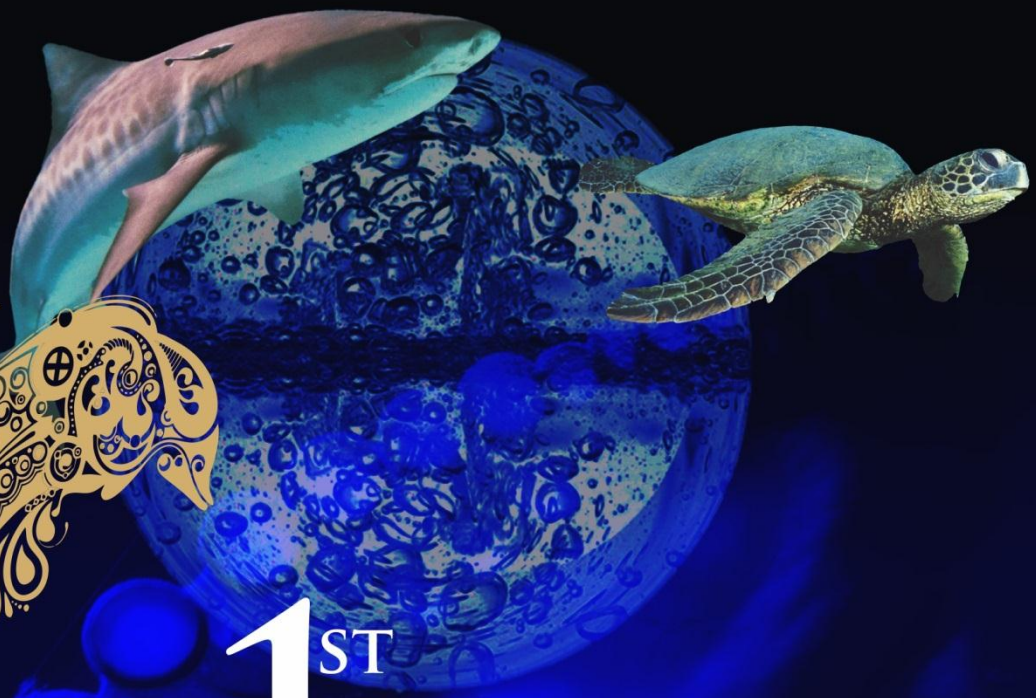
AQUA CYPRUS 2014

ABSTRACT BOOK



1ST INTERNATIONAL SYMPOSIUM ON AQUATIC SCIENCES & TECHNOLOGY

CYPRUS - 2014

15 16 17 May

ORGANISED BY:
GIRNE AMERICAN UNIVERSITY - CYPRUS
KASTAMONU UNIVERSITY - TURKEY
CANAKKALE ONSEKIZ MART UNIVERSITY - TURKEY

FOREWORD



Dear Ministers, Rectors, honoured attendees and guests,

In an era where time is not restricted with the life clock, the basic fact of universal sharing and awareness is the power of knowledge. Today this knowledge is reshaped by Kastamonu and Canakkale Onsekiz Mart Universities, which are prestigious universities of Turkey, and by Girne American University in Cyprus.

In today's world, man's power over nature progressively increases in accordance with the developing technologies and conditions. It should be always remembered that great awareness should be encouraged in every field as the right approaches will always provide the right feedback. Aqua-science, which focuses on aqua-life, physical and chemical specifications of water, relations with the species and places in the eco-system, will enable humankind to prepare a quality of life for future generations.

75% of the Earth's surface is covered by water. Scientific research will not be restricted only to marine geology, which comprises oil and mining research, but will be combined with the oceanography that focuses on the biological functions of marine history and other sub-branches of the aqua sciences, while students and researchers are encouraged to be sensitive towards

ecological life. Girne American University is honoured to host the "1st International Symposium on Aquatic Science and Technologies" with the very valuable cooperation of Kastamonu University and Canakkale Onsekiz Mart University, and I would like to express my sincere thanks to all attendees and speakers for their tremendous contributions.

WELCOME to the TRNC and our University.

Serhat AKPINAR
Chancellor
Girne American University



Esteemed Ministers, Rectors, Academicians and dearest Guests;
I firstly welcome you to Girne American University- the first university of the Island as is preparing to celebrate the 30th Year of its establishment and like to emphasize the complacence we have as you have honored us.
I thank personally to the Rectors of Kastamonu University and Çanakkale University for sharing the organization of this scientific event and to the participants for their participations and scientific contributions.
Holding the symposium in one of the most significant islands of the Mediterranean; I believe that studies of your valuable academicians who have famed in Maritime Sciences and Technologies in Europe, America, Far East and numerous various countries will indeed blossom beneficial results.
The potential of satisfying the demands of the increasing number of the world population through energy resources and aquatic plant products located in the Mediterranean, besides maritime transportation and freight, have not been utilized efficiently until today. Your scientific knowledge and experiences will be significant in addressing the demands.
The necessity to reinforce the relations and the corporation between university and working life is indeed apparent.
I finally wish to see the progress of similar successful organizations and present my compliments.

Sincerely yours

Prof.Dr. Yıldırım ÖNER
Rector
Girne American University



As a result of mankind's use of resources lavishly, changes in the global ecological balances have taken place. 21st century, along with the researches carried out by scientists by using developing technology as a sample in their studies in order to produce new resources and use existing resources sustainably, has become the century of the development of new perspectives regarding Aquatic Sciences, and in this century science world has excitedly focused on this matter.

"Aqua Cyprus 2014" symposium was held with the partnership of Girne American University, Kastamonu University and Çanakkale Onsekiz Mart University between 15th May and 17th May 2014 in Turkish Republic of Northern Cyprus. Aqua Cyprus 2014 is of great importance in terms of the symposium's being the first international aquatic sciences and technologies symposium held jointly by three universities in Turkish Republic of Northern Cyprus.

"1st International Symposium on Aquatic Sciences and Technology" was highly rewarding particularly for the audience and for the whole science world with the participation of academicians and scientists from various parts of the world to present their papers. This e-book is a resource involving the abstracts of the papers presented in the symposium.

We would like to thank to the Symposium Organizing Committee and Scientific Committee for the efforts they exerted for the organization of the symposium. We would like to express our sincere gratitude to the distinguished academicians who added scientific value with their papers to the symposium and to all our guests who made the symposium become more meaningful. We also would like to present our compliments to all and wish that the symposium "Aqua Cyprus" become conventional and be organized in the years ahead.

Prof. Dr. Seyit AYDIN
Rector
Kastamonu University



All of the scientific branches have some dynamics not only peculiar to them but also common with other branches. These dynamics include "gathering scientific data about the field, getting both deduction and results, providing the implemention of these by the members of the sector and finally bringing into service by feedbacks". In this respect, I believe that "AquaCyprus-2014" symposium that we participate in the organization will function as a kind of data mining and announce all of the beneficial results for the sector to the international community. I wish you a successful symposium, and thank to all of the participants.

Prof. Dr. Sedat LAÇİNER
Rector
Çanakkale Onsekiz Mart University

COMMITTEES

CHAIRMAN

Prof. Dr. Sadık Ülker, Girne American University
Prof. Dr. Seyit Aydın, Kastamonu University
Prof. Dr. Sedat Laçiner, Çanakkale Onsekiz Mart University

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Asst. Prof. Dr. Nejdet Gültepe, Kastamonu University
Bihter Asena Yanar, Girne American University
Fevziye Işıl Meydani, Girne American University
Ümit Acar, Muğla Sıtkı Koçman University
Osman Sabri Kesbiç, Kastamonu University

INVITED SPEAKERS

Prof.Dr. Alexander Meinesz	(Université de Nice-Sophia Antipolis, France)
Prof.Dr. Barbaros Çelikkol	(University of New Hampshire, USA)
Prof.Dr. Brian Austin	(University of Stirling, Scotland - UK)
Prof.Dr. Daniel D. Benetti	(University of Miami, USA)
Prof.Dr. Shunsuke Koshio	(Kagoshima University, WAS Asian-Pasific Chapter, Japan)

SCIENTIFIC COMMITTEE

Abdulkadir Çiltas	(Atatürk University, Turkey)
Adem Yavuz Sönmez	(Kastamonu University, Turkey)
Alexander Meinesz	(Université de Nice-Sophia Antipolis, France)
Ali Türker	(Muğla Sıtkı Koçman University, Turkey)
Altan Lök	(Ege University, Turkey)
Barbaros Celikkol	(University of New Hampshire, USA)
Belgin Hoşsu	(HSV, Turkey)
Brian Austin	(University of Stirling, Scotland, UK)
Daniel D. Benetti	(University of Miami, USA)
Harun Yıldız	(Çanakkale Onsekiz Mart University, Turkey)
Hatice Parlak	(Ege University, Turkey)
Ivan Sergeevich Sazykin	(South Federal University, Russia)
Judson DeCew	(University of New Hampshire, USA)
Marina Alexandrovna Sazykina	(South Federal University, Russia)

Marisol Izquerdo Lopez	(Universidad de Las Palmas de Gran Canaria, Spain)
Masashi Maita	(Tokyo Uni. of Marine Science and Technology, Japan)
Melih Ertan Çınar	(Ege University, Turkey)
Murat Yiğit	(Çanakkale Onsekiz Mart University, Turkey)
Murray T. Brown	(Plymouth University, UK)
Musa Bulut	(Çanakkale Onsekiz Mart University, Turkey)
Nadia Pinardi	(University of Bologna, Italy)
Nejdet Gültepe	(Kastamonu University, Turkey)
Olcay Hisar	(Çanakkale Onsekiz Mart University, Turkey)
Pietro Volta	(CNR-Institute of Ecosystem Study, Italy)
Recep Bircan	(Sinop University, Turkey)
Riza Akgül	(Kastamonu University, Turkey)
Sadasivam J. Kaushik	(World Aquaculture Society, Asian-Pasific Chapter Repr., INRA, France)
Saichiro Yokoyama	(Kagoshima University, Japan)
Sebahattin Ergün	(Çanakkale Onsekiz Mart University, Turkey)
Serdar Kum	(İstanbul Technical University, Turkey)
Serkan Sancak	(Girne American University, Cyprus)
Seyit Aydın	(Kastamonu University, Turkey)
Shunsuke Koshio	(Kagoshima University, Japan)
Sıtkı Aras	(Kastamonu University, Turkey)
Soner Bilen	(Kastamonu University, Turkey)
Suat Ateş	(Çanakkale Onsekiz Mart University, Turkey)
Şükran Cirik	(Retired, Çanakkale Onsekiz Mart University, Turkey)
Şükriye Aras Hisar	(Çanakkale Onsekiz Mart University, Turkey)
Takayuki Katagiri	(Tokyo Uni. of Marine Science and Technology, Japan)
Tolga Göksan	(Çanakkale Onsekiz Mart University, Turkey)
Yeşim Büyükateş	(Çanakkale Onsekiz Mart University, Turkey)

Symposium Programme

AQUA CYPRUS 2014 "1 st International Symposium on Aquatic Sciences and Technology" 15 May 2014 First Day Collective Meeting (Main Hall)	
08:30–10:00	Opening Remarks
	Inauguration
12:00-13:30	Lunch
13:30-17:30	Keynote Speaker Prof.Dr. Daniel Benetti "Overview on Marine Finfish Aquaculture in the Americas"
	Keynote Speaker Prof.Dr. Brian Austin "Developments in the Understanding of Bacterial Diseases of Mariculture"
	Keynote Speaker Prof.Dr. Shunsuke Koshio "Development of Functional Aquafeeds"
	Keynote Speaker Prof.Dr. Barbaros Çelikkol "Developments in Ocean Engineering Technology at UNH"
	Keynote Speaker Prof.Dr. Alexandre Meinesz "Aquaculture on *Posidonia oceanica* Beds"
17:30-18:00	Coffee Break & Poster Session (Poster Hall)
19:00	**DINNER**
AQUA CYPRUS 2014 "1 st International Symposium on Aquatic Sciences and Technology" 16 May 2014 Second Day (Main Hall)	
09:00-09:20	Antimicrobial Activity of *Origanum onites L.* on Protection Against *Lactococcus garvieae* and *Vibrio anguillarum* in Rainbow Trout (*Oncorhynchus mykiss*, Walbaum) **Öznur Diler, Öznur Görmez, Abdullah Diler, Seçil Metin**
09:20-09:40	Use of Oxidative Stress Biomarkers in Three Crustacean Species for the Assesment of Water Pollution in Kocabaş Stream (Çanakkale, Turkey) **Mehmet Akbulut, Kahraman Selvi, Hasan Kaya, Müge Duysak, Fatma Akçay, Ekrem Şanver Çelik**
09:40-10:00	Assessing the Oil Oxidizing Microorganisms Potential Based on Specific Activity of Catalase and Superoxide Dismutase **Sazykin I.S., Sazykina M.A., Khmelevtsova L.E., Khammami M.I.**
10:00-10:20	Determination of the Content of Heavy Metal in *Mugil cephalus* L. 1758 Obtained from Bafa Lake (Turkey) and Its Evaluation in terms of Public Health **Murat Yabanlı, Aykut Yozukmaz, Fatma Sel**
10:20-10:40	Monitoring Freshwater Fish Species Using Environmental DNA **Emre Keskin**
10:40-11:00	Tea/Coffee Break
11:00-11:20	Does Copper Alloy Net Cage Affect Metal Accumulation in Fish **Murat Yiğit., Barbaros Çelikkol, Musat Bulut, Langley Gace, Sevdan Yılmaz, Hasan Kaya, Olcay Hisar, Harun Yıldız, Yeşim Büyükateş, Bayram Kızılkaya, Latife Ceyda İrkin, Malik Selek, Dwyer R., Judson DeCew**
11:20-11:40	Determinations of Seasonal Levels of Chlorophyll A and Organic Carbon on Surficial Sediments of Uzunçayır Dam Lake **Banu Kutlu, Ekrem Mutlu, Sebahat Şeker**
11:40-12:00	Practical Application Method of HPLC for Analysis of Amino Acid by Precolumn Derivatization with OPA in Seafood **Bayram Kızılkaya, Harun Yıldız, Sefa Acarlı, Gülen Türker, Evren Tan**
12:00-13:20	Lunch

13:20-13:40	Assessment of Ecotoxicological Parameters of Lower Don Sediments (2011) **Sazykina M.A., Sazykin I.S., Khammami M.I., Kudeevskaya E.M.**
13:40-14:00	Evaluation of The Water Quality of Yıldız Lagoon (Sivas) **Ekrem Mutlu, A. Yavuz Sönmez, Banu Kutlu, R. Can Özdemir, Talat Yanık**
14:00-14:20	A Research on the Use of Phytogenic Products in Fish **Ebru Yılmaz, Sevdan Yılmaz, Sebahattin Ergün, Hasan Kaya**
14:20-14:40	Physicochemical Parameters and Plankton Interactions In a Cage Culture System In The Daradenelles (Çanakkale-Turkey) **Yeşim Büyükates, Ceren Oral, Ezgi Döventaş, Murat Yiğit, Barbaros Çelikkol, Jud DeCew, Ertuğ Yentur**
14:40-15:00	Tea/Coffee Break
15:00-15:20	An Escape Gate Study To Prevent Ghost Fishing In Fish Traps **Adnan Ayaz, Uğur Altınağaç, Alkan Öztekin, Talip İbin, Ata Aksu, Osman Odabaşı**
15:20-15:40	Cytokine Responses in the Japanese Pufferfish (*Takifugu rubripes*) Head Kidney Cells Induced with Nigericin **Soner Bilen, Gouranga Biswas, Aslı Müge Bilen**
15:40-16:00	Egg Production and Distribution of Egg and Larvae of Small Pelagic Fish in Sinop Coast of Southern Black Sea **Hasan Hüseyin Satılmış**
16:00-16:20	Estimation of Growth Parameters of Gilthead Seabream (*Sparus aurata* L., 1758) Tagged with VI Alpha Tags in Beymelek Lagoon, (Southwestern Coast of Turkey) **Çetin Sümer, İbrahim Erkoyuncu**
16:20-16:40	Amyloodinium Infestations in Cultured European Sea Bass (*Dicentrarchus labrax*): Beneficial Effects of Oral Humic Acid Supplementation **Sebahattin Ergün, Nergiz Soytaş, Mert Gürkan, Sevdan Yılmaz, Hasan Kaya, Erol Tokşen**
16:40-17:00	Determination of Safety Dose Value of *Foeniculum vulgare* L. Hydrosol on Carp Fish **Azime Küçükgül, Başar Altınterim, Önder Aksu**
17:00-17:30	Tea/Coffee Break & Poster Session (Poster Hall)
17:30-18:10	**Wrap up Discussion and Summary** Collective Meeting (Main Hall)
19:30	**GALA DINNER (CAMELOT BEACH CLUB - LAPTA)**
AQUA CYPRUS 2014 "1 st International Symposium on Aquatic Sciences and Technology" 16 May 2014 Second Day (Hall–2)	
09:00-09:20	Breeding and Larval Rearing of the Doctor Fish *Garra rufa* (Heckel, 1843) and *Cyprinion macrostomus* (Heckel, 1843) Under Laboratory Conditions **İhsan Çelik, Tolga Şahin, Pınar Çelik**
09:20-09:40	Non-Specific Immune Responses and Protection Against *Aeromonas hydrophila* Infection in Koi Carp (*Cyprinus carpio*) Treated with Tetra (*Cotinus coggygria*) Extract **Soner Bilen, Gouranga Biswas, Aslı Müge Bilen, Sevdan Yılmaz**
09:40-10:00	First Observation of Red Mark Syndrome (RMS) in Cultured Rainbow Trout (*Oncorhynchus mykiss* Walbaum, 1792) in Turkey **Ayşegül Kubilay, Sercan Çiftçi, Pınar Yıldırım, Behire Işıl Didinen, Seçil Ekici, Tamer Demirkan, Birgit Oidtmann**
10:00-10:20	High-Throughput Sequencing and Metagenomics: Moving Forward in the Culture-Independent Analysis of Fish Microbial Ecology **Mahdi Ghanbari, Konrad J. Domig, Wolfgang Kneifel**
10:20-10:40	Effects of Fish Size on Transport and Seawater Acclimatization of Rainbow trout (*Oncorhynchus mykiss*) with Different Adaptation Procedures **Yeşim Büyükateş, Murat Yiğit, Musa Bulut, Hakan Baki, Ertuğ Yentur, Bob Dwyer, Langley Gace**

10:40-11:00	Tea/Coffee Break
11:00-11:20	Nutritional Components of Some Economic Shellfish Species and Editing Their Sonsumer Srategies by Identifying the Contents of Shell. **Harun Yıldız, Olcay Hisar, Sefa Acarlı, Bayram Kızılkaya, Gülen Türker, Pervin Vural, Fettah Gündüz, Asiye Nur Saltan, İsmail Kaya**
11:20-11:40	The Effects of *Artemisia vulgaris* L. on Nonspecific Immunity of Rainbow Trout (*Oncorhynchus mykiss*, Walbaum) **Öznur Diler, Sedef Terzioğlu**
11:40-12:00	COEXIST - Integration of Fisheries and Aquaculture **Øivind Bergh**
12:00-13:20	Lunch
13:20-13:40	The Future of Fish Farming - Integrated Multi Trophic Aquaculture **Murat Yiğit, Barbaros Celikkol, Ilknur Ak, Harun Yıldız, Yeşim Büyükateş, Musa Bulut, Murrey Brown, Umit Yiğit, Nick Taylor.**
13:40-14:00	Gametogenic Cycle and Biochemical Composition of Fan Mussel, *Pinna nobilis* Linnaeus 1758 in Aegean Sea, Turkey **Sefa Acarlı, Aynur Lök, Deniz Acarlı, Ali Kırtık, Harun Yıldız, Bayram Kızılkaya, Aysun Küçükdermenci, Pervin Vural, Fettah Gündüz**
14:00-14:20	The Effects of Cinnamic Acid with or without Probiotic Supplementation on Growth Performance, Fatty Acid Composition, Health Characteristics in Rainbow Trout: Project Presentation **Sebahattin Ergün, Sevdan Yılmaz, Hasan Kaya, Ekrem Şanver Çelik, Nergiz Soytaş, Fatma Akçay**
14:20-14:40	Dietary Supplementation of Tetra (*Cotinus coggygria*) Extract Elevates Haemato-Immunological Responses and Resistance to *Vibrio anguillarum* Infection in Koi Carp, *Cyprinus carpio* **Soner Bilen, Gouranga Biswas, Aslı Müge Bilen, Sevdan Yılmaz, M. Sıtkı Aras**
14:40-15:00	Tea/Coffee Break
15:00-15:20	Mediation of Inflammatory Response in the Japanese pufferfish (*Takifugu rubripes*) Leukocytes Stimulated with an Inflammasome-Inducing Agent, Nigericin **Soner Bilen, Gouranga Biswas, Aslı Müge Bilen**
15:20-15:40	Bycatch Composition in Longline Fisheries in Çanakkale Region **Uğur Altınağaç, Adnan Ayaz, Alkan Öztekin, Osman Odabaşı, Ata Aksu, Talip İbin**
15:40-16:00	Preliminary Study for Squid Jigging with Different Bait Types **İlker Aydın, Biran Yaldız, Ozan Soykan, Cemil Sağlam, Cengiz Metin**
16:00-16:20	Current Status of Adıyaman Province Hunting and Fishing Hunting Made Fish Species **Hakan Akgün, Emin Çiçek, Selahattin Gürçay, Rıdvan Tepe**
16:20-16:40	Crayfish (*Astacus leptodactylus* Eschscholtz, 1823) Fecundity in Lake of Çıldır **Önder Aksu, Şekip Serdar Kabasakal**
16:40-17:00	Fishing Activities in TRNC **Mehmet Emin Debeş, Ahmet Beyoğlu, Serdar Kum**
17:00-17:30	Tea/Coffee Break & Poster Session (Poster Hall)
17:30-18:10	**Wrap up Discussion and Summary** Collective Meeting (Main Hall)
19:30	**GALA DINNER (CAMELOT BEACH CLUB - LAPTA)**

AQUA CYPRUS 2014 "1 st International Symposium on Aquatic Sciences and Technology" 17 May 2014 Third Day **FIELD TRIP**	
09:10	Tour of Landing Bay and visit museums, monuments
09:45	Tour of the Girne American University
10:00	Guide tour of the Bellapaise, St Hilarion Castle and Catle of Girne
12:00	Free Time in Girne City Center

*Departure time by bus from hotel 09:00

AQUA CYPRUS 2014 "1 st International Symposium on Aquatic Sciences and Technology" 15-17 May 2014 Poster Session Programme (Poster Hall)		
Poster Number	**Topic**	**Authors**
P-01	Developmental Stages and Morphological Characters of Freshwater Angelfish Larvae (*Pterophyllum scalare Schultze*,1823)	İhsan Çelik, Pınar Çelik, Tolga Şahin, Mert Gürkan
P-02	Comparative Morphology of Red Blood Cells of Different Fish Species	Beria Falakalı Mutaf, Mesut Yılmaz, Olgaç Güven
P-03	Ecotoxicity of Engineered Nanoparticles to Aquatic Organisms	Mehmet Akbulut, Müge Duysak, Fatih Aydın, Hasan Kaya, Fatma Akçay
P-04	Effects of Global Warming and Rising CO_2 Level on Fish Physiology: What Does the Future Hold?	Mehmet Akbulut, Fatma Akçay, Hasan Kaya, Müge Duysak, Fatih Aydın, Sevdan Yılmaz
P-05	A Research on Fish Fauna in Büyük Menderes River	Ebru Yılmaz, Cengiz Koç
P-06	Exploitation and Mortalities of Four-Spotted Megrim (*Lepidorhombus boscii* Risso, 1810) from Saros Bay (Northern Aegean Sea, Turkey)	Özgür Cengiz, Uğur Özekinci, Ali İşmen, Alkan Öztekin, Alparslan Aslan
P-07	Determination of Nutritional Value and Quality of Chemical, Sensory, Microbiological of Octopus Salads Prepared by Using Different Cooking Techniques	Fikret Çakır, Fatih Eker
P-08	Determination of Nutritional Value, Chemical and Sensory Quality of Salmon (*Salmo salar*), Rainbow Trout (*Oncorhynchus mykiss*) and Shark (*Odontaspis ferox*) Pastrami.	Fikret Çakır, Esra Çağlı, Abdullah Çağrı Özer, Fatih Eker
P-09	Fecundity of European Sea Urchin (*Paracentrotus lividus*) in Çesme, Aegean Sea (Turkey)	Sefa Acarlı, Aysun Kücükdermenci, Aynur Lök, Serpil Serdar, Harun Yıldız, Selcuk Yiğitkurt, Ali Kırtık, Evrim Kutay
P-10	Seasonal Variation of Nutrient Composition of Chub (*Squalius sp*.) at Çiftekavak Stream in Rize, Turkey	Emre Çağlak, Barış Karslı, Vildan Karslı, Hava Akarsu, Leyla Turan

P-11	Determination of Seasonal Distribution of Biochemical Composition of *Barbus sp.* Species Distrubuted in Çiftekavak Stream, Rize, Turkey	Barış Karslı, Emre Çağlak, Vildan Karslı, Leyla Turan, Hava Akarsu
P-12	Determination of Water Quality Parameters from a Waste Treatment Plant Effluent (Balıkesir-Gönen)	Sinan Uzundumlu, Yesim Büyükateş
P-13	Effects of Gamma Irradiation on the Biogenic Amines Formation in Frog (*Rana esculanta*) Legs During Cold Storage (+2°C)	Merve Ergüven, Gülsün Özyurt, Ali Serhat Özkütük, Miray Etyemez
P-14	Discovery of a Nationally Important Loggerhead Turtle (*Caretta caretta*) Rookery in Northern Cyprus.	Wayne J. Fuller, Tricia Dann, Peter White, Andrea M. Barden, Özge Özden
P-15	Recycling of Fish Bones Occurring By-Product Waste from The Fish-Processing Industry	Bayram Kızılkaya, Gülen Türker, Evren Tan, Nail Üçyol
P-16	Effect of Fish Meal Replacement by Red Lentil Meal in Diets on Growth and Whole Body Amino Acid Composition of Rainbow Trout (*Oncorhynchus mykiss*)	Keriman Yürüten, Mustafa Yıldız
P-17	Technical Specifications of Main Fishing Gears Used in North Cyprus	Ercan Sınay, Uğur Sencer
P-18	Molecular Identification of Prey Species from Stomach Contents of the Angler (*Lophius piscatorius*)	Emre Keskin
P-19	Freshwater Crayfish Aquaculture in the World: A Case Study	Harun Yıldız, Selçuk Türel, Selçuk Berber, Müge Duysak, Semih Kale
P-20	The Occurrence of Enteric Bacteria in Marine Environment and Pollution	Berna Kılınç, Aysu Besler
P-21	Determination of Seafood Consumption Pattern in Canakkale	Fikret Çakır, Abdullah Çağrı Özer, Volkan Büyükyurtsever, Uğur Konuk
P-22	Determination of DNA Barcoding Success Using rbcL, matK and trnH-psbA Genes in Identification of *Stuckenia pectinata*	Esra Mine Ünal, Emre Keskin
P-23	The Effects of Climate Changes to Marine Ecosystem	Aysu Besler, Berna Kılınç
P-24	Novel Natural Products Obtained from Marine Environment	Aysu Besler, Berna Kılınç
P-25	Marine Environment is a Valuable Source as Food	Berna Kılınç, Aysu Besler
P-26	Research about Comparison of Aksona and Hyperbaric Pressure Room for Curing Of Diving Illnesses	Ferhat Yalgın, Ali Türker
P-27	Intragenic Variation of *Anguillicola crassus* isolated from the European Eel (*Anguilla anguilla*) sampled from the Ceyhan River, Turkey	C. Erkin Koyuncu, Emre Keskin, Ercüment Genç, Serhat Taşkın
P-28	The Effects of Larval Temperature on Sex Ratio and Growth Performance in Sea Bass (*Dicentrachus labrax*)	Filiz Akköse, Mahmut Ali Gökçe, Tülay Altun

P-29	Isolation and Characterization of Actinobacteria from Fresh Qater Fish Microbiome	Mansooreh Jami, Konrad J. Domig, Wolfgang Kneifel
P-30	Some Invasive Mollusc Species in Mediterranean and Their Evaluability	Sefa Acarlı, Asiye Nur Saltan, Harun Yıldız, Pervin Vural, Fettah Gündüz, İsmail Kaya
P-31	Economical Shrimp Species Found in Turkish Seas and Their Distribution Area	Harun Yıldız, İsmail Kaya, Sefa Acarlı, Pervin Vural, Fettah Gündüz, Asiye Nur Saltan
P-32	Production of Meatball of Silver Crucian Carp (*Carassius Gibelio*, Bloch, 1782) and Sensory Evaluatıon of the Product	Yunus Alparslan, Cansu Metin, Hatice Hasanhocaoğlu Yapıcı, Taçnur Baygar, Murat Yabanlı
P-33	Strategic Position of Muğla in Turkey's Aquaculture Production	Kenan Güllü, Rifat Tezel, Ümit Acar
P-34	The Evaluation of Selenium Concentrations in *Mullus barbatus* L., 1758 and *Mullus surmelatus* L., 1758 Obtained From Eastern Aegean Sea	Murat Yabanlı, Fatma Sel, Aykut Yozukmaz
P-35	Determination of Gynogenesis Application with Biotechnological and Molecular Methods	Rahmi Can Özdemir, Sude Atmaca, Aygül Ekici
P-36	Investigation of Physical and Sensory Changes During Cold Storage of Anchovy Marinades Added Chitosan	Ali Eslem Kadak, Mehmet Çelik
P-37	Effects of Dietary Fish Oil Replacement by Unrefined Peanut Oil on the Growth, Serum Biochemical Rarameters of Mozambique Tilapia Fingerlings (*Oreochromis mossambicus*)	Oğuzhan Demir, Ali Türker, Ümit Acar, Osman Sabri Kesbiç, B. Asena Yanar, F. Işıl Meydani
P-38	Utilization of Different Percent Garlic Meal in Fish Diets and its Effects on Growth Performance	Latife Ceyda İrkin, Murat Yiğit
P-39	Larviculture of Meagre (*Argyrosomus regius* Asso1801)	Nejdet Gültepe, Hakan Galip Dorlay, Mehmet İrşat Gültepe, Mustafa Karga, Osman Sabri Kesbiç, Ümit Acar, Seyit Aydın



KEYNOTE SPEAKERS PRESENTATIONS

Overview on Marine Finfish Aquaculture in the Americas

***Daniel Benetti*[*1]**

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Abstract

Relevant topics, progress and constraints in marine finfish aquaculture in the Americas are presented and discussed in this paper. A number of commercially important species of tropical marine fish are currently being cultured in several countries in the Americas - primarily in the US, Panama, Costa Rica, Mexico, Ecuador, Dominican Republic, Colombia, Brazil and Chile. High-value marine finfish species whose aquaculture technologies are available at various levels of feasibility in the region are cobia (*Rachycentron canadum*), yellowtail jacks (*Seriola spp*), pompanos (*Trachinotus carolinus*), snappers (*Lutjanus spp*), mahi (*Coryphaena hippurus*), sea basses, drums and corvinas (Scianidae), snooks (Centropomidae), groupers (Serranidae) and tuna (Thunnus spp) – among others. A number of state-of-art marine fish hatchery have been built and are currently operating. Basic science on genetics, physiology and nutrition is supporting the development of novel technologies for volitional broodstock spawning and mass production of fingerlings, allowing for the expansion of this new industry. Simultaneously, selective breeding programs based on cross-breeding males and females of wild parental broodstock with subsequent selection of the best progeny coupled with environmentally controlled maturation systems and improved nutrition have been yielding promising and, in some cases, outstanding results of production. Firm protocols on early developmental stages based on a proactive health management approach including the use of probiotics, prophylaxis and improved nutrition of live feeds have been used to assist in mass producing fingerlings for the growout market. Growout methods are primarily targeting the potential of exposed, high-energy areas of the open ocean using submersible cages such as SeaStations and Aquapods. Advanced technologies are also being used for land-based recirculating aquaculture systems (RAS). Recently, researchers are also making strides towards developing hatchery technology of tunas. Progress with blackfin tuna (*Thunnus atlanticus*) hatchery technology in the United States has been slow due to infrastructure and resources limitations. Conversely, increased scientific knowledge about early developmental stages is leading to major progress in reproduction, larval rearing and fingerling production of yellowfin tuna (*Thunnus albacares*) at the Inter-American Tropical Tuna Commission (ATTC) laboratory in Panama, Centro-America – where workshops hosting experts from the world over are held every year. Closing the life cycle of tunas in captivity with subsequent production of commercial numbers of juveniles in hatcheries is a major

challenge. Survival rates of < 0.5% to weaned juveniles are typical and mortality during the first 10 days was identified as a major limiting factor to their mass culture and is being addressed. Worldwide, low survival of hatchery reared tuna larvae of all species currently constrains the growth of tuna farming. Another important topic being targeted is the development of adequate diets for tuna growout. As with the development, implementation and expansion of any new industry, there are serious hurdles to overcome before commercial viability can be secured. Chiefly, economic feed conversion rates remain high at 2.0-3.0:1. Researchers and the industry are tackling this major issue by focusing on identifying the nutritional requirements at different life stages of each species targeted, aiming at formulating and manufacturing economically viable and ecologically efficient aquafeeds. In summary, marine fish aquaculture in the Americas is a reality. The infrastructure and logistics are in place (hatcheries, feeds manufacturing plants, concessions, processing plants, etc.) as well as a strong and steady market demand driven by thriving economies in some countries like the US, Canada, Brazil, Chile and Peru. During the last decade, the potential was identified, solid investments are being made, and as a consequence the industry is growing and posed to expand exponentially in the next few years.

Keywords : Marine fish aquaculture; hatchery and growout technologies

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Developments in the Understanding of Bacterial Diseases of Mariculture

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Abstract

There is a steady increase in the number of new bacterial diseases of mariculture, with research interests focusing on diagnoses and effective methods of [disease] control. Diagnostic procedures have progressed from the use of phenotypic methods through serology to molecular procedures with their enhanced specificity and sensitivity. From the previous predominance of chemotherapy, including the use of medically important antibiotics, disease control has focused on immunostimulation, namely by use of vaccines, immunostimulants such as glucans, probiotics and medicinal plant products. Yet after > 60 years of research, the number of commercial bacterial fish vaccines is small, to some extent reflecting the high cost of development and licensing. Probiotics, which are live microbial feed additives that have a beneficial effect on health, have been use routinely in many countries. Traditionally, the mode of action has been regarded as competitive exclusion in which the probiotic inhabits the digestive tract and inhibits the development of potential pathogens. However, research has also revealed that many probiotics act by immunomodulation, specifically stimulation of innate and cellular immunity, notably increased phagocytic activity of head kidney macrophages, respiratory burst, serum peroxidase, anti-protease, and serum and gut mucosal lysozyme activity. Probiotics often stimulate enhanced feeding sometimes leading to a feeding frenzy, better feed conversion, less background health problems, and commendable protection against specific diseases. Whether of not probiotics need to be viable is debatable as many inactivated whole cell preparations or purified sub-cellular components are as effective as viable cultures.

Keywords : Fish diseases, Probiotics, Important antibiotics, Disease control, Immunostimulation

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Development of Functional Aquafeeds

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Abstract

The role of feeds is one of the most important factors to develop the sustainable aquaculture. Recent years, some ingredients such as fishmeal and fish oil have problematic conditions due to the supply shortage and high cost. To solve those problems, there are many studies on the reduced use of those ingredients in aquafeeds. With changing some of important ingredients in aquafeeds, the quality changes of feeds will often expect to occur at the same time. It leads to the quality decline in most cases. To avoid the conditions, we have focused on the application of functional compounds to aquafeeds.

In this presentation, I introduce recent works, which were conducted in Kagoshima University, on the effects of several dietary ingredients and compounds for marine species to develop the functional aquafeeds.

The followings are the topics in the presentation:

1. Effects of Dietary Peptide Supplement for Red Sea bream, *Pagrus major*, Juveniles
2. Interactive Effects between Vitamin C and Fucoidan on Growth and Immunological Responses of Kuruma Shrimp, *Marsupenaeus japonicus*
3. Effect of Heat-Killed Lactobacillus on Red Sea Bream
4. Effects of Heat-Killed Lactobacillus on Kuruma Shrimp
5. Utilization of Fermented Products in Aquafeeds -Study on Japanese Flounder, *Paralichthys olivaceus*, Juveniles-
6. Effects of Fish Solubles on Flounder Juveniles
7. Effects of Dietary Lactoferrin on The Stress under High Temperature -Rock Fish, *Sebastiscus marmoratus*-
8. Effects of Inosine Supplementation for *Amber Jack, Seriola dumerili*

In conclusion, dietary supplementations of functional ingredients and compounds are very effective for marine species in terms of faster growth, immunological enhancement, stress resistance and etc. On the other hand, the cost effectiveness should be one of the key factors for further development of functional aquafeeds.

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Developments in Ocean Engineering Technology at UNH

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Abstract

Developments in Ocean Engineering technology during the last two decades at the University of New Hampshire, UNH, will be reviewed. UNH is a small state school with less than 15,000 students. New Hampshire has 30 kilometers of ocean coastline, yet UNH ranks 10th in Federal ocean funding in the USA. This has been made possible by faculty continuously pursuing funded projects. In order to attract funding, the University has had to partner with industry, the State and the Federal Government. In this presentation a summary of recent projects in oil spill response technology, open ocean aquaculture, ocean alternative energy and ocean mapping will be summarized.

Oil spill response research started due to the need of the industry to know how to respond to a spill in the coastal waters and estuaries of New Hampshire and Maine. Hydrodynamic models were developed for the estuaries and spill trajectories were calculated. Response strategies with existing technology was developed and delivered to the terminal personnel in short course form. This was followed by the development of new response devises and extensive testing.

During the 1990's Open Ocean Aquaculture research and development was started. A submersible farm with feeders that were capable of feeding submerged cages was developed. Cages developed at UNH and by others were tested under offshore conditions. Cooperation with the Soybean Association and the International Copper Association allowed us to develop new cages and test new materials. As the USA decreased its support of finfish aquaculture, research was diverted to finfish research. Currently we are working with mussel farmers trying to move their rafts to more exposed sea conditions.

As the funding for offshore finfish farming decreased, we started to get more involved in ocean alternative energy. The offshore aquaculture site became a wave energy testing facility and the Great Bay Estuary became a tidal energy test bed. Our tow/wave tank was modified, enabling us to make detailed laboratory measurements. Several student projects designed and built wave energy and hydrokinetic devises.

About a decade ago we saw the opportunity to set up a coastal mapping laboratory at UNH. We were joined by the National Oceanic and Atmospheric Administration, NOAA, to establish a coastal mapping center both for research and training hydrographers. This center has become the University's largest oceanic research center. Members of the center have participated in cruises around the world including Cyprus. They have mapped the Arctic Sea as well as the Gulf of Mexico during the BP oil spill.

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Aquaculture on *Posidonia oceanica* Beds

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Abstract

In the Mediterranean, the *Posidonia oceanica* seagrass meadow develops along the coast in all countries except in the south-eastern area (between Syria and Libya). Apart from low salinity areas (in front of mouths of rivers), these plants occupy the shallow bottoms between -1 and - 40 m. This vegetation constitutes the main underwater plant cover in the Mediterranean (biomass, density, etc.).

This linear oasis that borders the coasts where the human demographic density is very high, is subjected to severe human impact. It is irreversibly destroyed by being covered over by constructions built over the sea (harbours, landfill, seawalls). The deep part of the meadow is destroyed as the result of urban sewage which increases the turbidity of the water (not enough light at the level of the natural lower limit). The anchoring of boats and trawling open long-lasting breeches in the meadow. Finally, aquaculture facilities, anchored within the meadows, lead to the destruction of the vegetation over an area greater than that of the facility itself.

Yet these seagrass meadows are the richest benthic ecosystem in the Mediterranean (serving as shelter, food source and nursery to a large number of species), they also oxygenate the coastal waters and fix the underwater sediments (and also play a role in the maintenance of the shoreline).

For all these reasons, in many Mediterranean countries, the *P. oceanica* meadow is protected, above all against physical destruction by being built over. In France, it is prohibited to build any kind of construction over the *P. oceanica* meadow, in Italy the *P. oceanica* meadows in certain regions are protected by a European convention (they are included within the perimeters of the Natura 2000 sites).

In order the better preserve this major narrow, linear ecosystem bordering our coasts, any assault on its integrity must be avoided. Thus, to support recommendations against the installation of fish or shellfish farms above a *P. oceanica* meadow, we provide information based on the results of the transplantation of P. oceanica cuttings over a long period (24 years), which:

- demonstrate the extremely slow rate of regeneration of a meadow on a biotope that is favourable to it,
- relativise any hopes of artificial colonisation (by transplantation of cuttings) after the removal or closing down of an aquaculture facility,
- contribute to a better understanding of the importance of strict protection measures for all the seagrass meadows that are withdrawing throughout the Mediterranean as the result of multiple forms of human impact.

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MAİN HALL ORAL PRESENTATIONS

Antimicrobial Activity of *Origanum onites* L. on Protection Against Lactococcus garvieae and *Vibrio anguillarum* in Rainbow Trout (*Oncorhynchus mykiss*, Walbaum)

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Abstract

The wide and frequent use of antibiotics in the past has resulted the resistance development in pathogens in recent years, plant extracts such as essential oils have increased attention as potential alternatives to growth promoters for animal production. In this study, the effect of *Origanum onites* L. on antibacterial activity was investigated in *Oncorhynchus mykiss*. Experimental diets supplemented with four concentrations (0.125, 1.5, 2.5, 3.0 ml kg-1) *Origanum onites* L. for twelve weeks. Dietary application of *O. onites* L. as protection for Lactococcosis and Vibriosis were studied. Feeding with *O. onites* L. oil significantly reduced mortality following injection with *Lactococcus garvieae* and *Vibrio anguillarum*. Dietary administration of 2.5 and 1.5 ml kg-1 of *O. onites* L. significantly reduced mortality. The highest survival rate was observed in the group fed with the 3.0 ml kg-1. These results indicated that dietary *O. onites* L. survival and enhanced disease resistance of rainbow trout (*O. mykiss*).

Keywords : *Oncorhynchus mykiss, Lactococcus garvieae, Vibrio anguillarum, Origanum onites L.*

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Use of Oxidative Stress Biomarkers In Three Crustacean Species for the Assesment of Water Pollution in Kocabaş Stream (Çanakkale, Turkey)

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Abstract

Freshwater macroinvertebrates are commonly used in biological monitoring, but research of biomarkers at biochemical level is still at the early stage of development. Biomarkers in aquatic species are regarded as important for detecting stressor components, such as presence of pollutants and changes in environmental factors (pH, temperature, dissolved oxygen, etc.). In this study, to evaluate the pollution in the stream, we used specific biomarkers (GSH, TBARS and Na+,K+-ATPase) in homogenates of whole organisms. Macroinvertebrate samples were sampled from three locations receiving increasing levels of urban and industrial waste water discharges along the Kocabaş Stream (Çanakkale-Turkey) in April 2013. Locations were selected to include aquatic communities in poor and good ecological state according to measured physico-chemical water parameters and the analysis of benthic macroinvertebtrate communities. As a results of the study, important increases in TBARS and GSH level of Asellus aquaticus, Gammarus pulex pulex and Potamon ibericum tauricum collected from the stations in Çan and Biga were seen compared to the individuals collected from Yenice. These results show that serious pollutants presence in Kocabaş Stream especially in the region of Çan, and occurs on the physiology of macroinvertebrate organisms living in the region.

Keywords : Biomarker, water pollution, Kocabaş stream, *Asellus aquaticus, Gammarus pulex pulex, Potamon ibericum tauricum*

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Assessing the Oil Oxidizing Microorganisms Potential Based on Specific Actıvity of Catalase and Superoxide Dismutase

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Abstract

Bioremediation is currently one of the most effective, safe and cost-effective methods of purifying water ecosystems from oil pollution. In this regard, it is a very topical task of selecting the most effective strains of oil destruction bacteria. Today we have the data showing that biotransformation and biodegradation of oil by microorganisms is accompanied by reactive oxygen species (ROS) formation. Hydrocarbon - reducing microorganisms which emit hydrogen peroxide into the atmosphere actively are well-known also the formation mechanisms of other ROS types at enzymatic oxidation of oil hydrocarbons are known. In our research of prooxidant properties of Acinetobacter calcoaceticus microorganisms the data are provided confirming that at cultivation of these oil-biodegrading microorganisms in oil-containing medium, level of free radical processes increases in bacterial cells. Antioxidant complex enzymes, superoxide dismutase (SOD) and catalase, in particular, protect a microbic cell from ROS effectively. As synthesis of these enzymes is induced by those reactive oxygen species at elimination of which their enzimatic activity is aimed, activity of catalase and SOD can serve as the reliable indicator of hydrogen peroxide and superoxide-anion radical presence in the medium. Thus, an increase in activity of these antioxidant enzymes at biodegradation of oil could serve as confirmation of ROS formation in the course of oil compounds biodegradation. Incubation of active oil degrading microorganisms Achromobacter xylosoxidans of strains VKPM V-10344, 5 and 7 and Acinetobacter calcoaceticus of strains 6 and VKPM V-10353 was carried out within 24 hours at the temperature of 30 ºC and active aeration. Activity of antioxidant enzymes is calculated per 1 mg of bacterial biomass protein. Oil biodegrading microorganisms were introduced into 50 ml conic flasks with 15 ml of basal mineral salt medium with addition of 1% (150 mcl) of crude oil. In the control sample oil biodegrading microorganisms were cultivated on basal mineral salt medium with addition of 0,5% of yeast extract. Activity of enzymes was calculated per 1 mg of total bacterial protein at the moment of incubation termination. Protein concentration in bacterial suspension was estimated according to the Lowry method. Activity of SOD was estimated according to the Sun Yi et al. method. Catalase activity was estimated according to Goth method. Maximum level of catalase activity was observed at cultivation of bacteria on basal mineral salt medium with addition of 0,5% of yeast extract. In these conditions the highest culture growth rate was recorded. Specific catalase activity at cultivation on a complete nutrient medium was 5-20 times higher than

the indicators of specific activity of this enzyme at cultivation of the researched microorganisms on basal mineral salt medium with addition of crude oil. The maximum superoxide dismutase activity, on the contrary, was registered in the case when crude oil was the only source of carbon in the cultivation medium and reached 88-fold level at Achromobacter xylosoxidans VKPM V-10344. The superoxide-anion radical generation level of the researched microorganisms strains apparently increases in such conditions. The data obtained by us correspond with the recent catalase activity research of oil biodegrading bacteria of Gordona terrae, Rhodococcus rubropertinctus and Rhodococcus erythropolis. Judging by a really considerable superoxide dismutase induction in the researched microorganisms in the presence of hydrocarbons, one of the main types of formed ROS is superoxide anion. In our recent work it was shown that antioxidants suppress bacterial biotransformation of oil. We assume that ROS generated by oil biodegrading microorganisms and, in particular, superoxide anion radical play a significant role in biotransformation of heavy fractions of oil for which enzymatic metabolism ways have not been found. Concentration of hydrogen peroxide in the medium can also decrease at the expense of direct or mediated by bacterial peroxidases oil hydrocarbons oxidation. Accordingly, reduction of hydrogen peroxide amount causes the decrease in catalase synthesis by bacterial cells. Thus, the level and ratio of specific activity of catalase and superoxide dismutase, synthesized by bacterial cells at cultivation of strains on the medium with or without oil can serve for quick evaluation of bioremediation potential of oil biodegrading microorganisms.

Keywords : Oil oxidizing microorganisms, reactive oxygen species, catalase, superoxide dismutase, crude oil biotransformation, ROS, free radicals

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Determination of the Content of Heavy Metal in *Mugil cephalus* L. 1758 Obtained from Bafa Lake (Turkey) and Its Evaluation in terms of Public Health

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Abstract

This study presents heavy metal (Al, Cr, Ni, Cu, As, Cd, Hg, Pb) concentrations in the muscle, liver and gill tissues of *Mugil cephalus* obtained from Bafa Lake. In this context, the mineralization of tissues of 30 fish samples was conducted with the method of microwave-wet decomposition. In determining heavy metal concentrations in water and tissue samples, the technique of inductively coupled plasma-mass spectroscopy (ICP-MS) was applied. TORT 2 lobster hepatopancreas was used as certified reference matter in this study. Considering the mean heavy metal concentrations, it was found that aluminium was the heavy metal that had the highest rate in the gill (7.29 ± 2.90 mg/kg wet weight) and mercury was the heavy metal, which had the lowest rate in the muscle tissue (0.02 ± 0.001 mg/kg wet weight). It was determined that heavy metal concentrations, which were obtained from muscle tissues, did not exceed the national and international critical values.

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Keywords : *Mugil cephalus*, heavy metal, Bafa Lake

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Monitoring Freshwater Fish Species Using Environmental DNA

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Abstract

Freshwater faunas are one of the most crucial ecosystems with thousands of fish species struggling to avoid extinction. Despite the inevitable necessity of management and monitoring of this biodiversity, its complexity remains because of methods mainly based on taxonomic expertise. Correct identification of species is the most important step in biodiversity studies and some species are difficult to identify in particular developmental stages. In this study, fish species, especially invasive ones were detected using DNA samples obtained directly from water samples. Universal (for fish species) and specific primers were designed to amplify small portions of the mitochondrial cytochrome c oxidase subunit I gene. Amplified fragments were sequenced and identified after comparison with existing nucleotide sequences in databases. Reliability of the results were confirmed with in vitro experiments, which resulted that DNA trace becomes detectable from water samples with the presence of the species, and becomes undetectable within 10 days after the removal of the species. Results of this study indicates that molecular identification of species from environmental samples could be used as a molecular tool in monitoring biodiversity, without direct observation. Thereby, more successful management of freshwater ecosystems could be applicable with successful identification of species that are difficult to obtain or in different life stages lacking morphological traits.

Keywords : Biodiversity, environmental DNA, freshwater

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Does Copper Alloy Net Cage Affect Metal Accumulation in Fish

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Abstract

The conflicts between marine coastal zone users have brought cage aquaculture to a crossroad of expanding farm activities into marine offshore waters, which has brought new technical challenges for fish farmers, in terms of new investment costs, legislative and administrative regulations, environmental impact assessment procedures, and new applications, skills and management. As the Aquaculture industry looks to feed the world with its 9 billion people in 2050 in a sustainable way, worldwide fish farmers need to be supported with knowledge of new applications and alternative materials for environment friendly production. Reducing biofouling on cage nettings may have overall benefits in terms of better fish growth induced by increased feeding rate, reduced fish stress, improved fish health due to a more sanitary environment, and less labor cost from net changes. As an antimicrobial material, copper alloy nettings are capable of preventing biofouling on the marine system. The objective of the present study is to investigate metal concentrations in the tissues of young seabream cultured to market size. Result showed that metal concentrations in the tissues of young seabream cultured to market size in copper alloy net cage, and in the muscle tissues of Mediterranean mussels distributed around the cage system were below the regulatory limits for human consumption levels. This scientific approach with field work and advanced laboratory analyses demonstrates the beneficial effects of copper-alloy net material on fish and mussel tissues in terms of Safe Food production for the Aquaculture Market.

Keywords : Copper alloy net, cage aquaculture, metal accumulation, fish tissue

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Determinations of Seasonal Levels of Chlorophyll A and Organic Carbon on Surficial Sediments of Uzunçayır Dam Lake

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Abstract

Importance for the region. The usability of potentials of Uzunçayır Dam Lake depends of course on having a healthy ecosystem. This can be possible with researching the processes in ecosystem, sustaining continuous observation activities, and revealing the general status. With this study, a step has been taken in this way, and it is aimed to observe the increase of primary production caused by wastes discharged into the lake as a result of domestic, agricultural and animal-breeding activities through sediment. The sediment samples have been collected via grap from 10 stations chosen from littoral zone along the northern shores of Uzunçayır Dam Lake. The sampling study has been carried out in Autumn, Winter, and Spring. Some of samples have been kept under room temperature, and some of them have been kept wet at -18 ^{0}C'. For organic carbon, the collected sediment sampled kept dried have been thrashed before the analyses, and analyses have been carried out according to Wakley-Black titration method. For Chlorophyll a, the sediment samples have been kept wet by extracting with acetone overnight. At the end of 24 h, the sediment and acetone have been separated via filtration method, and the resultant liquid has been read in spectrophotometer, then the concentrations have been calculated. While the lowest organic carbon value has been observed in sandy floor of the lake, the highest value has been observed at the region where the stream bed ends. Also, there is a different type of fish in this region. The values of Chlorophyll a and chlorophyll deterioration products have varied within a wide range. This situation indicates that the contribution of phytoplankton to the amount of organic carbon in sediment is relatively low

Keywords : Uzunçayır lake, sediment, chlorophyll a, organic carnon

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Practical Application Method of HPLC for Analysis of Amino Acid by Precolumn Derivatization with OPA in Seafood

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Abstract

Nutrition is the most important basic requirements for people. Amino acids are one of major building blocks for all living things. And also it has many role and action in living systems. Therefore, it is significant to determine amino acid composition in seafood. There are many methods to identify the amino acids as instrumental. High performance liquid choromotogrpy (HPLC) are generally used to analysis its contents. O-phthalaldehyde (OPA) and fluorenyl methyl chloro formate (FMCF) is the important pre-column derivatization reagents by HPLC-Floresans Dedection or UV. The column and flow rate is a C18 reversed phase and 1.2 mL/min. Fluorimetrical detection of OPA derivatives is carried out at an Ex. 350 nm, Em. 450 nm for OPA derivatization, Excitation 266 nm, Emission 305 nm for FMOC derivatization, and also UV detection is carried out at 338 nm for OPA, 262nm for FMOC. Mobile Phase consistent of phosphate buffer solution (pH 7.3, 0,02 M) (A) and ACN: MeOH: water (45:45:10, v/v/v) (B). The gradient elution system (A/B) is used as 90/10-3 min, 90/10-10 min,78/22-2 min, 72/28-9 min, 70/30-4 min, 35/65-7 min, 25/75-1 min, 0/100-1 min, 0/100-2min, 90/10-2 min. The derivatization reagents are 10 µL 3-Mercaptopropionic Acid in 10 mL Borate Buffer, 10 mg o-Phthalaldehyde in 5 mL Borate Buffer and 4 mg 9-Fluorenyl Methyl Chloro Formate in 20 mL acetonitrile. Firstly, it is added 45 µL MPA + 25 µL + 10 µL sample at the derivatization procedure, and then mixed and waited for 1 min. Then, it is added 10 µL FMOC in the solution, and mixed and waited for 2 min. Finally, 10 µL of derivatizated amino acids is injected to HPLC.

Keywords : Amino acid, HPLC, OPA, Analysis

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Assessment of Ecotoxicological Parameters of Lower Don Sediments (2011)

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Abstract

The river Don belongs to the most significant water bodies by volume and economic importance in the Rostov region (Russia). The Lower Don ecosystem is exposed to intense anthropogenic pressure - it gets a wide range of contaminants. For an objective assessment of pollution and, especially, its ecological effects, it is needed to compare the data of chemical analysis of pollutants and biotests describing the toxicological effects of the whole complex of substances present in the researched samples. Samples of bottom sediments taken in 16 areas of the lower reaches of the river Don in 2011 were the material for the research. To detect toxins and genotoxins in the samples a battery of bacterial lux-biosensors was used. Concentration of polyaromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB) and of heavy metals was evaluated with the help of standard methods. Analysis of integrated toxicity with usage of Vibrio aquamarinus VKPM B-11245 strain showed that 6 samples of bottom sediments (37,5 %) were toxic, 10 bottom sediments extracts (62,5 %) - highly toxic. Bottom sediments genotoxicity was registered in all 16 areas that were researched. The biggest genotoxic effect was recorded in the estuary of the Aksai river (induction factor is 3,0), 500 m downstream of the Aksai river estuary (3,3) and in the Sal river estuary (3,1). The presence of substances causing oxidative stress was detected with the help of E. coli MG1655 (pSoxS-lux) biosensor in 3 out of 16 sediments extracts (18,75 %), and with the help of E. coli MG1655 (pKatG-lux) in 14 out of 16 extract (87,5 %). The greatest effect with both biosensors was registered in bottom sediments sampled near the estuary of the Bolshaya Kuterma distributary and in the area of the Bagaevskaya Cossack village. The presence of mercury was recorded during testing with E. coli MG1655 (pMerR-lux) biosensor in all bottom sediments extracts (100 %), the presence of arsenic was discovered using the E. coli MG1655 (pArsR-lux) in 15 out of 16 extracts (93,75 %). Maximum permissible concentration for bottom sediments are not established. But the detected concentrations of arsenic and mercury are in the normal range, if we take into account Hygienic Normatives 2.1.7.2041-06 «Maximum permissible concentration (MPC) of chemicals in the soil» (Russian Federation). With the biosensor strain E. coli MG1655 (pGrpE-lux), intended for the detection of substances causing damage to proteins, response effect was registered in 12 extracts (75 %). For the detection of substances that cause damage to the membranes E.coli MG1655 (pFabA-lux) biosensor was used. During testing extracts of bottom sediment with this biosensor substances causing damage to membranes were

identified in 12 extracts out of 16 (75 %). The chemical analysis results showed that the maximum concentration of PAH - 529 mcg/kg of dry weight was found in the sediments of the Bolshaya Kuterma distributary. Moreover, almost 50 % were fluoranthene and benzo(b)fluoranthene. PAH with high and medium carcinogenic activity were present in all test samples. Their mass fraction varied from 7,0 % (upstream of the Manych river estuary) to 32,4 % (estuary of the Bolshaya Kuterma distributary) of the identified compounds total. PCB in concentrations ranging from 1,4 to 8,5 mcg/kg of dry weight were found in 38 % of the analyzed samples. Study of heavy metals showed the presence of maximum concentrations of vanadium, nickel and zinc in the Aksay river estuary: chromium - in the Sal river estuary; copper, lead and arsenic – 0,5 kilometres downstream of the Temernik river estuary; mercury - in the Bolshaya Kuterma distributary, cadmium – in the Mokraya Kalancha distributary. Correlation analysis of our data of genetic toxicological analysis with different content of xenobiotics in the bottom sediments of the Lower Don revealed correlation dependence (0,5 to 0,7) of genotoxicity (biosensor E. coli C600 (pPLS-1)), detected using metabolic activation with the presence of specific PAHs (phenanthrene (0,66), fluoranthene (0,58), pyrene (0,55), chrysene (0,51), benzo(k)fluoranthene (0,71), benzo(a)pyrene) (0,62). Induction of genotoxicity at testing with E. coli C600 (pPLS-1) biosensor without metabolic activation was registered with the content of phenanthrene (0,58) and benzo(k)fluoranthene (0,51). Correlation was found between the genotoxicity revealed with the help of E. coli C600 (pPLS-1) biosensor with the use of metabolic activation, and nickel (0,52). The correlation coefficient between the mercury content and genotoxicity (E. coli MG1655 (ColD-lux) biosensor) using metabolic activation was 0,65, between mercury content and pro-oxidant effect (E. coli MG1655 (pKatG-lux) sensor) - 0,6. This may indicate that mercury compounds may enhance free radical processes and thereby contribute to genotoxicity. Thus, from the obtained data it is clear that a detailed picture of contamination may be obtained by concurrent use of biotesting and chemical analysis. Such an integrated approach will allow the target search of sources that form the high human impact on ecosystems.

Keywords : Toxicity, genotoxicity, lux-biosensors, bottom sediments, the river Don

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Evaluation of the Water Quality of Yıldız Lagoon (Sivas)

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Abstract

Yıldız lagoon is a lagoon which is located in north of Sivas city, at the southern foot of Mount Yıldız and on Kayalıgöl Creek, have 1693 h of surface area and 3.4 m of mean depth. The objectives of this study are to observe the monthly and annual changes in water quality for 1 year in 3 stations determined in Yıldız Lagoon which is located in central Yıldız district of Sivas, to determine the water quality properties, to determine the suitability level in terms of aquatic life, and to classify the quality of water in accordance with Surface Water Quality Management Regulation. The study has started in April, 2012, and the sampling has been carried out monthly in 3 stations for 12 months in order to make water analyses. The water quality parameters of temperature, dissolved oxygen, pH, saltiness, and electrical conductivity (E.C.) have been measured directly in field. For other water quality parameters of suspended solid matter, COR, BOR, total alkalinity, total hardness, total ammonium azote (NH4), nitrite, nitrate, phosphate, sulfate, sulfide, free chloride, sodium, magnesium, calcium, ferrous lead, copper and cadmium analyses, the water samples have been taken to laboratory, and analyzed in same day. The results obtained as a result of performed analyses indicated for the Yıldız Lagoon in which various fish species exist and which provide suitable conditions for aquatic life and fish that it is very important for sustaining the ecologic balance and watering the agricultural fields near the lagoon to protest the actual water quality of lagoon. It has been found that the lagoon shows I-III class water characteristic according to SWQMR. It has been determined that the Yıldız Lagoon is under the pressure of pollution and it should be continuously monitored for sustaining the ecological balance and protecting the existing water quality

Keywords : Water quality, water pollution, Yıldız lagoon

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A Research on the Use of Phytogenic Products in Fish

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Abstract

Over the last decade research has focused on the application of using herbal feed additives such as aromatic plants, herbal products, essential oils and oleoresins to replace antibiotic growth promoters in terrestrial animal feeds. More recently such applications have begun to demonstrate positive effects in feeds for various fish species. The potential of phytogenic products in fish diets is not only depleted by their usega as alternatives for antibiotic growth prometers but maybe extended into other areas of interest, such as disease control and immune response. The purpose of this present study is to summarize and discuss the results of these studies, to provide useful information for the application of phytogenic products in fish culture. In this study, it is aimed to discuss results which made before on blood parameters of fish feeding plant extracts. Research has been carried out world-wide, focusing on fish species using a wide variety of plant extracts establishing the positive effects of the plant extract used. Even if they exhibit a positive influence on many parameters, their use is dose dependent, as higher or lower doses could have inhibitory effect or no effects at all.

Keywords : Plant extract, feed additives, aquaculture, phytogenic products

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Physicochemical Parameters and Plankton Interactions In a Cage Culture System In The Daradenelles (Çanakkale-Turkey)

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Abstract

The study was carried out monthly, from September 2011 to July 2012 in three stations selected from Dardonos Cage Site (Çanakkale, Turkey). The aim of this research was to determine the physicochemical parameters and plankton interactions. Physicochemical parameters including temperature, salinity, pH, dissolved oxygen (DO), total suspended solids and nutrients such as ammonium (NH4), nitrite+nitrate (NO2+NO3), ortho-phosphate (PO4), total phosphorus (TP), silicone dioxide (SiO2) were examined. According to the in situ measurements and laboratory analysis; temperature, salinity, pH, DO, TSS, NH4, NO-2+NO-3, PO4, TP, SiO2 varied between 10.26-22.97 oC, 23.20-38.93 ‰, 8.02-8.49, 6.70-10.71 mg l-1, 0.06-10.40 mg l-1, 0.016-2.653 µM, 0.001-0.517 µM, 0.103-12.918 µM, 0.099-41.834 µM, 0.080-4.570 µM, respectively. Biological parameters were chlorophyll-a, phytoplankton, and zooplankton. Chlorophyll-a concentrations varied between 0.103 and 2.585 µg l-1. Most abundant taxa of phytoplankton were Ceratium horridum, Noctiluca scintillans from the dinoflagellates. Most abundant zooplankton taxa were *Acartia clausi, Oithona nana, Oithona similis, Oithona plumifera, Temora longicornis* from the copepods, *Evadne spinifera, Podon intermedius, Penilia avirosrtis* from the cladocerans and *Oikopleura dioica* from the appendicularians. This study was funded by ICA PROJECT NO. TEK-1049.

Keywords : Pysicochemical parameters, phytoplankton, zooplankton

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An Escape Gate Study to Prevent Ghost Fishing in Fish Traps

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Abstract

The fisheries managers and the scientists make agreat effort for reducing by-catch species and sustaining the fish stocks in the world. Recent investigations on fishing suggest that the techniques developed elsewhere might be useful, even in multi species fisheries, to reduce discarding; particularly of non target species by-catch and discard are the most complex issues facing fisheries today. The methods captured products are alive in had come into prominence for solving these problems with the understanding of ecosystem approach fisheries. One of these methods is trap fishing, besause the catch remain live in the traps. On the other hand, baited fish trab has a big problem, ghost fishing, after being lost. In the study, it was aimed to make an escape gate on the baited fish traps which will be able to provides the catch escape after a period of the time. For this pupose, two device contains frames for testing opening time of the escape gates was made. One side of the escape gate fixed to the frames like door by using electric clamps. The opposite of this side was fastened by degradable materials and two different weights was hanged on the materials. It was planned that this weights forced to open the gates. Eight different material tested in this devices. These devices were observed by scuba diving. It was determined that the best material for opening after a period of time to prevent ghost fishing is catgut (Suture contains sheep gut). This study was supported by TUBİTAK (Project no: 112Y191)

Keywords : Ghost fishing, escape gate, fish trap, catgut

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Cytokine responses in the Japanese pufferfish (*Takifugu rubripes*) Head Kidney Cells Induced with Nigericin

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Abstract

Cytokine responses in the Japanese pufferfish (*Takifugu rubripes*) head kidney (HK) cells to an inflammasome-inducer, nigericin were investigated by a transcriptomic examination. The HK cells were treated with bacterial lipopolysaccharide (LPS) at 20 µg mL^{-1}, nigericin at 30 µM and a combination of nigericin (30 µM) + LPS (20 µg mL^{-1}) and incubated for 1, 4 and 24 h at 25°C. Expression of 18 cytokine genes was assayed by a multiplex RT-PCR analysis (GenomeLab Genetic Analysis System, GeXPS; Beckman Coulter Inc.). The 18 genes included in the assay were pro-inflammatory (IL-1β, IL-6, TNF-α and TNF-N), cell-mediated immunity inducing (IL-12p35, IL-12p40 and IL-18), antiviral/ intra-cellular pathogen killing (I-IFN-1 and IFN-γ), anti-inflammatory (IL-10) and other regulatory (IL-2, IL-4/13A, IL-4/13B, IL-7, IL-15, IL-21, TGF-β1 and CSF-1β) cytokines. Expression of all pro-inflammatory cytokines tested here was significantly elevated by nigericin and nigericin+LPS stimulations compared with the unstimulated control ($P < 0.05$). Similarly, cell-mediated immunity inducing cytokines were up-regulated by both the said stimulations. The intra-cellular pathogen killing cytokine (IFN-γ) had increased expressions in nigericin and nigericin+LPS stimulated HK cells ($P < 0.05$). Therefore, this in vitro study has demonstrated the modulation of cytokine defence mechanism in the HK cells by nigericin indicating its potentiality as immunostimulant to fish. Further in vivo studies to elucidate the cytokine regulation networks will validate our present observations.

Keywords : Cytokine responses, Japanese pufferfish, head kidney cells.

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Egg Production and Distribution of Egg and Larvae of Small Pelagic Fish in Sinop Coast of Southern Black Sea

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Abstract

In this study spawning season and egg quantity of of eggs and larvae of small pelagic fishes; sprat (*Sparttus sprattus*), anchovy (*Engraulis encrasicolus*) and horse mackerel (Trachurus mediterraneus) in Sinop coast were investigated between 2002 November and November 2003. A total of six stations were selected and plankton tows were made both vertically and horizontally. Distribution and abundance of egg and larvae were determined. In plankton tows mean egg quantity of sprat, anchovy and mackerel were found 35.9±19.68, 27±9.26 and 2.8±1.11 by vertically hauls and 21.4±6.42, 80.6±34.52; and 5.2±1.87 by horizontally hauls, respectively. Mean larvae numbers of sprat and anchovy were determined 2.7±1.58 and 8±2.52 by vertically hauls and 8.2±3.08 and 22.3±11.3 by horizontally hauls, respectively. Sprat, anchovy and mackerel was determined reproduction between October and April, May and September, and April and September, respectively. Mean individual egg production of sprat, anchovy and mackerel were 2698±272, 3843±769 and 16177±662, respectively. The results were compared with those from other studies and discussed.

Keywords : Fish egg, larvae, Black Sea, egg production, sprat, anchovy, horse mackerel.

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Estimation of Growth Parameters of Gilthead Seabream (*Sparus aurata* L., 1758) Tagged with VI Alpha Tags in Beymelek Lagoon, (Southwestern Coast of Turkey)

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Abstract

In this study, growth parameters of seabream (*Sparus aurata* L., 1758) were estimated with VI Alpha tags in Beymelek Lagoon, costal of southern Mediterranean in Turkey. Seabream (lengths between 17.8 – 37.7 cm (TL)) was released to lagoon after tagging with VI Alpha between October 2006 and May 2007. As a result of retain rate was found 16.25%. The growth parameters of L∞ and K were estimated as 33.42 cm and 0.474 year-1 by Gulland-Holt Method using recapture data.

Keywords : *Sparus aurata*, VI Alpha tags, Beymelek lagoon, Gulland-Holt method, Tagging

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Amyloodinium Infestations in Cultured European Sea Bass (*Dicentrarchus labrax*): Beneficial Effects of Oral Humic Acid Supplementation

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Abstract

Amyloodinium is a ectoparasite that causes serious problems on wide range of fish species in intensive production systems. In this study, the effects of the supplementation of humic acid (0, 0.25, 0.50, 0.75 or 1.50 g/100g diet) on the histopathological alterations in sea bass under *Amyloodinium spp*. infestations were investigated. Fish were fed humic acid diets for 20 days. Then, naturally infested sea bass were analyzed in order to evaluate histopathological alterations against the Amyloodinium. No histopathological effects were observed in the positive control group (non-infested sea bass). Epithelial lifting, acute cellular swelling, fusion of secondary lamellae, hyperplasia of epithelium and blood congestion were observed in gill tissues infested with Amyloodinium. Infestation by Amyloodinium appeared to exacerbate the negative histopathological effect in fish fed humic acid at a rate of 1.50 g/100g. However, humic acid (0.50 and/or 0.75 g/100g) administration resulted in overall improvement in the gill histopathology, emphasizing the protective potential of humic acid.

*The present study was supported by COMU BAP Project Number: FYL-2013-104.

Keywords : Amyloodinium, European sea bass, humic acid, histopathological alterations

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Determination of Safety Dose Value of *Foeniculum vulgare* L. Hydrosol on Carp Fish

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Abstract

Introduction: In Turkey, Cyprinids are the richest and the most important family of fish, and its members are distributed world-wide. These family members are distributed widely in fresh water sources. Hydrosols, also known as floral water, distillate water or aromatic water, are the co-products or the byproducts of hydro- and steam distillation of plant material. In this study, we demonstrated death percentages of fennel (*Foeniculum vulgare)* hydrosol at different concentrations in cultured carp and determined the safety dose of fennel. Material and Methods: *Cyprinus carpio* with an average weight of 475±11 g and lengths of 31.0±4.0 cm were used in this study. Fish were acclimated for 1 week in these aquariums. Fennel used in the study was purchased from a local firm Elazig/Turkey. Fennel's oil compositions were determined by gas chromatography-mass spectrometry (GC-MS). Fish were acclimated for 1 week in these aquariums. Temperature, pH and dissolved oxygen levels of water were recorded along this period. Hydrosols were prepared by the hydro-distillation according the method described by Sagdic (2003). The hydrosol of *F. vulgare* was obtained for 1 h in a hydro distillation apparatus with 500 ml of double distilled water (1:10; w/v). After hydro-distillation, essential oil was separated by separation funnel and the mixture without essential oil identified as hydrosol. Hydrosol concentrations were set up using doses of 4 %, 5 % and 6 % levels of hydrosol to determine mortalities and effects of the hydrosol concentrations. All experiments were repeated three times and performed in triplicate. Results: According to GC-MS method, the most important components of F. vulgare oil were benzene (67.99 %) and 1-methoxy-4-(1-propenyl) (16.03 %). Temperature (^{o}C), pH, dissolved oxygen DO (mg/L) were 16, 7.63 and 8.9 respectively. After added the hydrosol concentration, the data were observed macroscopically showed that mental behavior and/or mortality was not observed at all treatments exception of dose of 6 %. All fish had swimming changes, lethargy, lack of breath and leaning to the depth of the aquariums at the dose of 6 % and died within 4 h. The safety dose of *F. vulgare* hydrosol on carp was determined as at the dose of 5 %. The safety dose of F. vulgare hydrosol has never been studied before. Especially wild fennel is endemic in Turkey, and so it has a special importance for this study. Fish mortality may be due to volatile oil or other components of hydrosols, and results herein will be a reference for future investigations.

Keywords : *Cyprinus carpio*, fennel oil, *Foeniculum vulgare*, hydrosol, safety dose

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HALL- 2 ORAL PRESENTATIONS

Breeding and Larval Rearing of the Doctor Fish *Garra rufa* (Heckel, 1843) and *Cyprinion macrostomus* (Heckel, 1843) Under Laboratory Conditions

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Abstract

The present study describes captive breeding, reproductive behavior and larval rearing of the doctor fish *Garra rufa* and *Cyprinion macrostomus* under controlled laboratory conditions. Juvenile fish that were collected from Kangal /Sivas Turkey were carefully transferred to the laboratory within a day after capture and kept in aquariums (70×40×40 cm, l×w×h). All fish were kept under the same conditions at a maximum density of 50 individuals per aquarium for 12 months. Mature males and females were selected using observing morphological body characters. Broodstock fish were stocked to each tank at a ratio of 2 females to 2 males. Spawnings occured in the morning (02:00-06:00 a.m.) and the eggs were scattered on the gravel and were demersal. Total number of eggs and number of hatchings were recorded. All eggs were incubated at a constant temperature of 28±1 °C. Embryonic development stages of two fish species (*G. rufa* and *C. macrostomus*) was very similar to that of other cyprinid fish eggs and hatching occurred between 34 to 38 hr at water temperature 28±1°C. Larvae were kept at 28±1ºC and fed with *Artemia sp*. and commercial granular fish food. The mouth of larvae opened 3 days after hatching (DAH). The yolk sac is completely consumed within 5-6 days. Larvae started to swim actively within 3–5 days. Early juveniles were first observed on day 8-10. The metamorphosis was completed and the larvae transformed into juveniles at 15-30 DAH.

Keywords : *Garra rufa*, *Cyprinion macrostomus*, doctor fish, spafish, breeding.

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Non-Specific Immune Responses and Protection Against *Aeromonas hydrophila* Infection in Koi Carp (*Cyprinus carpio*) Treated with Tetra (*Cotinus coggygria*) Extract

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Abstract

Due to eco-friendly nature of herbal products, a considerable attention is given towards their application as therapeutics and immunostimulants both in higher and lower vertebrates. Tetra (*Cotinus coggygria*) is widely distributed in the north-west part of Turkey and has been traditionally used in Turkish folk medicine. Whether this herb has any immunostimulatory effect in koi carp (*Cyprinus carpio*), we investigated non-specific immune responses and protection against Aeromonas hydrophila infection after a 30-day feeding trial. Healthy koi carps were fed with diets containing tetra leaf extract at 0 (Control), 0.5 (Te1), 1.0 (Te2) and 1.5 g kg-1 feed (Te3) ad libitum twice daily for the said duration. At the end of the feeding experiment, haemato-immunological parameters and resistance to *A. hydrophila* challenge (intra-peritoneal injection of 100 µL of 108 CFU mL-1) were assessed. Except erythrocyte count that was significantly increased in Te2 group ($P < 0.05$), other haematological parameters showed no differences among treatments. Nitroblue tetrazolium activity was found to be higher in all the treatment groups compared to the control, with higher values were recorded in Te3, Te1 and Te2, respectively. Lysozyme and myeloperoxidase activities of the treatment groups were significantly enhanced compared to control ($P < 0.05$), and their higher values were observed in Te3, Te2 and Te1, respectively. In the challenge test, koi carps fed with Te3, Te2, Te1 and control diets had 13.3, 20.0 and 26.7 and 40.0% mortality, respectively. Results indicated that tetra extract enhanced non-specific immune responses and conferred protection against *A. hydrophila* infection in koi carp.

Keywords : *Cotinus coggygria*, *Aeromonas hydrophila*, goldfish, immunostimulant.

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First Observation of Red Mark Syndrome (RMS) in Cultured Rainbow Trout (*Oncorhynchus mykiss* Walbaum, 1792) in Turkey

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Abstract

In this study, red mark syndrome (RMS) in rainbow trout was confirmed for the first time in Turkey. The disease occurred in marketsize rainbow trout (250-300g) reared in raceways at a water temperature of 11°C in the Mediterranean region of Turkey in February 2014. The affected fish showed scale loss, followed by a haemorrhagic dermatitis, with the oval lesions perpendicular to the lateral line. The lesions were bright red, usually raised, non-ulcerative, approximately 5 cm in length and usually on the flank on the fish. The fish were in good condition, showed normal behaviour and there was no increased mortality associated with the disease. Samples for bacteriological examinations were collected from the anterior kidney, liver and spleen and skin lesions by using sterile swabs. These samples were streaked onto trypticase soy agar plates and incubated 22°C for 48 h. Bacterial growth was not observed on the plates.

Keywords : Rainbow trout, *Oncorhynchus mykiss*, skin lesion, red mark syndrome (RMS), cold water strawberry disease (CWSD).

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High-Throughput Sequencing and Metagenomics: Moving Forward in the Culture-Independent Analysis of Fish Microbial Ecology

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Abstract

The fish gut microbiome contributes to digestion and can affect nutrition, growth, reproduction, overall population dynamics, and vulnerability of the host fish to disease and therefore is highly relevant for aquaculture practice. Following recent trends in environmental microbiology, fish microbiology studies has benefited from the advances in molecular biology and adopted novel strategies to detect, identify, and monitor microbes in fish microbiome. An in-depth study of the microbial diversity in fish gut can now be achieved by using high-throughput sequencing (HTS) approaches after direct nucleic acid extraction from the sample to be studied. In this presentation, the current scenario and future perspectives of HTS uses to study fish microbiota are presented. The knowledge provided by these next generation technologies will be useful for better nutrient management of fishes, helping the aquaculture industry to increase efficiency in fish food and feed management. Additionally, these methods can be used for metagenomic analyses, permitting to determine not only which species are present but also what functional role they play in the fish gut ecosystem, hopefully leading in the near future to a clear examination and understanding of the microbe-driven changes in fish physiology and growth.

Keywords : Fish microbiome, next-generation DNA sequencing, gut microbiota, pyrosequencing

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Effects of Fish Size on Transport and Seawater Acclimatization of Rainbow trout (Oncorhynchus mykiss) with Different Adaptation Procedures

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Abstract

Rainbow trout (*Oncorhynchus mykiss*) is an important fish species for the World aquaculture industry. Due to the ion regulatory ability of rainbow trout, cage culture of this species in seawater has been in a rapid growth in recent years. Since fish farmers nowadays are challenging problems of high feed costs, it is crucial to reduce any other costs that may influence the total production profit. The loss of fish during seawater acclimatization is one of the issues reducing the capital of the production. Hence, fish transfer from fresh water hatchery to the seawater site and adaptation of fish to seawater conditions is an important matter that needs to be considered for a successful start and set out of rainbow trout culture in sea based cage aquaculture systems. In this study, the adaptation steps of rainbow trout starting from the transportation from freshwater hatchery to seawater and the acclimatization process have been observed. Two different size groups of fish (mean weights of 35g and 22 g) were transported and two different seawater acclimatization processes have been applied for each fish group, i.e., short and long term acclimatization. Transport 1 (large fish group) was carried out on 12 January 2014 while Transport 2 (small fish group) was conducted on 16 January 2014. Total of 3500 and 5500 fish were carried on the 1st and 2nd transports, respectively. In both of the transports, short term acclimatization process took 6 hours and the long term acclimatization process took 48 hours. After the transportation and seawater adaptation processes, a mortality rate of 26% was recorded for the large fish group and 43% for the small fish group in the short term acclimatization. In the long term acclimatization however, mortality rate was observed as 10% and 16% for the large size fish and small size fish groups, respectively. The objective of the present study is to evaluate seawater acclimatization of rainbow trout of different sizes with the aim of supporting trout farmers with practical information for the sustainability of marine cage aquaculture industry.

Keywords : Fish size, transport, acclimatization, rainbow trout (*Oncorhynchus mykiss*)

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Nutritional Components of Some Economic Shellfish Species and Editing Their Sonsumer Srategies by Identifying the Contents of Shell.

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Abstract

Bivalve named as sea fruit are consumed in various regions of the world. In Turkey, the consumption is usually limited in coastal areas and especially, Mediterranean mussel, Mytilus galloprovincialis Lamarck, 1819 is eaten. Although Turkey have a great potential for both fisheries and culture of bivalve, consumption amount are not sufficient. The most important point of production to encourage is formed of a domestic market. The production originated with the foreign markets has risks and especially, this event blocks to aquaculture activities. For the formation of domestic market, bivalve species must be introduced to the Turkish people. For this purpose, nutritional components of oyster, (*Ostrea edulis* Linnaeus 1752), wedge clam (*Donax trunculus* Linnaeus 1758), carpet shell (*Ruditapes decussatus* Linnaeus 1758), Japan carpet shell (*Ruditapes philippinarum* Adams and Reeve 1850), striped venus clam (*Chamelea gallina* Linnaeus 1758), smooth scallop (*Chlamys glabra* Linnaeus 1758) and Mediterranean mussel (*Mytilus gallopravincialis* Lamarck 1819) should be observed. Variations of nutritional components is determined by means of monthly samples and physicochemical variables such as temperature, salinity, pH, chlorophyll-a particulate organic and inorganic matter that affect these variations also monitoring. Reproductive cycles of the species is determined in this study, the effects of nutritional and biochemical variables studying. After exhaustion of bivalve, their shells are accepted as waste. The protein content of waste shell is detected. Amino acid content, cholesterol amount, major and minor minerals of these species are stated for the first time for our country and there is no a detailed study like this in the relevant literature. Besides, antioxidant contents were not studied before. In this study we have a chance to have the results required, feeding strategies of human could be clarified. So, bivalve farmers will be encouraged for cultivation of these species. After determining all protein content of the shells, to use as biomaterials the studies will be carried out.

Keywords : Shellfish, aminoacid, mineral, vitamin, fatty acid, antioxidant, reproduction

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The Effects of *Artemisia vulgaris* L. on Nonspecific Immunity of Rainbow Trout (*Oncorhynchus mykiss*, Walbaum)

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Abstract

The microbial diseases cause economic losses in aquaculture on global scale and the use of commercial antibiotics for disease treatment produces undesirable side effects. Using of natural plants as immunostimulants and antibacterials is more useful than antibacterial drugs that cause adversely side effcets for fish, environment and consumer. The objective of this study was to determine the effects of *Artemisia vulgaris* L. on the immune response, and disease resistance against *Vibrio anguillarum* in rainbow trout (*Oncorhynchus mykiss*). *Artemisia vulgaris* L. was incorporated into the diets of rainbow trout (20,48±0,19—20,81±0,04 g) as powder and ethanol extracts. Some haematological (WBC, RBC, Hematocrit level) and immunological (NBT (+) cell activation, lysozyme and phagocytic activity) parameters and antioxidant effects were determined in fish blood. Results showed that in respiratory burst activity, lysozyme, phagocytic activity and antioxidant properties were enhanced in *Artemisia vulgaris* L. treated groups compared with the 0% control group ($p < 0.05$). After 60 days, fish were challenged with *V. anguillarum* and mortality (%) was recorded up to day 10 post-challenge. These results indicate that *Artemisia vulgaris* L. supplementation significantly increased the immunity and makes *O. mykiss* more resistant to infection by *V. anguillarum*.

Keywords : *Artemisia vulgaris* L., *Vibrio anguillarum*, resistance, immunity, *Oncorhynchus mykiss*, lysozyme, phagocyctic, antioxidant

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COEXIST - Integration of Fisheries and Aquaculture

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Abstract

Globally, coastal areas are subject to an increase in competing activities. Coastal fisheries and aquaculture are highly dependent on availability and accessibility of appropriate sites. Aquaculture production is increasing, whereas fisheries are at best stagnant. Coastal activities also include activities such as recreation, tourism, facilities for renewable energy production, all of which are expected to increase in importance. There is also increasing focus on Marine Protected Areas (MPAs). Thus, competition for available sites will probably increase, emphasizing the need for Marine Spatial Planning (MSP) and improved management tools supporting policies for space allocation along the entire European coastline. Successful MSP is not likely to be achieved without a certain level of conflict, and without iterative adaptations in management actions. MSP is viewed an essential part of advancing ecosystem-based management as demanded by the Marine Strategy Directive. The biological interconnectedness of fisheries and aquaculture is strong, with factors such as competition for space, disease transmission, genetic impact from escapees, availability of food for cultured finfish, and organic and inorganic waste management. Furthermore, the public perception of aquaculture in Europe and North America may be characterized by the view of aquaculture being a “new” and “unnatural” activity, whereas fisheries are viewed as “traditional” and “natural”. However, in an ecosystem-based management context, both industries represent human activities strongly influencing, and influenced by, the environment. Management of aquaculture and fisheries, as well as other uses of the coastal zone, should be considered integral parts with local variations in their respective importance.

Keywords : Aquaculture, fisheries, coastal zone, marine spatial planning, disease management

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The Future of Fish Farming - Integrated Multi Trophic Aquaculture

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Abstract

World Aquaculture Industry is in a rapid growth in recent years and the environmental pressure of fish farming activities is becoming more and more important to be considered seriously for the sustainability of the oceans. Implementation of innovative and environmentally friendly production model, in terms of coupling fed aquaculture with extractive aquaculture, the so called "Multi-tropic production system" may support the sustainability of the aquaculture industry. Significant contributions of this production model for the sustainability of aquaculture is being expected in terms of the use of waste material derived from one organism to be used as food for the other organisms, which may enable the improvement of high quality protein supply for the needs of people worldwide, while decreasing environmental impacts of aquaculture facilities. In the present study, the benefits of Integrated Multi-trophic aquaculture will be evaluated in terms of the utilization of waste outputs from fed aquaculture as nutrients for extractive aquaculture species in the same system.

Keywords : Cage aquaculture, multi-trophic aquaculture, fed aquaculture, extractive aquaculture, mussel, seaweed

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Gametogenic Cycle and Biochemical Composition of Fan Mussel, *Pinna nobilis* Lınnaeus 1758 in Aegean Sea, Turkey

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Abstract

The fan mussel *Pinna nobilis* is large (size 60-120 cm) and endemic species to the Mediterranean Sea. The population of *P. nobilis* has been greatly reduced during the last few decades as a result of amateur collection, commercial fishing for food, destruction of egg and larvae by chemical pollutants. Consequently, in recent years this species has been protected by law in Turkey as many European countries. To effectively protect this species there is a pressing need for better information on its reproductive biology. In this study, the gonadal development and gametogenic cycle of fan mussel Pinna nobilis, were investigated using individuals collected monthly from March 2008 to February 2009 in Karantina Island, Aegean Sea, Turkey. Environmental parameters such as chlorophyll-a, seawater temperature, salinity particulate organic (POM) and inorganic matter (PIM) were monitored each sampling time. As a result of this investigation, gonadal development was observed mainly in the spring month and at the beginning of the summer. The meat yield (MY) reached the maximum in June and the minimum in November. Environmental parameters showed that it was suitable for gonadal development and gametogenic cycle.

Keywords : Fan mussel, *Pinna nobilis*, gametogenetic cycle, biochemical composition, sex categories, Turkey

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The Effects of Cinnamic Acid With or Without Probiotic Supplementation on Growth Performance, Fatty Acid Composition, Health Characteristics in Rainbow Trout: Project Presentation

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Abstract

It is common practice in the aquaculture industry to use large amounts of synthetic chemicals (antibiotics, chemotherapeutics, etc.) following the discovery of the growth-promoting and disease-fighting capabilities of chemicals. However, the overuse of antibiotics in aquaculture can eventually be detrimental not only to the health of the fish but also that of animals, humans and the aquatic environment. This practice can lead to increased antibiotic resistance in the pathogens of fish. Therefore, in fish farming, organic acids and/or probiotics considered as health promoting, nutrient promoting, biological control agents, are offered as an alternative to synthetic products. Previous studies showed that organic acids and/or probiotics are successfully used replace antibiotics in fish culture. They are improved to growth, feed utilization, immune system, disease resistance, prevention of stress and decreased mortality rate. However, there was no study in the literature evaluating combination of an cinnamic acid and a prebiotic in fish. The aim of this research will to assess the effect of dietary different ratio of cinnamic acid with or without probiotic on the growth performance, proximate and fatty acid compositions, intestinal lactic acid bacteria counts, total bacteria counts, coliform bacteria counts and yeast and mold counts, immunological, hematological and serum biochemical healt characteristics of rainbow trout (*Oncorhynchus mykiss*). This study is financially supported by TUBITAK through the research project No: 113O364

Keywords : Cinnamic acid, probiotic, rainbow trout, growth performance, healt characteristics

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Dietary Supplementation of Tetra (*Cotinus coggygria*) Extract Elevates Haemato-Immunological Responses and Resistance to *Vibrio anguillarum* Infection in Koi Carp, *Cyprinus carpio*

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Abstract

Use of medicinal herbs as remedies to infectious diseases and immunostimulants has been gaining popularity in higher animals as well as lower vertebrates like fish. Tetra (*Cotinus coggygria*) is an important medicinal plant which is abundant throughout the north-west part of Turkey. To assess immunomodulatory effects of tetra, we tested dietary incorporation of methanolic extract of tetra leaves in cultured koi carp (*Cyprinus carpio*). Tetra extract was mixed with a basal diet at three different concentrations (0.5, 1, 1.5 g kg-1 feed) and the same basal diet containing no extract served as a control feed. Healthy koi carps (4.14±0.08 g) were fed with the four different diets ad libitum two times a day for a 4-week period and at the end of the feeding trial, cellular and humoral immune parameters, and haematological parameters were assessed. Moreover, the treated fish were subjected to a challenge with a strain of Vibrio anguillarum (108 CFU mL-1) injected intra-peritoneally at 100 µL. Results indicated no influence of feeding tetra extract on growth performance. However, cellular immune parameter, viz. nitroblue tetrazolium (NBT) activity was found to be the highest in the fish group received tetra extract at 1.5 g kg-1 feed, while humoral parameters such as lysozyme and myeloperoxidase activities were elevated in tetra extract- fed groups than in control diet-fed group ($P < 0.05$). Among haematologicals parameters, erythrocyte count and mean corpuscular haemoglobin concentration were higher in fish provided with the diet containing 1 g kg-1 tetra extract ($P < 0.05$). After 7 days of challenge with V. anguillarum, koi carps fed diets supplemented with tetra extract at 0, 0.5, 1 and 1.5 g kg-1 feed had 37.50, 31.94, 18.06 and 12.50% mortality, respectively. Results suggested tetra as an effective immunostimulant for koi carp.

Keywords : *Cotinus coggygria*, *Cyprinus carpio*, immunostimulant , *Vibrio anguillarum*

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Mediation of inflammatory response in the Japanese pufferfish (*Takifugu rubripes*) leukocytes stimulated with an inflammasome-inducing agent, nigericin

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Abstract

In vertebrate immunity, an intracellular multi-protein complex, inflammasome drives inflammation process by generating biologically active pro-inflammatory cytokines, interleukin (IL)-1β and IL-18. However, inflammatory cascades mediated by the inflammasome are unknown in a lower vertebrate like fish. Towards obtaining some preliminary information, we carried out transcriptomic analysis of pro-inflammatory cytokines ((IL-1β, IL-6 and IL-18) in the Japanese pufferfish (*Takifugu rubripes*) head kidney leukocytes stimulated with an inflammasome-inducing agent, nigericin (30 µM), and a combination of nigericin (30 µM) + LPS (20 µg mL-1) at 1, 4, 12, 24 and 48 h by a quantitative real-time PCR. Furthermore, to confirm functionality of potentially activated inflammatory immunity, we also assessed superoxide anion production (NBT assay) in the nigericin-stimulated leukocytes. An increased expression of pro-inflammatory cytokine genes was recorded in nigericin and combined nigericin + LPS- stimulated leukocytes. Enhanced cellular immunity (NBT assay) in the nigericin-stimulated leukocytes at 4 and 24 h further indicated induction of inflammatory response. Therefore, results of this in vitro study suggested an induction of inflammatory response in the Japanese pufferfish by nigericin.

Keywords : Cytokine responses, Japanese pufferfish, head kidney leukocytes.

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Bycatch composition in Longline Fisheries in Çanakkale Region

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Abstract

Longline fisheries have an important place in smale scale fisheries in Turkey and all over the world. Not only target species but also bycatch species are caught during long line fisheries. Discard of the bycatch is commonly practiced by the commercial fisheries worldwide and is estimated as 7,3 million tons annually. In order to ecologically sustain commercial fisheries many developed countries are setting up bycatch policies. Estimation of the amount and identification of the bycatch species is an important part of the unaccounted mortality rates for fisheries management. In this study, bottom longlines one of the ecological fishing gear surveys were conducted in Çanakkale region in Turkey. The aim of the study is to determine quantity and species of bycatch captured by bottom longlines. In the study 3 different types longline were used, 40 fishing operation conducted and 28800 fishing hooks were tried. End of the fishing activities totally 61 species were caught, belongs to 11 class, 36 family. Proportion of the fish caught 37% is target catch, 17% is incidental catch and 46% is discard species.

Keywords : Fisheries, longline, bycatch, discard, Çanakkale

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Preliminary Study for Squid Jigging With Different Bait Types

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Abstract

Squid jigging experiments were carried out to determine whether differences occurred between different types of bait in the Turkish coasts of the Aegean Sea. For this purpose artficial squid jigs were used with new designed natural ones. As a result the cost of natural ones are found cheaper than artificial ones. However, the cathcing efficiency of the artificial ones are determined higher than natural jigs.

Keywords : Squid jigging, artificial bait, natural bait, Aegean Sea.

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Current Status of Hunting and Fishing Hunting Made Fish Species in Adiyaman Province

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Abstract

This study on hunting was carried out between January to December, 2013 at Ataturk Dam, in the province of Adiyaman 8. The fish species caught during sampling activities, , the quantities, the total sales amount, the number of fishing boats were determined with the aim to reveal the current state of hunting in the region. As a result of the researchin 2013, the amount of the total catch in the field of hunting has been counted as 621.480 tons / year. Common carp (*Cyprinus carpio*) and shabbout (*Barbus grypus*) bring the largest economically incoming in the region.. An annual sales amount of 1.483.350 TL, corresponding to a 858,420 TL monthly/ per capita income for fishermen has been identified.

Keywords : Atatürk Dam Lake, Adıyaman, inland water fish

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Crayfish (*Astacus leptodactylus* Eschscholtz, 1823) Fecundity in Lake of Cildir

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Abstract

In Turkey, shellfish production is completely based on the hunting of natural populations. *Astacus leptodactylus* (Eschscholtz, 1823) belonging to the family of Astacidae are distributed in over a wide area including Turkey, Ukraine, Southwestern Russia, Iran, Kazakhstan, Belarus, Slovakia, Bulgaria, Romania and Hungary as original. In Turkey, which is one of the areas where the spread of crayfish and Cildir Lake located in the city of Ardahan-Kars, is largest the second lake and the largest freshwater of Eastern Anatolia. The study was conducted on 26-27 May 2012. In this study, 11 egg crayfish (A. leptodactylus) caught with crayfish pinters from Lake Çıldır, in no time, was brought to the laboratory of Fisheries Faculty of Tunceli University in the styrofoam boxes filled with water and oxygen including a ventilation system. The eggs which are adhered to pleopod of sampled crayfish taken without damaging with the help of forceps and was weighed with 0.001 g precision electronic scales in tared containers. Then, the correlation among total live weight (TA), carapace length (KU), abdomen width (AG) and egg weight (YA), egg diameter (YC), number of eggs (YS) of individuals is found. Data analysis was performed with MS-Excel. Average data of egg individuals as is determined as TA 42.29 g, KU 57.10 cm, KG 31.55 cm, AG 52.09 cm, YA 13.78 g, YÇ 27.19, YS 188.10. Correlation analysis results demonstrated a weak relationship in the positive direction in between TA and YC (r2 = 0.28). While very poor relationships with the positive direction were determined among KU-YÇ (r2=0.18), KU-YA (r2=0.03), AG-YÇ (r2=0.10), very poor relationships with the negative direction found to be among TA-YS (r2=0.20), TA-YA (r2=0.002), AG-YS (r2=0.17). A weak relationship in negative direction was between KU and YS (r2=0.39). There was no relation between AG and YA. In many studies related to crayfish, egg diameter is influenced by many factors and morphometric data have been reported to be associated with the weak. Fecundity that are controlled by genetic factors rather than the ecological factors and the studies related to another factor affected the efficiency are specified in the other studies. On the other hand, this work was compared with other works, differences in egg losses and eggs developmental stages were found. As a result of conducting of the work in the advanced stages of eggs maturation, these differences may have arisen.

Keywords : *Astacus leptodactylus*, Çıldır Lake, fecundity

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Fishing Activities in TRNC

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Abstract

Fishes are a renewable natural biological source; however it is not an endless source. The fact that fishes are able to go different hunting areas or getting hunted by different countries in a hunting area means that fishes are a part of a common heritage. For this reason, when fishing activities are uncontrolled it may cause considerable reduction in stocks and it is obliged to enforce common rules and following these rules and collective management and/or planned activities for fishing sources. The national legislations related to fishing activities in TRNC are detailed discussed in this study. In addition, the existing and potential water sources are also assessed on the view point of mariners. This study presents at least five years statistics of fish hunting and aquaculture, also fishing fleet in TRNC. Finally, this study clarifies some applicable recommendations to increase the fishing activities in TRNC by considering to Ecosystem Management.

Keywords : Statistics of fishing activities in TRNC; fishing and environment integration; Ecosystem Management

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POSTER PRESENTATIONS

Developmental Stages and Morphological Characters of Freshwater Angelfish Larvae (*Pterophyllum scalare* Schultze,1823)

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Abstract

In the present study, the morphological development of freshwater angelfish larvae was examined in controlled aquarium conditions. The larvae were obtained from three pairs of angelfish broodstocks, which were kept in aquariums (40cm, 40cm, 40cm l, w,h) at 50 L water volume. Random larvae specimens (n=5) were collected on daily basis in the first 10 DAH, while one specimen was collected every other day (n=5) from 10 DAH to juvenile period. Larvae specimens collected from the tank alive were anesthetized by and were analyzed under stereomicroscope. The specimens were photographed with the video camera connected to the microscope. Based on the external morphology, the different stages during larval development of angelfish were identified: yolk sac larva; preflexion larva; flexion larva and postflexion larva. Mouth and anus are opened at 3 days after hatching (DAH). The swim bladder has formed and is clearly visible, extending to the posterior location at 5 DAH. Cement glands on the head disappeared at the 8 DAH. Dorsal and anal fin rays became apparent. Caudal fin development is about to be completed in 10 days. At 17 DAH, Dorsal and anal fin of the larvae began to look like fin form of adult individuals. Larvae have a characteristic body structure and color specific to its species. The metamorphosis of larvae is completed and juvenile stage began in 23 days.

Keywords : *Pterophyllum scalare*, aquarium, ornamental fish, angelfish, larval development

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Comparative Morphology of Red Blood Cells of Different Fish Species

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Abstract

The study was conducted to determine morphometric parameters of red blood cells (RBCs) of different fish species caught during trawl operations in Antalya Bay, Turkey. Cell and nuclear sizes of RBCs of 11 fish species examined and measured. Variations in RBCs overall shapes and sizes were observed among the species. While *S. solea, P. erytrinus, T. trachurus, U. moluccensis, M. barbatus, L. mormyrus, L. whiffiagonis* and *H. dactylopterus erytrocytes* maintained smooth morphology, sickling with a prominent hemoglobin bar appeared in *N. randalli, E. aeneus* and *M. merluccius*. The latter group of fishes seemed to manage to survive successfully in natural populations. Whether hemoglobin polymerisation is a permenant characteristics or only appear subsequent to capture stress, is a question to be solved in future studies if sickling in fishes has a physiological or an adaptive mechanism.

Keywords : Red blood cell, morphology, fish, sickling, hemoglobin

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Ecotoxicity of Engineered Nanoparticles to Aquatic Organisms

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Abstract

Engineered nanoparticles are defined as any intentionally produced particle that has a characteristic dimension from 1 to 100 nm. Nanotechnology is a rapidly expanding and advancing field of research that has already yielded a variety of commercially available products including cosmetics, suntan lotions, paints, self-cleaning windows and stain-resistant clothing. There are mainly three types of engineered metal-containing NPs (zinc oxide, copper oxide, and silver) in the literature on potential hazardous to organisms. Mammalian and in vitro studies have raised concerns about the toxicity of nanoparticles, but there are very limited data on ecotoxicity to aquatic life. There are many challenges to overcome before we can determine if the benefits outweigh the risks associated with NPs. Understanding the fate and bioavailability of NPs in aquatic systems is important to predict their impact on aquatic microorganisms (e.g., zooplankton) and producers (e.g., algae), and transfer through the food chain. Some researchers, copper oxide (CuO), and zinc oxide (ZnO) NPs (as the representative of industrial and household use, respectively) have been found to have adverse effects on growth of organisms, the survival, animal health and the aquatic environment. NPs exhibit greater toxicity than micro ones with the same composition, and various-sized NPs induced different levels of cytotoxicity and DNA damage. Metal ions that dissolved from metal oxide NPs also play an important role in inducing toxicity, and the character of the exposed environment influences toxic effect because it affects the state of NPs. Oxidative stress, coordination effects, and non-homeostasis effects were discussed in the context of understanding the toxicity mechanisms of metal oxide NPs. In future studies more attention should be given to the formulations of NPs to better understand their toxicological properties since both surface properties and ion release kinetics change with underlying manufacturing processes.

Keywords : Nanoparticles, toxicity, aquatic organisms

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Effects of Global Warming and Rising CO_2 Level on Fish Physiology: What Does the Future Hold?

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Abstract

The concentration of atmospheric CO2 have been continuously increasing from about 280 ppm at the beginning of the industrial revolution to 379 ppm at present. Future estimates of atmospheric CO2 concentration for the year 2050 is expected to range between 450 and 600 ppm. Associated with this rise of CO2 and other greenhouse gases is predicted an increase in mean global temperature from 1.4 °C to 5.8 °C by the end of the century. The thermodynamics of the reactions between carbon dioxide and water require this addition to cause a decline of water pH and carbonate ion concentrations. There are few studies assessing the effects of elevated CO2 and temperature levels on fish physiology. In this review, we focused on studies concerning about toxicity of elevated CO2 and temperature within a global warming scenario. When fish are exposed to high levels of CO2 for prolonged periods, blood CO2 will increase (hypercapnia) and blood pH will decrease resulting in respiratory acidosis. Fish compensate for acidosis by increasing the plasma bicarbonate levels and excreting phosphate via the kidney. Other physiological effects on fish exposed to hypercapnia include increased epinephrine levels, hyperventilation, depression of the blood oxygen content, reduced branchial chloride influx rates and reduced plasma chloride. For these reasons, further studies are required and should include long-term studies on the combined effects of elevated carbon dioxide and temperature levels on the fish physiology.

Keywords : Elevated carbon dioxide, global warming, fish physiology

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A Research on Fish Fauna in Buyuk Menderes River

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Abstract

Büyük Menderes river (592 km) is the largest river of the Aegean region, it rises in the Anatolian plateau south-west of Afyon province and flows westward thru a narrow valley and canyon. It then expands into a broad, flat-bottomed valley and from here this slow moving river winds across the Aegean plains and empties into the sea near Kuşadası. The catchments area is 24 976 km2. The basin covers the provinces of Aydın, Denizli, Muğla, Uşak and Afyon. In this study, it is established fish fauna in Büyük Menderes River during 2003 and during 2013. There are not endemic fish species in the main river reach of Büyük Menderes. Carassius gibelio species that are very dangerous can be seen at a very large amount in Büyük Menderes.

Keywords : Büyük Menderes, fish

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Exploitation and Mortalities of Four-Spotted Megrim (*Lepidorhombus boscii* Risso, 1810) From Saros Bay (Northern Aegean Sea, Turkey)

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Abstract

This study was carried out to determined total (Z), natural (M) and fishing (F) mortalities of four-spotted megrim (*Lepidorhombus boscii* Risso, 1810) between September 2006-2008 in Saros Bay, which had been closed to trawl fishing since 2000. Total (Z), natural (M) and fishing (F) mortalities of four-spotted megrim from Saros Bay were found as 0.31 year-1, 0.24 year-1 and 0.07 year-1, respectively. The exploitation rate (E=0.22 year-1) are evidence of fishing pressure on four-spotted megrim, even if just a bit. *This study was summarized from the Ozgur Cengiz's Ph.D. Thesis entitled "Determination of population parameters of four-spotted megrim (*Lepidorhombus boscii* Risso, 1810) from Saros Bay (Northern Aegean Sea)" and carried out with financial support of TUBITAK (project no: 106Y035).

Keywords : Exploitation, mortality, four-spotted megrim, *Lepidorhombus boscii*, Saros Bay

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Determination of Nutritional Value and Quality of Chemical, Sensory, Microbiological of Octopus Salads Prepared by Using Different Cooking Techniques

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Abstract

This study was carried out for determination of nutritional value and quality of chemical, sensory, microbiological of octopus (*Octopus vulgaris*) prepared with different cooking techniques and stored -180 C and caught from Çanakkale. Water content has been decreased from %80 to %70 in fresh octopus meat after the processes of scalding and making salad applied to fresh octopus meat. Also nutritional value of product has been increased by rising protein content (from % 14-15 to %21-22), fat content (from %3-3,5 to %4-4,9), ash content (from%1,4-1,6 to 1,8-3,5) despite of the decline water content in products. Detected at the rate of 101 cfu/g aerobic and psychrotrophic bacteria count have been inhibited with scalding process in fresh octopus meats. However total aerobic bacteria, psychrotrophic bacteria, yeast, mold and Lactobacillus sp. which are stemming from salad ingredient have been specified at the rate of 101-102 cfu/g in octopus meats blended with salad ingredients. Obtained values are acceptable for Turkish Food Codex. Added vegetable and vinegar to different cooking techniques and scalding water have been enhanced the sensory quality values of octopus meat and salad such appearance, odor, flavor and consistency. This situation was voiced by panelist when the products evaluated as sensory. Consequently, octopus meat is a good source of protein. And different mouth-pleasing products have occured with applied different cooking techniques. Also these products was liked by panelist. Therefore studies must be performed to increase the consumption of octopus meat and this product which has high nutritional value should be gained to consumption.

Keywords : Sensory quality, chemical quality, microbial load, nutritional value, octopus salad

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Determination of Nutritional Value, Chemical and Sensory Quality of Salmon (*Salmo salar*), Rainbow Trout (*Oncorhynchus mykiss*) and Shark (*Odontaspis ferox*) Pastrami.

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Abstract

This study was carried out for determination of nutritional value, chemical and sensory quality of shark, rainbow trout and salmon prepared with same fenugreek formulations. After applied salting and fenugreeking processes to gutted and filletted fish meats water content has been decrased in fresh rainbow trout from 70,08% to 57,39%, in fresh salmon from 70,52% to 56,64%, in fresh shark from 72% to 57,05%. Nutritional value of products have been increased by rising protein content (from 21,09% to 26,12% in rainbow trout pastrami), (from 20,92% to 27,15% in salmon pastrami), (from 22,2% to 30,94% in shark pastrami) although decrease of water content in products. Sensory quality values such as appearance, odor, flavor and texture have increased depends on firmness and thickness of fish meats when products examined as sensory. This situation was stated by panelist. As a conclusion fish meat is strong protein source. Especially products which proper toTurkish palatal delight have occured with applied salting and fenugreeking processes and this products were liked by panelist. Applied pastrami method is a a new range of processed products. Besides quality products can be acquired with different methods and processed products can be created a board market in both domestic and overseas. Therefore especially use of pastrami technology is crucial in evaluation and gain the consumption of shark meat which caught as by-catch in our country.

Keywords : Sensory quality, nutritional value, shark, rainbow trout, salmon pastrami

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Fecundity of European Sea Urchin (*Paracentrotus lividus*) in Cesme, Aegean Sea (Turkey)

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Abstract

This study summarizes fecundity, gonad index of the most common and abundant echinoderm species (*Paracentrotus lividus*) of the Aegean Sea (western Turkey). Paracentrotus lividus was collected monthly at coast of Cesme for six months and biometric parameters were measured and then dissected. Indices of gonad were calculated. The mean number of eggs were determined and eggs diameter were measured. Mean egg diameter was 91,14±1,46 µm. There was a peak in fecundity in March (346.582 eggs/female) that correlated with the observed peak in gonad indices (11.02±0.54 %) and egg size (95.68±01.98 µm). Larger eggs corresponded to more eggs per unit body weight.

Keywords : *Paracentrotus lividus*, sea urchin, fecundity, egg, size.

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Seasonal Variation of Nutrient Composition of Chub (*Squalius sp*.) at Çiftekavak Stream in Rize, Turkey

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Abstract

In this study, seasonal variation of nutrient composition of chub that sampling survey was carried out between April 2013-March 2014 (*Squalius sp.*) at Çiftekavak stream in Rize, Turkey was investigated. It was used chub fishes whose mean of total length 16.68±1.65 cm and mean weight 68.33±29.49 g. pH, water activity (aw), colour, crude ash, crude protein, crude fat analysis was examine to determine of variation of nutrient composition. Winter, summer, spring, autumn data was evaluated. Max value of % crude protein was observed in summer as 19.49 %. When looked at the % crude fat data, min value was detected in winter as 2.45 %. In addition of these, there are statically significant variations as seasonal resulted from other analysis.

Keywords : Chub, seasonal, nutrient composition, *Squalius sp*., Çiftekavak (Rize)

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Determination of Seasonal Distribution of Biochemical Composition of *Barbus sp*. Species distrubuted in Çiftekavak Stream, Rize, Turkey

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Abstract

In this study, was investigated from that and to detect of effect of seasons on biochemical composition of *Barbus sp*. species which sampled from Rize Çiftekavak Stream and have 19.93±12.47 cm of average total length and 37.26±16.47 g of average weight. Crude fat, crude protein, crude ash, dry matter, pH, water activity (aw) and color analyzes were carried out to the samples obtained from the study conducted between the 2013-2014 including spring, summer, autumn and winter seasons. The obtained min-max crude fat, crude protein, crude ash, dry matter, pH, water activity (aw) and color values as the result of analysis was found 1.17-2.72%, 18.54-21.4%, 1.29-1.59%, 19.13-21.17%, 6.39-6.59, 0.9900-0.9962 ve L (28.85-33.7), a+ (4.1-6.58), b+ (5.5-8.3), respectively. In the evaluations performed, the differences in terms of the analysis were demonstrated ($P < 0.05$)

Keywords : *Barbus sp*., biochemical composition, seasonal, Çiftekavak (Rize)

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Determination of Water Quality Parameters from a Waste Treatment Plant Effluent (Balıkesir-Gönen)

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Abstract

This study was conducted seasonally in four sampling stations in the discharge point of a slaughterhouse waste treatment system in Çerpeş Creek (Gönen-Balıkesir, Turkey) between August 2013 and March 2014. The aim of this study was to determine the physicochemical and biological effects of waste treatment's effluent to the discharge point. According to the analysis results temperature changed between 9 and 27 ºC among sampling stations that were being in the seasonal ranges. Conductivity ranged between and 578 and 3520 µs/cm. Nutrients such as nitrite+nitrate (Nox), ammonium (NH_4), orthophosphate (PO_4) and silicate (SiO_2) varied among sampling stations having the values 0.0316 – 5.049 µM, 0.0001–0.0151 µM, 0.004–0.310 µM, and 2.26 – 5.02 µM, respectively. Total suspended solids (TSS) were measured between 1.2 and 104 µg/L and found to have the highest values in the first station which was the discharge point. Greased oil was only analyzed during winter sampling, and found to be over the Water Pollution Control Regulation standards in all stations except the second station which was prior to the discharge point, with the values changing between 27.80 and 62.40 mg/L. Biological (BOD) and Chemical (COD) oxygen demand values were generally higher than the pronounced values in the Water Pollution Control Regulation standards ranging between 10.42 – 514.48 mg/L, and 19.51 – 1268.28 mg/L, respectively. Chlorophyll-a concentration changed between 0.078 and 13.79 µg/L among sampling stations, seasonally. In order to determine the microbial quality of the receiving water fecal and total coliform bacteria counts were also performed. Results showed that fecal and total coliform counts varied between 520-11000 cfu/100 ml and 1100-11000 cfu/100 ml, showing a high contamination in the system. Results of the environmental parameters indicated that the water quality of the study area changed seasonally among stations, and while the first station can be referred as the "fifth order quality" which can be considered as "very polluted", the second, third and fourth stations can be considered as "polluted" having "fourth order quality". This study was funded by Çanakkale Onsekiz Mart University Research Foundation (BAP Project # 2013-121). Thanks are extended to Ezgi Döventaş and Ceren Oral for their support for the laboratory analysis.

Keywords : Waste treatment, water quality, nutrients, BOD, COD, coliform bacteria

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Effects of Gamma Irradiation on the Biogenic Amines Formation in Frog (*Rana esculanta*) Legs during Cold Storage (+2°C)

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Abstract

The formation of biogenic amines and ammonia of gamma irradiated frog legs (*Rana esculanta*) during a cold storage period (+2°C) were investigated. Instead of freezing the frog legs for a prolonged shelf-life, gamma irradiated fresh frog legs can be used for consumer satisfaction, because consumers prefer fresh frog legs and are willing to pay more for them than the frozen ones in European market. Frog legs were irradiated at doses 0 (control), 4 and 5 kGy using 60Co sources. On the bases of sensorial evaluation, the shelf-life of frog legs during cold storage was 10 days for non-irradiated frog legs and 17 days for the irradiated ones. The main biogenic amines formed in frog legs were putrescine, cadaverine, spermidine, spermine, histamine, serotonine and agmatine. At the end of the storage periods, ammonia contents significantly increased for non-irradiated and irradiated samples ($p < 0.05$). It was determined that histamine, putrescine and spermine concentrations showed no differences between 4 and 5 kGy groups. However, cadaverine (2.15±1.58, 1.33±0.08 for 4 and 5 kGy) and spermidine (1.87±0.42, 1.71±0.12 for 4 and 5 kGy) concentrations for irradiated frog legs generally were lower than for non-irradiated samples (7.99±0.02 and 3.32±0.09 respectively) at the end of the storage period. Even if there were some significant differences for each group at the end of the storage period, it was observed that biogenic amine concentrations between 4 and 5 kGy doses showed little or no significant concentrations.

Keywords : Gama irradiation, *Rana esculanta*, biogenic amine, frog leg, cold storage

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Discovery of a Nationally Important Loggerhead Turtle (*Caretta caretta*) Rookery in Northern Cyprus

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Abstract

Monitoring of marine turtle nesting has been carried out on numerous beaches throughout northern Cyprus. This monitoring was started by the Society for the Protection of Turtles (SPOT) in the early 1990's, with the major nesting beaches being identified by 1995. Two species of marine turtles nest in North Cyprus, the green turtle (*Chelonia mydas*) and the loggerhead turtle (*Caretta caretta*), the latter being the most abundant and widespread. Since 2008, Karşıyaka beach has been monitored annually by a group of volunteers known as Karşıyaka Turtle Watch (KTW). Through the dedications and consistent monitoring of KTW, Karşıyaka beach has been identified as a nationally important nesting beach for loggerhead turtles. Mean loggerhead turtle nesting at Karşıyaka beach is 42.3 nests/year making it second only to Alagadi (56.6 nest/yr) in terms of clutches deposited each year. When nesting density (nest/km) is considered Karşıyaka beach has again the second highest nesting density of all loggerhead nesting beaches in Northern Cyprus. Considering the high levels of nesting seen at this rookery over the last 6 years, it is of the utmost importance that this beach receives official designation as a Special Environmental Protection Area (SEPA).

Keywords : Loggerhead turtle, *Caretta caretta*, marine turtle, nesting rookery

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Recycling of Fish Bones Occurring By-Product Waste from The Fish-Processing Industry

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Abstract

Nowadays, it is known that environmental pollution, due to the increase in world population, uncontrolled industrialization and technological developments have reached dangerous levels for humans and the environment. In addition, natural resources are over-utilized in order to meet the needs of the rapidly growing world population. Most of the urban, industrial and technological wastes are thrown to the environment without being eliminated in a healthy way. Especially, in recent years, many studies have been focused on the conversion of wastes to qualified materials. Many natural and waste materials can be converted due to their chemical properties and may be utilized in a better way with higher value. For this purpose, many researchers have been working to convert wastes into utilizable materials. Bones which are source of biogenic apatite are composed of 30% organic and 70% inorganic compounds by weight. The inorganic compounds of bones consists mainly of hydroxyapatite Ca10(PO4)6(OH)2. The hydroxyapatite which have been both the ion exchange property and hydroxyl (-OH) groups are used as one of the important material. One of the natural waste products is the fish bones. Fish bones are by-product waste from the fish-processing industry. In our country, it is known that the production and consumption of fish products have a very large area. Most of the bones occurring as waste in consequence of processing are not utilized. The fish bones emerging as an industrial waste with low economic value can be investigated to contribute the country's economy with environmental and biochemical applications to be converted to the economic, efficient, qualified and useful materials having applications in different areas with multi-functional chemical modification. Therefore, natural bones consist of biogenic hydroxyapatite that can be effectively used.

Keywords : Fish bones, recycling, chemical modification

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Effect of Fish Meal Replacement by Red Lentil Meal in Diets on Growth and Whole Body Amino Acid Composition of Rainbow Trout (*Oncorhynchus mykiss*)

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Abstract

The purpose of this study was to determine the effects of replacing fish meal with red lentil meal (RLM) as an alternative plant protein source in diets for juvenile rainbow trout (10.14±0.04 g mean initial weight), on growth performance and whole body amino acid composition of fish. Four iso-nitrogenous (approximately 48% crude protein) and iso-lipidic (approximately 15% crude lipid) experimental diets in which protein red lentil meal replaced 15%, 20% and 25% of fish meal in formulation were fed to rainbow trout for 60 days. At the end of feeding trials, the highest mean individual weight gain value (30.6 g) of fish was found in control group. Weight gains of RLM20 (29.3 g) and RLM25 (28.9 g) experimental groups were found to be similar and lower than other experimental groups ($P < 0.05$). VSI value of control groups (18.2) was found to be lower than other experimental groups ($P < 0.05$). In contrast, HSI values no statistically significant difference was observed between the experimental groups ($P > 0.05$). Crude protein level of whole body gradually decreased with the increase red lentil meal percentages in the diets. Generally, essential amino acid (EAA) profiles of whole body were reflected the EAA profile of the experimental diets. EAA profile of fish fed RLM25 diet was lower than fish fed the control group. As a result of growth performance and amino acid composition of experimental fish in this study, it can be use that replacement of fish meal in juvenile rainbow trout diets with 150 ‰ ratio of red lentil meal.

Keywords : Rainbow trout, nutrition, fish meal, red lentil meal, amino acid, growth

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Technical Specifications of Main Fishing Gears Used in North Cyprus

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Abstract

This study, aimed to make a plan according to the FAO (Food and Agriculture Organization) and classify fishery gears traditionally used along the coastline of Turkish Republic of North Cyprus (TRNC) considering ISSCFG (International Standard Statistical Classification of Fishing Gear). For this purpose, the traditional fisheries gears are identified and measured in the places they are used. Furthermore, the structural and technical features of these fisheries gears are identified by using fishery gear questionnaires. The data is classified and 19 fishing gear is stated as 11 gillnets, 3 long lines, 3 trolling lines, 1 pot and 1 scoop. The technical plans of these fishing gears are drawn. These gears are used by the fishermen to catch the fish.

Keywords : North Cyprus, fisheries, fishing gear, classification

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Molecular Identification of Prey Species from Stomach Contents of the Angler (*Lophius piscatorius*)

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Abstract

Determination of interspecific relationships like predation are difficult, especially for marine ecosystems. However, it is also critically important to analyze the relationship among predator and prey in order to provide a successful data to be used at management of the marine biodiversity. Morphological identification of prey from semi-digested stomach contents has always been a challenging approach. Recently, molecular approaches such as identification of prey species from DNA samples taken from stomach content and amplifying small fragments using PCR assisted with universal primers has started to be used as an alternative method in determination of prey analysis studies. DNA based prey identification is useful when the predator species are too small or remaining of the preys lacking parts for morphological examination. In this study, stomach contents of the Angler (*Lophius piscatorius*) were identified using mitochondrial cytochrome c oxidase I sequences amplified using DNA extracted from complex stomach content of the specimens. Universal DNA barcoding primers were used to identify semi digested prey remnants. A wide range of preys, mainly fish, were identified at species level. Results indicate that molecular identification using the DNA extracted from the stomach content is a fast and effective approach in determination of predator-prey relationship.

Keywords : *Lophius piscatorius*, stomach content, prey, molecular identification

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Freshwater Crayfish Aquaculture in the World: A Case Study

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Abstract

People are turned to alternative food resources due to rapidly growing population of the world. Besides being an alternative food resource, seafood sector has nowadays become one of the most important sectors over the world with $ 125 billion trading volume. The crayfish which have more than 640 species in the world have shown a wide distribution mainly in the United States and Australia including the European countries. There are ten mostly cultured crayfish species over the world which belongs to the Astacidae, Cambaridae and Parastacidae families. The members of the Astacidae and Cambaridae families are cultured in the northern hemisphere while the members of the Parastacidae family are cultured in the southern hemisphere. The extensive culture technic has been widely used for crayfish; however semi-intensive and intensive culture technics have also been used. The crayfish production in our country have rapidly decreased from 5000 tonnes to 200 tonnes after the 1985 due to reasons such as over-fishing, pollution and fungus disease (*Aphanomyces astaci*). It is necessary to find out the new adaptable valuable species for our country and to manage the present stocks efficiently in order to boost the production potential. The crayfish known as “Kerevit” in Turkey is a quality protein resource and it is very important for its high economic value based on its delicious meat. The consumption of the crayfish in Turkey is quite low. The crayfish production in Turkey resulted in 492 tonnes according to 2012 datum. The crayfish caught in our country have been exported to many countries primarily to France and Sweden. It is necessary to find out the new adaptable valuable species for our country and to manage the present stocks efficiently in order to boost the production potential of crayfish.

Keywords : Crayfish, aquaculture, alternative food resource

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The Occurrence of Enteric Bacteria in Marine Environment and Pollution

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Abstract

The microbiological quality of the marine environment affects the microbiological quality of all fishery products. This study is the review of the occurence of enteric bacteria in freshly harvested fishery products is dependent on the quality of marine environment from which these products are harvested. The control of marine environment from pollution as measured by the index of fecal coliform bacteria is necessary. Otherwise, our fishery products can be contaminated from polluted marine environment. Environment factors are predominate for the quality of seafoods. These factors consist of human and animal sources of enteric bacteria in the marine environment. Enteric bacteria in polluted marine environment can be contaminated migratory fish species, mobile fish species as well as sedentary shellfish. Molluscs such as oysters, mussels, cockles, and clams filter and concentrate environmental microorganisms in high numbers in their tissues. These microorganisms may be active when the molluscs are eaten raw. Some enteric pathogenic bacteria can be found in polluted marine environment (*Clostridium spp. such as C. perfringens, C. botulinum, Salmonella spp*. such as *Salmonella typhi, Shigella spp., Vibrio spp.* such as *V. parahaemolyticus, Vibrio chlorea, Escherichia spp*. such as *E. coli*). These pathogens also can be found on live fish and shellfish. Furthermore, the microorganisms on seafood that may cause illness and death. The safety of various seafood products varies according to the origin of the fish, microbiological ecology of the product, handling and processing practices and traditional preparations before consumption. Marine environment must be protected from the pollution becauce of limiting disease outbreaks of enteric pathogenic bacteria.

Keywords : Marine environment, enteric bacteria, pollution

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Determination of Seafood Consumption Pattern in Canakkale

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Abstract

This study is questionnaire study which applied to 500 people who selected randomly and lived in Çanakkale in 2013. This study has been done for determination of seafood consumption patterns, reasons for the preferences of seafood, fish preferences, cooking methods, purchased location, monthly consumption of seafood and perspectives for processed seafood. İndividuals who participated in questionnaire are male 56,2% (281), 43.8% are women (219). İndividuals generally have elementary family of four structure and majority of families consist of young individuals. Officials have taken first place in occupational groups of individuals and employees and self-employed persons have followed it. At the same time the majority of individuals who participated in questionnaire have been working for 1500TL and under 1500TL. Anorher persons have income 2000TL and over 2000TL. When we look at the consumption; it is determined that white meat is the first (37.8%), red meat is second row and the fish meat is the last, sadly. Although, the vast majority thinks the fish meat cheap, the fish consumption of them is determined as once every fifteen days. They said that the reason of their choice is health and balanced diet. It is determined that the vast majority buys fish from fish markets which they believe the markets are fresh fish seller, clean and reliable. Also they care the fish is delicious, fresh and economical when they buy. People who lived in Çanakkale are prefering marine fish A rate of approximately 90%. Main reason of this situation, marine fishs more tastier and healthier according to individuals who lived in Çanakkale. Most of İndividuals who participated in questionnaire have prefered the marine fishs due to start of fish season in fall and winter seasons. İndividuals are preferring the small and easily huntable fishs however also they said that we can prefer all fishs in questionnaire, generally. Monthly, seafood consumption has been ranged from 1 to 6 kg provided that consume at least once in 15 days. Processed seafood consumption was observed to be less. The main reasons of this situation are people's fresh fish choice and people's lack of knowledge about processed seafood. Therefore, in order to encourage processed products, studies must be done about introduction and popularization of these products to the consumer.

Keywords : Seafood, consumption, seafood preference, Çanakkale

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Determination of DNA Barcoding Success Using rbcL, matK and trnH-psbA Genes in Identification of *Stuckenia pectinata*

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Abstract

The most recent molecular approach on species identification, known as DNA barcoding, has provided great convenience on this process for the scientists. DNA barcoding actually depends on fast, efficient and low cost analyzing a short and standardized fragment of the DNA and characterize the species using this genetic data. Selection of the barcoding regions involves one or more standard loci that can be sequenced reliably and routinely in large and diverse sample sets. This locus is standardized as mitochondrial cytochrome c oxidase I gene (COI) for animals. In plants, it is more challenging as the plant mitochondrial genome has a low rate of nucleotide substitution. Alternatively, The Consortium for the Barcode of Life (CBOL) Plant Working Group and the majority of researchers recommended a barcode including fragments of two plastid coding regions, ribulose 1,5-bisphosphate carboxylase (rbcL), maturaz (matK) and one non-coding region, trnH-psbA. In this study, Stuckenia pectinata specimens collected from two distant locations were identified to species level using DNA barcoding. Molecular analyses include extraction of DNA from collected samples, polymerase chain reaction (PCR) amplification of rbcL, matK and trnH-psbA genes which were suggested as DNA barcode regions for plant species by International Barcode of Life (iBOL), and generating first official DNA barcode records after DNA sequence analyses of these PCR products. Results were clearly indicating effectiveness of DNA barcoding in terms of identification at species level, determination of intraspecific and interspecific variation using nucleotide data from fragments of rbcL, matK and trnH-psbA genes.

Keywords : *Stuckenia pectinata*, DNA barcoding, rbcL, matK, trnH-psbA

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The Effects of Climate Changes to Marine Ecosystem

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Abstract

Global climate variations continuously change the surface temperature. The effects of temperature increase affect especially the livings that inhabit in the seas. There are serious effects on fish stocks, fish species and microflora of sea water. Furthermore, warm water temperature changes the ratio of sediments, nutrients, pathogens, toxic metals and salts that are present in the seas. The toxic metal (cadmium, lead and mercury) accumulation on various marine organisms (crustaceans, echinoderms and molluscs) increases. The temperature increase in marine environment raises the number of algae (macro- and micro-) and pathogen microorganisms (especially *Vibrio spp.*). The toxins of different algae types, such as ciguatoxins, saxitoxin and its derivatives and domoic acid, can accumulate on fish and shellfish. The negative effects of climate changes should be investigated by researches.

Keywords : Climate change, marine ecosystems

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Novel Natural Products Obtained from Marine Environment

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Abstract

In coastal areas; economic valuations of marine resources have focused on fisheries, tourism and shoreline protection. On the other hand, in open oceans; the focus is on climate regulation, nutrient cycling and waste bioremediation. Variety of plants and animals are found in marine environment. Recent researches studied about the substances and compounds extracted from marine plants and animals for examining the pharmacological properties of these extractions. There is an urgent need for new drugs in order to overcome the problem of antibiotic resistance in bacterial pathogens. Many cancers and infectious diseases currently cannot be effectively treated. In recent years, so many researches have been done about marine derived compounds discovered for the treatment of diseases. Algae is an important source about obtaining compounds and substances. Algae have essential amino acids and they are widely used directly or in most cases indirectly in dietary supplements, cosmetics, dairy products, industrial products, etc. At the same time marine bacteria led to the discovery of new classes of therapeutics. Marine bacteria synthesize new compounds that are valuable for the improvement of drugs. So many marine bacterial compounds were identified by researchers. Most of these compounds originated from classes Actinobacteria and Cyanobacteria. Anticancer, antifungal and antibacterial effects of some compounds were detected which isolated from *Streptomyces sp*. such as Bonactrin, Caprolactones, Chinikomycins, 3,6-disubstituted, İndoles, Glaciapyrroles, Gutingimycin, Himalomycins, Trioxacarcins. Some compounds isolated from Cyanobacteria such as Apratoxin A, Apratoxin D, Coibamide A, Curacin A, Cryptophycinsare of great importance on cancer threatments. Bryostatin, isolated from Proteobacteria, can be used in esophageal cancer threatments but it is recommended to be used with other medication combinations. Cyanobacteria and Actinomycetes are the most economically and biotechnologically valuable prokaryotes. Also marine archaea may be a source of new secondary metabolites. Microbiology provides great chances for the future of marine natural product research. Unlimited microbial diversity of the ocean offers a huge potential.

Keywords : Marine natural products, marine drugs

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Marine Environment is a Valuable Source as Food

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Abstract

There are many species of fish, shellfish, crustaceans, cephalopods, sea plants etc. are found in marine environment. This marine environment is a good source of foods for human consumption. People not only consume the meat of fishery products, but also they can consume their roe. Many products can be made from fishery products such as fish sausages, fermented fish, dried-salted fish, marinated fish, canned fish, fish burger, fish balls, fish soup, fish finger, surimi etc. Sea cucumber and sea urchin can also be consumed by people in most of the countries. Seaweeds can be consumed as food in many countries. Many foods can be made by using sea plants such as sushi, kombu. Soup, bread, biscuits, chips and also meals can be prepared by using sea plants. Medicines, drinkings, drugs and cosmetic creams can be obtained by using algaes. Fish sauces can be made from the meat of fishery products and also by using their guts. Fish meal is prepared for aquaculture feed. The skin of fish can be utilized as leather. Fish glue can be prepared from the skin and bones. The bones of squid can be used for birds' feeding. The shells are used for decorating homes in many things and also building the walls of house. Fish pastes, fish hydrolysate, fish oil can also be produced from fishery products. Medicine can be made from sea horse, star fish, sea urchin and sea cucumber. Pigments can be produced from cuttlefish and sea snails. Pearls can be produced from oysters. Iodine, soap and glass productions are obtained from kelp. Marine products are good source for people in many industries.

Keywords : Seafood, marine environment

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Research About Comparison Of Aksona and Hyperbaric Pressure Room for Curing Of Diving Illnesses

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Abstract

In this project; mostly mentioned about the violation of regulations by scuba divers who work at marine products production and catching (mussel catching), afterwords various diving sicknesses because of exiting rule violations and traditional and scientific treatments of this sicknesses. Divers who haven't got the special training for the diving organisation they made, who don't use appropriate equipment at the diving have prety high risk to be caught to arterial gas embolism and decompression diseases. Modern medical science takes in hand alot of variables like pressure, pressure volume connection, underwater pressure and underwater pressure volume conection to source production of advanced machines to cure this illnesses. Nevertheless there is another treatment performed known as traditional method and knowledge picked up here and there by listening. This methot is known to be Aksona and mistakes while executing can produce fatal results. In this thesis hidrostatic pressure changes occured underwater refereced to gas laws and by this concept various sicknesses occured in human metabolism, performed treatment methods of this illnesses and Aksona practices has been excamined.

Keywords : Aksona, diving illnesses, hyperbaric, decomprassion, scuba diving

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Intragenic Variation of Anguillicola crassus isolated from the European Eel (*Anguilla anguilla*) sampled from the Ceyhan River, Turkey

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Abstract

The European Eel (*Anguilla anguilla*), is a critically endangered species with a decline level of 90-98% in the number of eels reaching Europe. Main factors related to this decline include over-fishing, barriers preventing migration, natural changes and parasites such as Anguillicola crassus. A. crassus is a parasitic swim bladder nematode which was originally endemic to East Asia. It was introduced to water bodies in Europe by its native host, the Japanese eel (*Anguilla japonica*). The nematode is found to be very successful colonizer as it already spread to four continents (Asia, Europe, Africa and America). The European Eels are infected by A. crassus through ingestion of third stage larvae found in crustacean intermediate hosts or by ingestion of larvae found in fish hosts. Following the infection, the nematode damages swim bladder function resulting in mortality of both farmed and wild populations. In this study, we used DNA barcoding as a molecular approach to identify the A. crassus isolated from eels sampled from the Ceyhan River (Adana, Turkey), which is a natural habitat of the European eel. All the nematode samples were subjected to a DNA extraction, which was followed by PCR amplifications of a fragment from mitochondrial cytochrome c oxidase I gene, known as the barcode region. Amplified fragments were sequenced and nucleotide sequences were aligned using reference sequences from the BOLD database. All sequences were successfully identified at species level. A mean intragenic distance of 0.006 was found among nematode specimens. Network analysis was performed in order to graphically visualize the genetic divergence pattern of genetic variation found in A. crassus specimens.

Keywords : *Anguillicola crassus*, *Anguilla anguilla*, nematode, COI, DNA barcoding

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The Effects of Larval Temperature on Sex Ratio and Growth Performance in Sea Bass (*Dicentrachus labrax*).

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Abstract

In this study, sex ratio and growth performance of sea bass exposed to different temperatures (15, 17 0C and control (mean temperature 15 to 20 0C)) during 30, 60 and 90 days at larval period were investigated. The fish were reared (mean initial live weights and lengths were between 0.0093±0.00006 and 0.0095±0.00004 g, 0.027±0.012 and 0.039±0.001 cm respectively) during 13 months including the temperature treatment period. The data of the experiment were evaluated after this period. The highest sex reversal rate (female 67.7 %; male % 22.0; intersex % 10.3) was determined in 90 days group of 15 0C. The highest mean weight and total length were obtained (205,16±0,36 g; 26,91±0,57 cm) for the 90 days group of 15 0C. The highest daily growth rate (0,53±0,00), specific growth rate (2.56±0.003) were also found in this group of fish. Moreover, while food efficiency rate (0.55±0.003), food conversion rate (1.82±0.01) and survival rate (70.38±0.25) were observed at the same group, the highest condition factor (1.009±0.65) were determined at the group of 90 days of 17 0C.

Keywords : Sea bass, *Dicentrachus labrax*, temperature, sex ratio, growth performance.

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Isolation and Characterization of Actinobacteria from Fresh Qater Fish Microbiome

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Abstract

The fish microbiome is a largely unexplored source of Actinobacteria, which are potentially able to produce antimicrobial compounds. Examining the fish intestine and its content, we set out to isolate and characterize the community of Actinobacteria from two fresh water fish species (*Schizothorax zarudnyi, Schizocypris altidorsalis*). Therefore, a set of selective cultivation procedures and culture independent methods (e.g. 16S rRNA gene sequencing) were applied. In the first phase of the ongoing project an interesting diversity of Actinobacteria, especially belonging to the Streptomyces genus, was observed and characterized. This presentation describes the methodology and strategy for studying of fish intestine associated Actinobateria beginning from the selection of media to the antagonistic activity analysis. These results are reported for the first time for isolates from the Snow trout and Anjak microbiome and expand the scope to functionally characterized novel Actinobacteria and their metabolites for the potential application in aquaculture.

Keywords : Aquatic fish microbial ecology, Actinobacteria, fsh gut microbiota

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Some Invasive Mollusc Species in Mediterranean and Their Evaluability

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Abstract

Mediterranean sea has a large scale of marine species and some of this species are invasive alien species. A great majority of this species are fishes, mollusks and decapods. However, most of this alien species are mollusks (gastropods and bivalves) species. Some of this species have a great potencial of aquaculture applications. Among this group, some gastropod and bivalve species in the world production has a significant percent. Introduction of this invasive species to mediterranean water are a variety of way such as ship traffic, through suez canal and aquaculture activities and these species are widely distributed in various regions of the Mediterranean. Inside this group bivalvia also has a great potencial in aquaculture, some of these bivalvia species has a great economic value and for this reason we can develop production strategy for these species. Some of this species are Pacific giant oyster (*Crassostrea giga* Thunberg, 1793), manila clam (*Ruditapes philippinarum* Adams & Reeve, 1850), pearl oyster (*Pinctada radiata* Leach, 1814), ark shell (*Anadara demiri* Piani, 1981), ark shell (*Anadara inaequivalvis* Bruguiere, 1789) and large Pacific chama (*Chama pacifica* Broderip, 1835). On the other hand these species can be very dangerous for native ecosystems and their potencial easily turn to threat for natural habitats. In conclusion we must carefully consider these species and act with caution in aquaculture facilities.

Keywords : Mediterranean, invasive alien species, mollusca, economic value

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Economical Shrimp Species Found in Turkish Seas and Their Distribution Area

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Abstract

The shrimps are found in river, brackish water, and sea systems and have high economic values. Roughly, 2500 subspecies in the world are known and 300 of them have economic values. The amount of total production in the world is approximately 7.1 million tons and 3.2 million tons of this amount is produced by hunting. Remaining 3.9 million tons are also produced by aquaculture. Economic prawn species in Turkish Seas are *Marsupenaeus japonicus* (Bate,1888), *Penaeus semisulcatus* De Haan,1842, *Melicertus kerathurus* (Forskål,1775), *Metapenaeus monoceros* (J.C. Fabricius, 1798), *Metapenaeus stebbingi* Nobili,1904 and *Parapenaeus longirostris* (Lucas,1846). Most of them are lessepsian migrants introduced to Mediterranean ecosystem by Suez Canal. *Melicertus kerathurus* (Forskål,1775) and *Parapenaeus longirostris* (Lucas,1846) are distributed on all coast of Turkey excluding the Black Sea.

Keywords : Shrimp, aquaculture, Turkey

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Production of Meatball of Silver Crucian Carp (*Carassius Gibelio* Bloch, 1782) and Sensory Evaluatıon of the Product

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Abstract

This study aims to obtain meatballs of different contents from silver crucian carp (*Carassius gibelio* Bloch, 1782) known as Israel carp by public and to determine sensorial qualities of these meatballs. Fresh silver crucian carp (*Carassius gibelio*, Bloch 1782; average 172±30.82 weight and 19.75±2 length) were obtained from a local aquaculture farm. The samples, placed in polystyrene foam boxes with flake ice, were transferred to the Fish Processing Laboratory in the Faculty of Fisheries at Mugla Sitki Kocman University within 2 hours. After cleaning and washing the fish, the meat part was separated as fillets. After these fillets were boiled for 10 minutes, bones were picked out and then the fish meat was minced. Mince of silver crucian carp (İnegol meatballs, Kadınbudu meatballs, Swedish meatballs, Croquet meatballs, Tekirdağ meatballs, İzmir meatballs, Hamburger meatballs and Dry meatballs) was prepared as fish mince of different contents and shaped in accordance with meatball type. The fish balls were fried in sunflower oil and evaluated by an experienced group consisting of 20 panelists with regard to color, odor, appearance, friability, taste and general accepted. According to results of sensory analysis performed on silver crucian carp assessed as fish balls, it was determined that the mostly liked fish balls were fish ball croquet ($P < 0.05$). Hamburger fish balls and dry fish balls were the second and the third ones which were liked by panelists. İzmir fish balls were liked least by the group. In this study, it was determined that silver crucian carp, especially with the big basis weight could be used as fish balls. In addition to being consumed freshly, its usage as fish balls might provide added-value to the economy of the country.

Keywords : Silver crucian carp, *Carassius gibelio*, fish balls, sensorial evaluation

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Strategic Position of Muğla in Turkey's Aquaculture Production

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Abstract

Aquaculture sector is developing day by day. The aquaculture production of Turkey was approximately 212.410 tones in the year 2012. Nearly 38% of this production was in Muğla. According to 2011 statistics 82.480.000 dollars of 186.017.000 total exportation was in Muğla. Furthermore 70% of marine fish production and 12% of inland fish production in aquaculture was in Muğla. In this regard Muğla has a strategically importance for Turkey's Aquaculture Sector. If national strategies about aquaculture put Muğla to the center, it will be more profitable for our country. Making products more competitive in foreign market, having food safety preventions and making effort to increase the fisheries product consumption for per person up to average of World's consumption in domestic market is very important. Moreover, use of water resources effective and sustainable, needs for varied products in market, structural and legislative requirements are the problems waiting solutions. Muğla is the most important province to achieve the 20% increase in aquaculture production and 30% increase in aquaculture products exportation objectives for 2023. As a result, to achieve the estimated growth in aquaculture sector, management of production sustainably is very important.

Keywords : Sustainability, water resources management, national strategies

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The Evaluation of Selenium Concentrations in *Mullus barbatus* L., 1758 and *Mullus surmelatus* L., 1758 Obtained From Eastern Aegean Sea

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Abstract

In this study, selenium concentrations in the muscle tissues of *Mullus barbatus* and *M. surmelatus* obtained from Bodrum, Datça and Marmaris, which were located in Eastern Aegean Sea, were researched. The muscle tissues of the fish samples caught in 2013 were mineralized with wet decomposition and then their selenium concentrations were determined with inductively coupled plasma-mass spectroscopy (ICP-MS). According to the obtained results, the mean selenium concentration was 205.64 ± 93.44 µg/kg wet weight in *M. barbatus* and 210.03 ± 51.93 µg/kg wet weight in *M. surmelatus*. In terms of the selenium concentrations of the *M. surmelatus*, there was not any statistically significant difference ($p>0.05$).

Key words: *Mullus barbatus*, *Mullus surmelatus*, Aegean Sea, Selenium

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Determination of Gynogenesis Application With Biotechnological and Molecular Methods

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Abstract

Genetic value of individuals in breeding studies, which is effortful process, was maked by itself or relatives performance. In this regard, besides modern biotechnological methods of conventional breeding methods are required to participate in the work of the production. Biotechnological and molecular methods; influential individuals and parents determination, yields traits and diseases controlling or detection of genes controlling disease resistance at a molecular level (breeding process supported by marker), sperm crypreservation, chromosome manipulation, sex identification and reversal technologies will be accelerated to classical breeding period. In this rewiev, giving information about gynogenesis which is one of the chromosome manipulation techniques, its determination with molecular methods as microarray, DNA fingerprinting, using of markers, microsatellite and its purpose.

Keywords : Gynogenesis, biotechnology, molecular

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Investigation of Physical and Sensory Changes during Cold Storage of Anchovy Marinades Added Chitosan

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Abstract

This study investigates the effects of chitosan on physical and sensory properties of anchovy (*Engraulis encrasicolus*) marinades during refrigerated storage. Marination process was performed with 10 % NaCl + 1% and 0.5 % chitosan solution (solved in 3% acetic acid) for chitosan groups and with 10 % NaCl + 3% acetic acid solution for control group at a rate of 1:1.5 (fish: solution) within 27 hours. After marination process, anchovy fillets were stored in a refrigerator for 90 days. Statistically significant changes were detected in physical and sensory properties of all marinated anchovy groups during storage ($p < 0.05$). pH stayed under 4.5 in all groups during storage. There were significant differences between groups in terms of L*, a*, and b* values on certain days of storage ($p < 0.05$). In the sensory analysis, 1 % chitosan supplemented group was concluded as the best group, which was followed by 0.5 % chitosan supplemented group and control group, respectively.

Keywords : Chitosan, anchovy, *Engraulis encrasicolus*, marination, shelf life

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Effects of Dietary Fish Oil Replacement by Unrefined Peanut Oil on the Growth, Serum Biochemical Rarameters of Mozambique Tilapia Fingerlings (*Oreochromis mossambicus*)

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Abstract

This research aimed to evaluate the effects of partial or total replacement of fish oil (FO) with unrefined peanut oil (PO) on growth and some physiological parameters of Mozambique tilapia fingerlings for 60 days. Three triplicate groups (initial weight 6.36±0.19 g) were fed with isoenergetic and isonitrogenous diets in which FO was replaced with PO in graded increments of 50% (PO0, PO50, PO100). The results showed that weight gain and feed efficiency of fish fed with PO50 diet was statistically higher than in the other two groups ($P < 0.05$). No significant effects were observed on whole body proximate composition of fish fed with the experimental diets ($P > 0.05$). Serum glucose, total cholesterol and triglyceride were lower in fish fed with PO50 diet ($P < 0.05$). The present study demonstrated that PO can be used as an alternate source of dietary lipid up to 50% in tilapia feeds without adverse effects on growth performance and serum biochemical parameters.

Keywords : *Oreochoromis mossambicus*, growth performance, haematological parameters, serum biochemical, dietary lipid, vegetable oil source

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Utilization of Different Percent Garlic Meal in Fish Diets and its Effects on Growth Performance

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Abstract

The significant increase of prices of fish meal, which is an important and main protein sourcefor fish diets, has encouraged researchers to focus on the utilization of alternative protein sources in fish diets. The incorporation of immunostimulants or growth promoters may play an important role for improving feed conversion and the digestibility of feed ingredients, hence increasing growth performance of fish. The increase of fish appetite may improve stress resistance and so the fish health and fish welfare. The present study is focused on the effects of dietary garlic meal on growth performance and feed utilization of fish as an appetite promoter.

Key words: Garlic meal, alternative protein sources, sea bass, growth performance

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Larviculture of Meagre (*Argyrosomus regius* Asso1801)

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Abstract

This investigation compared the suitability of different diets for larviculture of meagre (*Argyrosomus regius*). For this purpose, wild fish were caught with longline and subsequently fed either a commercial diet or a mollusc diet. After two years, there was a significant difference between the two diets in the body weight but not the survival rate of the fish (P<0.05). Both the weight gain and the FCR were significantly higher in fish that were fed the commercial diet compared with those fed the mollusc diet. The broodstock was separated into two groups for spawning. Eggs averaged 800 µm in diameter in a group that spawned naturally, but no spawning occurred in a group injected with GnRHa. Three alga diets were used for the initial feeding of larvae: A_1, A_2 and A_3, consisting of 30/70, 60/40 and 50/50 *Nannochloropsis* sp. /*Isochrysis* sp., respectively. There was a significant difference in larval survival rate among the alga diets (P<0.05). These results indicate that meagre readily tolerates commercial production systems, where it can grow rapidly and easily reproduce.

Key words: Meagre, *Argyrosomus regius*, larviculture, production protocol

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