [1,] & İrem Aycan Şentürk [1]*

[1] Department of Agricultural Bio-Technology Niğde Ömer Halisdemir University, TURKEY

rabiabsnz@gmail.com

ABSTRACT

İn Turkey, the need for seedlings for the establishment of orchards has been increasing rapidly in recent years. One of the most important inputs of fruit sapling production is rootstock. Thanks to the grafting of the seedlings on the appropriate rootstock, fruit trees become more resistant to soil-borne diseases and pests, and as a result of good root development, they make better use of water and nutrients in the soil. Thus, input costs such as pesticides, fertilizers and water are reduced in fruit production. Rootstocks of fruit seedlings are generally propagated vegetatively with cuttings obtained from plant stems and branches, by immersion method and by tissue culture method in the laboratory. However, it is difficult to propagate and root of some rootstocks by cutting and dipping method. İn addition, these methods do not guarantee healthy rootstock production. Rootstock propagation by tissue culture method in the laboratory has advantages such as not requiring agricultural soil, production not depending on the season, all rootstocks having a certain standard and producing virus-free, disease-free rootstocks. However, there are problems in the cultivation of some stone fruit rootstocks under tissue culture conditions. İn this study, it was aimed to improve the tissue culture production process of rootstocks used for stone fruit seedlings such as cherry (Maxma 14), nectarine (GF 677) and plum (Myrobolan 29-C). For this purpose, combinations of different plant growth regulators (auxin, cytokinin) were used in the media and performance differences were observed between cultivars. İn addition, plants were exposed to different light sources (white, red, blue, red-blue) to promote faster root growth. While the micropropagation coefficient of Myrobolan 29-C rootstock is the highest compared to other varieties, the micropropagation coefficient of Maxma 14 rootstock is the lowest. Since shoot growth is the best compared to other varieties, Myrobolan 29-C shoots are used in rooting experiment in different light sources and their performance will be observed. İn the continuation of the study, different protocols will be tried for other varieties. Thus, rootstock micropropagation efficiency will be increased in further processes, the production process will be shortened, and a contribution will be made to the amount of rootstock production needed in Turkey.

Keywords: stonefruit rootstocks, tissue culture, shoot proliferation, rooting induction

THE BIOSTIMULANT EFFECT OF CYSTOSEIRA BARBATA EXTRACTS ON WHEAT GERMINATION

Hande Mutlu Durak [1,], Yağmur Arikan [1] & Bahar Yildiz Kutman [2]*

[1] Department of Biotechnology Gebze Technical University / Gübretaş R&D Center, Turkey
[2] Department of Biotechnology Gebze Techical University, TURKEY
hndemutlu@gmail.com

ABSTRACT

Plant biostimulants, sometimes referred to as agricultural biostimulants, are a diverse classification of substances that can provide positive effects on growth, nutrition, abiotic and biotic stress tolerance of plants. Seaweed extracts are one of the most important classes of biostimulants. These extracts can be applied to seeds by different seed treatment techniques, directly to plants by foliar applications, or to roots by mixing with irrigation water or germination medium. İt is known that seaweed extracts, which have biostimulant effect thanks to their rich bioactive compounds such as osmolytes, secondary metabolites, and plant hormones, have significant positive effects on germination, plant growth and development and formation of root structure. Since these rich ingredients can have different compositions based on the extraction methods, it is critical to find and optimize the most effective extraction method in the development of seaweed-based biostimulants. The very early stages of the life cycle of plants are vital for their development, healthy growth and high yield capacity. Unfortunately, at these early stages, such as seed germination and seedling formation, plants are highly sensitive to environmental conditions. The usage of seaweed-based biostimulants as seed treatment agents is a very important strategy for food security and sustainable agriculture due to their use of safe and renewable resources, low cost, effectiveness and eco- friendly features. İn this study, the potential effects of different seaweed extracts (water, alkali and acid) obtained from *Cystoseira barbata*, a brown algae species collected from Tuzla coast, as a biostimulant agent were evaluated and different concentration (low, medium and high) of seaweed extracts, which were applied directly to perlite medium or used as seed soaking agents, on germination and short-term growth of summer durum wheat (*Triticum durum* cv. Sariçanak-98). These germination experiments were conducted on perlite media under growth chamber conditions. Auxin-like activity, total free aminoacid, total phenolic, total soluble carbohydrate and mineral analyses were reported in the extracts in line with the analyzes performed based on the characterization of the *C. barbata* extracts. The results suggest that seaweed based biostimulants could improve the wheat seedlings performance and positively affect various growth parameters including shoot and shoot length, as well as root morphology system related parameters including root biomass, root length, root surface area and root volume. İn the experiment, where seaweed extracts were applied directly to the perlite medium, more pronounced results were observed when compared to seed soaking applications. Based on the results of this study, the use of seaweed extracts obtained from *C. barbata* as a biostimulant in seed applications in agriculture may contribute to the reduction of economic losses in wheat production, global food security and sustainable agriculture. İt may be possible to transform macroalgae, which is seen as a source of pollution on our beaches, into unique bioeconomy resources, into high

value-added, environmentally friendly, renewable, reliable, promising and sustainable commercial products which may reduce the need for chemical fertilizers.

Keywords: Biostimulant, Cystoseira barbata, Seaweed Extract, Seed Treatment, Wheat, Perlite Experiment, Germination, Sustainable Agriculture

INVESTIGATION OF BIOSTIMULANT EFFECTS OF CYSTOSEIRA BARBATA EXTRACTS ON SOIL GROWN BROCCOLI PLANTS

Yağmur Arikan [1,], Hande Mutlu Durak [1] & Bahar Yildiz Kutman [2]*

[1] Department of Biotechnology Gebze Technical University / Gübretaş R&D Center, Turkey
[2] Department of Biotechnology Gebze Techical University, TURKEY
yagmurarkn@gmail.com

ABSTRACT

Depending on the increase in the population, an increase of 50% in the food production is required. Policies to increase the yield and quality of plants is a necessity. Modern farmers apply excess quantities of agro-chemicals which may have negative effects on agricultural ecology to attain high yield and quality. İt is well known that, regardless of the essential minerals they contain, biostimulants are effective in boosting plant growth and yield, increasing stress tolerance, and product quality when applied at very low concentrations. Seaweed extracts are presently one of the primary biostimulants due to their benefits on promoting plant growth, stress tolerance, and crop quality due to their rich contents in minerals, pigments, polyphenols, plant growth hormones, polysaccharides, amino acids, fatty acids. *Cystoseira barbata*, brown seaweed specie abundant in Turkey has a great potential to have a biostimulant impact on plant development, has not ever been the subject of research to be used as a biostimulant. Brassica vegetables, particularly broccoli which is a high value crop has a variety of mineral nutrients and phytochemicals that promote human health, have drawn a lot of attention. The aim of the research is that the *C. barbata* extracts, which were prepared by using 3 different extraction techniques, have been tested to increase the growth and yield potential of broccoli. *Brassica oleracea* L. cv. Maraton were grown under greenhouse conditions and the treatments consisted of applying the seaweed extracts by irrigation at two different concentrations. After 100 days, the plants were harvested, and plant growth characteristics were evaluated. At the intermediate period of the plants, chlorophyll, flavonoid, and anthocyanin were measured in the leaves of the plants. İn addition, seaweed extracts were subjected to tests for biochemical characterizations (mineral analysis, total free amino acids, total soluble carbohydrate, total phenolic content) of the extracts to better understand the potential effects of biostimulants. İt was observed that flavonoid and anthocyanin that are potentially important in plant stress response were at lower levels and statistically different in some seaweed treated groups compared to the control group. That's why, seaweed treated plants were healthier than control under unexpected adverse conditions. Moreover, in the group treated with low concentration of acid extraction, the dry weight of broccoli heads, the component with the highest economic value, showed increases of up to 55%. İt was also noted that the total dry weight of the plants increased by almost 43% with high concentration of hot water extraction application. Bearing in mind all the above, this work reports the beneficial effects of different extracts of *Cystoseira barbata* applied with different concentrations as a plant biostimulant to broccoli grown in a soil system. İt can be said that biostimulant effects can differ due to different concentrations of potential bioactive components. This study will help to improve sustainable agriculture, global food security, and the reduction of economic losses in broccoli production. Our country's national bioeconomy resources can be transformed into products with value and contribute the economy.

Keywords: Plant Biostimulant, Seaweed Extract, Cystoseira barbata, Broccoli, Soil Treatment, Sustainable Agriculture

SHORT BREEDING CYCLE STUDIES OF SUNFLOWER (*Helianthus annuus* L.) WITH EMBRYO CULTURE

Mehmet Yasin Tulum [1,], Ahu Altinkut Uncuoğlu [2] & Yildiz Aydin [1]*

[1] Department of Bioloqy Marmara University, İstanbul, TURKEY
[2] Department of Genetics and Bioenqineerinq Marmara University, İstanbul, TURKEY

mehmetyasintulum@gmail.com

ABSTRACT

Sunflower (*Helianthus annuus* L.) is the fourth most important vegetable oil source grown in the world after soybean, rapeseed and peanut. The consumption of sunflower seeds in our country is high due to the high oil content and edible oil quality. İn order to increase sunflower agriculture in our country on a large scale, it is necessary to improve their genetic structures in terms of quality characteristics, and to increase their morphological and physiological characters in an efficient way. As a result of classical sunflower breeding studies in field conditions, one generation progress can be achieved in a year and a long time such as 10-15 years is needed by using classical breeding methods to develop a new variety with desired characteristics. For this reason, speed breeding technologies offer an opportunity to shorten the time in breeding studies. With this technique, long-term photoperiod applications and embryo culture technique in order to accelerate plant development, rapid generation progress, thus shortening the breeding period, new varieties appear in a short time. İn this study, embryo culture applications were carried out in order to skip generation for rapid breeding of CMS lines used in hybrid seed production in sunflower. For this purpose, fertile sunflower B lines and CMS lines from the Trakya Agricultural Research İnstitute were harvested at different ages (10-12 days), depending on the time elapsed after pollination, and transferred to the laboratory environment. For embryo isolation and culture of isolated embryos, the shells of the seeds, which were subjected to surface sterilization, were cut and removed. All cultures were kept in a 16-hour light and 8-hour dark photoperiod and in a plant growing room that provided 24±2 0C temperature conditions. Plants developed from embryos, which were cultured and regenerated at a rate of 52%, were also adapted to the soil at a rate of 25% by reaching a sufficient level of development. For the continuation of backcrossing to CMS plants developed from embryo culture in this way, B line plants will be planted in a way that their blooms match and CMS plants will be backcrossed with B line pollen and embryo culture process will be continued, thus it is aimed to shorten the total baseline breeding time.

Keywords: Sunflower, speed breeding, embryo resque, CMS line

INOCULATION OF WHEAT WITH THE ENDOPHYTIC FUNGUS PIRIFORMOSPORA INDICA ENHANCES GROWTH AND CONFERS TOLERANCE TO SALINITY STRESS AND BORON TOXICITY

Özgür Altundaş [1,] & Ümit Bariş Kutman [1]*

[1] İnstitute of Biotechnology Gebze Technical University, Kocaeli, Turkey

ozguraltundas.2@gmail.com

ABSTRACT

Abiotic stress factors threaten global food security by reducing yield and quality in crop production. Considering the increasing population and the changing dietary habits, crop production must be doubled in the next three decades to feed the world. Salinity and boron (B) toxicity are two common abiotic stress factors that tend to co-occur in some regions with semi-arid climates. Wheat is a major cereal crop which is commonly grown in these stress-prone regions. Novel sustainable management strategies are required to ameliorate the destructive effects of these stress factors. The importance of soil microbiota for soil fertility had long been neglected but recent progress in our understanding of beneficial plant-microbe interactions has revealed the great potential of symbiotic microorganisms in sustainable crop production. *Piriformospora indica*, a soil-borne mycorrhiza-like fungus, is a root-colonizing mutualistic symbiont with a broad host range. İnoculation of different crops with *P. indica* was shown to boost yield, alleviate detrimental effects of abiotic stresses and improve soil health. However, to the best of our knowledge, the potential of *P. indica* to increase wheat growth and yield under B toxicity alone or in combination with salinity stress was not investigated before. Here, results of three different consecutive pot experiments which were conducted in a climate-controlled glasshouse are reported. İn the first experiment, the effects of *P. indica* and arbuscular mycorrhizae (AM) on the vegetative growth of wheat were investigated in a factorial design with either low or adequate phosphorus (P) fertilization. Afterwards, in the second experiment, wheat plants were grown to full maturity to reveal the effects of *P. indica* and AM fungi on wheat yield. The last experiment was carried out to illustrate the physiological mechanisms behind the observed beneficial effects of inoculation with *P. indica* on wheat grown under varying salinity stress and B toxicity. Shoot and grain samples were analyzed for their essential and toxic mineral concentrations by İCP-OES. Spectrophotometric assays were conducted to quantify various enzyme activities and oxidative stress parameters. Results of the first and second experiment showed that both co-inoculation and single inoculation with the beneficial fungi promoted plant growth under both low and adequate P supply and promoted grain yield. The yield promotion reached over 40% in the case of co-inoculation with *P. indica* and AM fungi when compared to control. The results of the third experiment demonstrated that inoculation with *P. indica* enhanced plant growth parameters both in the absence and presence of abiotic stress. Colonization of wheat roots with *P. indica* was visualized by staining followed by light microscopy. İnoculation of soil with *P. indica* helped wheat maintain mineral homeostasis under B toxicity and salinity stress. Furthermore, total and specific antioxidant enzymes activities were increased by inoculation and oxidative membrane injury was alleviated.

İt was concluded that inoculation of soil with *P. indica* is a promising and ecofriendly tool to promote wheat growth and yield and co-inoculation with AM fungi may further augment the benefits. By helping plants exclude toxic ions and triggering tolerance mechanisms under combined salinity stress and B toxicity, *P. indica* can reduce yield losses and thus contribute to food security.

Acknowledgement: This project was funded by the TUBİTAK 1001 project 118Z984 with the title "İnvestigation of the application potential and physiological effects of *Piriformospora indica* as a biological agent against boron toxicity in wheat".

Keywords: Piriformospora indica, Salinity Stress, Boron Toxicity, Wheat

LOW CARBON NEIGHBORHOOD MOVEMENTS IN TURKEY: EVALUATION OF DUZCE ARAPCIFTLIGI NEIGHBOURHOOD AGRIURBANISM PRACTISES

Pinar Gültekin

Department of Landscape Architecture Düzce Üniversitesi, Turkey

pinargultekin@duzce.edu.tr

ABSTRACT

The neighborhood where individuals live should provide environments for daily contact with nature, while forming both their physical and social environment. Neighborhoods are a starting point for developing low-carbon ideas and technologies to create a sustainable society. Neighborhood-scale work contributes to the development of green infrastructure such as urban green space, transportation, buildings and water systems. Within the scope of this study, urban agriculture practises in Düzce City were evaluated in the frame of reaching low carbon cities at neighbourhood scale. Agriurbanism can be listed as the applications of the green infrastructure and integrating urban allotment gardens and private urban gardens into public policy as a land management strategy will help to create more sustainable and low carbon cities. Arapçiftliği neighborhood is one of the most accessible settlements in Düzce, where the quality of life is the highest, the square meter of green space per capita is high, and it supports bicycle use. İn the study area soil structure, climatic conditions, land use, agricultural production, product pattern, population rate, built environment, water use, air quality were examined as necessary conditions for agriurbanism in Arapçiftliği. Verbal interviews were conducted with 10 urban agriculture practitioners in their own gardens. Barriers and opportunities were evaluated. Strategies for developing agriurbanism and urban farming practices have been produced for Düzce city wirh the context of low carbon living.

Keywords: Green İnfrastructure, Agriurbanism, Low Carbon, Nature Based Solution,Sustainable Urban Areas.

AN ECOTOXICOLOGICAL EVALUATION OF TRACE ELEMENTS IN THE WATER OF IRRIGATION PONDS LOCATED IN THRACE REGION OF TURKEY

Cem Tokatli

Department of Laboratory Technology Trakya University, TURKEY

cemtokatli@trakya.edu.tr

ABSTRACT

İn this research, boron, selenium and manganese accumulations in water of irrigation ponds located in the Thrace Region of Türkiye were determined and probable non-carcinogenic health risks of these elements via daily human intake were evaluated. Total od 12 irrigation ponds were selected in the region and water samples were collected during the summer (dry) season of 2020. The element levels were measured by using an İCP-MS device and Estimated Daily İntake (EDİ) and Hazard Quotient (HQ) of boron, selenium and manganese were calculated seperately. Boron concentrations were varied from 44.541 – 716.984 ppb; selenium concentrations were varied from 0.307 – 1.266 ppb; and manganese concentrations were varied from 1.621 – 1577.944 ppb. All the calculated HQ values in all the investigated locations in terms of all the investigated age groups were recorded as less than the critical limit of 1.

Keywords: Thrace Region, İrrigation ponds, Boron, Selenium, Manganese, Health risk assessment

CHLORINE AND PHOSPHATE LEVELS IN DRINKING WATER OF IPSALA DISTRICT AN AGRICULTURAL STRESSED REİİON İN TURKEY: A GIS BASED EVALUATION

Cem Tokatli

Department of Laboratory Technology Trakya University, TURKEY

cemtokatli@trakya.edu.tr

ABSTRACT

Anthropogenic applications causing a transformation of the natural phosphorus cycle is considered as one of the most fundamental environmental issues. The aim of this research was to determine the chlorine and phosphate accumulations in drinking water of İpsla District located in the Meriç Plain in the west of Thrace Region of Türkiye. Tap – drinking water samples were taken during the winter season of 2021 from 23 selected locations including İpsala District and 22 connected villages and the water quality parameters were measured by spectrophotometric method. Chlorine concentrations in drining water samples were varied from 27 – 167 mg/L and phosphate concentrations in drinking water samples were varied from 0.001 – 0.639 mg/L.

Keywords: İpsala District, Drinking water, Chlorine, Phosphate

APPROACH OF AN ANALYSIS OF THE IMPACT OF CLIMATE CHANGE ON AGRICULTURE IN ALGERIA

Belkhodja Moulay [1,] & Aissat Amina [1]*

[1] Department of Biology University of Oran, ALGERIA

moulay2009@yahoo.fr

ABSTRACT

In Algeria, high temperatures, insufficient rainfall, water loss by evaporation of soil, lead to the soil salinization, factor of biotope degradation, loss of plant biodiversity and reduction of agricultural area.Ecophysiological approach is among the strategy to rehabilitate these areas to safeguard the agricultural sector through the search for plant species adapted to abiotic constraints and high socio-economic value such as the halophytic species. The objective of this study is an analysis of the behavior of two halophytic species, *Atriplex halimus* L. (***A.h***.) and *Atriplex canescens* P.N. (***A.c***.) irrigated with 30% of field capacity (**f.c**.) and exposed to 600 and 900 mM NaCl. Relative Water Content (**RWC**), Relative Water Loss (**RWL**), Water Saturation Deficit (**W.S.D**), biochemical parameter such as proline, indicator of stress, relative salt sensitivity index (**RSSİ**) are used to assess the responses of two atriplex species to these abiotic constraints. Results indicate that water deficit at 30% of **f.c.** alone (control) or combined with NaCl affecting negatively on leaves and roots biomass ratio calculated from fresh and dry weights of each organ of each specy. For ***A.h***., leaf ratios evolve with values that are substantially similar under 600 NaCl compared to control with all the same a maximum ratio recorded under 600 mM NaCl (5.17); for roots, the calculated maximum ratio represents a value twice as high compared to leaves (11.96 against 5.17) under 600 mM NaCl. For ***A.c***., ratios under all treatment vary with very similar values for both leaves and roots with a maximum ratio about twice as high for control roots as for leaves (8.84 against 4.35). Foliar RWC of ***A.h.*** of plants irrigated at 30% of **f.c**. varies by increasing with NaCl concentration of medium, so that highest RWC rate is observed in leaves of plants submitted to 900 mM NaCl (94.36 against 86.13% for control). On the contrary, the rate of RWC of ***A.c***.leaves plants drops significantly under 600 and 900 mM NaCl compared to control (89.26% and 71.59% against 96.83%). RWL of ***A.h***. plants at 30,60 and 120 min drops significantly under 600 mM NaCl; RWL varies from control, 4.69 mg of water lost.cm-2.mn-1 at 30 min to 1.86 mg.cm-2.min-1 in leaves of plants under 600 mM NaCl after 120 min of transpiration. Under 900 mM NaCl, water losses become greater during 30 min (6.17 mg.cm-2.min-1). Leaf water losses of ***A.c***. strongly intensifies during 30 min when salinity increases up to a maximum (0.53 mg-1.cm-2.min) under 900 mM NaCl; this maximum is reached for leaves of plants treated by 600 mM NaCl (0.62 mg.cm-2.min-1) but the water loss is for control plants around 0.64 mg.cm-2.min-1 after 120 min. W.S.D of plants at 30% of **f.c**. increases to its maximum (19.71%) under 600 mM NaCl, then drops rapidly to 5.63% under 900 mM NaCl for ***A.h.*** specy while it's increasing for ***A.c***. up to a level four times higher under 900 mM NaCl than control (12.4% against 2.15%). The R.S.S.İ determined from

fresh and dry biomass of plants at 30% of f.c. distinguishes clearly the level of sensibility of each specy. İnded, RSSİ calculated for ***A.h***. shows values above unity (respectively 1.31 and 1.15 under 600 and 900 mM NaCl) while it's well below unity, i.e. 0.32 and 0.92 under 600 and 900 mM NaCl.for ***A.c.*** Proline amount of ***A.h***. and ***A.c***.in leaves and roots of all plants increased with NaCl concentration. Leaves of plants stressed with 900 mM NaCl accumulate proline up to a maximum, 2.17 for ***Ah*** and 0.87 mg.g-1 DW for ***A.c***. İn roots, proline increases slowly with significantly lower levels than leaves regardless of the treatment of the two species.

Keywords: Agriculture, Salinity, RWC RWL, WSD , RSSİ, Proline, Atriplex species

COMPARATIVE STUDY OF THE BASELINE BLOOD BIOCHEMICAL PARAMETERS IN CAPTIVE BEARDED, GRIFFON, CINEREOUS AND EGYPTIAN VULTURES

Rusko Petrov [1], Dobry Yarkov [2], Tzvetan Chaprazov [3], Yana Andonova [4,] & Stefka Dimitrova [4]*

[1] Department of General Animal Husbandry Trakia University, BULGARIA
[2] Department of Animal Science Trakia University, BULGARIA
[3] Department of Veterinary Surgery Trakia University, BULGARIA
[4] Ngo Green Balkans, Bulgaria

yandonova@greenbalkans.org

ABSTRACT

Through their feeding habits, vultures play a very important role in the ecosystem's balance, and they prevent the spread of pathogens. Plasma levels and certain metabolics can provide very valuable information for evaluation of the physical wellbeing and adaptation of the species towards aviary living. Some biochemical markers can prove to be very important in understanding and interpreting behaviour changes in wild birds that live in captivity. Their feeing cycles and body condition determine the urea levels, PH of the urine, the total protein level, cholesterol and glucose levels, which can be used to optimise the feeding of the birds in conditions with limited space and movement opportunities. Knowledge of the baseline values of serum biochemical parameters is of paramount importance for the care and rehabilitation and release of endangered birds of prey. İn the last two years we received blood samples and analysed the values of: total protein, ASAT, ALAT, glucose, cholesterol, triglycerides, fibrinogen, calcium, phosphorus, magnesium, urea, creatinine, creatin kinase, alkane phosphatase, amylase and lipase in captive bearded, griffon, cinereous and Egyptian vultures in Bulgaria. There were 103 blood samples in total. They were divided in four groups as follows:

- Blood samples of bearded vultures – 7
- Blood samples of griffon vultures – 50
- Blood samples of cinereous vultures – 40
- Blood samples of Egyptian vultures – 21

Although several studies have been made and published over the past years in the regard of normal indexes of the hematology and blood chemistry of different wild bird of prey species there are significant differences between species, and in the values of wild and captive vultures. The goal of this research is to determine the baseline blood biochemical indexes for aviary bearded, griffon, cinereous and Egyptian vultures in Bulgaria, to serve in determining clinical pathology and nutrition.

Keywords: vultures, biochemical indexes, bearded vultures, griffon vultures, cinereous vultures, Egyptian vultures

OVERVIEW OF DIFFERENT TYPES OF ARTIFICIAL NEST BOXES USING BY LESSSER KESTREL IN EUROPE

Stilyana Yaneva [1,], Gradimir Gradev [2], Sara Tounti [3] & Tatyana Bileva [4]*

[1] Agroecology&Environmental Protection Agricultural University of Plovdiv, BULGARIA
[2] N/A `Green Balkans - Stara Zagora` Ngos, Bulgaria
[3] N/A Universitat Politecnica De Valensia, Bulgaria
[4] Agroecology&Environmental Protection Agricultural University, Bulgaria

stilqna.qneva91@gmail.com

ABSTRACT

Lesser Kestrel (*Falco naumanni*, Fleischer, 1818) is a small species of falcon, one of the smallest falcons found in Europe. İn Europe, declines equivalent to 46% in each decade since 1950 have occurred and on the wintering grounds in South Africa, there have been declines equivalent to 25% in each decade since 1971. İn the breeding range, problems include demolition of older buildings where the birds nested, loss of habitat through afforestation, intensification of agriculture, and urbanization, pesticide poisoning, human persecution, and interspecific competition. The most serious problem today is the critically low number of populations and isolation, which do not allow the species to recover naturally. Due to the drastic reduction of natural habitats, the placement of artificial nest boxes provides reliable nesting sites with a low risk of predation. The research show that the use artificial nest boxes of Lesser Kestrel is common practice in Europe. Countries like Bulgaria, Greece, İtaly, Spain, Portugal and etc. use them for recovery as a breeding species and strengthening existing colonies. The artificial nest boxes are constructed by different materials made to be strong, reliable and to protect birds, eggs and young chicks. The surveys also, conducted that have different types of artificial nest boxes used for Lesser Kestrel. Some of them are classical wall nest box, cavity wall nest box, under-roof nest box, classical nest boxes directly on the floor and etc. which are specially designed for the Lesser Kestrel and ecology of the species. Modern architecture considers providing suitable nesting places for important species like Lesser Kestrel. All studies show that Lesser Kestrel adapts extremely successfully to artificial nest boxes and this is a major way to conserve the species as well as increase its numbers.

Keywords: Conservation, Falco naumanni, Rare Birds, Recovery

ECOSYSTEM SERVICES PROVIDED BY FARMLAND BIRDS - CASE OF LESSER KESTREL IN SPA SAKAR, BULGARIA

Gradimir Gradev [1], Stilyana Yaneva [2,] & Tatyana Bileva [3]*

[1] N/A `Green Balkans - Stara Zagora` Ngos, Bulgaria
[2] Agroecology&Environmental Protection Agricultural University of Plovdiv, BULGARIA
[3] Agroecology&Environmental Protection Agricultural University, Bulgaria

stilqna.qneva91@gmail.com

ABSTRACT

Lesser Kestrel (*Falco naumanni*, Fleischer, 1818) is strongly attached to agro-environmental landscapes, showing high preferences towards extensively managed wheat crops and extensively grazed or otherwise maintained pastures. The colonies of species are often nesting in urban areas, are usually surrounded by agricultural fields or open uncultivated grasslands, securing food sources. This defines the species as a typical representative of farm land birds, whose main foraging and breeding habitats in Bulgaria fall into two main types of ecosystems - Agroecosystems and Grassland ecosysytems, and its breeding habitats cover Urban ecosystems. The aim of the present study is to evaluate the potential ecosystems services related to Lesser Kestrel after recovering the species as a breeder in Bulgaria by Green Balkans NGOs. İnvestigations based on the MAES Ecosystem type, were carried out in the largest colony of the species in the country at the moment, located on the territory of SPA "Sakar", part of the ecological network NATURA 2000. As a result, two main categories of ecosystems services provided by Lesser Kestrel have been identified - Regulating ecosystem services (suppressing arthropods, reptiles and rodents) and cultural ecosystem services (ecotourism, environmental education, birdwatching, conservation of natural resources, etc.).

Acknowledgements: These results were achieved through "LİFE for Lesser Kestrel" LİFE19 NAT/BG/001017 project funded by the LİFE program of the European Union.

Keywords: Agroecosystems, Falco naumanni, Grassland, NATURA 2000

EFFECT OF MANAGEMENT PRACTICES ON SOIL MICROARTHROPODS IN CONVENTIONAL ORCHARD IN PLOVDIV REGION

Tatyana Bileva [1], Ekaterina Valcheva [2,], Rada Popova [3], Galya Dobrevska [4], Manol Dallev [5] & Slaveya Petrova [6]*

[1] Agroecology & Environmental Protection 1Agricultural University, BULGARIA
[2] Agroecology and Environmental Protection Agricultural University of Plovdiv, BULGARIA
[3] Soil Science and Agrochemistry Agricultural University, BULGARIA
[4] Viticulture & Fruit Growing Agricultural University, BULGARIA
[5] Agrocultural Machinery Agricultural University, BULGARIA
[6] Ecology & Environmental Plovdiv University, BULGARIA

valchevakatia@gmail.com

ABSTRACT

Different management of apple orchards agrosystems affects microarthropods. İn conventional orchard usually are used synthetic fertilizers, insecticides and herbicides which influenced negatively on soil fauna. A field study was conducted to examine the influence of agricultural practices on soil microfauna. The study was carried out on conventional managed apple orchard at Experimental field of Department of Viticulture & Fruit Growing - Agricultural University of Plovdiv for spring 2022 in three plots with 5 variants. Comprehensive information by monitoring of various agrometeorological factors and agro-technological practices (tillage, mowing, irrigation, pest management and soil analysis) was obtained. Comparing the frequency of species in the different plots, it was found that only two (Collembola and Acari) of all identified taxa were present in the five variants. The most numerous and with the highest frequency of encounter in the five experimental variants are the representatives of Collembola, which were 57-65% of all identified geobionts. Based on the results obtained, it is reported that the highest similarity of soil communities is between sward-drip irrigation and sward- sprinkler irrigation (42.9%).

Keywords: apple orchard, soil biodiversity, conventinal farming

CULTURAL ECOSYSTEM SERVICES AS KEY ELEMENT IN HUMAN WELL-BEING IN STANDJA NATURE PARK, BULGARIA

Ekaterina Valcheva [1,], Tatyana Bileva [2], Gradimir Gradev [3] & Stilyana Yaneva [4]*

[1] Agroecology and Environmental Protection Agricultural University of Plovdiv, BULGARIA
[2] Agroecology & Environmental Protection Agricultural University, BULGARIA
[3] N/A `Green Balkans - Stara Zagora` Ngos, BULGARIA
[4] Agroecology&Environmental Protection Agricultural University of Plovdiv, BULGARIA

valchevakatia@gmail.com

ABSTRACT

The future sustainability of society in global level depend on the ecosystem services provided by natural ecosystems. Protecting natural, unmodified ecosystems helps to increase the diversity of life and resilience to the adverse effects of climate change, which in turn sustains and restores services. Nature and human well-being are interrelated. Each ecosystem provides many services. Human relationships with the environment and the importance they have are in accordance with the definition of cultural ecosystem services and well-being. Despite there are different systems for classifying ecosystem services (ESS), cultural ecosystem services (CES) are defined as "... the intangible benefits of ecosystems (aesthetic pleasure, recreation and tourism, inspiration for culture, art and spiritual experience) "(Millennium Ecosystem Assessment, 2005). Although the growing interest in the study and evaluation of ESS is not yet clearly defined and there are few attempts to evaluate it. The difficulty comes from the fact that it has to be assessed non-material benefits, with material means. The territory of the Park is large and the ecosystem services are very diverse. The aim of the current study is to review the cultural ecosystem services in the Strandja Nature Park, which are in the preservation of the culture of traditions and local communities. Based on a review of the literature - scientific journals, publications of Bulgarian and foreign authors, on-line (electronic) editions, as well as author's research in Strandja Nature Park, the following domains of well-being of CES can be identified: Heritage, Existence and Spirituality, Sense of Place and İdentity, Knowledge /Education/ and Biodiversity. Regardless of material ecosystem services are most recognizable by local communities (mushrooms, herbs, wood etc.) cultural ecosystem services are essence of overall well-being. The promotion of cultural ecosystem services in Strandja Nature Park play key role for the conservation and sustainable use of natural resources. İn addition rural development is supported.

Keywords: ecosystem services, biodiversity, Nature, Strandja

RECOVERY OF THORIUM FROM PURIFICATION PROCESS OF RARE EARTH ELEMENTS

İbrahim Hakan Demirelli [1], Gokhan Onder Erguven [2,], Numan Yildirim [3] & Gozde Erguven [4]*

[1] Department of Environmental Engineering Munzur University, TURKEY
[2] Urbanization and Environmental İssues Munzur University, TURKEY
[3] Plant and Animal Production Munzur University, TURKEY
[4] Environmental Engineering Munzur University, TURKEY

gokhanondererguven@gmail.com

ABSTRACT

Rare earth elements (REE) will be able to bring today's world where we live to high technology, everything that may be possible is going through the miniaturization of electronics. Rare-earth (RE) industries generate a large amount of radioactive residue containing thorium concentrations at a high rate. Due to the fact that thorium is considered a non-economic element, large volume of these RE processed residues are commonly disposed of without any recovery methods. İt is very important to study an appropriate recovery method that could reduce the volume of waste materials for final disposition. İt will be able to cause technological developments that can change our world, including defense systems and telecommunications, from green energy to the pharmaceutical industry. Thorium that is a mamber of rare earth elements is electrochemical, optical, magnetic, nuclear, alloying, luminescent, catalytic, etc. due to their use in their processes, they are becoming increasingly important resources. Thorium elements are extremely important due to their use in components or equipment of many state-of-the-art products such as electric vehicles, green energy production, electronic devices and high-performance aircraft. There are no alternative materials that can replace these kind of elements yet. Radioactive elements of uranium and thorium are usually associated with rare earth deposits. The separation of thorium from rare earths is often a big concern in rare earth industry in order to reasonably manage the radioactive nuclides. İt is not the main raw material of the products it is used for, but it is usually added as an additive in certain proportions and allows these materials to gain superior properties. This paper reviews the technologies used for separating thorium from rare earths in rare earth production.

Keywords: Rare earth elements, radioactive residue, Thorium, green energy production

WATER SUPPLY AND SEWAGE SYSTEMS FROM ANCIENT AGES TO THE PRESENT

Yunus Emre Aksakal [1], Gokhan Onder Erguven [2,] & Numan Yildirim [3]*

[1] Department of Environmental Engineering Munzur University, TURKEY
[2] Urbanization and Environmental İssues Munzur University, TURKEY
[3] Plant and Animal Production Munzur University, TURKEY

gokhanondererguven@gmail.com

ABSTRACT

To provide water for livings for cleaning, drinking and agriculture purposes, water supply, wastewater removal and irrigation systems have been established from past to present, and some of the infrastructures of these systems still exist today. İn the past, drinking water supply and sewage systems were built to remove wastewater from living quarters and meet the need for water supply. When a city, castle or a strategically important region was occupied or a new administration was formed, one of the first activities was to build water channels and bring water distribution systems to the public. Conversely, if a region is to be occupied, first of all, food and water resources have become the target. This situation has also become a war strategy as well as an important service of leaders to the public. İn this study, from ancient times to the present day, drinking water, wastewater, and irrigation systems, which are activities aimed at increasing the permanence of empires and thrones in both eastern and western civilizations, as well as a service to the public, were examined with many photographs and drawings of those periods. The similarities of these systems, traces of which can still be found today, with the systems built today were compared.

Keywords: wastewater, sewage systems, water channels, irrigation systems

EVALUATION OF THE DAILY VARIATION OF AERODYNAMIC RESISTANCE OF GRASS IN LOW-TECH MEDITERRANEAN-TYPE GREENHOUSES

Cihan Karaca

Greenhouse Production Program Kumluca Vocational School, Akdeniz University, TURKEY

cihankaraca@akdeniz.edu.tr

ABSTRACT

Aerodynamic resistance (ra) is one of the parameters required to estimate the reference evapotranspiration (ETo) with the Penman-Monteith equation. Various models were developed to determine ra in field conditions depending on wind speed. Since the wind speed is very low in low-technology greenhouses, the ra values calculated with these models cause an incorrect estimation of ETo. This study, it was aimed to determine the changes in daily ra values of the grass in low-tech Mediterranean-type greenhouses. For this purpose, first, the ET value of the grass was determined by weight type lysimeter, and then the ra values were calculated by taking the inverse of the Penman-Monteith equation (İ.P.M). Although there was a moderate relationship between the ET values measured by lysimeter and estimated by the P.M equation (R2=0.60), it was not homogeneously distributed around the 1:1 reference line. The results showed that ra values changed depending on the daily indoor climate. The obtained results showed that the ra values were very strongly dependent on the indoor climate.

Keywords: Referance evapotranspirtation, Penman-Monteith, greenhouse, lysimeter

UTILIZING OF ATRIPLEX HOTENSIS FOR PHYTOREMEDIATION OF METALS-CONTAMINATED SOILS

Salma Kachout

Laboratory of Animal and Forage Production National İnstitute of Agronomic Research, Tunisia
salmasaikachout@gmail.com

ABSTRACT

Contamination by metals from anthropogenic activities has significant consequences on ecosystems and human health. İndeed, these elements, by nature non-biodegradable, have a high ecotoxicity and could be involved in many pathologies. The genus Atriplex is well adapted to extreme environmental conditions and exhibits heavy metal accumulating properties. This study aimed to use a halophytic plant (*Atriplex hortensis*) to remediate a soil polluted with toxic elements. By applying this metallic stress to the *A. hortensis* plant during two months of growth, the morphological analyzes show no reduction in the leaf area of the *Atriplex hortensis* and in the growth, the elongation of the stems and roots, the masses of fresh matter and drying of different plant organs of *Atriplex hortensis* compared to controls grown on sand. The biochemical and physiological analyzes show a slight decrease in the content of foliar chlorophyll pigments (chlorophyll a, b and total) as a function of the increasing concentration of heavy metals in the leaves and roots. The results obtained in our study show that *A. hortensis* can grow in environments heavily polluted by metals such as zinc, lead and cadmium. As a result, the cultivation of this species, often recommended for the phytostabilization of sites polluted by metals, could be established. The results obtained are in favor of the involvement of *Atriplex hortensis* in a phytoremediation project to clean up contaminated soils. Contamination by metals from anthropogenic activities has significant consequences on ecosystems and human health. İndeed, these elements, by nature non-biodegradable, have a high ecotoxicity and could be involved in many pathologies. The genus Atriplex is well adapted to extreme environmental conditions and exhibits heavy metal accumulating properties. This study aimed to use a halophytic plant (*Atriplex hortensis*) to remediate a soil polluted with toxic elements. By applying this metallic stress to the *A. hortensis* plant during two months of growth, the morphological analyzes show no reduction in the leaf area of the *Atriplex hortensis* and in the growth, the elongation of the stems and roots, the masses of fresh matter and drying of different plant organs of *Atriplex hortensis* compared to controls grown on sand. The biochemical and physiological analyzes show a slight decrease in the content of foliar chlorophyll pigments (chlorophyll a, b and total) as a function of the increasing concentration of heavy metals in the leaves and roots. The results obtained in our study show that *A. hortensis* can grow in environments heavily polluted by metals such as zinc, lead and cadmium. As a result, the cultivation of this species, often recommended for the phytostabilization of sites polluted by metals, could be established. The results obtained are in favor of the involvement of *Atriplex hortensis* in a phytoremediation project to clean up contaminated soils.

Keywords: heavy metals, Atriplex hortensis, morphological parameters, physiological parameters.

NATURAL SWIMMING POOLS: DESIGN AND IMPLEMENTATION PRINCIPLES

Aleyna Gün [1] & Tutku Ak [1,]*

[1] Department of Landscape Architecture Çanakkale Onsekiz Mart University, TURKEY

tutkuak@gmail.com

ABSTRACT

While natural (biological) swimming pools have started to become widespread around the world, particularly in European countries, it is a new development that has recently come to attention and practiced in Turkey. For this reason, scientific studies are mostly carried out in USA and Europe, which take into account the climate conditions and vegetation of those regions. The technology used in natural swimming pools is also quite diverse and has been specialized through private firms in practice. The objective of this research is to identify the principles to be considered with the design and implementation of natural swimming pools, based on both scientific research and experience gained from implementation in Turkey. İn this research, in addition to the literature review, face-to-face interviews were conducted with companies that implement natural swimming pools in İstanbul. The initial results of the research presented here can both guide local practices and contribute to the limited scientific literature in Turkey.

Keywords: aquatic plants, biological filtration, biological swimming pools, substrate layer

PRE-TREATABILITY OF TUNCELI ORGANIZED INDUSTRIAL ZONE WASTEWATERS BY COAGULATION/FLOCCULATION PROCESS

Mehtap Tanyol

Faculty of Economïcs and Admïnistratïve Sciences, Department of Political Scïence and Publïc Admïnistration Munzur Universïty, TURKEY

mtanyol@hotmail.com

ABSTRACT

The Tunceli (Turkey) Organized İndustrial Zone (OİZ) was established in 2013. The distribution of 17 industrial facilities in Tunceli OİZ according to sectors is as textile industry, food industry, plastic industry and furniture manufacturing. İn the present work, the pre-treatability of Tunceli OİZ wastewaters by coagulation and flocculation processes was investigated. For this purpose, iron (İİ) sulfate was used as coagulant and batch experiments were performed with a jar test setup. Response surface methodology (RSM) based on a central composite design (CCD) were applied to optimize the operating variables (i.e. coagulant dosage and pH). The optimal conditions were as follows: 141.37 mg/L of coagulant dosage and an initial pH equal to 4.72. Under these conditions, the removal efficiency of chemical oxygen demand (COD) was 51.44%. The results showed that the coagulation/flocculation process would be a useful process for the pre-treatment of Tunceli OİZ wastewaters.

Keywords: Central composite design, coagulation/flocculation treatment, chemical oxygen demand removal, optimization

RETURN OF THE WOLF (*Canis lupus* L.) TO LJUBINJE - CASE STUDY: STANISTE "DJURDJEVA GLAVA"

Selma Vejzagic

Forest Protection Faculty of Forestry, University of Sarajevo, Bosnia

selma.vejzagic@web.de

ABSTRACT

The wolf (*Canis lupus* L.) has returned to many ancient habitats of the european continent, and the overgrown fields and villages of the south of Bosnia and Herzegovina, the wolf's ancient habitat in the mountains, hills in the Herzegovinian Karst and massive forests of central and continental Bosnia and Herzegovina are once again home to the country's most important predator. After attempts to cut down the wolf population in 1993, after a wolf pack attacked and killed all the horses on a well-known horse farm in the south of Bosnia and Herzegovina, the wolf population fragmented, migrated and became stigmatized. Once, on the way from the town of Stolac, through mountains Hrgud and Radimlja, over the Berkovici, Neveinjsko Polje, Ljubinje, and all the way through villages Zrvnje, Krtinje and Zvjerina, three packs of wolves used to share this large area, and they found their refuge on a hill called Djurdjeva Glava. This research has been carried out since 2017, and the research includes many oral and written data, as well as the results of observation, photography, recording, analysis of feces and tracking of the now stable population of pet wolves, which consists of these individuals. There is great potential for a lone wolf to join this pack, which has proven to be extremely capable of surviving all the challenges of a single life in the extreme surroundings of Ljubinje. The growing dissatisfaction of local farmers, who now have to protect goats, sheep and cows from wolves and jackals, which is in the stage of invasion, will threaten the wolf in the future by setting traps, throwing poison and organizing frequent wolf hunts. The main results of the research indicate the eventual return of the wolf to the Ljubinje region - the location Djudjeva Glava, and the existence of originally four individuals from Ljubinje. The expectation of inheritance is already well justified, because it is expected that with the massive emigration of the population to the cities, the remaining fields in the villages will also grow, and that the population will return to a stable number of 7-8 individuals, which is how many wolves were counted per pack in 1960- years in the village of Gradac. İntegral protection of the wolf in the forest ecosystems of Bosnia and Herzegovina should become an imperative of scientific research in the field of hunting, which is why further research of this population is recommended.

Keywords: Canis lupus L., Herzegovina, Ljubinje, Gradac, integral protection

NATURAL HAZARDS AND POLICIES FOR ECOLOGICAL AGRICULTURE IN BULGARIA

Boian Kuolov [1], Velimira Stoyanova [1,], Bilyana Borisova [2] & Nikolay Rachev [3]*

[1] Department of Geography National İnstitute of Geophysics, Geodesy, and Geography - Bulgarian Academy of Sciences, BULGARIA
[2] Faculty of Geology and Geography Sofia University "St. Kliment Ohridski, BULGARIA
[3] Faculty of Physics Sofia University "St. Kliment Ohridski, BULGARIA

stoyanovavelimira@gmail.com

ABSTRACT

This research analyzes the natural hazards and policies for ecological agriculture in Bulgaria. Landslides, earthquakes, droughts, floods (channel and fast-flowing), storms, and winter meteorological phenomena (snowfall, ice), with proven negative consequences for ecological agriculture. The main challenges facing Bulgaria in the implementation of EU policy and legislation in the field of environment and agriculture are: the EU wants to avoid the risks of environmental degradation and to keep agro-ecological systems sustainable, while at the same time promoting the use of biomass and bioenergy.; EU rural development programs help people and businesses in these areas to address economic, environmental, and social challenges and take advantage of opportunities; EU legislation contains quality requirements for all products in the EU. The quality schemes (PGİ/PDO) of the EU protect products produced traditionally; EU funds for rural development support the sustainable management of forests in EU countries, while at the same time increasing competitiveness and creating jobs; With the system of direct payments within the framework of the CAP, the incomes of agricultural holdings are supported. This is related to compliance with several EU rules, including new greening requirements; EU legislation ensures that 'organic' means the same thing to consumers and producers, and covers the supply chain in the organic farming sector.

Acknowledgements: This work has been carried out in the framework of the National Science Program "Environmental Protection and Reduction of Risks of Adverse Events and Natural Disasters", approved by the Resolution of the Council of Ministers № 577/17.08.2018 and supported by the Ministry of Education and Science (MES) of Bulgaria (Agreement № Д01-279/03.12.2021).

Keywords: Natural Hazards, Risks Reduction, Forestry, Rural areas

SPECTROSCOPIC MONITORING OF THE PHOTOCATALYTIC DEGRADATION OF HUMIC ACID USING BINARY OXIDES

Yeliz Akpinar [1,], Nazli Turkten [2], Dila Kaya [3], Yunus Karatas [2] & Miray Bekbölet [4]*

[1] Department of Chemistry Kirşehir Ahi Evran University, TURKEY
[2] Department of Chemistry Kirsehir Ahi Evran University, TURKEY
[3] Chemistry İstanbul Medeniyet University, TURKEY
[4] İnstute of Enviromental Science Boğaziçi University, TURKEY

yeliz.akpinar@ahievran.edu.tr

ABSTRACT

Natural organic matter (NOM) is a key component in an aqueous environment, consisting mainly of humic acids and fulvic acids. The presence of NOM in water leads to notable problems, mainly by causing disinfection by-product formation in drinking water. Therefore, NOM removal is a primary concern for the availability of safe drinking water.The present work was focused on the investigation of the photocatalytic degradation of humic acid (HA) as a representative compound of NOM. Detailed analysis of the degradation process was conducted using ATR-FTİR and Raman Spectroscopy techniques. The binary oxides with three different mass ratios of ZnO/TiO2(1:1, 1:3, and 3:1) were prepared by a simple solid-state dispersion method and used as the photocatalyst [1]. The structural changes in the functional groups of HA during the photocatalytic process have been monitored by using ATR-FTİR. Proving the results of the study with the fast and inexpensive ATR-FTİR method showed the feasibility of the photocatalytic study. Raman spectroscopy contributed complementary information to the FTİR results. These two characterization methods showed that the photocatalytic process was quite efficient. İn general, slight variations and shifts were observed in the characteristic bands of HA due to the photocatalytic irradiation time and upon binary photocatalyst.

Keywords: Binary oxides, heterogeneous photocatalysis, humic acid, TiO2-ZnO.

CHARACTERISTICS OF MINIMUM TEMPERATURES AND AGRO-CLIMATIC FEATURES OF THE SOUTHWEST AREA OF ALBANIA

Elvin Çomo [1,], Albana Hasimi [1] & Blerina Papajani [2]*

[1] Department of Meteorology İgeo, ALBANIA
[2] Department of Physics Aleksandër Xhuvani University of Elbasan, Albania

elvincomo1@gmail.com

ABSTRACT

Various agro-climatic indicators such as temperature and precipitation are a set of favorable conditions for the growth and development of subtropical crops, while the minimum temperature affects the fulfilment of the requirements of these crops. The variety of physical-geographical conditions of the area affects the irregular distribution of the minimum temperature. As a result, in different points of this area, even in two neighboring countries, significant changes are observed in the annual, monthly and daily absolute temperature values. These changes determine the extent and spread of subtropical cultures within the area.

Keywords: minimum temperatures, crops, agro-climatic indicators

MICRO-SCALE DRINKING WATER FOOTPRINT MAPPING OF BOVINE, OVINE AND POULTRY FARMING IN CANAKKALE, TURKEY USING GIS

Sude Nur Kaya [1], Melis İnalpulat [2,] & Levent Genc [1]*

[1] Urban and Regional Planning Çanakkale Onsekiz Mart University, TURKEY
[2] Agricultural Structures and İrrigation Canakkale Onsekiz Mart University, TURKEY

melisinalpulat@gmail.com

ABSTRACT

Agricultural activities are known to be one of the great water consumptive sectors whereas animal production holds approximately one third of the total agricultural water consumption. İdentification of the annual consumed amount may provide better understanding for foreseen future situations for planners in the local authorities for maintenance of present resources and planning of future water collection units in the perspective of climate change. The main purpose of the study was to determine and map the drinking water footprint of different livestock types including bovine, ovine and poultry at town and village scale in Canakkale Province, Turkey. The inventory data representing the number of animals for each type were obtained from local inventory records of Canakkale Directorate of Provincial Agriculture and Forestry. Water footprints were calculated depending on standard water consumption assumptions accordingly to livestock type. The study presents the first attempt for subscale mapping in the area, and has potential to serve as a basis for further studies.

Keywords: Animal farming, Canakkale, Drinking water footprint, GİS, Micro-scale mapping.

CHEMICAL COMPOSITION AND ANTIOXYDANT ACTIVITY OF CALICOTOME VILLOSA (POIR.) LINK FLOWERS

Samira Fetni

Departement of Pharmacy University of Batna, ALGERIA

s.fetni@univ-batna2.dz

ABSTRACT

İn this work, we were interested in the valorization of a Saharan medicinal plant *Calicotome villosa (Poir.) Link* (Fabaceae) by characterizing it by a phytochemical screening, an evaluation of the antioxidant activity and an identification of certain phenolic compounds by chromatography. The quantitative determination of total flavonoids by the aluminium trichloride method reveals that the butanol and ethyl acetate fractions are the richest with respective contents of (105.36 ± 0.58 µg EC/mg extract) and (88.69 ± 1.06 µg EC/mg extract). The evaluation, in vitro, of the antioxidant activity of the two fractions was carried out by three methods, namely: reduction of phosphomolybdate, reducing power of ferric ion, scavenging of the DPPH- radical. Thus, they present interesting antiradical and antioxidant activities, depending on the flavonoid content. A linear relationship was established; the fractions richest in flavonoids being the most active. The chromatographic identification carried out on this species made it possible to characterise the main phenolic compounds. Two major families of compounds were identified: six phenolic acids (gallic acid, protocatechuic acid, chlorogenic acid, caffeic acid, p-coumaric acid and ferulic acid) and seven flavonoids (catechin, epicatechin, quercetin, quercetin-3-glucoside, apigenin, resveratrol and kaempherol). These major active ingredients have various biological activities and play a recognised role in maintaining good health.

Keywords: Calicotome villosa, Flavonoids, HPLC-UV, antioxydant activity.

BIOLOGICALLY ACTIVE SUBSTANCES AND ANTIOXIDANT POTENTIAL IN WASTES AND DISTILLATION WATERS OBTAINED FROM ROSA DAMASCENA MILL. PETALS GROWN UNDER DIFFERENT AGRICULTURE MANAGEMENT

Nadezhda Petkova [1], Neli Grozeva [2,], Mima Todorova [3] & Mariya Gerdzhikova [3]*

[1] Organic Chemistry and İnorganic Chemistry University of Food Technologies – Plovdiv, Bulgaria
[2] Department of Biology and Aquaculture Trakia University, Faculty of Agriculture, 6000 Stara Zagora, Bulgaria
[3] Department of Crop Production, Faculty of Agriculture Trakia University, 6000 Stara Zagora, Bulgaria

grozevatru@gmail.com

ABSTRACT

The by-products obtained after rose oil production present a perspective source of antioxidant. Therefore, the aim of the current research was to evaluate the content of total polyphenols and antioxidant potential of wastes and distillation waters from *Rosa damascena* Mill. petals. Roses were collected from six private farms (three farms were designated within the conventional farming and the other three are certificated as organic farms) situated in the Kazanlak rose valley, Bulgaria for the period 2020–2021. The content of total phenols, total flavonoids and total monomeric anthocyanins were determined in the rose wastes and distilled waters. Four antioxidant methods were used for the evaluation of wastes and distilled water from Rosa damascena Mill. Petals, as follows: 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2′-azino-bis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS), ferric reducing antioxidant power (FRAP), and cupric reducing antioxidant capacity (CUPRAC) assays. The results demonstrated that the byproducts from two organic rose farms in Skobelevo and Asen villages showed high values of polyphenols and flavonoids. The average content of total phenols (21.43 mg GAE/g) and total flavonoids (4.83 QE/g) in the waste flowers of *R. damascena* was higher compared to their content in the distillation waters (2.68 mg GAE/ml and 0.52 QE/ml). İn general, organic production was found to have higher total phenolics and total flavonoids than conventional, both in wastes flowers and distilled waters. Total average anthocyanins content was 2.71 mg cya-3-glc/ml in the distilled waters, while in the rose waste flowers its value was 0.05 mg cya-3-glc/g. The highest antioxidant potentials were found in waste rose flowers obtained from organic farms in Yasenovo, Asen and Skobelevo by ABTS and CUPRAC methods. The high content of these biologically active substances in waste rose flowers revealed their potential to be used as a cheap source for their extraction and their further use in the pharmaceutical, food and cosmetic industries.

Acknowledgments. This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme “Healthy Foods for a Strong Bio-Economy and Quality of Life

Keywords: wastes, distilled waters, Rosa damascena Mill. petals, polyphenols, antioxidants

INVESTIGATION OF THE BOLA-DOB GENE POLYMORPHISMS IN TURKISH HOLSTEIN

Sertaç Atalay

Central Research Laboratory Namik Kemal University, TURKEY

satalay@nku.edu.tr

ABSTRACT

Selective breeding for economically important traits reduces genetic diversity in animal breeds. Holstein cattle, which dominate global milk production, have been subjected to intense selective breeding. Therefore, Holstein cattle are highly susceptible to pathogens and heat stress. Major histocompatibility complex (MHC) genes are recognized for their important role in immunity against infectious pathogens. Heat stress is closely related to the immune system. Stress reduces the immune system and yields traits of livestock. The MHC gene family is also known as bovine leukocyte antigens (BoLA) in cattle. The BoLA gene family contains many genes with intense genetic variation. MHC, class İİ, DO beta (BoLA-DOB) is expressed in antigen presenting cells such as dendritic cells and macrophages. İt is known that polymorphisms in BoLA Class İİ genes are associated with resistance and susceptibility to infectious diseases. However, BoLA class İİ genes are associated with adaptation to tropical environments and susceptibility to heat stress. Heat stress upregulates the expression of heat shock proteins and downregulates the expression of BoLA genes in cattle. İn this study, 5' UTR and exon 1 regions of the BoLA-DOB gene were analyzed by DNA sequence analysis in Turkish Holstein (n=30). The 416 bp target region was amplified in all samples with the designed primer pair. BoLA-DOB locus was found to be monomorphic in Turkish Holstein. This locus is polymorphic in *Bos indicus* cattle and variations are associated with heat stress tolerance. *Bos indicus* cattle are more resistant to heat stress and tick infections than *Bos taurus*. İnvestigation of BoLA-DOB gene polymorphisms in larger Holstein populations may help find genetic markers for heat stress tolerance.

Keywords: BoLA-DOB, cattle, heat stress, polymorphism

DETERMINATION OF OPTIMUM CONDITIONS FOR BIOSURFACTANT PRODUCTION FROM 2SB ISOLATE AND ITS ANTIBACTERIAL ACTIVITY

Didem Aksu [1,], Selin Sariçayir [2], Pelin Sarikaya [2], Mamadou Malick Diallo [3] & Güven Özdemir [4]*

[1] Central Research Testing and Analysis Laboratory Research and Application Center, Ege University Bornova, İzmir, 35100, Turkey Ege University, Turkey
[2] 2Ege University, Faculty of Science, Dept. of Biology, Basic and İndustrial Microbiology Section, Bornova, İzmir, Turkey. Ege University, Turkey
[3] 3Ege University, Faculty of Science, Dept. of Environmental Sciences. Ege University, Turkey
[4] Ege University, Faculty of Science, Dept. of Biology, Basic and İndustrial Microbiology Section, Bornova, İzmir, Turkey. Ege University, TURKEY

didem.erglu@gmail.com

ABSTRACT

Surfactants are amphipathic molecules that reduce surface tension. İn recent years, biosurfactants produced by microorganisms instead of chemically produced surfactants have become more attractive in studies aimed at preventing environmental pollution. Biosurfactants, which have a wide range of uses in many fields such as pharmaceutical, cosmetics, food industry; İt is produced by different microorganisms. İn our study, İn our study, A bacterium called isolate 2sb was isolated from oil-contaminated soils at a car workplace (38·27'N, 27·15'E) in Bornova, İzmir Turkey. Characterization of the 2sb by 16S rRNA showed their homology in the phylogenetic tree in which *Chryseobacterium* sp. The biosurfactant producing ability of the 2sb was investigated by emulsification index, The culture flasks were shaken for seven days at 150 rpm and 30°C. Different parameters such as different carbon and nitrogen sources, pH, temperature were studied and optimum conditions for bacteria biosurfactant production were investigated. İn addition, the antibacterial activity of the biosurfactant was determined. At the end of the study, the highest biosurfactant production occurred in the medium containing 9% peptone and 2% glycerol. The pH was determined as 7 -7.5 temperature 30 degrees.

Keywords: Biosurfactants, Chsryseobacterium sp., oil-contaminated soil, antibacterial activity

IMPACT OF ZINC NANOPARTICLES ON BIOCHEMICAL, NUTRITIONAL AND FATTY ACID COMPOSITION OF *Brassica napus*

Dr Sohail [1] & Zia-Ur-Rehman Mashwani [2,]*

[1] İnstitute For Biology/Plant Physiology, Humboldt University Zu Berlin, Germany
[2] Department of Botany Pmas Arid Agriculture University, Rawalpindi

zia.botany@gmail.com

ABSTRACT

Nanomaterials practice in agriculture is the need of time and might help to overcome food security threats. Rapseed (*Brassica napus*) is considered to be the third most important crop for edible oil, having double low unsaturated fatty acids. Plant-mediated synthesis of zinc nanoparticles (ZnNPs) was carried out followed by characterization through UV Vis, SEM, TEM, EDX and XRD. NPs were ranged from 30-70 nm in size exhibiting irregular shape. EDX analysis confirmed 96.08% of Zn in the sample. Biochemical characterization showed a substantial change on exposure to ZnNPs, and constant increased was observed in the antioxidant enzymes (SOD, POD and CAT). Oil and moisture content dropped significantly from control level in the *B. napus* varieties. However, different trends have been noted in nutritional (Zn, Na+, K+) and fatty acid profiling of *B. napus*. This study demonstrates ZnNPs potential to improve the biochemical, nutritional and fatty acid profile of *B. napus.*

Keywords: Zinc, Nanoparticles, Brassica napus, fatty acid, canola

THE EFFECTS OF EXOGENOUS GLUTAMINE APPLICATION ON SOME GERMINATION PARAMETERS OF DIFFERENT CARROT CULTIVARS GROWN IN SALINITY CONDITIONS

Hatice Üstüner [1,], Kamile Ulukapi [2] & Ayşe Gul Nasircilar [3]*

[1] Department of Bioloqy Antalya Science and Art Center, TURKEY
[2] Bitki ve Hayvan Hayvansal Üretim Bölümü Akdeniz University, TURKEY
[3] Department of Mathematics and Science Education Akdeniz University, TURKEY

h.ustuner1977@gmail.com

ABSTRACT

Carrot (*Daucus carota*), which can be orange, yellow, purple, white and red in color due to the difference in the pigments it contains, is a very rich food in terms of carotene and ascorbic acid. İn this study, the effects of exogenous Glutamine (Gln) pre-treatments (1, 2, 3, 4 mM) on some germination parameters of carrot seeds (orange, yellow, purple), which are known to be sensitive to salt stress according to the cultivar, were investigated under salt stress conditions (150 mM NaCl). For this purpose, germination percentage (GP), mean germination time (MGT), germination rate coefficient (CVG), germination rate index (GRİ), germination index (Gİ), which are some of the important germination parameters, were determined. According to the results of analysis of variance, it was determined that there was an interaction between cultivars and applications and all germination parameters under salt stress conditions (***$p<0.001$). The effect of Gln pre-treatments on germination under salt stress and unstressed conditions differed according to the application dose and cultivar. Glutamine application under salt stress had no effect on germination except for the orange carrot cv. İn this cultivar, 1 mM pre-treatment had a positive effect on germination parameters under salt stress conditions. İn unstressed conditions, although 3 mM Gln pretreatment in orange carrot cv. and 4 mM Gln in yellow carrot cv. had a positive effect on germination parameters compared to control, the highest germination in purple carrot cv. was obtained in control seeds.

Keywords: Carrot, Germination, Glutamine

EVALUATION OF THE EFFECTIVENESS OF SILICON DIOXIDE ON SOME GERMINATION AND VEGETATIVE GROWTH PARAMETERS OF RADISH CULTIVARS IN SALINE CONDITIONS

Kamile Ulukapi [1], Ayşe Gul Nasircilar [2] & Hatice Üstüner [3,]*

[1] Bitki ve Hayvan Hayvansal Üretim Bölümü Akdeniz University, TURKEY
[2] Department of Mathematics and Science Education Akdeniz University, TURKEY
[3] Department of Bioloqy Antalya Science and Art Center, TURKEY

h.ustuner1977@gmail.com

ABSTRACT

The salt tolerance level of the radish (*Raphanus sativus* L.), which has a rich nutritional content, varies depending on the cultivar (cv). İn this study, which was carried out using two radish cv. (big red, little red), it was aimed to determine the effect of exogenous silicon dioxide (0.5, 1, 1.5, 2 mM SiO2) applications on germination and vegetative growth parameters under salt stress conditions (150 mM NaCl). After determining the germination percentage (GP), germination index (Gİ), germination rate coefficient (CVG), mean germination time (MGT) and germination rate index (GRİ) for germinating seeds, shoot and root length (mm), leaf width and length (mm), root and shoot fresh weights (g) were measured and seedling vigour index (SVİ) was calculated. Silicon dioxide applications had a positive effects on germination parameters in both cultivars under both non-stress and salt stress conditions. While 1.5 mM SiO2 application caused an increase in germination rate in little red cultivar, it was determined that 1 mM application was more effective under salt stress conditions and increased the germination rate by 2 times (from 24% to 48%). İn the big red cv., 2 mM SiO2 application had a positive effect on germination parameters both in salinty and unsalinity conditions. Exogenous SiO2 pre-treatment had also the positive effects on vegetative growth in both cultivars under stressed and unstressed conditions. According to the results of variance analysis, interaction was determined (***$p<0.001$) between cultivars and applications and all other parameters except root fresh weight. 1.5 mM application dose significantly increased all vegetative growth parameters in little red cultivar under non-stress and salt stress conditions. İn the big red cv., a similar effects were obtained as a result of 1 mM SiO2 application.

Keywords: Germination, Raphanus sativus, Salt Stress, Silicon Dioxide

THE EFFECTS OF EXOGENOUS SILICON DIOXIDE TREATMENT ON SOME GERMINATION AND VEGETATIVE GROWTH PARAMETERS OF ROCKET CULTIVARS UNDER SALT STRESS CONDITIONS

Ayşe Gul Nasircilar [1,] & Kamile Ulukapi [2]*

[1] Department of Mathematics and Science Education Akdeniz University, TURKEY
[2] Bitki ve Hayvan Hayvansal Üretim Bölümü Akdeniz University, TURKEY

nasircilar@akdeniz.edu.tr

ABSTRACT

Rocket (*Eruca vesicaria*), a plant from the cruciferous (*Brassicaceae)* family, whose leaves are eaten as a salad, is also considered a medicinal plant due to its different therapeutic properties. İn this study, the effects of exogenous silicon dioxide (0.5, 1, 1.5 mM SiO2) applications on the germination and vegetative growth properties of two different rocket cultivars (Geniş Yaprak, Eda) were investigated under increased salt stress conditions (150, 200 mM NaCl). For this purpose, germination percentage (GP), germination index (Gİ), germination rate coefficient (CVG), mean germination time (MGT) germination rate index (GRİ) were calculated as germination parameters. Shoot and root length (mm), leaf width and length (mm), plant fresh weight (g) were measured in seedlings developed from germinated seeds, and seedling vigour index (SVİ) was calculated. The effects of SiO2 applications on germination and vegetative growth differed according to the cultivar. İn Geniş Yaprak cv., 1 mM SiO2 application had a positive effect on germination percentage both in seeds not applied salt stress and under 150 mM salt stress, and increased the germination rate from 30% to 73%, especially in salty conditions. Under 200 mM salt stress, 1.5 mM SiO2 had a positive effect on germination percentage in the same cultivar. Although SiO2 applications in Eda cv. were not effective on germination parameters under stress-free conditions, they had a positive effect on vegetative parameters. Especially, 1.5 mM application dose increased SVİ, root and shoot length and plant fresh weight. İn both salt concentrations, 1 mM application dose made a slight improvement in germination parameters of Eda cv. The positive effects of SiO2 applications on vegetative growth parameters such as leaves, roots and shoots were determined at different doses for both salt concentrations.

Keywords: Germination, Rocket, Salt Stress, Silicon Dioxide

INVESTIGATING THE ROLE OF CYANAMIDE IN SEEDS GERMINATION, PLANT GROWTH AND DEVELOPMENT

Saima Hashim

Department of Weed Science The University of Peshawar, Pakistan

saimahashim@aup.edu.pk

ABSTRACT

Cyanamide is an organic compound being used for multiple purposes like breaking bud dormancy, as fertilizer, pesticide, nematocide and herbicide. The current study was conducted to determine the effect of cyanamide on seeds germination, plant growth and development. Three different plant species like Brassica rapa (Field Mustard), Oryza sativa (Rice) and Lactuca sativa (Lettuce) were exposed to different concentrations (1 µM, 10 µM and 50 µM) of cyanamide and after 10 days of treatment data was recorded for root length, shoot length and percent seeds germination. İn comparison to control, almost all plants were affected positively except for lactuca sativa where the plants were affected negatively. At 50 µM the mean root length of Oryza sativa observed was 1.77 cm as compared to the control which was 0.4 cm while the shoot length increased from 1.55 to 3.93 cm at 10 µM. The percent seeds germination also increased from 67.50 to 88.33% at this concentration. İn case of Lactuca sativa there was a significant reduction in root length accompanied by a decrease in shoot length and percent seeds germination. At 50 µM root length and shoot length was reduced from 3.70 to 1.67 cm and 1.38 to 0.48 cm, respectively however, there was a significant increase in root length, shoot length and percent seeds germination at 10 µM. Similarly, in case of Brassica rapa there was a significant increase in root length, shoot length and percent seeds germination where the recorded increase in these parameters were from 3.04 to 8.75cm, 2.15 to 2.54cm and 29.33 to 79.33%, respectively. Moreover, from the microarray analysis data of cyanamide two genes of Alcohol dehydrogenase and four genes of İnositol phosphate synthase were selected for further molecular characterization and bioinformatics analysis. The putative promoter analysis showed that Brassica rapa ADH and İPS contained a number of cis-acting elements involved in different abiotic stress tolerance. The expression profiling showed that ADHs and İPS were expressed during developmental stages of plants upon application of cyanamide. The above results suggest that cyanamide can be exploited for a number of practical applications in agriculture.

Keywords: Cyanamide, Mechanism, seed germination, plant growth

THE ROLE OF GLUTAMINE AS A REGULATOR OF GENE EXPRESSION UNDER STRESS CONDITION N PLANTS

Ayşe Gul Nasircilar [1,] & Kamile Ulukapi [2]*

[1] Department of Mathematics and Science Education Akdeniz University, TURKEY
[2] Bitki ve Hayvan Hayvansal Üretim Bölümü Akdeniz University, TURKEY

nasircilar@akdeniz.edu.tr

ABSTRACT

Amino acids, which are necessary for the synthesis of proteins and also some other nitrogenous components in organisms, are also effective in the synthesis and activities of some enzymes and gene expression. İt is known that stress tolerance is provided by different mechanisms, especially with the accumulation of some specific amino acids under stress conditions in plants. Although the role of some amino acids such as proline under stress conditions has been demonstrated by many studies, the mission of some other amino acids under stress conditions has not yet been fully elucidated. Like other amino acids in the organisms, glutamine is involved in the synthesis of nitrogenous compounds such as amino acids and nucleotides. The functions of glutamine in plants, which are known to be involved in signal transmission in humans, yeast and bacteria, are not yet fully known. For this reason, studies conducted in recent years have focused on elucidating the role of glutamine in signal transduction pathways under stress conditions. İt has been revealed by transcriptome analyzes that exogenous glutamine applications support growth and development in some plants by inducing the expression of many genes involved in metabolism, transport, signal transduction and stress response. İt has been determined that these genes synthesize transcription factors that avtivate the genes involved nitrogen metabolism or stress response. The induction of these transcription factor genes by glutamine supports the idea that it functions as a signaling molecule regulating gene expression in plants. İn this review, studies investigating the role of glutamine especially under stress conditions were examined, and it was aimed to create a resource for researchers in future studies.

Keywords: Glutamine, Plant, Signal Transduction, Stress

PARTICIPATION OF HYDROGEN PEROXIDE (H2O2) AND NITRIC OXIDE (NO) IN THE DEFENSIVE RESPONSE OF LUPINE TO THE FUNGAL PATHOGEN COLLETOTRICHUM GLOEOSPORIOIDES - THE CAUSATIVE AGENT OF ANTHRACNOSE

Magda Formela-Luboińska

Department of Plant Physiology Poznan University of Life Sciences, POLAND

magda.formela-luboinska@up.poznan.pl

ABSTRACT

İn order to care for the natural environment, meet the nutritional needs of humanity and limit the use of imported soybeans, it is necessary to promote the cultivation of protein crops İn Poland, three species of lupins are of economic importance: narrow-leaved lupine (*L. angustifolius*), yellow lupine (*L. luteus*) and white lupine (*L. albus*). Among the lupins, the narrow-leaved lupine is characterized by the lowest susceptibility to anthracnose in comparison to the other species (yellow and white lupins) and this feature determines its greater acreage. Pathogens, including *Colletotrichum gloeosporioides*, causing anthracnose, are the main reasons for the reduction in the yield of green mass and seeds in lupine cultivation. Selecting an appropriate variety with greater resistance to disease is one of the methods to reduce the risk of infection. The relative generation of endogenous nitric oxide (NO) and hydrogen peroxide (H2O2) in the analyzed material was performed using confocal microscopy. For in vivo detection of NO, the fluorescent dye DAF-2DA (4,5-diaminofluorescein diacetate) was used, and for H2O2-DCFH-DA (2'7'-dichlorofluorescein diacetate). Analysis of the leaf plates of *Lupinus luteus* and *Lupinus angustifolius* as well as the cross sections prepared from the roots of both species showed at 72 and 96 h after infection with *C. gloeosporioides* generally stronger emission of green fluorescence, indicating stronger NO generation in the infected leaves of yellow and narrow-leaved lupine seedlings. However, in the case of roots, no significant differences were noted in the level of NO generation. Moreover, the infection increased the yellow fluorescence for H2O2 in the leaves of seedlings of both tested lupine species, especially at 72 and 96 hours.

Keywords: hydrogen peroxide, nitric oxide, Colletotrichum gloeosporioides, anthracnose

PHYSICOCHEMICAL AND MICROBIOLOGICAL CHARACTERIZATION OF THE WATERS OF SEKKAK DAM (ALGERIA)

Boumerdassi Hanane [1,], Djouadi Lydia Nêila [2] & Nateche Farida [2]*

[1] Ecology and Environment University of Science and Technology-Houari Boumediene, Algiers, Algeria.
[2] Biologie Cellulaire Et Moléculaire University of Science and Technology-Houari Boumediene, Algiers, Algeria.

hboumerdassi@usthb.dz

ABSTRACT

Dams are lake ecosystems that host an important fauna and are used to regulate the flow and store water for flood control, irrigation, industry, hydroelectricity, fish farming and drinking water storage. Therefore, the quality of the waters dams can influence the health of humans and animals that hosts it. The objective of the study is to evaluate the physicochemical and microbiological quality of the waters of an Algerian lake system. The Sekkak dam in the northwest of Algeria was chosen. The water of the dam was sampled seasonally during one year. For each sample, 11 physico-chemical parameters were measured, 3 of which were measured in situ (temperature, pH and oxygen concentration) and 8 in the laboratory (dry residue, nitrates, nitrites, ammonium, phosphates, organic matter, biological oxygen demand, chemical oxygen demand). İn addition, a count of the microbial flora of the aseptically collected water (total flora, total coliforms, fecal coliforms and fecal enterococci) was performed on specific solid culture media after filtration. The results of the physicochemical analyses showed variations in the concentration of the different parameters during the seasons exceed the standards, which qualifies the waters of Sekkak Dam as polluted to highly polluted. The most threatening pollutants are: nitrites (NO_2-), nitrates (NO_3-) and ammonium (NH_4+) and phosphates (PO_4-). The fluctuations of these parameters are mainly related to anthropogenic factors which are industrial and domestic discharges as well as agricultural practices such as uncontrolled use of pesticides and fertilizers. The results of the bacteriological analyses showed variations in the concentration of the different bacterial groups during the seasons and confirm the excessive human activity. High fecal contamination (fecal coliforms and fecal enterococci) is reported. The polluted water is a threat to the fauna of the dam and human healthand requires continuous monitoring.

Keywords: Water, dam, physicochemical quality, microbiological quality, pollution

A GREEN EXTRACTION OF PHENOLIC COMPOUND: A NEW PERSPECTIVE FOR PHYTOTHERAPY

Katia Djenadi [1,], Assia Cherifi [2], Ahmed Boulal [3], Mohamed Malik Mahdjoub [4], Mustapha Bachir Bey [5] & Djamel Edine Kati [6]*

[1] Laboratoire De Biochimie Appliquée, Faculté Des Sciences De La Nature Et De La Vie, Université De Bejaia, 06000 Bejaia, Algeria
[2] Faculty of Biological Sciences and Agricultural Sciences. Mouloud Mammeri University of Tizi-Ouzou. Algeria Laboratory For The Production, Protection and Safeguard of Endangered Species and Crops.
[3] Laboratoire Des Ressources Naturelles Sahariennes. Adrar University, Algeria
[4] Department of Biology Akli Mohand Oulhadj University, Bouira
[5] Laboratoire De Biochimie Appliquée Faculté Des Sciences De La Nature Et De La Vie, Université De Bejaia, 06000 Bejaia, Algeria.
[6] Laboratoire De Biochimie Appliquée, Faculté Des Sciences De La Nature Et De La Vie, Université De Bejaia, 06000 Bejaia, Algeria.

djenadi-katia@hotmail.fr

ABSTRACT

Since the last decade, scientist look for a new alternative to face the multidrug resistant bacteria thread and the emergence of inflammatory and degenerative diseases. Phenolic compound from plant extract are the most molecules investigated for their beneficial properties to human health including; antioxydante and antimicrobial effects. The extraction process protocols of these actives compound such as solvent, time, temperature and plant powder should be optimized to obtain the optimum yield with the maximum concentration of the active compounds. Numerous extraction process have been published to harvest the phenolic compounds from plant material, mostly based on the use of organic solvents such as methanol, ethanol, or acetone. However, green and sustainable approaches to extract phenolic-compound including supercritical fluid, microwaves, ultrasounds as well as of green solvents such as glycerol witnessed for their low environmental impact and important yield of active compounds.

Keywords: Phenolic compound, phytotherapy, green extraction.

ANTIOXIDANT POTENTIAL AND GASTROPROTECTIVE EFFECTS OF AQUEOUS EXTRACT FROM ALGERIAN *Thymelaea hirsuta* L. AREAL PARTS

Ounis Roumaissa

Biology and Animal Physiology Faculty of Nature and Life Sciences, University of Setif , ALGERIA

roumaissa.ounis@univ-setif.dz

ABSTRACT

Thymelaea hirsuta, is a plant belonging to Thymeleaceae family. İt has been used in folk medicine for its biological properties. This research focused primarily on the antiulcer properties of aqueous decoction. extract (ADE) from *Thymelaea hirsuta* areal parts on gastric ulceration induced by ethanol in rats, mucosal damage was compared with that given with ranitidine. Total polyphenol and flavonoid content were evaluated and *in vitro* antioxidant activity of ADE were investigated with ABTS scavenging and reducing power assays. ADE showed a large amount of total polyphenols and a low content of flavonoids with 114.0±1.35 mgGAE/g and 16.80±1.03 mgQE/g DW of extract, respectively. İn addition, ADE showed a high ability to scavenge ABTS radical with İC50 at 52.93±0.9 µg/mL and a high redox potential with a concentration at A0.5 =124.5±1.79 µg/ml. The antiulcer effect of *Thymelaea hirsuta* aqueous decoction extract was evaluated by the 100% ethanol-induced ulcer test. The results obtained revealed that the aqueous decocted extract with 125, 250 and 500 mg/Kg exerted a dose dependent effect of protecting the stomach at 52.35±3.51%, 69.57±2.16 and 83.01±1.92, respectively.

Keywords: antioxidant, antiulcer, Thymelaea hirsuta, polyphenols, flavonoids

THE EFFECTIVENESS OF ULTRASOUND TREATMENT ON THE GERMINATION OF ORIENTAL TOBACCO SEEDS

Marija Srbinoska [1,], Vesna Rafajlovska [2], Valentina Pelivanoska [3], Jana Klopchevska [2] & Vesna Krsteska [4]*

[1] Department of Chemistry of Tobacco, Tobacco Smoke, Residues From Pesticides and Biochemistry Scientific Tobacco İnstitute Prilep, Macedonia
[2] İnstitute of Organic Technology Faculty of Technology and Metallurgy, Ss. Cyril and Methodius University İn Skopje, Macedonia
[3] Agrotechnics of Tobacco Scientific Tobacco İnstitute, Macedonia
[4] Department For Tobacco Protection From Diseases, Pests and Weeds Scienific Tobacco İnstitute Prilep, Macedonia

marija.srbinoska@uklo.edu.mk

ABSTRACT

Seed germination and seedling emergence are the most important and vulnerable phases of a crop cycle. A poor quality of seed has both direct (e.g., the lack of seed germination translates either into the need to re-sowing with further costs) and indirect (e.g., lower competitiveness of seedlings toward weeds and more favorable conditions for the development of diseases) impacts on crop yield. Ultrasound is one of the newest methods for improve germination uniformity and accelerate the rate of germination of different seeds. We have investigated whether ultrasonic waves can be used to increase seed germination and water imbibition of the tobacco seeds. A laboratory experiment was conducted to determine the effect of ultrasound (US) exposure time on germination behavior of six-year seeds from three different tobacco varieties. After characterization of the lot, the processed seeds were stored for six years under ambient conditions at 20 °C ± 2 in aluminium cans. The seeds were treated with ultrasonic energy (30-40 kHz) at constant temperature (25 ºC) and time of exposure ranging from 5 to 15 min. The efficacy of ultrasound on the imbibition of seed was investigated after 24 h of soaking at 20ºC±2 and sonication for 5-, 10- and 15-min. Seed weight was determined gravimetrically as the difference before and after ultrasound treatments. İn the germination test, three replications of 100 seeds were kept in a germination chamber with alternating temperature between 20 and 30 °C, 8 h photoperiod and light intensity of 2,000 lux (İSTA, 2004). The germination results were expressed as percentage of normal seedlings, which are evaluated on the seventh day after sowing in order to obtain the germination energy, and on the fourteenth day for germination. İt was concluded that priming of seeds with ultrasound was effective in improving water uptake. After sonication for 5 minutes, the average weight of the seeds of different varieties increased from 17% to 24%, and after 10 minutes from 31% and 42%, respectively. The 15 min treatment shows the highest degree of imbibition. İt was found that the average germination energy and germination in the seeds of the all tested oriental tobacco varieties increased compared to that of the untreated seeds. Seeds sonicated for 5 min increased in average germination from 20 % to 24 %, and for 10 min from 24 % and 28 %, respectively. The highest seed germination was observed at 15 min of sonication and it was 33% compared to the control. The ANOVA showed significant effects of both ultrasound treatments water on imbibition and germination. Significant correlation ($r=0.83$, $p<0.01$)

between water imbibition and seed germination implies that the ultrasound seed treatments enhanced both water imbibition and germination processes.

Keywords: Tobacco seed, germination, imbibition, ultrasound treatment

MEDICINAL PLANTS IN FOLK TRADITION OF BOSNIA AND HERZEGOVINA

Edina Muratović [1,], Fatima Pustahija [2] & Adisa Parić [3]*

[1] Laboratory For Research and Protection of Endemic Resources Faculty of Natural Sciences and Mathematics University of Sarajevo, BOSNIA
[2] Faculty of Forestry Unicersity of Sarajevo, BOSNIA
[3] Department of Biology Faculty of Natural Sciences and Mathematics, BOSNIA

edina1muratovic@yahoo.com

ABSTRACT

Bosnia and Herzegovina is caracterised by a high diversity of vascular plants, including a significant number of endemic species. However, the traditional plant knowledge and uses of wild medicinal plants remain scarcely investigated. This study represents the first comprehensive ethnobotanical research of the everyday usage of medicinal plant species in folk medicine in Bosnia and Herzegovina. Here we report 125 plant species/taxa used in Bosnian folk medicine, mainly from Rosaceae, Asteraceae, Lamiaceae, and Poaceae families. The aerial part or only leaves, dried and prepared as a tisane, are the most commonly used. The use of such preparations was particularly for various inflammatory processes, including treatments of respiratory, gastrointestinal, and urogenital conditions. The obtained data showed that the folk use of plants is often present in Bosnia and Herzegovina as part of everyday practice.

Keywords: Balkan, ethnobotany, wild medicinal plants

USE OF IMAGEJ IMAGE PROCESSING SOFTWARE IN FUNGAL GROWTH TRACKING

Zemran Mustafa [1,], Fatih Ölmez [2] & Mahinur Akkaya [3]*

[1] Department of Plant Production and Technologies Sivas University of Science and Technology, TURKEY
[2] Department of Plant Protection Sivas University of Science and Technology, TURKEY
[3] School of Bioengineering Dalian University of Technology, CHIAN

zemustafa@hotmail.com

ABSTRACT

Fungi are eukaryotic microorganisms that have important functions in nature. There can be categorized as obligate parasites, facultative parasites and saprophytes. Most of the facultative parasites and saprophytes can be grown in artificial media, under laboratory conditions. Determining the growth dynamics of fungi in artificial media is important for mycological studies. Measuring colony development at certain time points manually using ruler is a common practice. Using this technique in fungal cultures that do not form smooth, circular colonies causes problems in during calculations.İmageJ is an open-source, Java-based image processing program that can calculate area and pixel value statistics for user-defined selections. The program has a user-friendly interface and it can easily distinguish and select the object of interest from its background on any photographic image. After photographing the fungi in the medium, using İmageJ program, the fungal growth data can be obtained much faster and more precisely. With this method, the effects of irregularities in fungal growth on data acquisition can be minimized. İn this study, the use of İmageJ software in the case of the wheat leaf pathogen Zy*moseptoria tritici* is described. Steps such as visualization of fungal growth, selection of the area to be calculated from the images, distance calibration, processing of the obtained images are explained with visuals.

Keywords: Keywords: Fungal growth, İmageJ, İmage processing

EFFECT OF QUERCETIN AND RUTIN ON REDOX STATUS IN HEPATIC MITOCHONDRIA IN WISTAR RATS EXPOSED TO ALUMINIUM

Kessas Khadidja

Department of Bioloqy Oran 1 University, ALGERIA

khadoujakess@gmail.com

ABSTRACT

Aluminum is recognized as a public health problem because of its potential toxic effects on cellular functions. To this end, we are interested in the oxidative stress generated by aluminum in hepatic mitochondria and the ability of quercetin and rutin to restore or not this effect. 15 male wistar rats were divided into 3 groups; the first group served as the intoxicated group which received intraperitoneally a dose of 60mg/ml of AlCl3 3 times a week for 21 days. However, the animals in the second and third group received intraperitoneally a dose of 60mg/kg/ml aluminum chloride, and were treated at the same time by the administration (gavage) of quercetin 15mg/ml and rutin 35mg/ml respectively 3 times a week for a duration of 21 days. The administration of quercetin and rutin treatment in both groups induced a highly significant increase ($p \leq 0,001$) in total protein levels, a significant increase ($p<0.05$) in both antioxidant enzymes (catalase, SOD) as well as GSH levels. Nevertheless, there was a significant decrease ($p<0.05$) in GST activity and TBARS levels,in the two treated groups compared to the intoxicated group. İn conclusion, the results show that the administration of quercetin and rutin confers a protective effect against oxidative alterations and a modification of mitochondrial functions.

Keywords: Aluminium, Quercetin, Rutin, Hepatic mitochondria, total proteins , Cat , SOD , GST, GSH, TBARS

CYTOTOXIC EFFECT OF BETA GLUCAN IN HEPATOCELLULAR CARCINOMA $HEPG_2$ CELLS

Sevcan MAMUR

Gazi University, Life Sciences Application and Research Center, 06830, Ankara, Turkey

smamur@gazi.edu.tr

ABSTRACT

Beta glucan (β-glucan), is very potent immunomodulators with effects on immune, sourced from cereals, fungi and yeasts. Based on the some studies have reported that β-glucans have various bioactivities such as antioxidant, anti-inflammatory, antiviral and antiproliferatif properties. Due to these positive effects on health, beta glucans have been used as a dietary supplement in many countries. The aim of this study, the potential cytotoxic/antiproliferatif effect of β-glucan has been evaluated in human hepatocellular carcinoma $HepG_2$ cells using Mtt and Neutral red uptake (Nru) assays. These assays are widely used popular biomarker detected the cytotoxicity. β-glucans were isolated from the yeast strains *Pichia kudriavzeii* M_{13} and *Kluyveromyces marxianus* M_{59}. $HepG_2$ cells were grown to confluence at 37°C under 5% CO_2 in flasks with Dulbecco's Modified Eagle Serum (DMEM) including 10% fetal bovine serum (FBS), 1 (%) penicillin/streptomycin and 2 mM L-glutamine. Cells were treated with different concentrations of β-glucans (7.5 – 480 µg/mL) at 24 hour treatment period. A negative control (distilled water) was also maintained. As a result, β-glucan obtained from *Pichia kudriavzeii* M_{13} strain did not significant affect on the cell viability using both Mtt and Nru assays. However, β-glucan isolated from *Kluyveromyces marxianus* M_{59} strain was significantly decreased the cell viability at 60-480 µg/mL using Mtt assay. Additionally, the half of inhibitory (IC_{50}) value was determined as 480 µg/mL for 24 hour using Mtt assay. Consequently, it has been determined that β-glucan isolated from *Kluyveromyces marxianus* M_{59} strain has a cytotoxic activity especially at higher concentrations on $HepG_2$ cells.

Acknowledgement: I would like to thank Prof. Dr. Zehra Nur Yüksekdağ for the supply of β-glucans.

Keywords: β-glucan, $HepG_2$ cell, cytotoxicity, Mtt assay, Neutral red uptake assay

PARTICIPATION OF HYDROGEN PEROXIDE (H2O2) AND NITRİC OXIDE (NO) IN THE DEFENSIVE RESPONSE OF LUPINE TO THE FUNGAL PATHOGEN COLLETOTRICHUM GLOEOSPORIOIDES - THE CAUSATIVE AGENT OF ANTHRACNOSE

Magda Formela-Luboińska [1] *& Tamara Chadzinikolau* [1*]

[1] *Department of Plant Physiology Poznan University of Life Sciences, POLAND*

tamarisch2@gmail.com

ABSTRACT

İn order to care for the natural environment, meet the nutritional needs of humanity and limit the use of imported soybeans, it is necessary to promote the cultivation of protein crops İn Poland, three species of lupins are of economic importance: narrow-leaved lupine (*L. angustifolius*), yellow lupine (*L. luteus*) and white lupine (*L. albus*). Among the lupins, the narrow-leaved lupine is characterized by the lowest susceptibility to anthracnose in comparison to the other species (yellow and white lupins) and this feature determines its greater acreage. Pathogens, including *Colletotrichum gloeosporioides*, causing anthracnose, are the main reasons for the reduction in the yield of green mass and seeds in lupine cultivation. Selecting an appropriate variety with greater resistance to disease is one of the methods to reduce the risk of infection. The relative generation of endogenous nitric oxide (NO) and hydrogen peroxide (H2O2) in the analyzed material was performed using confocal microscopy. For in vivo detection of NO, the fluorescent dye DAF-2DA (4,5-diaminofluorescein diacetate) was used, and for H2O2-DCFH-DA (2'7'-dichlorofluorescein diacetate). Analysis of the leaf plates of *Lupinus luteus* and *Lupinus angustifolius* as well as the cross sections prepared from the roots of both species showed at 72 and 96 h after infection with *C. gloeosporioides* generally stronger emission of green fluorescence, indicating stronger NO generation in the infected leaves of yellow and narrow-leaved lupine seedlings. However, in the case of roots, no significant differences were noted in the level of NO generation. Moreover, the infection increased the yellow fluorescence for H2O2 in the leaves of seedlings of both tested lupine species, especially at 72 and 96 hours.

Keywords: lupine, hydrogen peroxide, nitric oxide, Colletotrichum gloeosporioides, anthracnose

THE EFFECTS OF ADDITIONS ORGANIC ACIDS AND SACCHAROSE TO DRINKING WATER BEFORE WITHDRAWAL ON MEAT AND LIVER pH, COLOR VALUES, AND NUMBER OF MICROORGANISMS

Zafer Binbir [1,] & Ergin Öztürk [2]*

[1] Department of Zootechnics Ondokuz Mayis University, Samsun, TURKEY
[2] Department of Animal Production Ondokuz Mayis University, Samsun, TURKEY

zaferbinbir@gmail.com

ABSTRACT

This study aimed to determine the effects of adding organic acids and saccharose to the drinking water of broiler chickens on weight loss, carcass yield, the total number of small intestine coliform bacteria, and meat and liver color during the pre-slaughter feed withdrawal period. Broilers were housed individually and divided into 4 groups before slaughter. Drinking water was provided ad libitum to all groups during the 10-hour feed withdrawal period before slaughter. The experimental groups were 7.5 pH drinking water (control group), 7.5 pH drinking water with 1% saccharose addition, pH 4.0 drinking water (organic acid addition), and pH 4.0 drinking water with 1% saccharose addition. Organic acids used a mixture of formic acid and citric acid, while granulated sugar was used as a source of saccharose. The measurement was carried out at the time of slaughter and 24 hours after slaughter. The addition of organic acids and saccharose to the drinking water increased the breast meat b*, thigh meat L*,and b* values and decreased the pH of thigh and liver.At 24 hours after slaughter, the addition of organic acids and saccharose increased the L* and b* color values of the liver. The total number of coliform bacteria in the small intestine was significantly affected by the addition of a combination of organic acids and saccharose (pH 4.0 and 1% saccharose).

Keywords: Broiler, pre-slaughter, meat and liver color, pH, organic acid, saccharose

USE OF BENTONITE AGAINST AFLATOXICOSIS IN POULTRY FEEDING

Uğur Temiz [1,] & Ergin Öztürk [2]*

[1] Department of Zootechnics Amasya University, TURKEY
[2] Department of Animal Production Ondokuz Mayis University, TURKEY

ugur_temiz05@hotmail.com

ABSTRACT

Aflatoxins are poisonous chemical compounds produced by some fungal species when suitable conditions are met. Aflatoxins cause significant losses in the quality and quantity of foods and feeds that can develop very easily in the environments where people live and in nature, and adversely affect the health of humans and animals. Contamination of feed used in animal feeding with aflatoxins before, during and after harvest constitutes an important problem affecting the health of animals, producers and consumers. The health and economic problems caused by aflatoxins have led researchers to control strategies for removing mycotoxins from the environment. Removal of aflatoxins from contaminated feed is an important problem and effective, inexpensive and practical decontamination methods are needed. İn order to detoxify and reduce the toxic effect of mycotoxins, it is aimed to add various inert sorbent substances to the diets and thus to prevent the absorption of mycotoxins in the gastrointestinal region and to ensure their elimination from the body. İn order to reduce the absorption of aflatoxins from the digestive system, some non-nutritive compounds and adsorbents are used in the diet. One of the most striking compounds among these adsorbents is bentonite, which has physical and chemical properties preferred for many sectors. İn this study, the usability of a toxin-binding bentonite known as aluminosilicates against aflatoxicosis in poultry feed, and the possibilities of finding solutions to these questions and problems were investigated.

Keywords: Poultry feed, aflatoxicosis, toxin binder, bentonite.

USE OF BENTONITE AS PERFORMANCE ENHANCER IN BROILERS

Uğur Temiz [1,] & Ergin Öztürk [2]*

[1] Department of Zootechnics Amasya University, TURKEY
[2] Department of Animal Production Ondokuz Mayis University, TURKEY

ugur_temiz05@hotmail.com

ABSTRACT

İn addition to the fact that the additives used in poultry compound feeds are expensive, their unconscious use causes adverse health effects both in animals and in humans who consume their products. İn recent years, studies have been carried out on the use of new feed additives in animal nutrition, which do not harm animal health, increase various yields and are abundant in nature. Bentonite, which is one of the natural mineral resources, improves the performance of farm animals (live weight gain, feed consumption, feed conversion rate) and reduces the cost of animal products by increasing the amount and quality of the yield obtained from animals, since it binds the fungal or bacterial toxins in the feed of animals and prevents their absorption from the intestinal system. İn this article, the usability of bentonite, known as aluminosilicates, as a performance enhancer in broiler feeds was evaluated.

Keywords: Poultry feed, broiler, feed additive, performance enhancer, bentonite.

DETERMINATION OF DROUGHT IN MERIC-ERGENE BASIN USING STANDARD PRECIPITATION INDEX

Umut Mucan [1,] & Murat Yildirim [2]*

[1] Department of Agricultural Structures and İrrigation Çanakkale Onsekiz Mart University, TURKEY

[2] Agricul Çanakkale Onsekiz Mart University, Çanakkale, TURKEY

umut.mucan@comu.edu.tr

ABSTRACT

Drought, which has the greatest impact on human life and economy, is the most important natural disaster and develops under different meteorological and environmental conditions. Different drought monitoring indices are used to determine the temporal and spatial characteristics of droughts. İn this study, the precipitation data obtained from the meteorology stations in the Meriç-Ergene basin were obtained with the standardized precipitation index method, which is one of the methods of determining the severity of the drought, in the R program, and the spatial and temporal analysis of the geostationary meteorology stations in the basin with the ordinary cokriking interpolation method in the ArcGİS Program.

Keywords: drought, drought, standard precipitation index (spi), geographic information systems, Meriç-Ergene Basin,

EFFECTS OF IRIGATION WITH WATER FROM DIFFERENT SOURCES ON THE SOME SOIL CHEMICAL PROPERTIES

Perihan Tari Akap [1,], Mehmet Gündüz [2], Şener Özçelik [3] & Şerafettin Aşik [4]*

[1] Agricultural İrrigation and Land Reclaimation İnternational Research and Training Center,Turkey
[2] Agricultural İrrigation İnternational Reserach and Training Center, Turkey
[3] Agricultural İrrigation İnternational Agricultural Research and Training Center, Turkey
[4] Department of İrrigation Technology Ege University, TURKEY

perihantari@gmail.com

ABSTRACT

This study was carried out to determine the effect of irrigation with water from different sources on the macro (Na, K, Ca, Mg) and available micro (Fe, Cu, Zn, Mn) plant nutrients of the soil. The research was carried out in a randomized plot design with three replications for three years. Trial subjects consisted of "Treated Domestic Wastewater", "%50 Refined Domestic Waste Water + %50 Well Water" and "Well Water". According to the analysis results of 0-120 cm layers of soil, Na (mg/kg) and Ca (mg/kg) elements tended to increase slightly in soils irrigated with Treated Domestic Wastewater. İn the soils irrigated with %50 Refined Domestic Waste Water + %50 Well Water, it was determined that Na and Ca elements still tend to increase, although not as much as the effect of treated wastewater. There was no change in the amount of K, Mg element in the soils irrigated with Treated Domestic Wastewater and %50 Refined Domestic Waste Water + %50 Well Water. There was a decrease in the micronutrients of the water taken from different sources and in Fe and Cu, which are potentially toxic elements, in the 0-28 cm soil layer. The temporal changes of plant nutrients and potentially toxic elements in the soil are shown graphically.

Keywords: Domestic waste water, Well water, İrrigation, Water properties, Soil properties

ASSESSMENT OF SOIL PHYSICAL AND CHEMICAL PROPERTIES FOR THE AGRICULTURAL AREAS IN THE MENEMEN PLAIN NEAR THE SEA

Mehmet Gündüz [1], Nebi Yeşilekin [2], Bayram Akyol [2], Perihan Tari Akap [2,], Şuayip Yüzbaşi [2] & Ümit Alkan [2]*

[1] Agricultural İrrigation İnternational Reserach and Training Center, Turkey
[2] Agricultural İrrigation and Land Reclaimation İnternational Agricultural Research and Training Center, Turkey

perihantari@gmail.com

ABSTRACT

İn terms of sustainability in agriculture, it is necessary to determine the physical, chemical, and fertility characteristics of the agricultural soils. The purpose of this study was to investigate various physical and chemical properties of agricultural areas near the sea of the Menemen Left Bank irrigation system, which is in the Aegean Region in western Turkey. To that end, 1x1 km grids in the East-West (5 points) and North-South (5 points) directions were established in Tuzcullu and Suzbeyli districts in the Menemen plain near the sea. Soil texture, pH, Electrical Conductivity (EC), Exchangeable Boron (B), and Calcium carbonate (CaCO3) analyses were conducted on a total of 25 soil samples collected from the 0-30, 30-60, 60-100, 100-150, 150-200, and 200-250 cm layers. As a result of these analyses, on average in the soil layers, the soil pH ranged from 7.8 to 8 indicating that slightly alkaline, while the soil EC (dS m-1) ranged from 1.35 to 3.5 with slightly saline content. İn addition, Boron (mg kg-1) varied between two ranges of 0.41-0.48 and 0.61-0.69 with deficiency and sufficiency class respectively. At last, Calcium carbonate (%) in the range of 6.7-10 with the indication of medium calcareous in the soil layers were observed. The textures of the first three soil layers were loam (L), while the soil layers of 150-200 and 200-250 cm were sandy loam (SL). Organic matter levels were determined to be 1.4 per cent and 1.1 per cent (low) on average in soil layers 0-30 cm and 30-60 cm.

Keywords: Menemen Plain, soil texture, pH, EC, boron, organic matter

THE USE OF DRIED BLOOD POWDER AS AN ANIMAL PROTEIN SOURCE IN THE DIETS OF NILE TILAPIA (*OREOCHROMİS NİLOTİCUS*)

Egbal Osman Ahmed Abdalla

Fish Sciences Alneelain University, SUDAN

egbalosman1@gmail.com

ABSTRACT

This study's method includes feeding Nile tilapia fry dried blood powder as a source of animal protein. Four diets were prepared, each one had a fixed level of protein (35%) and varied only in the quantity of dried blood powder it contained (5%, 10%, or 15%). The study was conducted for 6 weeks in four fiberglass tanks with a tank capacity of 300 liters, each tank placed 30 fish with an average weight of 6.9 ± 0.4 grams. At the beginning and end of the experiment, all fish in each tank were weighed. To evaluate their growth and recalculate their diet, they were also weighed weekly. For all treatments, fish were fed at a set rate ranging from 4% to 6%. Compared to the control diet, which only consisted vegetable feeds and had no blood powder, growth rates were increased after dried blood powder was introduced to rations by 10% and 15%. Fish fed with diets containing 10% and 15% of dried blood powder increased in weight by 165±1.23% and 157±1.12%, respectively, as compared to 140%±0.98 for fish fed with the control diet. The feed conversion rate was significantly improved by the blood powder, reaching 2.06±0.40 and 2.16±0.45 for the two treatments (10% and 15%, respectively), compared to 2.33±0.54 for the control treatment. İn comparison the diet containing 15% dried blood powder, to the diet containing 10% dried blood powder showed considerably better results. İt is evident that the control diet that does not contain dried blood powder is the most expensive, reaching 3.94 pounds/kg in comparing to the diets containing dried blood powder, where the cost of these diets was 3.58 pounds/kg, 3.22 pounds/kg, and 2.84 pounds/kg for each of the 5%, 10%, and 15% treatments, respectively. This is based on the local feed prices that were used in this study.

Keywords: Blood powder, animal protein sources, Nile tilapia, growth performance, diet cost

MUCILAGE MENACE IN THE SEA OF MARMARA AS A CURRENT PERSPECTIVE

Akasya Topçu [1,], İlknur Meriç Turgut [1] & Esra Özcan [1]*

[1] Department of Fisheries and Aquaculture Engineering Ankara University, Faculty of Agriculture, TURKEY

atopcu@ankara.edu.tr

ABSTRACT

Rising temperatures and anthropogenic pollution around the world have increased the size and frequency of algal blooms, posing the threat of mucilage in the aquatic ecosystem. Eutrophication due to nutrients such as high concentrations of N/P causes algal blooms, that leads to the emergence of mucilage, a colloidal exopolymeric compound released by aquatic organisms. İn the formation of mucilage in the aquatic environment, the decomposition of organic particles by enzymatic activity and the release of dissolved organic matter, while at the same time the decomposition of the cell wall of dead organisms and the production of polysaccharides of some diatoms are triggering factors. The formation of mucilage was first seen in the Adriatic Sea at the beginning of the 18th century and came to the fore as a threat in the Aegean and Black Seas. A similar situation was experienced in the Marmara Sea, which is the youngest and most dynamic sea of Türkiye. The disruption of the balance of the ecosystem in this sea as a result of the water temperature, which reached the highest average values of the last 40 years in 2021 due to climate change linked to global warming, the lack of current between the surface and the bottom in the water column, the intense discharge of urban wastes directly into sea has created mucilage. Recent studies have shown that mucilage poses a potential risk of death on benthos coral habitats and fish populations in the Marmara Sea, that have a rich aquatic ecosystem between the Aegean and Black Seas with mussel, crab, oyster, coral and approximately 120 fish species. The surface layer, middle and bottom areas of the water were affected by mucilage and it was reported that the visibility in the water decreased to half a meter. İn this context, in order to protect our seas and biodiversity, National Action Plan that was updated in 2018 together with party countries within the framework of the Barcelona and Bucharest Regional Maritime Conventions should be put into effect for the solution of the problem. İn addition, at the point of long-term solution, eliminating the conditions favorable for mucilage formation stands out as the most effective method. As a result, tackling the mucilage threat, deep sea discharge of dredged waste from polluted coastal areas should not be allowed, and increasing the number of waste treatment facilities and inspections were addressed to.

Keywords: The Marmara Sea, Aquatic Ecosystem, Mucilage, Eutrophication, N/P İnflux, Organic Material

HOW WILDFIRES AFFECT THE AQUATIC ECOSYSTEM: MUGLA PROVINCE AS A CASE

İlknur Meriç Turgut [1,], Akasya Topçu [1] & Esra Özcan [1]*

[1] Department of Fisheries and Aquaculture Engineering Ankara University Faculty of Agriculture, TURKEY

meric@agri.ankara.edu.tr

ABSTRACT

The number of wildfires due to climate change and global warming has been increasing over the years. Wildfires that start naturally in warm climate due to the factors such as high temperature and low humidity sometimes occur as a result of human insensitivity and cause consequences that deeply affect the entire ecosystem. Although the heavy destruction caused by wildfires is clearly observed on the terrestrial ecosystem, their effects on the aquatic ecosystem can often be ignored.At a glance of the impacts of wildfires on water resources; notably, the remaining ash and burnt vegetation does not allow the passage of rain water by contriving the soil hydrophobic and hauls the ash and alluvium from the surface to the hithermost water column. These transported substances pre-emptively reduce the permeability of the sunlight, prevent the primary production of aquatic plants and disrupt the food chain, reduce the oxygen level and affect the respiration of all aquatic organisms, notedly the fish in the ecosystem. Moreover, high amounts of nutrients such as phosphorus, nitrogen and potassium leading in the aquatic environment elicit harmful algal blooms and the formation known as red-tide. Furthermore, the oscillation of metals sort of iron and manganese eventualized associated with the ash due to the wildfire to the environment. High amounts of iron bioaccumulates in the gills, skin and muscle tissue of the fish and cause toxicity. Wildfires have intensified in the Mediterranean region over the last decades and becoming increasingly destructive, particularly the one occurred in the Muğla Province during 2021. According to the 2021 data of the General Directorate of Forestry, 2712 of the 12.515 wildfires that took place in Türkiye in the last 10 years occurred in Muğla and 54.497,8 ha of forest land was burned. Geographic İnformation Systems (GİS) based wildfire risk map and modelling researches were performed in the specified region. Additionally, the relationships between fire activity, drought and fire indices were also analysed and it was reported that most part of the fires were brought about human, both the expansion and the increment rate of fire as to were associated with drought. The research that conducted with two different scenarios and three different global climate models in order to reveal the prospective fire risk in long-term evaluation, a longer fire period and a high level of risk were foreseen. Turkey is one of the countries with the highest potential to be exposed to wildfires with its geographical location, topographic structure, climate, vegetation and the human factor. İn this sense, to protect the terrestrial and aquatic biodiversity; i) developing well-planned early warning, detection, monitoring and response strategies, ii) prioritizing afforestation and re-vegetation in basins as the Mediterranean Region possesing important water bodies, iii) to eliminate the adverse effects of wildfires on aquatic environment, the use of certain chemicals in terms of preventing erosion, increasing soil aggregation and reducing dispersion should not be underestimated.**Keywords**: South-West Region of Turkey, Wildfires, Hydrophobic Surface, Heavy Metal Oscillation, Aquatic Toxicity

THE BENEFITS OF APPLING BIOFILTERS TO IMPROVE THE WATER QUALITY IN AQUARIUMS

Egbal Osman Ahmed Abdalla

Fish Sciences Alneelain University, SUDAN

egbalosman1@gmail.com

ABSTRACT

The objective of the study was to determine whether biofilters can improve the water quality in fish-rearing aquariums and to analyze how ventilation and stocking density affect water quality. Experiments were conducted in four aquaria using Nile tilapia at average body weights 19.3±1.67 – 21.4±1.83g. Treatment "1" included 12 fishes reared without ventilation and biofilter. Treatment "2" included 12 fishes reared with ventilation and without biofilter. Treatment "3" included 12 fishes with ventilation and biofilter. Treatment "4" included 24 fishes reared with ventilation and biofilter. Fishes in all treatments were fed on the same diet which contained 35% protein. Each week, water pH, ammonia, nitrite, and nitrate concentrations were measured and recorded. The temperature of the water was observed daily and noted. All fishes in each aquarium were weighed at the beginning and end of experiments as well as weekly. The study revealed that, biofilters removed ammonia which converted into nontoxic nitrate, İt also showed that ventilation system can aid to some extent reduce the ammonia concentration. This study also indicates that, fishes growth were adversely affected in the first and fourth treatments that characterized by higher concentrations of ammonia and/or nitrite in most measurements as compared to the second and third treatments. Rate of mortality was almost higher in the first and fourth treatments. İn the fourth treatment, low growth and high mortality rates showed the negative effects of high stocking density on water quality. İn order to maintain acceptable water quality by eliminating high concentrations of ammonia and converting it into nitrate, which is safe to fishes, the current study suggests the significance of equipping fishes in aquaria with biofilters.

Keywords: Biofilter, water quality, Nile tilapia, stocking density, growth performance

THE EFFECT OF OXIDIZED FISH OIL ON BLOOD PARAMETERS AND LIVER HISTOLOGY OF NILE TILAPIA (*Oreochromis niloticus*)

Sana Yagoub Abdallah Tahir [1,] & Aysun Kop [1]*

[1] Department of Aquaculture Enqineerinq Ege University, İzmir, TURKEY

sana.agoub.at@gmail.com

ABSTRACT

Fish oil is a virtually unique source of natural LC omega-3 fatty acids EPA, DPA, and DHA, as an important source of lipid in aquafeeds. However during processing and storage, fish oil is prone to oxidation. The oxidized oil has many negative effects on the growth and health of farmed fish, therefore this study was conducted to investigate the effect of oxidized anchovy oil on blood parameters and liver histology of Nile tilapia (*Oreochromis niloticus*). Nile tilapia fingerlings with an initial average body weight of (15.07±0.58 g) were stocked in nine fiberglass tanks (with a tank capacity of 120 liters) in three groups in triplicates at a density of 50 fish/tank. Fish were fed with three test diets containing 35% crude protein and 8% crude fat (POV: 4.85, 50.10, and 100.80 meq/kg-1) twice a day at a feeding rate of 3% of their body weight per day for 12 weeks. During the experiment fish blood parameters analysis, and liver histology tests were performed on 3 fish taken randomly from each tank at the beginning of the experiment and monthly. The results of blood chemistry analysis showed better results in the group fed with feed that contained fresh oil (A) compared to groups fed with feeds that contained oxidized oils (B and C), but no significant differences ($P > 0.05$) between feed groups. Whereas the results of serum biochemical analysis showed significant differences ($P > 0.05$) between feed groups during the experiment period, oxidized fish oil increased serum ALT, AST activity, and TCHO level ($P < 0.05$), and decreased ALP activity. The liver histology test showed the best results in group A compared to oxidized oil groups (B, C), oxidized fish oil caused damage to the liver structure, and hepatocyte Nuclear migration and lipid droplets were observed in liver samples from the oxidized oil groups. İn conclusion, the present study demonstrates that oxidized fish oil may have a negative effect on the liver histology and blood parameters of Nile tilapia fingerlings.

Keywords: Oil oxidation, blood parameters, liver histology, Nile tilapia

AN OVERIEW: HEAVY METAL HYPERACCUMULATION AND PHYTOREMEDIATION IN PLANTS

Fadime Eryilmaz Pehlivan

Department of Biology İstanbul University, TURKEY

eryilmazfadime@gmail.com

ABSTRACT

Hyperaccumulator plants are plant species that accumulate various heavy metals excessively in their aboveground organs but are not adversely affected by it. The difference of hyperaccumulators from other plant species is that they take up heavy metals at high speed, effectively transport these heavy metals from the roots to the stem and leaves, and detoxify the heavy metals in the leaves. The basis of the hyperaccumulation ability lies in the differential expression and regulation of some genes, which are also found in non-hyperaccumulatory plants. İn addition, some of the heavy metals that hyperaccumulator plants absorb effectively from the soil are essential for living things. İn this study, the general characteristics of hyperaccumulator plants, their phytoremediation capacity and types, and the usability of these plants in the field of phytomining were discussed by using the literature.

Keywords: Heavy metal, detoxification, phytoremediation, phytomining areas

DETERMINATION CHANGES OF AGRICULTURAL LANDSCAPES OF THE STEPPE ZONE OF UKRAINE BY SATELLITE DATA

Elena Vlasova [1,] & Anatoliy Shevchenco [2]*

[1] Water Resources İnstitute of Water Problam and Land Reclamation, UKRAİNE
[2] Department of Water Resources İnstitute of Water Problems and Land Reclamation, UKRAINE

elena_vl2001@ukr.net

ABSTRACT

An urgent task both for individual farms and for branches of agricultural production throughout Ukraine is the study of trends in changes in the state of agrolandscapes in space and time. Changes are studied based on indicators such as moisture content, soil nutrient content and suitability of available water sources for irrigation. These indicators are determined during environmental and reclamation monitoring. This issue becomes especially important after the conduct of hostilities during the war. At this time, the soil cover undergoes deflation and over-compaction, and surface and underground waters undergo various types of pollution. Archival and operational multispectral satellite images of Landsat 5-9 and Sentinel 2 make it possible to study such changes. Based on them, dimensionless indicators are calculated spectral indices: water, vegetation, soil. İndicators are used to assess the state of the soil and vegetation cover. Research using satellite information was conducted in the steppe zone of Ukraine in the Vasylivsky district of the Zaporizhia region. The probability of years with insufficient moisture supply for this zone is 95%, which leads to a decrease in the favorable conditions for growing agricultural crops during the period of active vegetation. 80% of the district's soils are ordinary, low-capacity, sandy-loamy and medium-loamy black soil, which are characterized by an insignificant content of organic substances in the arable soil layer. Humus content does not exceed 2.0%. The amount of absorbed bases ranges from 17.5 to 23.5 mg-eq/100 g of soil. Soils are poorly structured. Aggregation varies between 43-50%. Water intake for irrigation is carried out from the Bilozersky estuary, the Kahovsky reservoir and from underground aquifers. The content of substances such as clay, iron oxide and other minerals was directly determined using images in the VİS-NİR ranges (visible and infrared spectrum ranges). The results of the calculations were obtained in the form of thematic maps. Mathematical regression models were obtained in the open software product QGİS. The closest correlation was found between hydration and iron oxide. The coefficient of determination is R2 = 0.877. The iron oxide index is the ratio of the red and blue wavelengths of electromagnetic radiation. On the thematic maps, the index is present both on the soil surface and in water. The magnitude of its values varies from 0.593 to 0.932. Obtaining such spatial information makes it possible to determine not only general mineralization, but also one of the indicators of water quality, which affects the elements of the irrigation system. İn the course of the research, it was found out that not only the state of soil and vegetation cover, but also the state of irrigation sources can be assessed based on the received thematic maps.

Keywords: agricultural landscapes, satellite data, spectral indices, thematic maps

MAPPING GREENHOUSE AREA CHANGES USING SENTINEL-2 IMAGERIES AND DIFFERENT CLASSIFICATION TECHNIQUES: PILOT AREA IN AKSU, ANTALYA, TURKEY

Melis İnalpulat [1,] & Levent Genc [2]*

[1] Agricultural Structures and İrrigation Canakkale Onsekiz Mart University, TURKEY
[2] Urban and Regional Planning Çanakkale Onsekiz Mart University, TURKEY

melisinalpulat@gmail.com

ABSTRACT

Present paper focused on the determination of greenhouse covered land changes (ha, %) around pilot area in Aksu district of Antalya Province, Turkey between 2016 and 2021. The study area was selected depending on the fact that, various types of land cover land use (LCLU) can be found together with the dense greenhouse areas. High resolution satellite images from Sentinel-2 sensor were freely downloaded and used to achieve the aim. Since the bands of the images have different spatial resolutions, 20 m resolution bands were resampled to 10 m prior to the classification process. Moreover, performances of different pixel-based supervised classification techniques were evaluated whereas same training samples from different classes were utilized in the classification procedure. The considered classes were included greenhouse (G), agriculture (A), dense vegetation (D), sparse vegetation (S), bare soil (B), residential (R), transportation network (T), and water surface (W) LULC types. Subsequent to the classification process, accuracy assessments were conducted for identification the reliability of obtained LCLU maps via 240 randomized control points using Google Earth. Results indicated that there were remarkable increases in greenhouse coverage in study area whereby random forest classification gave more accurate results among the tested algorithms. The study believed to serve as a baseline for further research that will be conducted in wider area within the Mediterranean region.

Keywords: Classification, Greenhouse, Mapping, Sentinel-2, Short-term changes.

QUALITY OF TOBACCO OF THE TYPE PRILEP P 66 9, DEPENDING ON THE MATURITY OF THE TOBACCO LEAVES AT THE TIME OF HARVEST

Natasha Zdraveska

Department of Technology and Chemistry of Tobacco and Tobacco Products "St. Kliment, Ohridski" University- Bitola, Scientific Tobacco İnstitute- Prilep, MACEDONIA

natasha_z78@yahoo.com

ABSTRACT

The physical characteristics of tobacco leaves are the basic indicator that enables the assessment of tobacco quality in practice. They reflect the structure and chemical composition of the leaf and are closely related to the smoking and flavor properties of the tobacco. Having in mind the previous knowledge in 2020 a field experiment by standard methodology was conducted on the surfaces of the experimental field of the Scientific İnstitute for Tobacco - Prilep, with oriental tobacco variety Prilep 66. Three variants were included in the experiment – tobacco was harvested during technological maturity, before technological maturity (green state), as well as the harvesting of tobacco leaves after technological maturity (overripe state) were performed. The aim of this study was to perceive the quality of tobacco depending on the time of harvest. Considering their great importance in the industrial processing of tobacco, we decided to analyze the following major physical properties: leaf substantiality, thickness and midrib content.

Keywords: oriental tobacco, variety Prilep 66 9, physical characteristics, maturity

THE EFFECTS OF THE COVID-19 PANDEMIC ON AGRICULTURE IN ISTANBUL

Elif Yildirim

Department of Economics Yildiz Teknik University, Istanbul, TURKEY

eeliffyildirim34@gmail.com

ABSTRACT

This project was written within the scope of TÜBİTAK 2209-A University Students Research Projects Support Program, application number 1919B012110208. İ am studying at Yildiz Technical University as a bachelor's degree student in Economics. İ am currently working in the Public Supported Project Management unit at Bank of Vakif Katilim. This project was made to analyze how Covid-19, which is seen in modern times and affects the whole world, will affect the agricultural production of İstanbul. The Covid-19 pandemic has emerged in China and has affected the world in a short period of time. With the arrival of Covid-19 in Turkey, it has caused production disruptions in all sectors. One of the most important sectors where production disruptions occur is agriculture. The region where Covid-19 cases and deaths are most common is İstanbul. For this reason, as a result of the restrictive measures taken in İstanbul, the panic experienced by people has increased consumption and stockpiling. The agricultural sector is a sector that directly affects the nutrition and health of people. İn this process, it has been understood once again that it is an important and indispensable sector. The Covid-19 pandemic has had negative effects on the agricultural sector, from the cultivation of agricultural products to their harvesting and reaching the latest consumer. With this project, İ aim to contribute to the academic literature by discussing how much and how Covid-19, which has also affected Turkey, affects agriculture in İstanbul with producers in areas where agricultural production is carried out in İstanbul and sellers in organic bazaars, finding solutions to what they are experiencing and the problems experienced in this process and finding solutions.

Keywords: Agriculture, Covid-19, Agricultural Production, Organic Market, Producer

SEED PRODUCTION OF MAIZE HYBRIDS IN BULGARIA

Emil Vasilev [1,], Valentina Valkova [2] & Nataliya Petrovska [2]*

[1] Genetic, Breeding and Seed Production Maize Research İnstitute – Knezha, BULGARIA
[2] Genetics, Breeding and Seed Production Maize Research İnstitute – Knezha, BULGARIA

vasilev_642@abv.bg

ABSTRACT

Maize hybrid varieties are the most used for seed production in Bulgaria. They provide improved genetic, contributing to high yield potential and both resistance to diseases and abiotic stress factors. Simple and rarely triple hybrids are found the most popular. Hybrid maize seed production involves definitely crossing a female parent population with a male parent in isolated fields. İn the paper good practices related to the seed production of maize hybrids in Bulgaria were discussed. Maize seed production is a system of activities aimed at to continuously propagate, implement and supply the market with high quality seeds from new and promising hybrids. Multiplication of parental lines with high genetic purity is an important element for the successful seed production for any hybrid. A distinctive feature of maize seed production is the annual production of first generation seeds (F1). The maintenance of each maize hybrid variety includes nursery of variety under controlled pollination, obtaining of pre-basic seeds from isolated fields with applying of negative selection, production of basic seeds and final seed-production hybrid field. İt is sown in isolated areas, spatially distant from other maize fields, where the crossing of the parental forms takes place and conditions for pollination of the mother only with pollen from the paternal component are under control. Following the above is the key to success in obtaining quality seeds.

Keywords: maize, seed production, multiplication

PLANT BIODIVERSITY AND PHYTOTHERAPY IN ALGERIA

Mahi Zineb

Living and Environment Usto, ALGERIA

z.mahiman@gmail.com

ABSTRACT

The review of several recent works on medicinal plants in Algeria has shed light on a set of very diverse results depending on the plants, regions, populations studied and objectives. However, the finding of this review highlights a set of points, among others: Algeria has a very important taxonomic richness which includes not only animals but also plants, the latter play an essential role within the trophic chains, according to DUPONT and GUİGNARD, (2015); but Unlike other Maghreb countries, Algeria imports almost all of its aromatic and medicinal plant needs (SAHİ, 2016). This, despite the productive potential which represents about 600 species of PAM according to MOKADDEM (1999). Algeria ranks 74th in the world for imports of aromatic and medicinal plants and 44th in the world for imports of essential oils (MENDACİ, 2017). Natural risk continues to represent a very real threat, particularly in countries where traditional culture is still alive, a threat that is all the more significant since learning to live in these changing societies no longer takes place, obligatorily, by the school of nature. The importance of floristic and ethnobotanical studies. These studies are more than necessary and indispensable for a better knowledge of plants on the morphological, physiological and anatomical level as well as on the photochemical level. The development of a detailed guide on poisonous plants is of great importance. İndeed, this guide provides guidance by sparing users from undesirable, sometimes harmful and toxic effects.The regulation of the profession of herbalist must absolutely be based on legal texts which prohibit herbalists from selling any poisonous or toxic plant.

Keywords: Poisonous plants, Aromatic plants, medicinal plants, Ethnobotany

LATEST DEVELOPMENTS IN AGROSCIENCE FOR PROVIDING FOOD SECURITY, ECOFRIENDLY AND CLIMATE-RESILENT AGRICULTURE

Atanas Atanassov

Sofia University Joint Genomic Center Ltd, BULGARIA

atanas_atanassov@jgc-bg.org

ABSTRACT

İn the year 2050 the Agroindustry is going to play a crucial role for the development of the most important for the humanity industries as food and forage, energy, pharmacy, textile, touristic and various others providing renewable and alternative resources. Along the traditional breeding and organic farming methods and technologies , the modern green biotechnology approaches are considered as ones of the most valuable tools for meeting the challenges related with the necessity to provide food security, eco-friendly and climate resilent agriculture. İn this context the old and new approaches are treated as co-existing and win/win agricultural future The recent progress in the development of such technologies like next generation sequencing (NGS), new plant breeding techniques (NPBT), epigenetics, microbiome and precision agriculture (digitalization, artificial intelligence, robotics etc) are presented in their close interactions

Keywords: Agroscience, Food Security, Climate Change, Resilient agriculture

AQUATIC FLORA OF VJOSA RIVER

Alma İmeri

Agronomy Sciences Agricultural University of Tirana, ALBANIA

aimeri@ubt.edu.al

ABSTRACT

The paper provides an overview of the Vjosa river besides major gaps in knowledge Vjosa is one of the richest river in Albania, sheltering a high diversity of habitats and species, most of them of international significance. A variety of protected areas is an important ecological corridor. The aquatic flora has attracted the interest of botanists for many years, however, thebotanical studies regarding aquatic plants have been limited. The study area is partly included in the European network of protected areas 'Natura 2000' and is of great scientific interest due to Vjosa's biodiversity. İn the floristic inventory of the studied areas two taxa, *Potamogeton sp*. and *Chara sp.* are reported. Furthermore, the bryophytes taxa. Several floristic pa-rameters related to life forms and geographical distributions of plant species (chorology) were examined and some ruderal, and invasive species were described. Additionally, human activities in river basins in recent years have changed the structure and composition of plant communities with the introduction of ruderal and alien species. Under the moto "save Vjosa as the last wild river in Europe" we should inventory, study, and save Vjosa for the better future.

Keywords: *Vjosa, ecological corridor, European network, chorology.*

APIS MELLIFERA MICROBIOME: BETWEEN DYSBIOSIS AND PROTECTION FROM PARASITE INFECTION

Katia Djenadi [1,] & Assia Cherifi [2]*

[1] Laboratoire De Biochimie Appliquée, Faculté Des Sciences De La Nature Et De La Vie, Université De Bejaia, 06000 Bejaia, Algeria
[2] Faculty of Biological Sciences and Agricultural Sciences. Mouloud Mammeri University of Tizi-Ouzou. Algeria Laboratory For The Production, Protection and Safeguard of Endangered Species and Crops., ALGERIA

djenadi-katia@hotmail.fr

ABSTRACT

Apis mellifera is an important pollinator species for wild flora and agricultural production. This small insect is threatened by several factors including high exposition to parasite and pathogen organism. Nowadays numerous scientist highlighted on the fact that microbiome of adult honeybees plays an important role for bee health. The gut of *Apis mellifera* adult workers are dominated by species that can have an impact on metabolism, immune function, growth and development and protection against pathogen. The presence of any other pathogenic bacteria in their gut flora can disturb the physiology and immune system of the honeybees. Overall, we can conclude that gut microbiome has an important role in the honeybees health.

Keywords: Apis mellifera, gut microbiome, dysbiosis, parasit, protection.

IMPORTANCE OF OLD BREAD WHEAT VARIETIES IN BIODIVERSITY

Desimir Knežević[1], Danica Mićanović[2], Gordana Branković[3], Mirela Matković Stojšin[4], Svetlana Roljević[4], Adriana Radosavac[5], Veselinka Zecevic[6]

[1]University of Pristina, temporary settled in Kosovska Mitrovica, Faculty of Agriculture, Lesak, Kopaonicka bb.,38219 Lesak, Kosovo and Metohia, Serbia;

[2]Serbian Chamber of Commerce and İndustry, Resavska15, Belgrade, Serbia;

[3]University of Belgrade, Faculty of Agriculture, Belgrade, Nemanjina 6, 11080 Zemun, Serbia;

[4]Agricultural İnstitute Tamiš in Pančevo, Novoseljanski put 33, 26000Pancevo, Serbia;

[5]University Business Academy in Novi Sad, Faculty of Applied Management, Economics and Finance in Belgrade, Jevrejska 24, 11000 Belgrade, Serbia;

[6] İnstitute for Vegetable Crops, Karađorđeva 71, 11420 Smederevska Palanka, Serbia;

deskoa@ptt.rs

ABSTRACT

The cultivation wheat in past century influenced that varieties have acquired certain specific forms of adaptation and changed their hereditary basis. Farmers, have their priorities in selecting a variety for traits yield, lodging resistance, and protein content. Wheat breeders pay more attention to balance those traits with others, like nutritional quality, disease resistance into a combination going to be attractive to a grower. Aim of this study is estimation of share of old wheat varieties in improving yield, quality and adaptation of developed modern bread wheat varieties. İn this investigation analyzed diversity and fluctuation wheat varieties which grown in Serbia from 19 to 21 century. İn the end of 19th century farmers grown indigeneous population, introduced foreign genotypes, local populations, old varieties approved after period of Green Revolution and modern wheat varieties. Also in study presented work on collection old wheat genotypes and local population, and distribution genotypes on localities were collected as well İnstitution where collected genotypes deposited. The differences between old and modern wheat varieties were established for yield, protein content, quality, resistance to diseases, resistance and susceptibility to low temperature, lodging etc. On the base of analysis can be concluded that old varieties and local populations are valuable resources of desirable genes for further wheat breeding for improving yield, quality and adaptability of further varieties which will be create.

Keywords: Old wheat, heritage, genes, biodiversity, resources

CHARACTERIZATION OF COWPEA (*V. unguiculata* L.) ACCESSIONS FOR MORPHOLOGICAL AND YIELD PARAMETERS UNDER AGROECOLOGY OF SOUTH BULGARIA

Tsvetelina Stoilova[1], Nikolaya Velcheva[1], Lixia Wang[2], Qiang Wang [3]

[1]İnstitute of Plant Genetic Resources "K. Malkov", Sadovo, Bulgaria

[2]İnstitute of Crop Sciences, Chinese Academy of Agricultural Sciences, Bulgaria

[3]Crop Resources İnstitute, Heilongjiang Academy of Agricultural Sciences, Bulgaria

tsvetelinas27@gmail.com

ABSTRACT

Cowpea [*Vigna unguiculata* (L.) (Walp.)] is a warm crop which is grown throughout the tropics and subtropics of the world. İn Europe, cowpea is grown in southern part of the continent including Bulgaria, where it is grown near to boarder of Greece and Turkey. Collecting and preserving cowpea landraces are important activities aimed to conserve very well adapted local diversity as a source for crop improvement to meet the current and future challenges of climate change, like heat, drought, flooding and salinity, new pests and diseases. Cowpea can be grown under harsh conditions with low external inputs without irrigation. The goal of this work was to characterize and evaluate a subset of cowpea germplasm collection under field conditions without irrigation. 25 cowpea accessions with different origin (15 Bulgarian, 3 Chinese, 6 Korean and 1 Nigerian) were characterized and evaluated following the İnternational Cowpea descriptor list. A total of 18 quantitative and qualitative traits were collected during vegetation and postharvest period. Days to flowering and days to maturity stages, plant height, leaf length and width, number of pods per plant, seed size and weight of seeds per plant and weight of 100 seeds were the most useful parameters for discrimination purposes. Higher-yielding, earlier maturing plants with big size of seeds were identified. Accessions with cat. No BOE0035, A9E1073 and A8E0553 were among the earliest flowering and early maturity accessions. Plant height of studied germplasm subset ranged between 41,6 and 140cm; number of pods per plant were from 5,2 to 20,8; weight of seeds per plant varied from 5,0g to 25,0g. The results of this research could be the base towards more efficient germplasm management in order to use cowpea collection as a source for the genetic improvement, particularly as an alternative grain legume crop suitable for cultivation in marginal dry areas.

Keywords: cowpea, germplasm, collection, characterization

DIVERSITY OF COMMON BEAN (*Phaseolus vulgaris* L.) ACCESSIONS WITH BULGARIAN AND CHINESE ORIGIN

Tsvetelina Stoilova[1], Nikolaya Velcheva[1], Lixia Wang[2], Qiang Wang [3]

[1]İnstitute of Plant Genetic Resources "K. Malkov", Sadovo, Bulgaria

[2]İnstitute of Crop Sciences, Chinese Academy of Agricultural Sciences, Bulgaria

[3]Crop Resources İnstitute, Heilongjiang Academy of Agricultural Sciences, Bulgaria

tsvetelinas27@gmail.com

ABSTRACT

There is a long tradition in cultivation of pulses in the Balkans and China, mainly used for human consumption. Among the major food legumes common bean is the most important one. A large range of landraces are still grown in different geographical locations, that have adaptation to local climatic conditions and possess resistance or tolerance to diseases and pests. This allows high yield stability with low input farming. The main purpose of this work was to analyze the morphological variability of 17 Chinese and 20 Bulgarian local accessions and old varieties, under environmental conditions in Sadovo, located in Central South Bulgaria. The aim of this stufy was to generate information that can help identifying the most suitable resources with good adaptability to different environments. The bean accessions were characterized on 16 morphological quantitative and qualitative traits and 3 agrobiological phases. All accessions were evaluated for two important bacterial disease, caused by pathogens, *Xanthomonas axonopodis* pv. *phaseoli* and *Pseudomonas syringae pv. phaseolicola*. A considerable morphological variation was found among different genotypes, particularly on earliness, plant growth habit, pod's and seed's morphology, etc. The majority of accessions possessed white seed colour, some accessions were with cream, purple seed colors or mottled. The predominant seed shape was oblong and three accessions had round shape. İn agrometeorological conditions of Sadovo, plants required less days to reach flowering and maturity phases and had comparatively high biological yield. The components that mainly determined yield were number of pods and number of seeds per plant. The highest value for these traits were found in one Chinese accession and one Bulgarian accession.

Keywords: common bean, germplasm, morphological characterization

SPECIES FROM GENUS IRIS IN THE COLLECTION OF IPGR-SADOVO

Katya Uzundzhalieva [1,], Tsvetanka Raycheva [2] & Kiril Stoyanov [2]*

[1] Plant Genetic Resources Agricultural Academy, İnstitute of Plant Genetic Resources - Bulgaria
[2] Botany Agricultural University – Plovdiv, Bulgaria

kspasova69@gmail.com

ABSTRACT

The species from genus İris are herbaceous perennial monocots. They are entomophily. Widespread, represented by 10 species in the Bulgarian flora /Stoyanov K.& Raicheva Tz. 2011-2022/. İrises are plants widely distributed in almost all regions of the northern hemisphere. They inhabit almost all types of habitats - from the bale to the dry and poor stony slopes of the mountains. Climatically, they are also undemanding and the different species can be found from the tundra to the subtropics. This diversity in ecological requirements, which the genus possesses and the noticeable appearance of the plants, is the main reason why today they are among the most cultivated flowers in the world. They are suitable for almost all areas, regardless of climatic features. They can be used as aquatic plants in the coastal zone of water areas or around them, as plants for the flower bed and in rock gardens. İrises may be a bearded or crested (beardless) type. Bearded İris are so-called because they have soft hairs along the center of their falls /İris germanica/. The hairs on crested types, like the İris sibirica, form a comb or ridge instead. İn İPGR-Sadovo is maintained collection of 21cultivated İris varieties. Each one of them has a unique color. They flower early in spring and bloom best in full sun, at least 6 to 8 hours of sunlight per day. The aim of the present study is to make a comparative characterization of the ornamental İris varieties by morphological phelological characters.

Keywords: İris, ornamental İris collection, ecology

MORPFOLOGICAL DIVERSITY AND SOME FRUIT BIOCHEMICAL TRAITS IN BULGARIAN EGGPLANT (*S. melongena* L) LANDRACES

Veselina Masheva [1,] & Mariya Sabeva [1]*

[1] Plant Genetic Resources İnstitute of Plant Genetic Resources "K.malkov", BULGARIA

vesi_masheva@yahoo.com

ABSTRACT

Environmental changes, including the loss of biodiversity, threaten agricultural production. The preservation and study of traditional germplasm collections is an essential element in the expansion of ecotypes. İn recent years, eggplant has enjoyed great interest as a functional food, falling among the top ten vegetables. At the İnstitute of Plant Genetic Resources, Sadovo, 22 local varieties of eggplant from four regions of Bulgaria were studied according to 13 morphological descriptors and 3 biochemical indicators. Wide variations were observed like plant branching, leaf length, diameter of corolla and fruit length and width of local cultivars. The phenotypic data were subjected to correlation principal component and cluster analysis, allowing four major morphological groups to be identified. Fruit quality was considered most important and therefore total sugar, crude protein and dry matter content were determined. Significant differences were observed A9E1156 being high in protein, A7E0525 and B6E0332 with highlighting sugars while high dry matter was found for B2E0019 and B2E0303. The results showed significant morphological and biochemical differences among the accessions evaluated, bases for further breeding programmes and major source of agricultural biodiversity

Keywords: eggplant, Solanum melongena L, morphological descriptors, biochemical traits, diversity

GENETIC BIODIVERSITY MANAGEMENT BY ITS PRESERVATION AND IMPROVEMENT, IN DIFFERENT CROPS

Maria Joita Pacureanu[1,2], Gabriel Popescu[2], Laurentiu Ciornei[2], Luxita Risnoveanu [3,4], Elisabeta Sava[5], Alexandru Bran[5]*

[1] National Agricultural Research and Development İnstitute, Fundulea N. Titulescu street, no. 1, 915200, Fundulea, Romania

[2] Research and Study Centre for Agriculture and Forestry Biodiversity, 13 September Street, no. 13, District 5, zip code 050711, Bucharest Romania

[3] Agricultural Research Development Station Braila, Viziru km. 9 street, Braila County, Romania

[4] Bucharest University Economic Studies, Faculty of Agri-food & Environmental Economics, 6 Piata Romana, Bucharest 010374, Romania

[5] The State İnstitute for Variety Testing and Registration, 60-61 Mărăşti Blvd, Bucharest, Romania

mariapacureanu2@yahoo.com

ABSTRACT

Biodiversity is the diversity of life on earth, including plants, animals, fungi, and microorganisms. Our food system relies on a very special part of biodiversity called agrobiodiversity. This is not only the diversity of all organisms associated with agriculture, but also the result of human ingenuity in manipulating biodiversity through breeding and landscaping. At the genetic level, agrobiodiversity includes the diversity found between varieties and landraces of the same crop, but also extends to diversity present in crop wild relatives, these are wild plants that are distant relatives of cultivated plants. Evolving crops through breeding and genomic techniques to include desirable traits relies on the maintenance and exploitation of genetic resources.There are efforts of scientists exploring agrobiodiversity, to develop genetic tools critical for improving crop performance to support both resilience to climate stresses, and local adaptation to low-input agriculture. Despite the importance of this richness of genetic resources is at risk of being progressively and irreversibly lost due to changes in land use and standardization of modern agriculture. For this reason is necessary to collect and secure as much agrobiodiversity as possible. This action has led to a significant portion of these resources being maintained *in situ* or *ex situ* in seed collections, available to breeders and researchers to fuel crop improvement. *İn situ* or *ex situ* genetic agrobiodiversity may provide breakthroughs to make the crops of the future more sustainable and more productive, capable of growing better today and including adaptations to combat effects of climate change tomorrow. Maize is one of most cultivated plant over the world. By using a very various and valuable germplasm, in different breeding programs there have been obtained valuable inbred lines, having very good characteristics. İn this way it was possible to create very good commercial hybrids. İt has been obtained an important genetic progress,

regarding the productivity, also different agronomic and physiological traits and adaptation to the biotic and abiotic factors. Sunflower is a very important oleaginous crop, over the world. İn the breeding programs there are important objectives, taking into consideration the seed market request, which is very much diversified, for this crop. By luck, sunflower has a high number of wild relatives, which are used as donor of genes, for important characteristics, in order to be introduced in valuable inbred lines, these being used for developing competitive commercial hybrids.

Keywords: biodiversity; genetic resources; genetic progress; maize; sunflower

WILD SPECIES FROM IRIDACEAE FAMILY IN THE COLLECTION OF IPGR-SADOVO

Katya Uzundzhalieva [1,], Tsvetanka Raycheva [2] & Kiril Stoyanov [2]*

[1] Plant Genetic Resources Agricultural Academy, İnstitute of Plant Genetic Resources - Bulgaria
[2] Botany Agricultural University – Plovdiv, BULGARIA

kspasova69@gmail.com

ABSTRACT

İridaceae is a family of perennial plants with almost worldwide distribution. İn Bulgaria, 5 genera and approximately 36 species growing wild – *İris, Crocus, Gladiolus, Sisyrinchium* and *Romulea*. Two species are Balkan endemits – *Crocus pallidus* and *Crocus veluchensis*; six species are protected by the Biodiversity Act - *Crocus olivieri, Crocus tommasinianus, Gladiolus palustris, İris aphylla, Romulea bulbocodium* and *Romulea linaresii ssp. graeca;* two species are included in the Red book of Protected plants – *İris aphylla* – critically endangered /CR/ and *Crocus tommasinianus* – vulnerable /VU/. Foe a period of 3 years in the living collection of İPGR - Sadovo are maintained and successfully adapted 93 accessions from naturally occurring populations of species belonging to the following taxonomic groups: genus *Crocus*- 48 accessions from 7 species; genus *İris* – 37 accessions from 7 species and genus *Gladiolus* – 7 accessions from 1 species, collected from nearly all floristic regions in Bulgaria. The living collection is valuable source of genetic material for scientific investigations as well as for reintroduction in nature of species with limited distribution and declining populations.

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Keywords: İridaceae, Crocus, İris, Gladiolus

MACROMORPHOLOGICAL AND MICROMORPHOLOGICAL STUDY OF ACHENES (CYPSELA) IN *Lactuca serriola* L. AND *Lactuca saligna* L. (*ASTERACEAE*)

Bediha Köse & Feruzan Dane

Trakya Üniversitesi, Fen Fakültesi, Biyoloji Bölümü, 22030 Edirne, Turkey

bediakose@yahoo.com

ABSTRACT

Turkey; İt has an extremely rich flora due to reasons such as its geographical location, physical structure and historical development. The flora of Turkey has over 8,500 species of flowering plants, and this figure exceeds 10,000 with the addition of subspecies and varieties. One of Turkey's richest family is Asteraceae. And the genus Lactuca L. is one of the larger genera of the Asteraceae family. This genus is represented by 17 taxa in the Flora of Europe. Morphological studies in the field of botany are one of the most important stages used in the identification and taxonomy of plants. Clarifying the boundaries of morphology in taxa, detecting possible variations in morphology (because of phenotype-environment interaction) will reveal the traces of evolutionary transformation in a region/area, solving taxonomic problems arising from these variants, boundaries of biodiversity. For this purpose, in our study, the macromorphological and micromorphological properties of achene (Cypsela) species of *Lactuca serriola* L. and *Lactuca saligna* L. belonging to the subfamily Cichorioideae subfamily Lactuceae of the Asteraceae family were examined under stereomicroscopy and scanning electron microscopy (SEM). İn the samples collected following the flowering season, macromorphological features of achenes (Cypsela), achene length measurements, color, shape, surface texture, abscission trace features and surface micromorphological features were investigated. İn *L. saligna*, achene is dark brown, elliptical, 2.5-3 mm in body length, ribs 9-11 striped on the face, beak filamentous and 6.5 mm, pappus white, 5-6 mm. achene faces often rugulose, having many small wrinkles carpopodium U shaped. İn *L. serriola* is light brown, obovate shaped, 3.5-5 mm in size, 5-7 ribs, 2-2.5 mm in body length, 3-5 mm in beak length, thin, white 4-5 mm, straight, whitish, pappus uniseriate. Achene surface was found to be scabrate, carpopodium round shaped. Micromorphological features of achenes (Cypsela) were similar in both species. However, the other remaining features were proved to be primarily diagnostic at the species level.

Keywords: *Lactuca serriola*, *Lactuca saligna*, Asteraceae, achene morphology; SEM; Surface microsculpture

INVESTIGATION OF SELECTIVE MOLECULAR MARKERS FOR RESISTANCE TO OROBANCHE IN SUNFLOWER

Müge KOÇ, Yalçın KAYA, Semra HASANÇEBİ

Trakya University, Faculty of Engineering, Genetics and Bioengineering Department, Edirne, Turkey

mugeturkoglu@hotmail.com

ABSTRACT

Oilseed production is not sufficient in our country, and this deficiency is compensated by importing by paying a high rate of foreign currency. One of the most important factors affecting the yield and quality of sunflower, which is constantly spreading in our contry and developing new breeds while spreading, is the orobanche parasite. Therefore, sunflower hybrids to be developed should be resistant to broomrape. The transfer of these resistance genes to the cultivated sunflower is very important for continuted resistance. The use of molecular methods in breeding studies shortens the breeding period by providing an effective and accurate selection, as well as saving time for studies. In the study, it was aimed to detectnew *Or5/Or6* gene source in inbred sunflower lines and to develop a molecular marker to be used for selection in transferring to cultivars. 9728A cultivar and 2517B sensitive cultivar carriying *Or5/Or6* resistance gene were used as parent lines and F2 genotypes obtained as a result of crossing were used for marker analyses. Resistant F2 bulk (DB) and sensitive F2 bulk (HB) were formed by combining gDNAs belonging to resistant and sensitive F2 genotypes in equal amounts. Fort he detection of markers to be used in the selection of the selective *Or5* and *Or6* genes, 40 primers with high polymorphism were selected among the degenerate RGA primers designed specifically fort he conserved P-loop, kinase-2, kinase-3a, GLPLAL and LRR regions found in the resistance genes of various plants and 52 different PCR was performed in combination. In addination, RGA172, RGA181, RGA192, RGA206, ORS1021, ORS665, ORS1036, ORS1114 markers reported in the literatüre for *Or5* and *Or6* genes were also used. A marker test was carried out on these hybridized and inbred sunflower lines, but a marker that is associated with the *Or5/Or6* gene and can be used for MAS could not be detected in the markers both presented in the literatüre and tested for new development. If the desired result is not achieved; this was attributed to the use of a bumblebee population consisting of a mixture of different races in phenotypic disease tests and the unknown which races are present in this different population.

Keywords: Sunflower, Orobanche, Molecular Marker

NEMATICIDAL POTENTIAL OF VERMİCOMPOST TEA AGAINST *MELOIDOGYNE INCOGNITA* ON TOMATO

Onur DURA[1], Sami DURA[2], Hayriye Didem SAĞLAM ALTINKÖY[3] İlker KEPENEKCİ[4]

[1] Atatürk Horticultural Central Research Institute, Yalova, Türkiye

[2]ROTAM Lifesciences Chemical Agriculture Trade Limited Company Pasaport, İzmir, Turkey

[3]Kırşehir Ahi Evran University, Agricultural Faculty, Plant Protection Department, Kırşehir, Turkey

[4]Tokat Gaziosmanpaşa University, Agricultural Faculty, Plant Protection Department, Tokat, Turkey

onurdura@gmail.com

ABSTRACT

Each year, pesticides and fertilizers are used extensively to ensure quality and high efficiency in plant production. Synthetic chemicals applied against soil pests and synthetic fertilizers applied to regulate plant development not only harm the environment and people health but also reduce soil fertility. Thus, beneficial organisms are reduced in the soil, plant resistance decreases, and the plant becomes sensitive to plant protection factors. In recent years, the sustainability of the soil has been ensured using vermicompost, while potential positive effects have been found against soil pests. With this study, the effect of vermicompost tea against *Meloidogyne incognita*, an important soil pest, was evaluated. In the experiment, doses of 100%, 75%, 50% and 25% were prepared from vermicompost tea. Abamax50 SC® was used as a positive control, and distilled water was used as a negative control. The experiment was set up with 5 replications in a completely randomized design and repeated 2 times. At the end of the experiment, some parameters were evaluated such as gall index scale, number of nematodes, plant height, number of plant leaves, and dry and fresh root weights. According to the results obtained, vermicompost tea has been determined to increase plant root development and the number of leaves. It has been determined that plant development is better at high doses of vermicompost tea. It was determined that the nematode gal index scale decreased as the dose of vermicompost tea increased. The lowest gall index scale was found to be 2.5 at %100 dose application, positive control application was determined as 3.30. In addition, the lowest nematode density was determined in the application of the highest vermicompost tea dose. According to the data obtained, vermicompost tea has been stated to improve soil quality and plant efficiency in its use as fertilizer, while also benefiting from biocontrol against *Meloidogyne incognita.*

Keywords: Vermicompost tea, *Meloidogyne incognita*, Biocontrol

NEMATICIDAL ACTIVITY OF PINE ROSIN EXTRACTS AGAINST *MELOIDOGYNE INCOGNITA* AND *PRATYLENCHUS THORNEI*

Onur DURA[1], Sami DURA[2], Hayriye Didem SAĞLAM ALTINKÖY[3] İlker KEPENEKCİ[4]

[1] Atatürk Horticultural Central Research Institute, Yalova, Türkiye

[2]ROTAM Lifesciences Chemical Agriculture Trade Limited Company Pasaport, İzmir, Turkey

[3]Kırşehir Ahi Evran University, Agricultural Faculty, Plant Protection Department, Kırşehir, Turkey

[4]Tokat Gaziosmanpaşa University, Agricultural Faculty, Plant Protection Department, Tokat, Turkey

onurdura@gmail.com

ABSTRACT

Plant parasitic nematodes cause significant yield losses in agricultural production. The main pests that cause this loss are *Meloidogyne* and *Pratylenchus* species. To control these pests, plant-based pesticides are an important role against synthetic pesticides. In this study, the effectiveness of the natural pine rosin against *Meloidogyne incognita* and *Pratylenchus thornei* was evaluated in laboratory conditions. The concentrations of 2%, 1% and 0.5% of the pine rosin were used in the experiments and their effectiveness at the end of 24, 48 and 72 hours were determined. The experiment was set up with 4 replications in a completely randomized design and repeated 2 times. According to the data obtained, the highest mortality was found at 64.88% in *Meloidogyne incognita* at 2% concentrations, and 66% in *Pratylenchus thornei* at the same concentration at end of 24 hours. The effect of the pine rosin has been determined to increase by dose concentration increase and time of impact. After 72 hours, 100% mortality was found in *Meloidogyne incognita* at 2% concentration, while 96.38% mortality was determined in *Pratylenchus thornei*. According to the results, the pine rosin has been determined to have an effective nematicidal effect.

Keywords: Pine rosin, *Meloidogyne incognita, Pratylenchus thornei*, Biopesticide

OSMOPRIMING UYGULAMASININ TEF (ERAGROSTIS TEF (ZUCC.) TROTTER) TOHUMLARININ DÜŞÜK SICAKLIK ŞARTLARINDAKI ÇIMLENME PERFORMANSI ÜZERINE ETKILERI

Nur Toptaş [1,] & Iskender Tiryaki [1]*

[1] Department of Agricultural Bio-Technology Çanakkale Onsekiz Mart University, Turkey

nurtoptas@stu.comu.edu.tr

ABSTRACT

Tohum çimlenmesi ve fide gelişimi bitkisel üretimin en kritik aşamalardan olup bitkisel verimliliği doğrudan etkilemektedir. Buna karşın düşük toprak sıcaklıkları iyi bir bitki örtüsünün oluşmasını engellemekte ve özellikle direkt tohum ekimi ile üretilen birçok bitki türünde yetiştiriciliği sınırlandırarak büyük ekonomik kayıplara neden olabilmektedir. Bu çalışmanın amacı osmopriming uygulamasının tef tohumlarının düşük sıcaklık şartlarındaki çimlenme performansı üzerine olan etkilerini belirlemektir. Çalışmada tef tohumları farklı konsantrasyonlardaki KNO3, KH2PO4, Gliserol, PEG ve NaNO3 varlığında farklı sürelerle 21 ± 0.5 °C'de prime edilmiştir. Devamında tohumlar faktöriyel olarak düzenlenmiş tesadüf blokları deneme desenine göre 4 tekerrür olarak yürütülen çimlenme denemesine alınmıştır. Tohumlar her petride 50 adet tohum olacak şekilde içerisinde çift katlı kurutma kâğıdı bulunan 60 x 15 mm çapındaki kapaklı petri kaplarına yerleştirilerek üzerlerine 3 ml dH2O ilave edilmiş ve devamında karanlık şartlarda 10 ± 0.5 °C'de çimlenme denemesine alınmıştır. Çalışma sonuçları en yüksek çimlenme oranının (%82) %1.5 NaNO3 varlığında 1 gün süreli yapılan osmopriming uygulamasından elde edildiğini, aynı şartlarda çimlendirilen kontrol tohumlarında ise bu oranın %35.5 olduğunu göstermiştir. Çalışma sonuçları farklı osmopriming uygulamalarının tef tohumlarının düşük sıcaklıktaki çimlenme performansının artırılmasında başarılı bir şekilde kullanılabileceğini göstermiştir.

Keywords: tef, çimlenme, priming, düşük sıcaklık

EFFECTS OF OSMO-PRIMING ON GERMINATION PERFORMANCE OF TEF (ERAGROSTIS TEF (ZUCC.) TROTTER) SEEDS AT LOW TEMPERATURE CONDITIONS

Nur Toptaş [1,] & Iskender Tiryaki [1]*

[1] Department of Agricultural Bio-Technology Çanakkale Onsekiz Mart University, Turkey

nurtoptas@stu.comu.edu.tr

ABSTRACT

Seed germination and seedling emergence are the most important development stages which directly affect plant yield. On the other hand, low soil temperatures prevent a good plant establishment and limit plant production especially for plants which directly propagated by seed planting and cause significant economic loses. The objective of this study is to determine the effects of osmo-priming treatments on germination performance of teff seeds at low temperatures. Teff seeds were primed with various concentrations of KNO3, KH2PO4, Gliserol, PEG and NaNO3 for different time periods at 25 ± 0.5 °C in darkness. Germination test was conducted with 50 seeds with 4 replications by using completely randomized block design at 10 ± 0.5 °C in darkness. The final germination percentage (FGP) and span of germination were determined, and the results were analyzed by using the SAS package program. The differences between the means were determined at the 5% significance level by using the least significant difference method. The results showed that the highest FGP (82%) was obtained from the seeds primed with 1.5 % NaNO3 for 1 d while control seeds had 35.5% FGP. The results of the current study revealed that osmo-priming treatments could successfully be used to improve germination performances of teff seeds at low temperatures.

Keywords: Teff, germination, priming, low temperature

EFFECT OF FOUR EXTENDERS ON THE QUALITY OF FRESH SEMEN IN BULGARIAN SPORTS HORSE BREED

Desislava Abadjieva [1,], Boyko Georgiev [1], Paulina Taushanova [1] & Zlati Shekerov [1]*

[1] Immunoneuroendocrinology Institute of Biology and Immunology of Reproduction, Bas, Bulgaria

dessi_l@abv.bg

ABSTRACT

Ninety-five ejaculates were obtained from five Bulgarian sport horse to study the impact of four extenders (Tris, INRA 82, EquiPlus and Modified Kenny) on the quality of stallions' semen. The aim was to find a link between motility, velocity parameters, morphology and vitality with the enzyme activity of Alkaline Phosphatase (ALP), Lactat Dehydrogenase (LDH), g-Glutamyl Transferase (GGT) and Creatine Kinase (CK) in semen plasma, water and triton X100 extracts from spermatozoa. Results revealed that velocity (VCL, VSL, and VAP) and trajectory parameters (STR and ALH), percentages of live sperm and abnormalities were better in the modified Kenny ($P<0.05$). Concerning activity of ALP, CK, GGT in seminal plasma diluted with modified Kenny extender were significantly higher ($P<0.05$). Enzyme activity of ALP and LDH in seminal plasma and water extract were significant higher in samples with Tris ($P<0.05$). In conclusion, Tris and modified Kenny extenders give better protection to the sperm. Activity of ALP, LDH, CK and GGT enzymes could be used as quality markers of fresh stallion semen from Bulgarian sport horse.

Keywords: semen, extenders, Bulgarian sport horse

IMPORTANCE OF COMMERCIAL SILAGE INOCULANTS

Ibrahim Ertekin [1,] & İbrahim Atış [1]*

[1] Department of Field Crops Mustafa Kemal University, TURKEY

ibrahim.ertkn@hotmail.com

ABSTRACT

Fermentation of green fodder is a traditional forage storage method that gains importance over hay production and feeding green roughage directly to animals. This fermentation technology is simple and based on the compression and storage of green fodder in an airtight environment. In this airtight environment, lactic acid bacteria convert the free sugars into lactic acid. The addition of some lactic acid bacteria to the surface of the silage material at the beginning of fermentation affects the fermentation process at a high level. Most biological additives used for silage contain the highest possible amount of homo-fermentative lactic acid bacteria for silage fermentation. On the other hand, there is a tendency towards hetero-fermentative lactic acid bacteria as well as homo-fermentative lactic acid bacteria that promote silage fermentation. *Lactobacillus buchneri* is the most preferred bacterium among hetero-fermentative lactic acid bacteria. In addition, among the homo-fermentative lactic acid bacteria, *Lactobacillus plantarum* is the most preferred bacteria. In this review, various information about *L. buchneri* and *L. plantarum* bacteria is presented.

Keywords: Silage, Fermentation, Lactic acid bacteria, inoculant

DEVELOPMENT OF DROUGHT TOLERANT ALFALFA (MEDICAGO SATIVA) GENOTYPES AT GERMINATION STAGE

İskender TİRYAKİ[1], Uğur SARI1, Selçuk ÇETİN[1], Okan Acar[2], Enes Gökhan Yılmaz[1], Erman Çavuşoğlu[1] and Beste Celep[1]

[1]Canakkale Onsekiz Mart University, Faculty of Agriculture, Department of Agricultural Biotechnology, 17020, Canakkale, Turkey.

[2]Canakkale Onsekiz Mart University, Faculty of Science, Department of Biology, 17020, Çanakkale, Turkey

ABSTRACT

The global warming is threatening today's agriculture production and water deficiency forces farmers to demand new plant varieties which tolerate drought stress at various plant development stages. The alfalfa (*Medicago sativa*) is an essential forage crop and has a significant economic importance worldwide due to its invaluable contribution to sustainable agriculture. However, alfalfa is very vulnerable to drought stress at germination and early seedling growth as well as at regrowth stage right after cutting in the planting year. Development of new drought tolerant alfalfa genotypes by using crossbreeding or by screening existing a narrow genetic bases of alfalfa is difficult due to low heritability and quantitative inheritance of drought stress controlled by several genes. Mutation breeding combined with molecular approaches provides new opportunities to developed drought tolerant novel alfalfa genotypes. Therefore, the objectives of the present study were to develop new drought tolerant alfalfa genotypes by in vitro screening of EMS mutagenized M3 seeds at germination stages in the presence of osmotic stress of 35% PEG6000. The root growth assay provided several drought tolerant mutants and some of them were further characterized under water-deficit conditions applied for 24 days after the first cutting at flower bud stage. Drought stress responses of mutants were compared with irrigated and unirrigated control plants at the physiological, morphological, and transcriptional levels. The results revealed that ***in vitro*** screening of M3 seeds was able to determine drought tolerant novel mutants which also tolerated water-deficit conditions after the first cutting at flower bud stage and gave unique mode of action at transcriptional and posttranscriptional levels.

The financial support of this study was provided by Scientific and Technological Research Council of Turkey (TUBITAK) with research grant TOVAG-116O417.

Keywords: Lucerne, seed, PEG, drought, RT-qPCR

INFLUENCE OF THE ULTRASOUND TREATMENT ON THE SOWING PARAMETERS OF *COLUTEA ARBORESCENCE* L. SEEDS

Velentin Panchev

Horticulture Agricultural Unïversity - Plovdiv, Bulgaria

valentin_panchev@abv.bg

ABSTRACT

The main goal of the present study was to establish the possibilities for improving the sowing qualities of the seeds of *Colutea arborescence* L. after applying different sonication with ultrasound. The seeds were sonicated pre-sowing for 2, 4, 6 and 8 minutes with ultrasound, the untreated seeds were used as a control. Germination energy, germination, mean germination time, uniformity of germination, length of embryo root, length of hypocotyls and fresh weight of seedlings were determined. The highest germination was found after sonification for 6 minutes. The development of seedlings was with the best values when applied 4 and 6 minutes. A linear regression of period for treatment and germination, with high coefficients of determination R2 = 0.90 was found. A strong positive correlation was observed between the fresh weight of the seedling and the length of the embryonic root.

Keywords: seeds, ultrasound, germination, seedling, sowing quality

STUDY OF THE POSSIBILITIES FOR IMPROVING THE SOWING QUALITIES OF SEEDS AND THE VITALITY OF SEEDLINGS FROM CRYPTOMERIA JAPONICA DON. THROUGH PRE-SOWING TREATMENT WITH ULTRASOUND

Valeria Ivanova

Plant Production Agricultural University – Plovdiv, Bulgaria

valeriasi1@abv.bg

ABSTRACT

Recently, in the production of planting material from ornamental species of trees and shrubs from seeds, more and more attention is paid to various physical methods aimed at increasing the germination and viability of seeds in difficult to propagate species. One of these methods is pre-sowing treatment of seeds with ultrasound. The present study was conducted to determine the effect of ultrasound on the germination and viability of seeds of ornamental species of Cryptomeria (Cryptomeria japonica D. Don.). The experiments were set in the laboratory of the Department of Horticulture, Agricultural University Plovdiv. The experiment with Cryptomeria was conducted from the end of February to the beginning of August. Variants with 5, 10, 15 and 20 minutes exposure were studied. Untreated seeds were used for control. Indicators related to the growth and phenological manifestations of plants were studied. It was found that the treatment of seeds with ultrasound affects the sowing qualities of the seeds of the studied specie. Ultrasound treatment has a beneficial effect on germination in Cryptomeria, with the optimal exposure being 20 minutes - so germination increases by 11% compared to control. Recently, in the production of planting material from ornamental species of trees and shrubs from seeds, more and more attention is paid to various physical methods aimed at increasing the germination and viability of seeds in difficult to propagate species. One of these methods is pre-sowing treatment of seeds with ultrasound. The present study was conducted to determine the effect of ultrasound on the germination and viability of seeds of ornamental species of Cryptomeria (Cryptomeria japonica D. Don.). The experiments were set in the laboratory of the Department of Horticulture, Agricultural University Plovdiv. The experiment with Cryptomeria was conducted from the end of February to the beginning of August. Variants with 5, 10, 15 and 20 minutes exposure were studied. Untreated seeds were used for control. Indicators related to the growth and phenological manifestations of plants were studied. It was found that the treatment of seeds with ultrasound affects the sowing qualities of the seeds of the studied specie. Ultrasound treatment has a beneficial effect on germination in Cryptomeria, with the optimal exposure being 20 minutes - so germination increases by 11% compared to control.

Keywords: Cryptomeria, seed propagation, ultrasound treatment, germination, ornamental plant.

INFLUENCE OF THE APPLICATION OF ULTRASOUND ON THE SEED QUALITY AND THE DEVELOPMENT OF SEEDLINGS OF *LAGERSTROEMIA INDICA* L.

Valeria Ivanova [1,] & Martin Stoilov [2]*

[1] Plant Production Agricultural University – Plovdiv, Bulgaria
[2] Department of Horticulture Agricultural University - Plovdiv, Bulgaria

valeriasi1@abv.bg

ABSTRACT

The use of various physical methods aimed at increasing the germination and vitality of seeds in hard-to-reproduce ornamental species is increasingly applied in nursery practice. One of these methods is pre-sowing seed treatment with ultrasound. The present study was carried out in order to determine the influence of ultrasound on germination and seed viability of the ornamental Indian lilac (Lagerstroemia indica L.) The experiments were carried out in the laboratory of the Department of Horticulture, Agricultural University - Plovdiv. Variants with exposure 5; 10; 15 and 20 minutes were studied. Untreated seeds were used as a control. Characteristics related to plant growth and phenological behaviour were studied. Ultrasonic seed treatment was found to have a positive effect on seed germination and subsequent development of Lagerstremia seedling. Treatment with ultrasound for 5 and 15 minutes resulted in an acceleration of the rate of stem growth, especially in the initial stages of plant development. Stem height and diameter, as well as the number of internodes, were again highest at 5 and 15 min exposure. The number of stem branches is the parameter that is negatively affected by the ultrasound treatment. The 20-minute exposure treatment is not recommended because it negatively affects both the phenological and biometric parameters of the seeds and seedlings.

Keywords: Lagerstroemia indica, ornamental plant, propagation by seeds, ultrasound treatment, germination

A QUICK START TO DO-IT-YOURSELF SMART FARMING: AN EXEMPLARY SYSTEM WITH THE INTERNET OF THINGS

Ismail Ağır

Bioengineering Istanbul Medeniyet University, TURKEY

agr.isml@gmail.com

ABSTRACT

Globally emerging concerns such as climate change, carbon footprint, drought, energy crisis, pandemics and finally food supply chain problems have forced mankind to find new solutions. Since agricultural production is vital and the only way to obtain food, it must be carried out efficiently. In order to protect the health of ecology, sustainability has become the main goal in agriculture as well as everywhere else. Saving the environment and helping it maintain health, preventing pollution, poverty and malnutrition, and increasing agricultural productivity is what the world seeks to achieve today through the Sustainable Development Goals. In order to increase the crop yield and reduce the total energy, water and fertilizer used, the farmers started to apply state-of-the-art technologies in their farmlands. Consequently, the latest developments in digital technologies such as computing, communication and artificial intelligence have been applied to agriculture with great success and finally digital agriculture (or smart agriculture) has become a trending research and application topic. In this paper, we propose a system consisting of fundamental sensors and actuators such as solenoid valve, water pump, UV meter, temperature and humidity sensors, barometric pressure sensor, soil moisture sensor, rain sensor and real-time clock module; to provide a quick start to digital agriculture by developing internet of things enabled irrigation control algorithms and weather monitoring tool. We designed the system by choosing commonly used parts that are suitable for do-it-yourself practice. We used an Arduino supported IoT enabled ESP32 microcontroller, which can also perform some machine learning applications over TinyML. We demonstrated an automated water-saving sprinkler prototype where data from meteorological events and soil sensors is successfully recorded and archived in the cloud storage. We used 10 watt photovoltaic solar panels as power source. We designed the body parts of the system with Autodesk Fusion 360 and 3D printed it with eco-friendly PLA material.

Keywords: digital agriculture, precision agriculture, sustainability, automatic irrigation, weather monitoring

EFFECT OF GROWTH REGULATORS AND SUGARS ON CALLUS INDUCTİON IN SERVICE TREE (*SORBUS DOMESTICA*)

Öznur Öz Atasever [1,] & Sevtap Doksöz Boncukcu [2]*

[1] Horticulture Science Gaziosmanpaşa University, TURKEY
[2] Bahçe Bitkileri Gaziosmanpaşa University, TURKEY

oznur.ozatasever@gop.edu.tr

ABSTRACT

Service tree (Sorbus domestica.) is a species belonging to the Rosaceae family, deciduous in winter and can be grown at different heights (3-25 m.). Propagation of this species is commonly by grafting the plant obtained from the seed. Since the propagation of this species is difficult by vegetative methods, studies are mostly focused on tissue culture methods. In this study, the effects of different growth regulators(BA,IBA) and different sugar doses(30-40 gL-1) on callus induction and shoot formation were investigated. In the experiment, micro-cutting with a length of about 1-2 cm with a single eye on them were disinfected and then planted in 6 different MS media. The best callus formation was obtained from M6 (1mgL-1BA+1mgL-1IBA+40gL-1S) and M7 (0.5mgL-1BA+2mgL-1IBA+40gL-1S) media.

Keywords: micropropagation, benzyladenine, indole butytiric acid, nodule

EFFECT OF PARTIAL SHADING NET AND PLASTIC COVER ON CANOPY MICROCLIMATE, BERRY COMPOSITION AND VINE GROWTH UNDER HOT CLIMATE CONDITIONS

Turcan Teker [1,], R. Oğuzhan Soltekin [2] & Ebru Toprak Özcan [3]*

[1] Hortıculture Eskişehir Osmangazi Unıversıty, TURKEY
[2] Department of Agronomy Manisa Viticulture Research Institute, TURKEY
[3] Department of Breeding and Genetics Manisa Viticulture Research Institute, TURKEY

turcanteker@gmail.com

ABSTRACT

Vineyards in Mediterranean zones are experiencing extreme heat, water scarcity, and high irradiance. In this study, the effects of partial shading net and plastic cover on microclimate conditions of the vineyard of Sultan 7 (*Vitis vinifera* L.) grape and vine growth in Manisa, Turkey, based on data from field experiments conducted between berry set and veraison in 2020-21 season. Three treatments were arranged in the vineyard: (1) control, (2) with 35% of partial shading net (PS), and (3) with 35% of partial shading net (in between berry set time and veraison) plus plastic cover (PSP) (from veraison to harvest) at 50 cm above the vine canopy. Due to seedless variety for raisin production, the vines were trained as a goblet system on a V-shaped trellis with a cane-pruning system. Canopy microclimate values were measured after veraison time. Accordingly, regarding the average daily photosynthetic active radiation (PAR) values, the highest value was obtained from the control (668.00 µmol m-2 s-1) and the lowest from the PSP (338.00 µmol m-2 s-1) treatments. Above the vine canopies, PSP treatment led to plus-shading, but the highest temperature values were recorded. Compared with the control, PS reduced inner canopy temperature by approximately 1℃. Based on one-way ANOVA and multiple comparisons of means Duncan test with $P \leq 0.05$, there was no significant difference between treatments for pruning weight (kg), shoot length (cm), and diameters (mm) of the 3rd - 4th and 11th – 12th nodes. PS (19.70 °Brix) treatment showed slightly lower value soluble solids than control (21.10 °Brix) at harvest time. However, the PSP recorded the lowest value (19.06 °Brix) because of insufficient light and high temperatures above the vine canopy.

Keywords: solar radiation, high temperatures, viticulture, shoot development

WHICH PLANT SPECIES IS MORE SUITABLE FOR THE CONTROL OF TETRANYCHUS URTICAE WITH AMBLYSEIUS SWIRSKII ?

Pınar Hephızlı Göksel [1,] & N. Alper Kumral [2]*

[1] Department of Plant Protection/ Graduate School of Natural and Applied Science Uludağ University, TURKEY
[2] Department of Plant Protection Uludağ University, TURKEY

pinar.hephizli@tarimorman.gov.tr

ABSTRACT

Two-spotted spider mites, *Tetranychus urticae* (Koch) (Acari: Tetranychidae) causes very high economic losses in vegetable cultivation. The predatory mite, *Amblyseius swirskii* Athias-Henriot (Acari: Phytoseiidae), is commercially used for biological control of *T. urticae* as well as thrips and whiteflies, around the World. Since the leaves, petioles and stems of vegetable plants are covered with glandular or unglandular trichomes, the predatory performance, development, survival and fecundity of the predatory mite are negatively affect from these plant defence structures. This tritrophic interaction in vegetable plants leads to complication for biological control of *T. urticae*. The aim of this study was to compare the biological parameters of a native strain of *A. swirskii* when feeding on *T. urticae* adults on different vegetable species such as tomato, pepper, eggplant, cucumber and bean. The observations on the development, survival, oviposition and life table parameters of *A. swirskii* were carried out under controlled laboratory conditions with a 16 h light : 8 h dark photoperiod at 27 ± 1°C and 70 ± 5% RH. Also, functional and numerical responses of *A. swirskii* were determined under same laboratory conditions. As a results of this study, *A. swirskii* was able to develop successfully from egg to adult stage through their entire life cycle on *T. urticae* in all plant species. But, our findings suggest that tomato and pepper were more suitable hosts for *A. swirskii* feed on *T. urticae* compared other vegetable species. This study was a part of Doctoral thesis of the first author and funded as a research project (TAGEM/BSAD/A/20/A2/P5/2043) by TAGEM.

Keywords: Biological control, life tables, Phytoseiidae, predator, tritrophic interaction, vegetables

EVALUATION OF PHYSICOCHEMICAL AND ANTIFUNGAL PROPERTIES OF ARTISANAL APPLE VINEGAR

Boufera Ikram

Department of Agronomic Sciences Mustapha Stanbouli University In Mascara From Algeria

ikram.boufera@univ-mascara.dz

ABSTRACT

Artisanal vinegar is one of the naturel products are considered healthy foods because rich in bioactive compounds that can treat and prevent fungal diseases. This paper aims is the physicochemical characterization of the artisanal apple vinegar and to demonstrate the advantage of their effect against various fungi isolated by fruit (Fusarium oxysporum ; Penicillium sp). The apple vinegar made in traditionel process during 40days by the waste apple of different cultivars and has been subjected to physico-chemical and biochemical analysis . Fungal strains are grown in PDA medium for seven days at 25-27 C° in incubator , the Mycelium growth was achieved by direct contact , which involves adding vinegar in the PDA at a different concentration of 1; 0,5 ; 0,25 ppm . The obtained results show that artisanal apple vinegar has a great effect on inhibiting the growth of fungi pathogens . In conclusion, the study of the effect of artisanal apple vinegar is included in the research of biofungicide to control fungal diseases in postharvest .

Keywords: apple vinegar , traditional process, antifungal activity , characterization , postharvest

EFFECTS OF COMPOST APPLICATION RATE AND MULCH THICKNESS ON SOIL PHYSICOCHEMICAL PROPERTIES UNDER SALT AFFECTED SOIL OF DUGDA DISTRICT OF ORAMIA REGEON, ETHIOPIA

Derartu WODAJO[*1], Amare HAILESLASSIE[2], Adugna DEBELA[3],*

[1]Department of plant science, Wollega University College of Agriculture and natural resources, Ethiopia

[2]International water management Institute (IWMI) Addis Ababa, Ethiopia

[3]Jimma University College of Agriculture and Veterinary Medicine Department of Horticulture and plant Science, Ethiopia

derartuwodajo@gmail.com

ABSTRACTS

Soil is increasingly recognized as an important non-renewable natural asset that should be properly managed to ensure sustainable development. The salt affected soils in Middle Awash Valley have been a challenge to agricultural production. Composts are used in agriculture and horticulture to improve soil fertility and quality because they can increase organic matter content, especially in sandy soils which have low water and nutrient holding capacity. However, the compost and mulch technology options were not demonstrated for irrigated agriculture in the study area. This objective was aimed to determine the effect of mulch and compost application rate on soil physicochemical property under salt affected soil for tomato production. The experiment was conducted in factorial experiment arranged in a Randomized Complete Block Design of three replications. The treatment combinations included four compost rate (0, 2, 4, and 6 ton/ha) and four mulch thickness (0, 5, 10, 15cm). Data on some soil physical and chemical properties and economic benefits were recorded and analyzed. Results showed that, Mg, Om%, CEC, Ec (ds)/m, Na, and Available (Av.P) ppm were significantly ($p<0.01$) affected by the interaction effects of compost application rates and mulch thicknesses. However, pH, TN%, OC%, and Ca are significantly ($p<0.01$) affected by the main effects of compost application rate. The net farm income and benefit cost ratio calculated confirm that, application of 6ton/ha compost rate and 10cm mulch thickness makes farmers' benefited from tomato yield. Further examinations are essential to make reliable technologies for compost rate and mulch thickness and draw recommendations on irrigated tomato production.

Keywords: Soil salinity, compost, mulch, profitability

COMPARATIVE EVALUATION OF GLUCOSE INHIBITION ON GALACTOOLIGOSACCHARIDE SYNTHESIS IN TWO DIFFERENT REACTORS

Kadir Cinar [1,], Haci Ali Gulec [1] & Gurbuz Gunes [2]*

[1] Department of Food Engineering Trakya University, TURKEY
[2] Department of Food Engineering Istanbul Technical University, TURKEY

kadircinar@trakya.edu.tr

ABSTRACT

Galactooligosaccharides (GOS) are an important class of food-grade oligosaccharides produced enzymatically from dairy lactose by β-galactosidase. The enzyme catalyzes hydrolysis and transgalactosylation reactions simultaneously and thus glucose and galactose concentrations increases over time in reaction medium. Considering that galactose is used in the transgalactosylation reaction, keeping the glucose concentration under control would be possible with glucose oxidase enzyme (GOE). Formed glucose molecules in this way can be oxidized to gluconic acid and therefore inhibition level of glucose can be decreased. Therefore, the aim of the presented study is to investigate the effects of GOE on GOS synthesis in two different reactors. Continuous stirred batch reactor (reactor-I) and osmotic membrane distillation integrated reactor (reactor-II) were set to work for lactose concentration (LC) of 32 °Bx, temperature (T) of 35 °C and enzyme concentration (EC) of 6 U/g lactose solution (LS). Initially (t=0), 0.06 mg/g substrate (9.8 U/g LS) GOE from *A. niger* was added to the reaction medium. GOS synthesis were carried out with GOE free, 1x GOE and 4x GOE. The amount of total GOS obtained for 420 min reaction time was found to be 25.72%, 26.39% and 27.10% for reaction mediums of GOE free, 1x GOE and 4x GOE in reactor-I, respectively. In the same order, 27.55%, 27.44% and 26.89% total GOS amounts obtained for reactor-II. There was an increase in the total GOS amount with addition of GOE compared with the result of GOE free experiments. On the contrary, there was a slight decrease in total GOS amount with GOE experiments with respect to GOE free ones. In reactor-II, the inhibition effect of monosaccharides increases as the reaction medium concentration increases with time. Therefore, in the studies performed by adding glucose oxidase in reactor-II, the total GOS and lactose conversion values decreased slightly compared to the studies performed without adding GOE. Since the reaction medium does not concentrate in reactor-II, the concentration of monosaccharides increases more slowly. For this reason, GOE has a slightly positive effect in terms of GOS synthesis performance in this reactor. As a result, the addition of high amount of GOE to reactor-I was not found to be applicable since it would significantly increase the unit cost of GOS.

Keywords: galactooligosaccharide; beta-galactosidase; inhibition; osmotic membrane distillation

ENZYMATIC SYNTHESIS OF GALACTOOLIGOSACCHARIDE IN OSMOTIC MEMBRANE DISTILLATION INTEGRATED SYSTEM: EFFECT OF WATER REMOVAL RATE

Haci Ali Gulec [1], Kadir Cinar [1,] & Gurbuz Gunes [2]*

[1] Department of Food Engineering Trakya University, TURKEY
[2] Department of Food Engineering Istanbul Technical University, TURKEY

kadircinar@trakya.edu.tr

ABSTRACT

Galactooligosaccharides (GOS) have been identified as the most specific bifidogenic factors among the prebiotic carbohydrates. GOS are synthesized from lactose by transgalactosylation reactions catalyzed by the enzyme β-galactosidase. However, GOS synthesis efficiency of this enzyme is low because it catalyzes transgalactosylation and hydrolysis reactions simultaneously. In order to increase the efficiency of GOS synthesis, the integration of osmotic membrane distillation system into the enzymatic GOS synthesis process was done. Compared with continuous stirred batch reactor, an increase in total GOS was achieved in this production system since it provides high selectivity separation of only water from the enzymatic reaction medium with a microporous membrane with high hydrophobicity. However, insufficient permeate flux values were obtained at low reaction temperatures due to narrow area of flat membrane. Therefore, it was considered that the desired reactor performance might have not been achieved due to this drawback. Also, it is observed in this reactor that transgalactosylation activity was higher in the first 1-2 hours of the GOS synthesis reaction. In this manner, it was aimed to investigate how the transgalactosylation activity would be affected if the concentration of galactosyl receptors in the environment increased in this time period, in other words, if the water removal rate was increased. For this purpose, GOS synthesis was studied with a flat membrane at different initial feeding amounts and a capillary type membrane with a larger membrane area. Osmotic membrane distillation integrated reactor were set to work for lactose concentration (LC) of 32 °Bx, temperature (T) of 35 °C and at different enzyme concentrations (EC). It was found that no significant difference was observed in the total GOS at increasing or decreasing water removal rates compared to the results obtained with the 300g initial feed solution. There was no correlation between transgalactosylation activity and water removal rate. It was conducted that the enzyme needs particular time for transgalactosylation activity, so a slow increase in the reaction medium brix rate provides better results. Because the rapid increase in the concentration of enzyme inhibiting agents in the reaction medium limited the transgalactosylation activity.

Keywords: galactooligosaccharide; osmotic membrane distillation; transgalactosylation; flux

ESSENTIAL OIL COMPOSITION AND ANTIOXIDANT ACTIVITIES OF FOUR CULTIVARS OF LAVENDER FROM EDIRNE

Buket Askin [1,], Sercan Ozbek Yazıcı [2], Yalçın Kaya [3] & Merve Guzel [4]*

[1] Department of Food Engineering Kirklareli University, TURKEY
[2] Department of Nutrition and Dietetics Mehmet Akif Ersoy University, TURKEY
[3] Department of Genetics and Bioenqineerinq Trakya University, TURKEY
[4] Agriculture and Forestry Directorate of Trakya Agricultural Research Institute Agriculture and Forestry Directorate of Trakya Agricultural Research Institute, TURKEY

buketaskin@klu.edu.tr

ABSTRACT

The research is the first study to compare the chemical compositions of 3 different lavender cultivars, including Raya, Seutopolis, Mubileina and Hemus, after adaptation in Edirne. The essential oil composition, polyphenol content and antioxidant activities of these cultivars were evaluated. The essential oils of these varieties were basically characterised by β-Linalool (47-35, %), Linalyl acetate (22- 29, %), α-Terpineol (5-0.46, %), Lavandulyl acetate (5-4, %), 1-Terpinen-4-ol (0.09-8.12, %), 3-Octanone (0.78-1.89, %), Limonene (0.35-0.27, %), Lavandulol (0.00-2.49, %), β-Cadinene (0.00-0.24, %) and camphor (0.26-0.72, %). The essential oils from these varieties have also significant differences for total phenolic and antioxidant contents. Hemus and Raya oils possess the highest total phenolic contents (16.98 µg GAE/mg (10µL) and 16.22 µg GAE/mg (10µL), respectively), followed by Mubileina and Seutopolis (12.77 µg GAE/mg (10µL) and 9.17 µg GAE/mg (10µL), respectively). The antioxidant activities as well as chemical composition of from essential oils of lavanders were compared. The highest antioxidant activity was calculated by the essential oil from seutopolis (18.403 mg/mL) while the oil from Hemus, Mubileina and Raya had lower antioxidant activity (14.666 mg/mL, 8.208 mg/mL and 4.639 mg/mL, respectively). This research has importance for agriculture and commercial production of Lavander in Edirne. Because these results belong to the cultivars that the first adaptation in Edirne, which formerly grown in Bulgaria.

Keywords: Essential oil, Lavander, Lavander cultivars, β-Linalool, Linalyl acetate

DEVELOPMENT OF ORGANIC AGRICULTURE IN THE WORLD AND IN TURKEY

Süheyla Ağızan [1], Kemalettin Ağızan [2,] & Zeki Bayramoğlu [2]*

[1] Department of Organic Agriculture Management Selçuk University, TURKEY
[2] Department of Agricultural Economy Selcuk University, TURKEY

agizankemalettin@gmail.com

ABSTRACT

The rapid increase in the world population has increased the need for food and intensive chemical inputs have been used in agricultural enterprises in order to obtain more output in a short time. Although this situation causes the deterioration of the ecological balance and the reduction of natural resources, the fact that approximately 1/3 of the population experiences hunger has not been able to solve the food security problem. Therefore, it is necessary to develop alternative agricultural systems that will produce enough to meet the needs of the population without disturbing the ecological balance, without polluting the environment. Organic (ecological) agriculture, which is one of the alternative production systems developed within this framework, has started a new period of structural change in the production process. While this structural change is gaining momentum due to the high level of healthy living awareness in countries, the development process of organic agriculture needs to be analyzed in order to improve the process and make better use of the opportunities. In this study, it is planned to reveal the difference of the organic agriculture sector from other agricultural systems and to compile the developments and emerging opportunities in the process. Thus, by discussing the opportunities that arise in response to the developments in organic agriculture, suggestions will be developed to increase the competitiveness of the new world order and to ensure the sustainability of production.

Keywords: organic agriculture, ecological agriculture, sustainable agriculture

CLIMATE CHANGE IMPACT AND ADAPTATION MECHANISM FOR IN AGRICULTURE IN ETHIOPIA

Derartu WODAJO[1], Wayessa GERADEW[2],*

[1]Department of plant science, Wollega University College of Agriculture and natural resources, Ethiopia

[3]Jimma University College of Agriculture and Veterinary Medicine Department of Horticulture and plant Science, Ethiopia

derartuwodajo@gmail.com

ABSTRACT

Climate change refers to long term fluctuations of temperature, precipitation, wind and other elements of Earth's climate system. It is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global or regional atmosphere. Severe weather events such as droughts and floods have historically imposed heavy costs in Ethiopia. Once every three or four years is a drought year in Ethiopia. Environmental degradation is also a critical factor which exacerbates soil loss, deforestation, and pest incidence all of which affect agricultural productivities and food security.Small- scale, rain fed, subsistence farmers and pastoralists, Women those highly involved in agricultural activities and Children are the most vulnerable groups to climate changes in Ethiopia. The causes of vulnerability includes, very high dependence on rain fed agriculture which is very sensitive to climate variability and change, under-development of water resources, low health service coverage, high population growth rate, low economic development level, low adaptive capacity, inadequate road and infrastructure in drought prone areas, weak institutions, lack of awareness etc and all are represents key challenge for adaptive capacity building in the country. The Ethiopian Government has already set in place a number of policies, strategies and programs aimed at enhancing the adaptive capacity and reducing the vulnerability of the country to climate variability and change. Thus, this paper tries to review climate change impact and its adaptation mechanism for sustainable livelihood in agriculture a case of Ethiopia.

Keywords: vulnerability, sustainable livelihood, adaptation option, challenges

MEDICINAL CROP PRODUCTION UNDER SOILLESS CULTURE AS RAW MATERIAL TO PHARMACEUTICAL INDUSTRY IN PAKISTAN: ANALYTICS AND CHALLENGES

Arshad Mahmmod Malik Dr

Department of Economics Pmas-Arid Agriculture University Rawalpindi, Pakistan

arshadmm@uaar.edu.pk

ABSTARCT

Global Pharmaceutical industry is growing rapidly with an annual compound growth rate of 5.8% till 2025. In Pakistan, only 5% API's are manufactured locally due to infant pharmaceutical industry posing high import bill for rest of API's. The Ginger, Garlic and Turmeric are in human use due to their medicinal importance, strong healing, anti-inflammatory and antioxidant properties (due to phenolic compounds) from the ancient times. Garlic has widespread pharmacological effects of A. sativum and its organosulfur compounds especially Allicin. Enhancing the product quality and market expansion need crop stability and performance evaluation. This research is planned to analyses the past performance of these three specialty crops on the basis of 19 years' secondary data from 2001-20. Cuddy-Della Valle Instability index was applied to estimate instability in relation to production area and yield. Growth rate of these crops were measured using compound annual growth rate. On the basis of these results, these crops were grown in controlled environment under soilless culture to improve productivity and provision of raw material for future pharmaceutical industry. Results indicated overall significant fluctuation in instability index and growth rate. Further regression for percentage growth rate and instability index was calculated by applying Cuddy-Della Valle index which showed positive and negative effect of growth rate and performance instability under the area and yield of the respective medicinal crop. This indicate crop stability level in this time series data. Furthermore, significant improvement has been noticed in productivity of these crops under soilless conditions. The results of the study will support policy makers and planners to improve crop stability and productivity in the country which is a vital pillar of food security and health.Global Pharmaceutical industry is growing rapidly with an annual compound growth rate of 5.8% till 2025. In Pakistan, only 5% API's are manufactured locally due to infant pharmaceutical industry posing high import bill for rest of API's. The Ginger, Garlic and Turmeric are in human use due to their medicinal importance, strong healing, anti-inflammatory and antioxidant properties (due to phenolic compounds) from the ancient times. Garlic has widespread pharmacological effects of A. sativum and its organosulfur compounds especially Allicin. Enhancing the product quality and market expansion need crop stability and performance evaluation. This research is planned to analyses the past performance of these three specialty crops on the basis of 19 years' secondary data from 2001-20. Cuddy-Della Valle Instability index was applied to estimate instability in relation to production area and yield. Growth rate of these crops were measured using compound annual growth rate. On the basis of these results, these crops were grown in controlled environment under soilless culture to improve productivity and provision of raw material for future pharmaceutical industry. Results indicated overall significant fluctuation in instability index and growth rate. Further regression for percentage growth rate and instability index was calculated by applying Cuddy-Della Valle index which showed positive and negative effect of growth rate and performance instability under the area and

yield of the respective medicinal crop. This indicate crop stability level in this time series data. Furthermore, significant improvement has been noticed in productivity of these crops under soilless conditions. The results of the study will support policy makers and planners to improve crop stability and productivity in the country which is a vital pillar of food security and health.

Keywords: Garlic, ginger, turmeric, growth, instability, production area, yield, Cuddy - Della Valle index, Pharmaceutical industry, Pakistan

ASSESSMENT OF LAND COVER, LAND USE AND WATER QUALITY IN THE OSAM RIVER BASIN, BULGARIA

Kristina Gartsiyanova [1,], Stefan Genchev [2] & Atanas Kitev [2]*

[1] Hydrology and Water Management Research Center National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences, BULGARIA
[2] Department of Geography National Institute of Geophysics, Geodesy and Geography-Bulgarian Academy of Sciences, BULGARIA

krisimar1979@gmail.com

ABSTRACT

Land use and land cover is a key factor in relation to water quality characteristics. This article aims to assets the land cover, land use and water quality in the upper and middle catchment of the Osam River (municipalities of Troyan and Lovech) for the period 1990-2018. The emphasis is on acquiring new knowledge through spatial-temporal analysis of the problem. To assess the river water quality this study considers the following parameters: pH, dissolved oxygen (DO), electric conductivity (EC), ammonia (N-NH4), nitrates (N-NO3), nitrites (N-NO2), phosphates (P-ortho-PO4), biological oxygen demand (BOD5). To identify the land use/cover in the region is based on GIS, digital topographic and thematic maps, Corine Land Cover data, high resolution satellite imagery (Google Earth), digital elevation model, statistics and field studies. The results obtained in this study show that during most of the analyzed period the concentrations of such indicators as phosphates (P-ortho-PO4), biological oxygen demand (BOD5), ammonia (N-NH4), nitrates (N-NO3), nitrites (N-NO2) are much higher than the reference norms. The point and non-point sources of pollutants that affect the quality of river water are defined. The obtained results are a good basis for planning and elaboration of the necessary policies for sustainable management of both land use and river waters in terms of their quality.

Keywords: Land use, Land cover, Water Quality, GIS, Osam River

EXPERIENCE IN PERFORMING RESTORATION WORKS OF DOCK PARTS OF PUMPING STATIONS USING THE INJECTION WATERROOFING METHOD

Voitovych Ivan [1] & Nataliya Bryuzgina [1,]*

[1] Национальная Академия Аграрных Наук Украины Институт Водных Проблем И Мелиорации, Ukraine

natalya-51@i.ua

ABSTRACT

Research has established that the majority of pumping stations of reclamation systems in Ukraine are in unsatisfactory technical condition. This especially applies to the dock part of the buildings of pumping stations. During the inspection of the technical condition of the dock part of the buildings of the pumping stations, leaks and seepage of water were found in the area where the wall of the dock part adjoins the groundwater, and in the entrance areas of the suction and pressure pipelines. In order to stop water filtration, the technology of eliminating active leaks by injecting two-component polyurethane compositions was used. The two-component polyurethane composition consists of component A - various types of polyols and component B - polyisocyanates of different chemical nature. When in contact with water, polyurethane resins enter into a chemical reaction with the release of carbon dioxide, which leads to the formation of foam and an increase in the volume of the material (from 3 to 25 times) and an increase in its internal pressure (up to 30 bar). The foam, which spreads over the structure, displaces water from the cavities and forms a waterproof polyurethane filler inside them. To perform the work, we chose a fast-reacting two-component resin SagboRur F from the company Minova. In the process of carrying out restoration works in the zone of filtering areas by the method of injection waterproofing with the use of this composition, water filtration through the body of concrete in the dock parts of the pumping stations was eliminated. Hardening time of the composition up to 60 s, adhesion to water-saturated concrete > 2.75 MPa and compressive strength 79 MPa. Development of the technology of injection waterproofing with two-component polyurethane compositions was carried out during restoration works at a number of pumping stations of the protective massifs of the cascade of Dnipro reservoirs. The monitoring of the quality of work carried out during 2018 - 2022 allows us to draw a conclusion about the quality of the restoration sections of the constructions of the dock parts of the pumping stations. Thus, the application of the technology of restoring the anti-filtration state by the method of injection waterproofing with polyurethane water-reactive resins is a promising technical solution.

Keywords: reclamation systems, water seepage, pumping stations, injection waterproofing

A REVIEW ON THE CUTTING-EDGE BIOTECHNOLOGICAL METHODS WITH THEIR UTILIZATION FOR IMPROVED FRUIT CULTIVARS IN TURKEY

Ghassan Zahid [1, 2], Sara Iftihar[3], Flavien Shimira [4], Fildaus Nyirahabimana [1] Dicle Dönmez[5] and Yıldız Aka Kaçar[4]

[1]Department of Biotechnology, Institute of Natural and Applied Sciences, Çukurova University, 01330, Adana, Turkey.

[2]Department of Biotechnology, The University of Azad Jammu and Kashmir, 13100, Muzaffarabad, Pakistan.

[3]Department of Biotechnology, Institute of Applied Biosciences, National University of Science and Technology, 44000, Islamabad, Pakistan.

[4]Department of Horticulture, Institute of Natural and Applied Sciences, Çukurova University, 01330, Adana, Turkey

[5]Biotechnology Research and Application Center, Çukurova University, Adana, Turkey

[4]Department of Horticulture, Institute of Natural and Applied Sciences, Çukurova University, 01330, Adana, Turkey

ghassanzahid@gmail.com

ABSTRACT

In the human diet, fruits are a significant source of vitamins, beneficial nutrients, fiber, and antioxidants, as well as the key source of foreign exchange earnings. Turkey has a rich scope of plant genetic resources and a wide range of fruit diversity, making it one of the most significant in the world. More than 80 fruit species are cultivated. Among them are temperate, tropical, and subtropical fruits such as apples, figs, pear, citrus (lemons, mandarins, and oranges), bananas, avocados, hazelnuts, Prunus (apricots, plums, peaches, cherries, almonds, and nectarines), and kiwis, etc. But in recent years, the abrupt increase in population, climate change and diverse adversities, mainly biotic and abiotic stresses, are hampering fruit productivity in Turkey and globally. To counter the above-mentioned constraints and to better understand the genetic resources and germplasm conservation of Turkish fruits, various biotech solutions are being considered. For instance, modern molecular biotechnology tools such as tissue culture, genetic markers, DNA-based molecular markers, sequencing, omics approaches, and genome editing are being used by researchers. In the same way, transgenes have been effectively used to enhance fruit crops, mainly based on improved tolerance to biotic and abiotic stress, increased fruit yield, minimizing generation time, high nutrition content, and better pre-and post-harvest features. In this note, we provide and report the latest studies being conducted by Turkish breeders and scientists.

Keywords: Climate change, Pomology, Molecular characterization, Genome-editing. Plant biotechnology

ALTERNATIVE SOLUTIONS TO THE CROP PLAN FOR THE EAST AREA OF ROMANIA, IN THE CONTEXT OF DRY-FARMING

Luxita RISNOVEANU[1,2], Daniela OPREA[1,3,], Marian BRAILA[1]*

[1] Agricultural Research Development Station Braila, Viziru km. 9 street, Braila County, Romania

[2] Bucharest University Economic Studies, Faculty of Agri-food & Environmental Economics, 6 Piata Romana, Bucharest 010374, Romania

[3] University of Agronomic Science and Veterinary Medicine – Bucharest, Bucharest, Romania

daniela.oprea@agro.usamv.ro

ABSTRACT

Implementation of the dry-farming work system is one of the solutions that allow maintaining the balance between the growing demand for the production of food and plant biomass with different uses, together with the negative impact that intensive agriculture has on the planet's natural resources. The paper aims to observe how some species of oilseed plants, namely *Sinapis alba* L., *Linum usitatissimum* L., and *Coriandrum sativum* L., can adapt to the prolonged drought conditions of the south-eastern part of Romania and its impact on the quality and quantity of the harvests obtained. *Sinapis alba* L. proved to be the plant with the highest sensitivity to the lack of precipitation, suffering losses of 70-80%. The emergence of *Coriandrum sativum* L. was higher compared to *Linum usitatissimum* L. and *Sinapis alba* L.

Keywords: *dry-farming, alternative crops, drought, productions*

AZADIRACHTA INDICA'NIN TÜRKİYE'DE YETİŞTİRİLMESİ, BU TÜRE AİT TOHUMLARDAN NEEM YAĞI VE NEEM TOZU ÜRETİMİ İLE ÜRETİLECEK AZADIRACHTIN A İZOMERİ BAZLI PESTİSİTİN BİYOLOJİK ETKİNLİĞİNİN BELİRLENMESİ

Tunahan ERDEM[1], Şule POLAT[2], Nesibe Ebru Kafkas[2]*

[1] Çukurova Üniversitesi Ziraat Fakültesi, Tarım Makineleri e Teknolojileri Mühendisliği, TURKEY

[2]Çukurova Üniversitesi Ziraat Fakültesi, Bahçe Bitkileri Bölümü, TURKEY

ABSTRACT

Dünya'da (Neem) ağacı olarak bilinen, Azadirachta Indica her dem yeşil bir bitki türüdür. Dört ayrı türü olan ağacın Anavatanı Hindistan, Burma, Pakistan, Güney Asya ve Avustralya'dır. Ülkemizde diğer bir türü olan Melia Azaderach tropik iklim bölgelerinde doğal olarak yetişen tespih ağacının başlıca kullanılan kısımları olgunlaşınca açık sarı renk alan meyveler ve yapraklarıdır. Meyveler Eylül-Ekim aylarında morfolojik olgunluğa ulaşmaktadırlar. Neem (Tespih ağacı) yağı bu meyvelerden, tozu ise hem meyvelerden hem de yapraklarından elde edilen ve organik tarım, tıp ve kozmetik ürünlerinde kullanılan ürünler olarak piyasada yer almaktadır. Neem yağı ekstraksiyon metoduna bağlı olarak içerisinde 300 ppm ile 2500 ppm oranında azaderachtin etkili maddesi içermektedir. Böceklere karşı kullanılan tetratriterponoid yapıdaki azaderachtin, böceklerde uzaklaştırıcı (repellent), beslenmeyi engelleyici, doğurganlığı azaltıcı, kısırlaştırıcı, yumurta bırakmayı önleyici, gelişme ve büyümeyi engelleyici etkileri olması sebebiyle Biopestisit olarak organik tarımda kullanılmaktadır. Bitkisel kökenli doğal insektisitler dünya insektisit pazarının %1'ini oluşturmakta ve organik tarıma yönelimin artması nedeniyle yılık satışlar her sene yaklaşık %10-15 oranında artış göstermektedir. Neem yağı ülkemize Hindistan ve diğer ülkelerden ithal edilmektedir. Ortalama olarak 1 litre neem yağı 900 TL'den satılmaktadır.

Bu çalışma ile neem yağının üretiminde kullanılan ve ülkemizde bulunmayan Indica türüne ait varyantların getirtilerek doku kültürü ile çoğaltılması ve bu varyantların tohumlarından çıkarılan neem yağının Azadirachtin A izomeri bazlı bir pestisit üretiminde kullanılması planlanmaktadır. Çalışma TAGEM-21/AR-GE/11 nolu proje kapsamında yürütülmektedir.

Keywords: Azadirachta Indica, Neem, Bio-Pest

PORTAKAL KABUK YAĞININ BIO-PESTISIT OLARAK KULLANIM OLANAĞI

Tunahan ERDEM[1], Nesibe Ebru KAFKAS[2]. Selçuk ULUSOY[3]*

[1] Çukurova Üniversitesi Ziraat Fakültesi, Tarım Makineleri e Teknolojileri Mühendisliği, TURKEY

[2]Çukurova Üniversitesi Ziraat Fakültesi, Bahçe Bitkileri Bölümü, TURKEY

[3]Adana Biyolojik Mücadele Araştırma Enstitüsü, TURKEY

ABSTRACT

Tarımsal pazar alanında yapılan çalışmalar son 15 yılda kimyasal bağımlı tarımın dünya çapındaki alanların büyük çoğunluğunu oluşturmasına rağmen, alternatif kalıntısız gıda ağlarına ve yeni pazarlar için ekolojik üretime orantısız bir şekilde ihtiyaç olduğunu göstermektedir. Özellikle ülkemiz tarım ürünlerinin ihracatında kalıntı büyük bir problem olarak karşımıza çıkmaktadır. İhraç ülkelerinin kalıntı eşiğinin düşük olması bu ürünlerin sağlıksız kabul edilmesi hem iç hem de dış pazar açısından önemli ekonomik kayıplara neden olmaktadır. Bu yüzden kalıntısız ürünlerin üretilmesi ve ihracata gitmesi oldukça önem arz etmektedir. Bio-pestisitler sıfır kalıntı etkinliğine sahip biyoloji preparatlar olup yaygınlığı tüm dünyada arttırılmaya çalışılmaktadır. Böceklerle mücadelede doğa dostu sürdürülebilir yeni ve farklı etki mekanizmalarına sahip ajanlar geliştirilmelidir. Son on yılda entegre mücadele programlarında kullanılabilecek biyolojik olarak ayrışabilir, pestisitlere alternatif bir strateji olarak görülen ve uygun potansiyele sahip doğal biyolojik aktiflere yani bi0-pestisitlere olan talep yoğun bir şekilde artmaktadır. Bu nedenlerle bitkisel kökenli pestisitler çevre dostu olması entegre mücadele yaklaşımlarına uygunluk hem çevre hem de insan sağlığı açısından GRAS (Generally Regarded As Safe, Güvenli olarak kabul edilen) statüsünde olması nedeniyle dikkatleri üzerine çekmektedir. Öte yandan, D-limonen (1-methyl-4-(1-methylethenyl) cyclohexane) doğal en yaygın monosiklik monoterpenlerdendir. En fazla miktarda narenciye çeşitleri(portakal, limon mandarin, laym ve altıntop) bünyesinde özellikle meyve kabuklarında bol miktarda ihtiva edip limon benzeri bir kokuya sahiptir. D-limonen GRAS (Code of Federal Regulations as generally recognized as safe) statüsünde yani insan sağlığı çevre ve ekolojik anlamda güvenli kabul edilen geri dönüşümü olan sürüdürülebilir doğal bir bileşen olarak kabul edilir. D-limonenin pek çok fungus türü ve bazı bakteri türleri üzerinde antimikrobik, antifungal ve anti bakteriyel etkileri olduğu da saptanmıştır. Bu çalışmada, portakal kabuğu esansiyel yağının bio-pestisit olarak olası kullanımını belirlemek için portakal kabuğu esansiyel yağı ekstrakte edilmiş ve içeriği analiz edilmiştir. Portakal kabukları güneş ışığı altında kurutulmuş ve esansiyel yağı portakal kabuklarından soksalet yöntemiyle ekstrakte edilmiştir. D-Limonen'in su buharı distilasyon yöntemi ile verimi %8.46 olarak kaydedilmiştir.

Keywords: Portakal, D-Limonen, Bio-Pestisit

HONEY POWDER AS INTERMEDIATE PRODUCT FOR BIOACTIVE SUPPLEMENT MANUFACTURING

Ozlem TOKUSOGLU[1,2]

[1]*Celal Bayar University, Engineering Faculty, Department of Food Engineering, Manisa, Turkey*

[2]*Dokuz Eylül University Techn. Develop. Zone, DEPARK Technopark, SPİL INNOVA Food R &D Consultant LLC, İzmir, Turkey*

proftokusogluozlem@gmail.com

ABSTRACT

Honey, a natural biological bee-food evolved from plant and fruit nectar and of major benefit to human body as food and drug, contains high sugar such as fructose and glucose (80- 90%) and water, additional to small levels of proteins, minerals, organic acids, and vitamins and phenolic compounds. Owing to its unique aroma and taste as well as its numerous health-promoting properties, honey has been significantly consumed. In this research, honey and gum-arabic (as a carrier) was spray dried by Buchi laboratory type pilot drying unit. The procedure took 60 min with an inlet air temperature of 60ºC and an outlet air temperature not exceeding 36ºC by novel procedure of our developed and particles sizes were in the range of 5-25 µm. The invention relates to the food industry and can be utilized in the health industry for value-added health promoting supplements, for confectionery and ready-to food industry and for commerce products.

Keywords: Honey powder, Spray-drying, Intermediate product, Food supplement

COFFEE TOXICOLOGY AND LIVER HEALTH: EFFECTS ON PROCESSED COFFEE PRODUCTS

Ozlem TOKUSOGLU[1,2]

[1]*Celal Bayar University, Engineering Faculty, Department of Food Engineering, Manisa, Turkey*

[2]*Dokuz Eylül University Techn. Develop. Zone, DEPARK Technopark, SPİL INNOVA Food R &D Consultant LLC, İzmir, Turkey*

ABSTRACT

The present study aimed to investigate the beneficial effects of coffee on the liver. The results show that coffee has beneficial effects on the liver and can reduce liver disease progression due to its antioxidant properties. Coffee contains antioxidant capacities of chlorogenic acid, hydrophilic components, hydrophobic components, lactones, and diterpenes. There are also rich amounts of potassium and magnesium in coffee. Roasting of the green coffee beans at high temperatures will make unique components due to the chemical reactions between carbohydrates and amino acids as Maillard reactions. Caffeine with a purine derivative is found in several dietary sources, including tea, chocolate bars, coffee, cocoa beverages, energy, and soft drinks. Caffeine can pass all biological membranes due to the hydrophobic properties of caffeine. Three primary metabolites, such as theophylline, theobromine, and paraxanthine, are caused by metabolizing caffeine in the liver. Caffeine at normal consumption doses mainly acts among humans as an antagonist of adenosine receptors. Two cups of coffee per day should be consumed to show its beneficial effects. Coffee drinkers experience a lower incidence of advanced cirrhosis and fibrosis. There are also differences between males and females in their responses to caffeine due to changes in circulating steroid hormones.

Keywords: Coffee, Caffeine, Liver

CITRININ MYCOTOXIN RISK IN BLACK AND GREEN TABLE OLIVES: THE QUICK SIMULTANEOUS DETERMINATION WITH OCHRATOXIN-A BY NOVEL EXTRACTION AND IAC-HPLC

Ozlem TOKUSOGLU[1,2]

[1]*Celal Bayar University, Engineering Faculty, Department of Food Engineering, Manisa, Turkey*

[2]*Dokuz Eylül University Techn. Develop. Zone, DEPARK Technopark, SPİL INNOVA Food R &D Consultant LLC, İzmir, Turkey*

proftokusogluozlem@gmail.com

ABSTRACT

The mycotoxin citrinin (CIT) (and ochratoxin-A (OTA) are formed as a secondary meta- bolic product of the mould fungi Penicillium, As- pergillus, Pythium and Monascus on agricultural products. CIT and OTA were simultaneously identified using immunoafinity column-high performance liquid chromatography with fluorescence detection (IAC-HPLC- FD) (Ex.333 nm; Em:495 nm) after an optimized extraction procedure. The four categories of citrinin levels [0-0.55; 1.56-2.0; 0.66-2.64; 5.76- 14.55 µg kg-1 of CIT] and three categories of ochratoxin levels [0 - < 0.1; 0.1-0.25; 0.30- 0.46 µg kg-1 of OTA] were found in 88 groups of olive samples. Recovery studies [y= 21416x - 7919.4 (R2=0.9998) for citrinin and y= 0.0001x + 0.0074 (R2=0.9999) for ochratoxin A] were performed and the mean analytical recoveries detected in CIT and OTA in table olives ranged from 92.65 - 96.83% and 88.92 - 95.58%, respectively. Limit of detection (LOD) was equivalent to 0.05 µg/kg for both CIT and OTA. With the proposed method, CIT and OTA were both quickly determined in table olives and could be used to detect of mycotoxinic risks in a HACCP quality system of olive and olive-based food products.

Keywords: Table Olives, Mycotoxin, Citrinin, Ochratoxin-A, Extraction, IAC-HPLC

ASSESSMENT OF SALT AND WATER STRESS TOLERANCE OF TUNISIAN SQUASH (*CUCURBITA MAXIMA* DUCHESNE) GERMPLASM DURING THE GERMINATION AND EARLY SEEDLING GROWTH

Neji TARCHOUN[1], Wassim SAADAOUI[1] , Khawla HAMDI[1] , Hanen FALLEH[2], Lillian BARROS[3], Riadh KSOURI[2]

[1] Laboratory "Management of Horticulture species in Organic and Conventional system" High Agronomic Institute of Chott Mariem, Department of Horticulture sciences, Sousse University- Tunisia

[2] Laboratory of Aromatic and Medicinal Plants, Center of Biotechnology, Technopark of Borj Cedria, BP 901, 2050 Hammam-Lif, Tunisia

[3] Centro d'Investigação de Montanha (CIMO) Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal

ABSTRACT

High salinity in soil or irrigation water and drought are considered as the most common abiotic stresses affecting seed germination and seedling growth especially in arid and semi-arid regions. Seed germination is the most sensitive stage during the life-cycle of many species. Local squash landraces are the important vegetable crops in Tunisia cultivated in open field and under greenhouse. The present study was carried out to assess the salt and water tolerance of four local squash (*Cucurbita maxima* Duchesne) landraces (Batati, Galaoui, Karkoubi and Bejaoui). Different salt (NaCl) and D-Mannitol concentrations of 0, 100, 200 and 300 mM were selected in order to evaluate the response of the study germplasm based on germination potential and agro-morphological traits of seedlings. A varied effect of the salt and water stress level was observed among the studied landraces. Results showed that all landraces were drastically affected at high stress NaCl and D-Mannitol level with a significant variation in their stress response, indicating the existence of considerable genetic variability. Under salt stress, landraces NGB746 (Batai) and 747 (Galaoui) were the best performing cultivars across stress levels, while under drought stress NGB751 (Bejaoui) proved as the most capable to germinate under the high water deficit. The seedling traits (shoot and root length, shoot and root fresh weight...) were more sensitive under drought stress than NaCl stress, nevertheless, root elongation was more affected under both stress than shoot growth. These findings can be extrapolated into efforts to develop more salt and water tolerant squash landraces and exhaust the possibilities of using saline water or soils under changing climate conditions.

Keywords: Cucurbita sp; landraces; salinity and water stress; seed germination; seedling growth

PARTICIPANT LIST

#	NAME	SURNAME	E MAIL	COUNTRY
1	Alma	Imeri	aimeri@ubt.edu.al	Albania
2	Amilda	Ballata	amilda.ballata@fshn.edu.al	Albania
3	Eglantina	Xhemollari	eglantina_xhemollari@yahoo.it	Albania
4	Elvin	Çomo	elvincomo1@gmail.com	Albania
5	Eniada	Reçi	eniadareci@gmail.com	Albania
6	Enkeleda	Ozuni	enkeleda.ozuni@ubt.edu.al	Albania
7	Ermelinda	Gjeta	ermelindagjeta@live.com	Albania
8	Manjola	Kuliçi	mkulici@ubt.edu.al	Albania
9	Edina	Muratović	edina1muratovic@yahoo.com	Bosnia & Herzigova
10	Selma	Vejzagic	selma.vejzagic@web.de	Bosnia & Herzigova
11	Oscar	Akouegnonhou	oscarak1989@gmail.com	Benin
12	Albena	Bekyarova	albenabekyarova1@gmail.com	Bulgaria
13	Atanas	Atanassov	atanas_atanassov@jgc-bg.org	Bulgaria
14	Desislava	Abadjieva	dessi_l@abv.bg	Bulgaria
15	Dimka	Haytova	haitova@abv.bg	Bulgaria
16	Dobry	Yarkov	yarkov@abv.bg	Bulgaria
17	Ekaterina	Valcheva	valchevakatia@gmail.com	Bulgaria
18	Emil	Vasilev	vasilev_642@abv.bg	Bulgaria
19	Emin	Eminov	emin.9@abv.bg	Bulgaria
20	Emine	Saralieva	emito969696@gmail.com	Bulgaria
21	Georgi	dimitrov	georgi_d4@abv.bg	Bulgaria
22	Katya	Uzundzhalieva	kspasova69@gmail.com	Bulgaria
23	Kiril	Stoyanov	k_stoyanov@au-plovdiv.bg	Bulgaria
24	Kristina	Gartsiyanova	krisimar1979@gmail.com	Bulgaria
25	Lilyana	Koleva	liljanakoleva.lk@gmail.com	Bulgaria
26	Maria	Geneva	boykova2@yahoo.com	Bulgaria
27	Maria	Petrova	marry_petrova@yahoo.com	Bulgaria
28	Nadezhda	Petkova	petkovanadejda@abv.bg	Bulgaria
29	Nayden	Chakarov	nayden.chakarov@uni-bielefeld.de	Bulgaria
30	Neli	Grozeva	grozevatru@gmail.com	Bulgaria
31	Nikolay	Panayotov	nikpan@au-plovdiv.bg	Bulgaria
32	Rositza	Mikova	rositzamikova@abv.bg	Bulgaria
33	Rusko	Petrov	rpetrov@greenbalkans.org	Bulgaria
34	Stilyana	Yaneva	stilqna.qneva91@gmail.com	Bulgaria
35	Tatyana	Bileva	tbileva@abv.bg	Bulgaria
36	Tsenka	Zhelyazkova	tsenka.zhelyazkova@trakia-uni.bg	Bulgaria

37	Tsvetanka	Raycheva	raicheva@abv.bg	Bulgaria
38	Tsvetelina	Stoilova	tsvetelinas27@gmail.com	Bulgaria
39	Valeria	Ivanova	valeriasi1@abv.bg	Bulgaria
40	Vanya	Slavova	vania_plachkova@abv.bg	Bulgaria
41	Velentin	Panchev	valentin_panchev@abv.bg	Bulgaria
42	Velimira	Stoyanova	stoyanovavelimira@gmail.com	Bulgaria
43	Veselina	Masheva	vesi_masheva@yahoo.com	Bulgaria
44	Yana	Andonova	yandonova@greenbalkans.org	Bulgaria
45	Zhulieta	Arnaudova	julieta_arnaudova@abv.bg	Bulgaria
46	Vincent	Michel	vincent.michel@agroscope.admin.ch	Check Republic
47	Belkhodja	Moulay	moulay2009@yahoo.fr	Algeria
48	Boudjabi	Sonia	soniabeida@yahoo.fr	Algeria
49	Boufera	Ikram	ikram.boufera@univ-mascara.dz	Algeria
50	Boumerdassi	Hanane	hboumerdassi@usthb.dz	Algeria
51	D. Zerroukı	Nacira	nacira.daoudi@ummto.dz	Algeria
52	Kahalerras	Labıba	labiba.kahalerras@gmail.com	Algeria
53	Katia	Djenadı	djenadi-katia@hotmail.fr	Algeria
54	Kessas	Khadidja	khadoujakess@gmail.com	Algeria
55	Labbaci	Fatima Zohra	labbaci.fatimazohra@yahoo.fr	Algeria
56	Lamari	Sara	lamarisara@gmail.com	Algeria
57	Lounıs	Wafaalns	wflns06@gmail.com	Algeria
58	Lynda	Abdellaoui	lyndabdellaoui5@gmail.com	Algeria
59	Naıma	Benkenana	benkenanan@yahoo.co.nz	Algeria
60	Ounis	Roumaissa	roumaissa.ounis@univ-setif.dz	Algeria
61	Samira	Fetnı	s.fetni@univ-batna2.dz	Algeria
62	Zoubir	Sahli	sahlizbir@gmail.com	Algeria
63	Salah	Abdelrahman	salahmaa@gmail.com	Egypt
64	D. Wodajo	Sedata	derartuwodajo@gmail.com	Ethiopia
65	Tadesse	Kebede Dabsu	tadk89@yahoo.com	Ethiopia
66	Eric K.	Naawe	eric.naawe@gmail.com	Ghana
67	Stefanos	Hatzilazarou	hatzilaz@agro.auth.gr	Greece
68	Stefanos	Hatzilazarou	hatzilaz@agro.auth.gr	Greece
69	Alireza	Allameh	a.allameh@areeo.ac.ir	Iran
70	Desimir	Kneževıć	deskoa@ptt.rs	Kosovo
71	Mirjeta	Sllamniku	mirjeta.sllamniku2@student.uni-pr.edu	Kosovo
72	Vahid Islam	Avdiu	vahid.avdiu@uni-pr.edu	Kosovo
73	Raimonda	Zinkevičienė	raimonda.zinkeviciene@vdu.lt	Lithuania
74	Shankar	Bhandari	shankar.bhandari@vdu.lt	Latvia

75	Aiga	Nolberga-Trūpa	aigat2@inbox.lv	Letonia
76	J Mohamed	Ehdadan	ehdadan82@yahoo.com	Libya
77	Abdelghani	Nabloussi	abdelghani.nabloussi@inra.ma	Maroc
78	Abdelmajid	Haddıouı	ahaddioui@yahoo.fr	Maroc
79	Mazri	Mouaad Amine	m.a.mazri@gmail.com	Maroc
80	Yassine	Zıne-Eddıne	zineeddine.yassine95@gmail.com	Maroc
81	Maria	Duca	mduca2000@yahoo.com	Moldova
82	Katerina	Bojkovska	katerina.bojkovska@uklo.edu.mk	Macedonia
83	Marija	Srbinoska	marija.srbinoska@uklo.edu.mk	Macedonia
84	Natasha	Zdraveska	natasha_z78@yahoo.com	Macedonia
85	Valentina	Pelivanoska	valentina.pelivanoska@uklo.edu.mk	Macedonia
86	C.s Michael	Ekenta	cmcekenta@gmail.com	Nigeria
87	Abdul	Qayyum	aqayyum@uoh.edu.pk	Pakistan
88	Ahmad	Sher	ahmad.sher@bzu.edu.pk	Pakistan
89	Aijaz	Soomro	ahsoomro@sau.edu.pk	Pakistan
90	Anila	Afzal	anilaafzal@gmail.com	Pakistan
91	Anwaar	Ahmed	anwaarft@uaar.edu.pk	Pakistan
92	A M Malik	Dr	arshadmm@uaar.edu.pk	Pakistan
93	Asad	Jan	janasad@aup.edu.pk	Pakistan
94	Bilal Saeed	Khan	bilalentomologyuaf@gmail.com	Pakistan
95	Javeria	Abid	laibaabid656@gmail.com	Pakistan
96	M Ahmad	Zeshan	muhammad.ahmad@uos.edu.pk	Pakistan
97	M	Saddiq	mssaddiq@gudgk.edu.pk	Pakistan
98	M Tehseen	Azhar	tehseenazhar@gmail.com	Pakistan
99	Saeed	Rauf	saeedbreeder@hotmail.com	Pakistan
100	Saima	Hashim	saimahashim@aup.edu.pk	Pakistan
101	Shahzor Gul	Khaskheli	sgkhaskhali@sau.edu.pk	Pakistan
102	Zeeshan	Yousaf	2017-gcuf-000801@gcuf.edu.pk	Pakistan
103	Z Rehman	Mashwani	zia.botany@gmail.com	Pakistan
104	Ewa	Ropelewska	ewa.ropelewska@inhort.pl	Poland
105	Tamara	Chadzınıkolau	tamarisch2@gmail.com	Poland
106	Daniela	Oprea	daniela.oprea@agro.usamv.ro	Romania
107	Luxita	Risnoveanu	luxita_risnoveanu@yahoo.co.uk	Romania
108	Maria-Joita	Pacureanu	mariapacureanu2@yahoo.com	Romania
109	Radu	Neamt	neamtr@yahoo.com	Romania
110	Rosu-Mares	Smaranda	smaranda.boila@usamvcluj.ro	Romania
111	Ivan	Pavlovic	dripavlovic58@gmail.com	Serbia
112	Marija	Nedeljkovic	dejanbrus@gmail.com	Serbia

113	Tanja	Lužaić	tanja.luzaic@tf.uns.ac.rs	Serbia
114	Artemii	Ivanov	a.ivanov2@g.nsu.ru	Russia
115	EO Ahmed	Abdalla	egbalosman1@gmail.com	Sudan
116	SY Abdallah	Tahir	sana.agoub.at@gmail.com	Sudan
117	Sara	Elnasikh	saraelnasikh@oiu.edu.sd	Sudan
118	Andrej	Filaček	andrejfilacek@gmail.com	Slovakia
119	Aporn	Songsang	asongsang@hotmail.com	Thailand
120	Woraphat	Khankhokkruad	nine277@gmail.com	Thailand
121	Kahlaoui	Samiha	sameh_kahlaoui@yahoo.fr	Tunisia
122	Ksouri	Riadh	ksouri.riadh@gmail.com	Tunisia
123	Salma	Kachout	salmasaikachout@gmail.com	Tunisia
124	Sarra	Hamzaoui	Hamzaouisarra1994@gmail.com	Tunisia
125	Tarchoun	Nejı	nejitarchoun@yahoo.fr	Tunisia
126	A.aytekin	Polat	aapolat@mku.edu.tr	Turkiye
127	Adem	Doğan	dogadem@gmail.com	Turkiye
128	Ahmet	Uludag	ahuludag@yahoo.com	Turkiye
129	A Tansel	Serim	ahmettansel.serim@bilecik.edu.tr	Turkiye
130	Akasya	Topçu	atopcu@ankara.edu.tr	Turkiye
131	Alp	Ayan	a.ayan@iku.edu.tr	Turkiye
132	Arif	Darmawan	arifdarmawan@apps.ipb.ac.id	Turkiye
133	Aslan	Fırat	firataslan0991@gmail.com	Turkiye
134	Aylin	Kabaş	demirelliaylin@hotmail.com	Turkiye
135	Ayşe Gul	Nasircilar	nasircilar@akdeniz.edu.tr	Turkiye
136	Ayşenur	Bektaş	aysnrkndmr@gmail.com	Turkiye
137	Bediha	Köse	bediakose@yahoo.com	Turkiye
138	Behiye Banu	Bilgen	bbilgen@nku.edu.tr	Turkiye
139	Beyza	Tunç	beyzatunc.ege@gmail.com	Turkiye
140	Beyzanur	Çetinkaya	ikutlu@ogu.edu.tr	Turkiye
141	Buket	Askin	buketaskin@klu.edu.tr	Turkiye
142	Burak Evren	İnanan	burakinanan@aksaray.edu.tr	Turkiye
143	Buse Ezgi	Kurban	buseezgikurban@gmail.com	Turkiye
144	Cem	Tokatlı	cemtokatli@trakya.edu.tr	Turkiye
145	Cengiz	Türkay	cengizturkay33@hotmail.com	Turkiye
146	Ceren	Ilğaz	crnilgazz@gmail.com	Turkiye
147	Cihan	Karaca	cihankaraca@akdeniz.edu.tr	Turkiye
148	Coşkun	Gülser	cgulser@omu.edu.tr	Turkiye
149	Çağatay	Tarhan	cagatay.tarhan@istanbul.edu.tr	Turkiye
150	Damla	Zobar	damlaozyigit@msn.com	Turkiye

151	Didem	Sözeri Atik	dsozeri@nku.edu.tr	Turkiye
152	Didem	Aksu	didem.erglu@gmail.com	Turkiye
153	Duygu	Demiröz	duygu.demiroz@tarimorman.gov.tr	Turkiye
154	Elif	Yıldırım	eeliffyildirim34@gmail.com	Turkiye
155	Elif Ayşe	Anlı	kocaoglu@agri.ankara.edu.tr	Turkiye
156	Emin Bülent	Erenoğlu	ebulenterenoglu@cukurova.edu.tr	Turkiye
157	Emin Bülent	Erenoğlu	ebulenterenoglu@cukurova.edu.tr	Turkiye
158	Emine	Toparslan	eminetoparslan@gmail.com	Turkiye
159	Emrah	Güngör	emrah.gungor@omu.edu.tr	Turkiye
160	Emre	Inalpulat	emreinalpulat@gmail.com	Turkiye
161	Engin	Takıl	etakil@ogu.edu.tr	Turkiye
162	Erol	Aydın	aydin.erol@tarimorman.gov.tr	Turkiye
163	Esra	Koca	esrakoca0211@gmail.com	Turkiye
164	Esra	Koca	esrakoca0211@gmail.com	Turkiye
165	Esra Nermin	Ertekin	nermin.kucukors@hotmail.com	Turkiye
166	Esra Tuğçe	Gül	esra.gul@selcuk.edu.tr	Turkiye
167	Fadime	Eryılmaz Pehlivan	eryilmazfadime@gmail.com	Turkiye
168	Figen	Idrisoğlu	figidrisoglu@hotmail.com	Turkiye
169	Filiz	Baysal	flzbysl1313@gmail.com	Turkiye
170	Gamze Nur	Atıl	gamzenuratil75@gmail.com	Turkiye
171	G Onder	Erguven	gokhanondererguven@gmail.com	Turkiye
172	Gökhan	Tunçelli	gokhan.tuncelli@istanbul.edu.tr	Turkiye
173	Gülcan	Kaymak Bayram	gulcan.kaymak@omu.edu.tr	Turkiye
174	Gülden	Çetin Özkan	gulden.cetinozkan@tarimorman.gov.tr	Turkiye
175	Gülşen	Kolaşinliler	g_kolasin@hotmail.com	Turkiye
176	Hande	Demir	hande.genckal@gmail.com	Turkiye
177	Hande	Mutlu Durak	hndemutlu@gmail.com	Turkiye
178	Hande	Gökcan	handegokcan2@gmail.com	Turkiye
179	Hande	Demir	hande.genckal@gmail.com	Turkiye
180	Hande Işıl	Akbağ	hiulku@comu.edu.tr	Turkiye
181	Hasan	Maral	hasmaral@gmail.com	Turkiye
182	Hatice	Üstüner	h.ustuner1977@gmail.com	Turkiye
183	Hilal	Susurluk	hilalsusurluk@uludag.edu.tr	Turkiye
184	Houtan	Vafaeifard	h.vafaeifard@gmail.com	Turkiye
185	Hülya	Doğan	hulya.dogan@bozok.edu.tr	Turkiye
186	Hümeyra	İspirli	humeyra_ispirli@hotmail.com	Turkiye
187	Ibrahim	Ertekin	ibrahim.ertkn@hotmail.com	Turkiye

188	Ibrahim	Sönmez	sonmez77@gmail.com	Turkiye
189	Ilknur	Alibas	ialibas@uludag.edu.tr	Turkiye
190	Ilknur	Meriç Turgut	meric@agri.ankara.edu.tr	Turkiye
191	Inanc	Baral	inancbaral@gmail.com	Turkiye
192	Ipek	Atılgan Helvacıoğlu	ipekhelvacioglu@trakya.edu.tr	Turkiye
193	Irem	Uzunsoy	iremuzunsoy@beun.edu.tr	Turkiye
194	Irfan	Sürer	irfan.surer@hotmail.com	Turkiye
195	Iskender	Tiryaki	tiryaki46@yahoo.com	Turkiye
196	Ismail	Ağır	agr.isml@gmail.com	Turkiye
197	I. Emrah	Tavalı	emrahtavali@gmail.com	Turkiye
198	İbrahim	Uz	ibrahimuz@nku.edu.tr	Turkiye
199	İrfan	Öztürk	ozturkirfan62@yahoo.com	Turkiye
200	Jannat	Khan	cennet-han@windowslive.com	Turkiye
201	Kadir	Cinar	kadircinar@trakya.edu.tr	Turkiye
202	Kemalettin	Ağızan	agizankemalettin@gmail.com	Turkiye
203	Kezban	Dinç	kezbantrdnc@gmail.com	Turkiye
204	Mehmet	Gökçe	mhmtgokce@outlook.com.tr	Turkiye
205	Mehmet	Tekin	mehmettekin20@gmail.com	Turkiye
206	Mehmet Y.	Tulum	mehmetyasintulum@gmail.com	Turkiye
207	Mehtap	Tanyol	mtanyol@hotmail.com	Turkiye
208	Melekber	Sülüşoğlu Durul	melekber_s@yahoo.com	Turkiye
209	Melihat	Tüzün	melihattuzun@trakya.edu.tr	Turkiye
210	Melis	İnalpulat	melisinalpulat@gmail.com	Turkiye
211	Merve	Şekerli	mervesekerli@gmail.com	Turkiye
212	Muhammet	Kaptan	m.kaptan@beun.edu.tr	Turkiye
213	Murat	Öztürk	murat.ozturk@bozok.edu.tr	Turkiye
214	Murat	Kibar	muratkibar@artvin.edu.tr	Turkiye
215	Mustafa	Celık	mcelik@adu.edu.tr	Turkiye
216	Mustafa	Yılmaz	mustafayilmaz80@hotmail.com	Turkiye
217	Nagehan	Çil Turgut	nagehan.cil@tarimorman.gov.tr	Turkiye
218	Nurcan	Koca	nurcan.koca@ege.edu.tr	Turkiye
219	Onur	Hocaoğlu	onurhocaoglu@gmail.com	Turkiye
220	Orhan	Eroğlu	orhaneroglu.zm@gmail.com	Turkiye
221	Özay	Yılmaz	yilmazozay96@hotmail.com	Turkiye
222	Özgür	Karadaş	ozgurkaradas1@gmail.com	Turkiye
223	Özgür	Altundaş	ozguraltundas.2@gmail.com	Turkiye
224	Öznur	Öz Atasever	oznur.ozatasever@gop.edu.tr	Turkiye
225	Perihan	Tarı Akap	perihantari@gmail.com	Turkiye

226	Pınar	Hephızlı Göksel	pinar.hephizli@tarimorman.gov.tr	Turkiye
227	R Busenaz	Kaya	rabiabsnz@gmail.com	Turkiye
228	R İlhan	Aytekin	ramazanilhanaytekin@gmail.com	Turkiye
229	Raziye	Koçkesen	raziyekocksn@gmail.com	Turkiye
230	Ruziye	Karaman	ruziyekaraman@isparta.edu.tr	Turkiye
231	Samet	Ata	sata@sutas.com.tr	Turkiye
232	Seçil	Acar	secilkolsal@gmail.com	Turkiye
233	Seda	Özdikmenli Tepeli	sdikmenli@hotmail.com	Turkiye
234	Selim	Esen	selim_esen01@hotmail.com	Turkiye
235	Selma	Kuru Berk	selmakuruberk@gmail.com	Turkiye
236	Serhat	Gürel	sgurel@uludag.edu.tr	Turkiye
237	Serkan	Uzun	serkan.uzun28@hotmail.com	Turkiye
238	Sertaç	Atalay	satalay@nku.edu.tr	Turkiye
239	Sevcan	Mamur	smamur@gazi.edu.tr	Turkiye
240	Sevil	Unal	sozcelik@selcuk.edu.tr	Turkiye
241	Seyda	Akbaş	akbaseyda@gmail.com	Turkiye
242	Sıtkı	Ermiş	seedman37@gmail.com	Turkiye
243	Süheyla	Ağızan	suheyla.agizan@selcuk.edu.tr	Turkiye
244	Süleyman	Kök	koks@trakya.edu.tr	Turkiye
245	Şebnem	Mutlu	s.olucay@hotmail.com	Turkiye
246	Şerife	Topkaya	serife.topkaya@gop.edu.tr	Turkiye
247	Şevket	Özlü	sevket.ozlu@omu.edu.tr	Turkiye
248	Turcan	Teker	turcanteker@gmail.com	Turkiye
249	Tutku	Ak	tutkuak@gmail.com	Turkiye
250	Uğur	Temiz	ugur_temiz05@hotmail.com	Turkiye
251	Uğur	Temiz	ugur_temiz05@hotmail.com	Turkiye
252	Umut	Mucan	umut.mucan@comu.edu.tr	Turkiye
253	Utku	Yükselbaba	uyukselbaba@akdeniz.edu.tr	Turkiye
254	Ülkü Zeynep	Üreyen Esertaş	biyolog_ulku@hotmail.com	Turkiye
255	Vasfiye	Kader Esen	vasfiye.esen@gmail.com	Turkiye
256	Veysel	Aras	varas2001@yahoo.com	Turkiye
257	Vildan	Akdeniz	vildankucukakdeniz@gmail.com	Turkiye
258	Yağmur	Arıkan	yagmurarkn@gmail.com	Turkiye
259	Yalcin	Kaya	yalcinkaya22@gmail.com	Turkey
260	Yeliz	Akpınar	yeliz.akpinar@ahievran.edu.tr	Turkiye
261	Yusuf	Sürmeli	ysurmeli1985@gmail.com	Turkiye
262	Yusuf	Biçer	yusufbicer@selcuk.edu.tr	Turkiye
263	Zafer	Binbir	zaferbinbir@gmail.com	Turkiye

264	Zahide	Özdemir	zozdemir@adu.edu.tr	Turkiye
265	Zehra Gül	Oğuz	zehraguloguz@gmail.com	Turkiye
266	Zemran	Mustafa	zemustafa@hotmail.com	Turkiye
267	Zeynep	Seyhan	zeynepseyhan.199701@gmail.com	Turkiye
268	Elena	Vlasova	elena_vl2001@ukr.net	Ukraine
269	Nataliya	Bryuzgina	natalya-51@i.ua	Ukraine
270	Rasim	Unan	rasimunan@hotmail.com	United States
271	Phokele	Maponya	maponyap@arc.agric.za	South Africa
272				
273				
274				
275				
276				
277				
278				
279				
280				
281				
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283				
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285				
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292				
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297				
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299				

AGRIBALKAN 2022 CONFERENCE STUDENT ORGANIZING TEAM

#	NAME
1.	Emrah AKPINAR
2.	Metin Burak TATLISES
3.	Müge KOÇ
4.	Havva AKAR
5.	Simge BAĞCI
6.	İlke KIZILYAR
7.	Deniz KIZILKAYA
8.	Alperen DILEKLI
9.	Elifgül AKSU
10.	İlayda KÜÇÜK
11.	Selinay DEMİR
12.	Mutlu ŞEN
13.	Yaren AKPINAR
14.	Ayten BOSTANCI
15.	

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"En Çok AR & GE Harcaması Yapan 500 Firma"
İçerisinde 190 Sıra Yükselişle
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Sektör Sıralamasında İlk Beş Firma Arasında
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