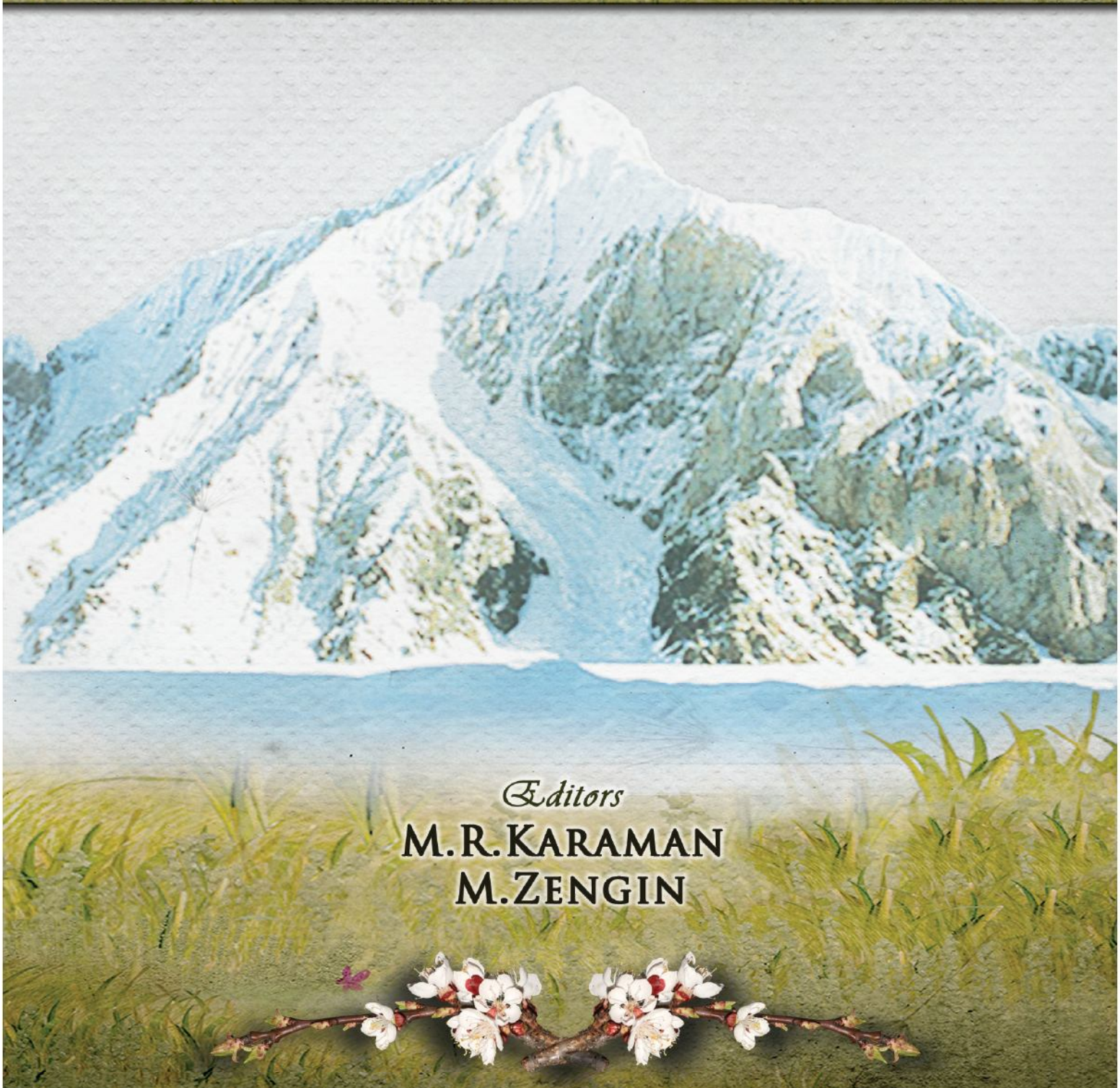
Soil-Water Journal

2013 Volume 2 Number 2 (1) ISSN: 2146-7072



Editors
M.R.Karaman
M.Zengin

SOIL-WATER JOURNAL

Vol 2 (2013) Number 2 (1)

Special Issue for AGRICASIA'2013

'1st Central Asia Congress on Modern Agricultural Techniques and Plant Nutrition'

01-03 October 2013

Kyrgyz-Turkish Manas University (KTMU)
Cengiz Aytmatov Campus, Bishkek, Kyrgyzstan

With the main sponsorships;

Editors

Mehmet Rüştü Karaman

Mehmet Zengin

© All rights reserved. The corresponding author signs and accepts responsibility for releasing this material on behalf of any and all co-authors. No part of the material protected by this copyright notice may be reproduced in any form or by any means without the prior permission of the copyright owners. This Special Isue of Soil-Water Journal were published with permission of the General Directorate of Turkish Agricultural Researches and Policies, Central Research Institute of Soil, Fertilizer and Water, Ankara, Turkey. http:// www.topraksudergisi.gov.tr.



Congress Secretary

Assoc. Prof.Dr. Mehmet Zengin



Congress Secretary

Asst. Prof.Dr. Adem Karataş



Congress Technical Coordinator

Mehmet Soyupak

Designed by

ART Studio, Yusuf Karaahmetoğlu, Turkey.
E-mail: artstudyo19@hotmail.com

Published by

The Pelin Publisher, Ahmet Faruk Daskıran, Turkey.

E-mail: pelinmatbaacilik@hotmail.com

ISSN: 2146-7072

Honorary Chairs of the Congress

Prof.Dr. Sebahattin Balcı	*Rector of Kyrgyzstan-Turkey Manas University*
Prof.Dr. Asılbek Kulmirzayev	*Vice Rector of Kyrgyzstan-Turkey Manas University*

Chairs of the Congress

Prof.Dr. Mehmet Rüştü Karaman	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Tinatin Döölötkeldiyeva	*Kyrgyzstan-Turkey Manas Univ., Kyrgyzstan*

Honorary Committee

Efkan Ala	*Undersecretary of The Prime Ministry of Turkey*
D. Bakashevich Kenjebay	*Deputy Minister of Agriculture, Kyrgyzstan*
Dr. Ferhat Şelli	*Ministry of Food, Agr. and Livestock, Turkey*
Prof.Dr. Garib Mammadov	*Chair. of State Committee of Land, Azerbaijan*
Prof.Dr. Sherali Nurmatov	*Deputy Minister of Agr., Water Res. Uzbekistan*
Dr. Serdar Çam	*President of Turkish Coop. and Coord. Agency*
Assoc.Prof.Dr. Masum Burak	*General Director of Agr. Res. Policies, Turkey*
Mevlüt Gümüş	*General Director of Crop Production, Turkey*
Prof.Dr. Mesut Akgül	*Rector of Süleyman Demirel Univ., Kazakhstan*
Prof.Dr. Mirdamad Sadıgov	*Rector of Azerbaijan State Agr. Unv., Azerbaijan*
Prof.Dr. Izatullo Sattarov	*Rector of Tajik Agrarian University, Tajikistan*
Dr. Mamedkuliev Kurbandurdy	*Rector of Turkmen Agrarian Unv., Turkmenistan*
Acad. Dzhamin Akimaliev	*General Director of SRI of Farming, Kyrgyzstan*
Mustafa Aktaş	*General Director of Turkish Coal Enterprises*
Dr. Gürsel Küsek	*General Director of Agrarian Reform, Turkey*
M. Halis Bilden	*General Director of Agr. Enterprises, Turkey*
Mesut Köse	*General Direct. of Turkish Grain Board, Turkey*

With the Supports of













































Organizing Committee

Prof.Dr. Maharram Babayev	*Res. Inst. of Soil Sci. Agrochem., Azerbaijan*
Prof.Dr. Rakhimdjan İkramov	*Central Asia Research Inst. of Irrig., Uzbekistan*
Prof.Dr. Ali İnal	*Ankara University, Turkey*
Prof.Dr. Amin İsmayilov	*Res. Inst. of Soil Sci. Agrochem., Azerbaijan*
Prof.Dr. Nejdet Kandemir	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Ali Kasap	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Ernazar Makhmudov	*Uzbek Academy of Sciences, Uzbekistan*
Prof.Dr. Bülent Okur	*Ege University, Turkey*
Prof.Dr. Sanginov Sanginboy	*Tajik Agrarian Academy, Tajikistan*
Prof.Dr. Abdulla Saparov	*Research Inst.of Soil Sci.Agrochem., Kazakhstan*
Prof.Dr. Ali Osman Solak	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Prof.Dr. Süleyman Taban	*Ankara University, Turkey*
Prof.Dr. Metin Turan	*Yeditepe University, Turkey*
Prof.Dr. Ahmet Tutar	*Humic Substance Society, Turkey*
Prof.Dr. Ediz Ulusoy	*Agricultural Machinery Society, Turkey*
Assc. Prof.Dr. Kadırbay Çekirov	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Assoc.Prof.Dr. Fatih Er	*Selçuk University, Turkey*
Asc.Prof.Dr.Nazgül İmanberdieva	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Assoc.Prof.Dr. Ali Jafarov	*Research Inst. of Soil Sci.Agrochem., Azerbaijan*
Assc.Prof.Dr. Necdettin Sağlam	*Gaziosmanpaşa University, Turkey*
Assc.Prof.Dr. Zeynal Tümsavaş	*Uludağ University, Turkey*
Assoc.Prof.Dr. Mehmet Zengin	*Selçuk University, Turkey*
Asst.Prof.Dr. Mürsel Çatal	*Akdeniz University, Turkey*
Asst.Prof.Dr. Ayhan Horuz	*Ondokuz Mayıs University, Turkey*
Asst.Prof.Dr. Adem Karataş	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Asst.Prof.Dr. Bülent Yağmur	*Ege University, Turkey*
Dr. A.Ahmet Yücer	*General Direct. of Agr. Res. Policies, Turkey*
Mehmet Şahin	*Ministry of Food Agr. and Livestock, Turkey*
Ayhan Karayama	*General Directorate of Agr. Enterprises, Turkey*
Dr. Kadir Redjepbaev	*Research Inst. of Agr., Water Res., Turkmenistan*
Dr. Şükrü Öztürk	*National Boron Research Institute, Turkey*

Dr. Orazmurad Karakhanov	*Research Inst. of Agr., Water Res., Turkmenistan*
Dr. Abdumalik Namozov	*Ministry of Agr., Water Resources, Uzbekistan*
Dr. Malik Bekenov	*Ministry of Agriculture, Kyrgyzstan*
Dr. A. Bayan Alimgazinova	*Institute of Kazagroinnovatsia, Kazakhstan*
Dr. Galina Stulina	*Sci. Information Center of CWC, Uzbekistan*
Dr. Abdurrahman Murat	*General Directorate of Turkish Coal Enterprises*
Dr. Hafiz Boboyorov	*Tajik Academy of Sciences, Tajikistan*
Mehmet Ali Olgun	*General Directorate of Crop Production, Turkey*
Mehmet Süreyya Er	*Turkish Cooperation and Coordination Agency*
Dr. İ.Hakkı Güçdemir	*Res. Inst. of Soil, Fertilizer and Water, Turkey*
Dr. Mesut Keser	*Country Representative of ICARDA, Turkey*
Dr. Emil Zhumabekov	*Research Institute of Soil Science, Kyrgyzstan*
Dr. Chary Muradov	*Res. Ins.of Deserts, Flora, Fauna, Turkmenistan*
Dr. Luidmila Martynova	*Res. Inst. of Soil and Crop Manag., Kyrgyzstan*
Dr. Akylbek Chymyrov	*Kyrgyz State University of CTA, Kyrgyzstan*
Dr. Amangeldi Annaev	*Scientific Res. Institute of Grain, Turkmenistan*
Dr. Batyr Mamedov	*Ministry of Nature Protection, Turkmenistan*
Dr. Mira Cunusova	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Ahmet Albayrak	*General Directorate of Turkish Coal Enterprises*
Levent Gelgeç	*Fertilizer Manufacturers Society, Turkey*
Dr. Alisher Tashmatov	*Central Asia Assc. of Agr. Res. Inst. Uzbekistan*
Dr. Tamara Bessonova	*Kyrgyz Agriculture Research Inst., Kyrgyzstan*
Dr. Gulnara I. Jumaniyazova	*Institute of Microbiology, Uzbekistan*
Dr.Ashyrmuhamet Saparmyradov	*Turkmen Academy of Sciences, Turkmenistan*
Ravza Mavlyanova	*Reg. Coord. for Cent. Asia AVRDC, Uzbekistan*
A. Tursunboy Abdulloevich	*Hort. and Vegetables Research Inst., Tajikistan*
Dr. Haydar Polat	*Central Res.Inst.of Soil, Fertilizer, Water, Turkey*
Uğur Erkaymaz	*General Directorate of Turkish Grain Board*
Ömer Faruk Noyan	*Middle Black See Agr. Research Station, Turkey*
Dr. Dmitriy Ten	*Ministry of Agriculture, Kyrgyzstan*
Dr. Kubanyzhbek Kulov	*Research Institute of Irrigation, Kyrgyzstan*

Scientific Committee

Prof.Dr. İbrokhim Abdurakhmonov	*Academy of Sciences, Uzbekistan*
Prof.Dr. Aygul Abugalieva	*Kazak Research Inst. of Farming, Kazakhstan*
Prof.Dr. Aydın Adiloğlu	*Namık Kemal University, Turkey*
Prof.Dr. Musa Ahmatbekov	*National Agrarian University, Kyrgyzstan*
Prof.Dr. Zeynal Akparov	*Genetic Resources Institute of ANAS, Azerbaijan*
Prof.Dr. Salih Aydemir	*Harran University, Turkey*
Prof.Dr. Amin Babayev	*Azerbaijan State Agrarian University, Azerbaijan*
Prof.Dr. Mustafa Y. Canbolat	*Atatürk University, Turkey*
Prof.Dr. Orazgeldy Charyev	*Turkmen Agricultural University, Turkmenistan*
Prof.Dr. K.Mesut Çimrin	*Mustafa Kemal University, Turkey*
Prof.Dr. H.Yıldız Daşgan	*Çukurova University, Turkey*
Prof.Dr. İlhan Doran	*Bilecik Şeyh Edebali University, Turkey*
Prof.Dr. Nurdin Düyşenbiyev	*Kyrgyz State Agricultural University, Kyrgyzstan*
Prof.Dr. Nevin Eryüce	*Ege University, Turkey*
Prof.Dr. Laziza Gafurova	*Tashkent State Agrarian University, Uzbekistan*
Prof.Dr. Naif Gebologlu	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Akif Gerayzade	*Research Inst. of Soil Sci. Agrochem., Azerbaijan*
Prof.Dr. Resul Gerçekçioğlu	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Sait Gezgin	*Selçuk University, Turkey*
Prof.Dr. Alovsat Guliyev	*Nakhchivan State University, Azerbaijan*
Prof.Dr. Aydın Güneş	*Ankara University, Turkey*
Prof.Dr. Hikmat Hisoriev	*Academy of Sciences, Tajikistan*
Prof.Dr. Khairidin Idiev	*Tajikistan Agrarian University, Tajikistan*
Prof.Dr. Coşkan Ilıcalı	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Prof.Dr. Ali İrfan İlbaş	*Kyrgyz-Turkish Manas University, Kyrgyzstan*
Prof.Dr. Farda İmanov	*Baku State University, Azerbaijan*
Prof.Dr. Almaz İrgaşev	*Kyrgyz National Agrarian University, Kyrgyzstan*
Prof.Dr. Amin İsmayilov	*Research Inst. of Soil Sci. Agrochem., Azerbaijan*
Prof.Dr. İzzet Kadıoğlu	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Gani Kaliev	*Academy of Agricultural Sci., Kazakhstan*
Prof.Dr. Mustafa Kaplan	*Akdeniz University, Turkey*
Prof.Dr. Muratbek Karabayev	*Regional Office of CIMMYT, Kazakhstan*
Prof.Dr. Nurudin Karabayev	*National Agrarian University, Kyrgyzstan*

Prof.Dr. Mehmet Rüştü Karaman	*Gaziosmanpaşa University, Turkey*
Prof.Dr. A.Vahap Katkat	*Uludağ University, Turkey*
Prof.Dr. Batyr A. Khasanov	*Tashkent State Agrarian University, Uzbekistan*
Prof.Dr. Ahmet Korkmaz	*Ondokuz Mayıs University, Turkey*
Prof.Dr. Ernazar Makhmudov	*Uzbek Academy of Sciences, Uzbekistan*
Prof.Dr. Hafiz Muminjanov	*Tajik Agricultural University, Tajikistan*
Prof.Dr. N.Mücella Müftüoğlu	*Çanakkale Onsekiz Mart University, Turkey*
Prof.Dr. Sonay Sözüdoğru Ok	*Ankara University, Turkey*
Prof.Dr. Nur Okur	*Ege University, Turkey*
Prof.Dr. Abdirahman Ombaev	*Agricultural Research Institute, Kazakhstan*
Prof.Dr. İbrahim Ortaş	*Çukurova University, Turkey*
Prof.Dr. Taşkın Öztaş	*Atatürk University, Turkey*
Prof.Dr. Bayram Sade	*Selçuk University, Turkey*
Prof.Dr. Boroshil Saipov	*Kyrgyz National Agrarian University, Kyrgyzstan*
Prof.Dr. Kadir Saltalı	*K.Maraş Sütçü İmam University, Turkey*
Prof.Dr. Sanginov Sanginboy	*Tajik Agrarian Academy, Tajikistan*
Prof.Dr. Batyrbek A. Sarsenbayev	*Institute of Plant Biotechnology, Kazakhstan*
Prof.Dr. İşenbay Sodombekov	*Kyrgyz National Agrarian University, Kyrgyzstan*
Prof.Dr. Fikrettin Şahin	*Yeditepe University, Turkey*
Prof.Dr. Süleyman Taban	*Ankara University, Turkey*
Prof.Dr. Şefik Tüfenkçi	*Yüzüncü Yıl University, Turkey*
Prof.Dr. Yusuf Yanar	*Gaziosmanpaşa University, Turkey*
Prof.Dr. Kadri Yürekli	*Gaziosmanpaşa University, Turkey*
Assoc.Prof.Dr. Oğuz Başkan	*Cent. Res. Inst.of Soil, Fertilizer and Water, Turkey*
As.Prof.Dr.Tubukhanım Kasımzade	*Baku State University, Azerbaijan*
Ass.Prof.Dr. Elekber Hasanaliyev	*Baku State University, Azerbaijan*
Ass.Prof. Dr. Fariz Mikailsoy	*Selçuk University, Turkey*
Dr. Dilfuza Egamberdieva	*National University of Uzbekistan, Uzbekistan*
Dr. Kadriye Kalınbacak	*General Direct. of Agr. Res. and Policies, Turkey*
Dr. Eziz Khankuliev	*Turkmen Agrarian University, Turkmenistan*
Dr. Kazbek Toleubayev	*Kazakh Res. Inst. for Plant Protect., Kazakhstan*
Dr. Ashyrbek Umetov	*Research Institute of Soil Science, Kyrgyzstan*

Bleeding Water Characteristics of Yalova Çekirdeksizi Grape Variety

Alper Dardeniz[1]*, Cafer Türkmen[2], Nuray Mücellâ Müftüoğlu[2], Murat Şeker[1], Mehmet Ali Gündoğdu[1]

[1]*Çanakkale Onsekiz Mart Univ., Faculty of Agric., Dept. of Horticulture, Çanakkale, Türkiye, *E-mail: adardeniz@comu.edu.tr*

[2]*Çanakkale Onsekiz Mart Univ., Fac. of Agric., Dept. of Soil Sci. and Plant Nutr., Çanakkale, Türkiye*

Abstract: This study was conducted on Yalova Çekirdeksizi grape variety of "Experimental Vineyard of the Table Grape Varieties" at Çanakkale Onsekiz Mart University Dardanos Campus during the spring seasons of the years 2009 and 2011 under Çanakkale conditions. Bleeding water samples were taken at three different periods (at the beginning, in the middle, and at the end of bleeding) and samples were analyzed with regard to amount of bleed–off, electrical conductivity, water soluble dry matter, acidity, gallic acid content and 19 different nutrient levels. The first bleeding was observed on 2nd of April in 2009 and the bleeding period lasted for 14 days. While the highest amount of bleed–off was measured at the beginning of bleeding period (241 mL), bleeding was not observed in the year 2011. While levels of macronutrients like Ca, K, P, Mg, Na and S were significantly high in different bleeding periods, Al was not observed in any samples.

Keywords: Bleeding, Çanakkale, nutrient, *Vitis vinifera* L.

1. Introduction

When the soil has reached to a certain temperature in spring but vines have not developed new roots yet, the water absorbed from the soil by passive osmosis reaches xylems from the cortex section of root through vacuolar means, and then rapidly transported to upper organs through a strong negative pressure along the live cells of xylem (Ağaoğlu, 2002). The magnitude of such a pressure in roots may reach up to 1.5 atmosphere (Oraman, 1972). During this period, water expels from cuts or wounds left over from pruning the vine (Ağaoğlu, 2002). Such an expulsion from cuts or wounds of late winter pruning is called "bleeding" (Andersen and Brodbeck, 1989a,b,c; Ağaoğlu, 2002; Çelik, 2007). Amount of bleed–off is affected by various factors like grape variety, transpiration rates, soil temperature, and soil moisture content. Bleeding increases with increasing soil temperature and moisture contents. Depending of grape varieties, bleeding usually occurs at soil temperatures between 7.4–16.5°C (Nosul'chak, 1984) and reaches to maximum levels at soil temperatures between 10–14°C (Currle et al., 1983; Çelik, 2007). Duration of bleeding period varies with the grape variety. While it is less than 5 days in some grape varieties, it may take between 16–27 days in others. Observed

bleeding in entire varieties investigated in his study but bleeding was not observed in one variety during 6 years of 8–year research period (Nosul'chak, 1984). The maximum level lasts for about 10–14 days, intensified just before hair formation on the bud and last until the end of emergence of bud-break (Alleweldt, 1965). Continuous cuts in canes in this period extends the duration of bleeding period (Reuther and Reichardt, 1963).

Initiation date and amount of bleeding may also vary depending on the grape variety (Bajva and Bindra, 1984; Nosul'chak, 1984; Anderson and Brodbeck, 1989a; Türkmen et al., 2013). In case of late pruning and continuous new cuts, a single vine can bleed up to 5–7 gallons (19–26 liter) (Winkler et al., 1974). In another study, this sum was reported as 0.5–5.5 liter, depending on rootstock and vine age (Galet, 1970). Amount of bleeding water is higher in young plants than in old plants because the water absorbed by roots reaches to the cut section earlier in young plants (Ağaoğlu, 2002). Currle et al. (1983) reported large differences in daily bleed-off of different vines as between 50–500 mL per vine stock. A bleed–off of 10–950 mL was reported from each pruned canes of vines, with each cane yielding 0.150–15.4 L bleeding water during the entire bleeding period and the total amount of 0.276–20.15 L loss of bleeding water during the bleeding period (Oraman, 1972). Schwickerath (1974) reported bleeding amount during the entire bleeding period as 150–4.150 mL and Vollmer (1976) reported the same value as 3.800–9.200 mL. It is generally assumed that a vine yields about 1 liter per vine stock bleed–off in a day, and such a value may reach up to 1.5 liter per vine stock at higher temperatures (Ağaoğlu, 2002). In one–armed cordon training systems with spur pruning, a heavier bleed–off is observed at the first and last heads rather than at mid heads.

Fertilization and other cultural practices have significant effects on bleeding water composition (Ağaoğlu, 2002). Bleeding water contains amino acids, carbohydrates, nitrogenous compounds, mineral matters, and hormones (Reuther and Reichardt, 1963; Nitsch and Nitsch, 1965; Galet, 1970; Branas, 1974; Winkler et al., 1974; Vollmer, 1976; Popa and Popa, 1980; Bajva and Bindra, 1984; Nosul'chak, 1984; Marangoni et al., 1986, Andersen and Brodbeck, 1988; Andersen and Brodbeck, 1989a,b,c; Andersen and Brodbeck, 1991; Glad et al., 1992; Türkmen et al., 2013). Kökbulut (1996) reported significant variations in the bleeding amounts of Sultani Çekirdeksiz and Perlette grape variety and indicated the initiation date of bleeding as April 7 for Perlette and as April 12 for Sultani Çekirdeksiz. The total amount of bleed–off was determined as 846.9 mL for Sultani Çekirdeksiz and as 144.9 mL for Perlette. While the macronutrients of N, K, and Ca had the highest values, micronutrients (Zn, Cu, Mn, and Fe) had fairly low values, and glucose and fructose were the largest sugar components. Macronutrients and micronutrients of Sultani Çekirdeksiz grape variety in the 1st and 2nd bleeding water collections varied as follows: N: 0.021–0.032%, P: 3.792–7.110 ppm, K: 197–261 ppm, Ca: 398–510 ppm, Mg: 21.14–27.14 ppm, Zn: 1.5–3.5 ppm, Cu: 2.000 ppm, Mn: 1–2 ppm, and Fe: 2.000 ppm. Same values for

Perlette grape variety were observed as follows: N: 0.012–0.033%, P: 4.977–8.058 ppm, K: 211–226 ppm, Ca: 407–521 ppm, Mg: 6.57–29.71 ppm, Zn: 3.5–7.0 ppm, Cu: 2.000 ppm, Mn: 1–2 ppm, and Fe: 2.000 ppm.

Türkmen et al. (2013) determined the bleeding water characteristics of Müşküle grape variety under Çanakkale–Türkiye conditions. Bleeding was observed in this grape variety in both experimental years and amount of bleed–off was higher at the beginning of bleeding period of the year 2009 (164 mL) and in the middle of bleeding period of the year 2011 (96 mL). The highest EC value was observed at the beginning of bleeding period of the year 2009 (1.361 $dS.m^{-1}$) and in the middle of bleeding period of the year 2011 (1.387 $dS.m^{-1}$). The highest WSDM (0.77%) was observed in the middle of bleeding period. While the amount of Mg was determined as 30.74 ppm, the value decreased to 16.27 ppm and 19.53 ppm respectively in the middle and at the end of bleeding period. In general, the investigated parameters determined from bleed–off samples taken at the beginning, middle, and end of bleeding periods were as follows: EC: 0.753–1.387 $dS.m^{-1}$, pH: 5.51–5.99, water soluble dry matter (WSDM): 0.30–1.10%, acidity: 0.009–0.017%, gallic acid: 144–494 $mg.g^{-1}$, Ca: 69–187 ppm, Mg: 13.82–40.14 ppm, S: 7.04–95.40 ppm, B: 0.105–2.404 ppm, K: 47.39–95.40 ppm, P: 5.73–76.95 ppm, Fe: 0.038–4.430 ppm, Cu: 0.014–0.529 ppm, Zn: 0.316–1.064 ppm, Mn: 0.67–1.79 ppm, Mo: 0–0.028 ppm, Co: 0.0001–0.064 ppm, Na: 0.74–57.0 ppm, Se: 0–0.6110 ppm, Ni: 0.0001–0.0628 ppm, Pb: 0–0.056 ppm, Cd: 0–0.031 ppm, and Cr: 0–0.085 ppm. Al was not observed at all.

Pruning or grafting in vineyards should be completed before the bleeding period. Excessive bleeding may hinders callus formation around grafted section and consequently affects the success of grafting (Uzun, 2004). Bleeding water is sometimes used as eye–bath in Türkiye to rest the eyes. It is also used as hair or face mask for hair and skin care. Bleeding periods in Çanakkale–Türkiye may vary from year to year, but bleeding generally occurs from mid–February (around 20^{th}) to mid–April (around 20^{th}) in a 60–day period (usually during March) with the increase in air and soil temperatures. In addition, trace amounts of bleeding may be seen at the beginning of December when temperature is high and in precipitated November. The objective of this study was to determine characteristics of bleeding water of Yalova Çekirdeksizi grape variety grown under Çanakkale–Türkiye conditions.

2. Materials and Methods

This study was conducted on Yalova Çekirdeksizi grape variety of "Experimental Vineyard of the Table Grape Varieties" at Çanakkale Onsekiz Mart University (ÇOMU) Dardanos Campus during the spring seasons of the years 2009 and 2011 under Çanakkale–Türkiye conditions. Sampling could not be done in 2010 because of extreme climate conditions during the winter and spring seasons with heavy precipitations and water poundings in the vineyard. Climate date of Çanakkale for the years 2009, 2010, and 2011 are presented in Table 1.

Table 1. Climate date of Çanakkale for the years 2009, 2010, and 2011

Climate Parameter	Years	Months			
		January	February	March	April
Average temperature (°C)	2009	7.8	7.1	8.7	12.2
	2010	6.6	8.9	9.1	13.4
	2011	6.2	5.9	7.7	10.8
Maximum temperature (°C)	2009	10.3	9.6	12.4	16.4
	2010	8.5	11.6	13.1	18.1
	2011	9.9	9.2	11.1	14.0
Minimum temperature (°C)	2009	5.4	4.9	5.6	8.7
	2010	4.7	6.3	5.7	9.7
	2011	3.3	3.1	4.9	7.7
Average precipitation (mm)	2009	80.2	110.9	80.1	40.3
	2010	106.4	196.6	60.9	22.9
	2011	43.8	17.5	56.7	69.8
Relative humidity (%)	2009	80.9	79.7	78.7	74.6
	2010	81.5	81.2	77.5	72.4
	2011	82.6	78.0	78.5	77.2

Bleed–off samples were taken from Yalova Çekirdeksizi grape variety at three different time periods (at the beginning, in the middle, and at the end of bleeding). These periods were determined by taking the initiation date of bleeding, climate conditions, and possible bud–break times of the relevant year into consideration. For Yalova Çekirdeksizi grape variety, the beginning, middle, and end of bleeding periods were respectively determined as April 2, 9, and 16 in 2009. Soil characteristics of the "Experimental vineyard" are presented in Table 2.

Table 2. Soil characteristics of the "Experimental vineyard"

Soil characteristics	Sampling depth (cm)	
	0–30	30–60
Texture	Clay–Loam	Clay–Loam
pH	7.49	7.57
EC ($dS.m^{-1}$)	0.98	0.84
Total lime (%)	9.66	12.08
Organic matter (%)	1.95	0.58
P_2O_5 ($kg.da^{-1}$)	7.6	5.0
K_2O ($kg.da^{-1}$)	68	30

Soils of experimental vineyard were unsaline clay–loam with slight alkalinity, medium level lime and poor organic matter content, and sufficient P and K levels. The research was conducted in a randomized block design with 3 replications, and each replication had 4 vines. A cane with average development was selected from the tip head of each vine. A transverse cut was performed between mid–tip internodes with a pruning shears and the cane was tilled

downward. A 1.5 L container was placed at the tip of these canes to collect bleed–off samples, and head of the containers was wrapped tightly with aluminum foils to prevent entrance of precipitation and other materials into the containers. For each bleeding period, cuts were performed and containers were placed at noon (12:00 pm) and then taken off after 24 h. The same canes were used in the 2nd and 3rd bleeding periods, but this time, the cuts were performed 2–3 cm below the previous cuts. Collected samples were prepared for analysis without losing any time. Amount of bleed–off (mL), bleeding water EC ($dS.m^{-1}$), pH, water soluble dry matter (WSDM) (%), acidity (%), and gallic acid contents ($mg.g^{-1}$) were determined at laboratories of "Horticulture" and "Soil Science and Plant Nutrition" departments of "ÇOMU," and a total of 19 macro–micro nutrient (P, K, Ca, Mg, S, Fe, Cu, Zn, Mn, Al, Co, Mo, B, Cd, Cr, Na, Ni, Pb, and Se) analyses were performed at laboratories of "Soil Science and Plant Nutrition," Department of "Konya Selçuk University". Samples for macro–micro nutrient analysis were sent to analysis laboratory in ice boxes to preserve cold–chain. Variance analysis was performed according to a randomized block design using MINITAB 13.0 statistical software. The difference between means (Least Significant Difference, LSD) was tested at $p<0.05$ level and indifferent means were indicated with the same letters.

3. Results and Discussion

Results of present study, carried out to determine characteristics of bleeding water of Yalova Çekirdeksizi grape variety grown under Çanakkale–Türkiye conditions, are presented in Table 3. Climate data of Çanakkale Province for the years 2009, 2010 and 2011 revealed highly precipitated winter and spring in the year 2010 and fairly cool spring in the years 2009 and 2011 (Table 1). Therefore, bud–break and bleeding were retarded in Yalova Çekirdeksizi grape variety in the year 2009, the first bleeding was observed at the beginning of April and 2nd of April was considered as the beginning of bleeding period of the year 2009. Bud–break of the same year was observed on 15–16 April. Data were not obtained in the year 2010 due to water poundings over the vineyard soils and there was not any bleeding in the year 2011.

Nosul'chak (1984) indicated that bleeding period may vary based on grape varieties and reported bleeding periods of less than 5 days in 13 grape varieties, 16–27 days in 7 grape varieties and no–bleeding in only one grape variety during 6 years of 8–year research period. No–bleeding case of present study in the year 2011 complies with the findings of Nosul'chak (1984). Alleweldt (1965) reported that maximum bleeding lasted for about 10–14 days, intensified just before hair formation on the bud and last until the end of emergence of bud-break. Parallel to findings of the researcher, in present study, bleeding period of the year 2009 lasted for 14 days.

Currle et al. (1983) indicated daily variations in the amount of bleed–off as between 50–500 mL per vine stock. Amount of bleed–off in Yalova Çekirdeksizi grape variety in the year 2009 was higher at the beginning of bleeding period with

241 mL (Table 3). These findings support the results of other researchers (Oraman, 1972; Schwickerath, 1974; Currle et al., 1983; Kökbulut, 1996).

Differences were observed in bleed–off compositions on different days and at different hours of a day. Such differences in Yalova Çekirdeksizi grape variety were parallel to the findings of other researchers (Andersen and Brodbeck, 1989a,b,c; Türkmen et al., 2013). The highest pH value (6.08) was observed at the end of bleeding period and the highest water soluble dry matter (0.67%) was observed in the middle of bleeding period. With regard to nutrients, higher B (2.875 ppm) values were observed at the beginning; Se (0.473 ppm) values in the middle; Co (0.044 ppm and 0.046 ppm) values at the beginning and in the middle; Ca (227 ppm), S (11.75 ppm), P (105.65 ppm) and Fe (3.777 ppm) values at the end of bleeding period (Table 3).

Table 3. Amount and composition of bleeding water of Yalova Çekirdeksizi grape

Periods	Amount of bleed–off (mL)	EC (dS m^{-1})	pH	WSDM (%)	Acidity (%)
BB	241±42 A	1.229	5.42±0.006 B	0.30±0.00 B	0.016
MB	65±07 B	1.332	5.69±0.091 B	0.67±0.07 A	0.023
EB	77±14 B	1.258	6.08±0.138 A	0.40±0.06 B	0.020
LSD	1%	ns	1%	1%	ns
	Gallic Acid (mg/g)	Ca (ppm)	Mg (ppm)	S (ppm)	B (ppm)
BB	126	129±02 B	51.75	8.21±0.74 B	2.875±0.095 A
MB	133	181±16 B	78.66	10.54±0.32 AB	0.974±0.157 B
EB	89	227±32 A	68.80	11.75±0.80 A	0.963±0.190 B
LSD	ns	5%	ns	5%	1%
	K (ppm)	P (ppm)	Fe (ppm)	Cu (ppm)	Zn (ppm)
BB	102.00	54.59±4.24 B	0.816±0.150 B	0.359	1.178
MB	106.90	73.98±2.61 B	0.725±0.028 B	0.196	1.508
EB	79.90	105.65±8.36 A	3.777±0.534 A	0.438	1.318
LSD	ns	1%	1%	ns	ns
	Mn (ppm)	Mo (ppm)	Co (ppm)	Na (ppm)	Se (ppm)
BB	1.36	0.006	0.044±0.0061 A	41.50	0.195±0.0434 B
MB	1.98	0.014	0.046±0.0072 A	45.90	0.473±0.1240 A
EB	1.88	0.037	0.010±0.0020 B	50.74	0.119±0.0190 B
LSD	ns	ns	1%	ns	5%
	Ni (ppm)	Pb (ppm)	Cd (ppm)	Cr (ppm)	Al (ppm)
BB	0.074	0.028	0.019	0.056	0.00
MB	0.057	0.035	0.021	0.060	0.00
EB	0.075	0.000	0.009	0.097	0.00
LSD	ns	ns	ns	ns	ns

BB: Beginning of bleeding, MB: Middle of bleeding and EB: End of bleeding.

In general in the samples taken at the beginning, in the middle and at the end of bleeding periods, amount of bleed–off varied between 65–241 mL; EC between 1.229–1.332 dS.m^{-1}; pH between 5.42–6.08; WSDM between 0.30–0.67%, acidity

between 0.016–0.023%; gallic acid between 89–133 $mg.g^{-1}$. Significantly high levels of macronutrients like Ca, K, P, Mg, Na and S and fairly low levels of micronutrient like Cu, Zn, Mn, Mo, Co, Se, Ni, Pb, Cd, and Cr were observed in the bleeding water samples. Bleeding water composition was determined as follows: Ca; 129–227 ppm, Mg; 51.75–78.66 ppm, S; 8.21–11.75 ppm, B; 0.963–2.875 ppm, K; 79.90–106.90 ppm, P; 54.59–105.65 ppm, Fe; 0.725–3.777 ppm, Cu; 0.196–0.438 ppm, Zn; 1.178–1.508 ppm, Mn; 1.36–1.98 ppm, Mo; 0.006–0.037 ppm, Co; 0.010–0.046 ppm, Na; 41.50–50.74 ppm, Se; 0.119–0.473 ppm, Ni; 0.057–0.075 ppm, Pb; 0–0.035 ppm, Cd; 0.009–0.021 ppm and Cr; 0.056–0.097 ppm. Al was not observed at all (Table 3). Such findings were relatively parallel to the results of Kökbulut (1996) and totally comply with the findings of Türkmen et al. (2013).

Beginning of bleeding period for Yalova Çekirdeksizi grape variety was determined at 2nd of April and bleeding lasted for 14 days. While the highest amount of bleed–off (241 mL) was observed at the beginning of bleeding period of the year 2009, bleeding was not observed in the year 2011. Bleeding water compositions of different periods were also different from each other. Significantly high levels of macronutrients like Ca, K, P, Mg, Na and S were observed in bleeding water samples and Al was not observed at all. It is recommended that similar researches should be carried out with different grape varieties and different sampling times for better investigation and monitoring of plant nutrient uptake and for better understanding of vine physiology.

References

Ağaoğlu, Y.S., 2002. Bilimsel ve Uygulamalı Bağcılık. (Asma Fizyolojisi-I) Cilt II. Kavaklıdere Eğitim Yayınları No: 5. 445 s. Ankara.

Alleweldt, G., 1965. Über den einfluss der temperatur auf die blutung von reben. Vitis. 5 10–16.

Andersen, P.C., Brodbeck, B.V., 1988. Water and solute fluxes through pruned Muscadine grape spurs. Hort. Science 23 (6): 978–980.

Andersen, P.C., Brodbeck, B.V., 1989a. Diurnal and temporal changes in the chemical profile of xylem exudate from *Vitis rotundifolia*. Physiology Plantarum 75: 63–70.

Andersen, P.C., Brodbeck, B.V., 1989b. Chemical composition of xylem exudates from bleeding spurs of vitis rotundifolia noble and *Vitis* hybrid Suwannee in relation to pruning date. Am. J. Enol. Vitic.. 40 (3): 155–160.

Andersen, P.C., Brodbeck, B.V., 1989c. Temperature and temperature preconditioning on flux and chemical composition of xylem exudates from *Muscadinia* grapevines. J. Amer. Soci. Hort. Sci. 114 (3): 440–444.

Andersen, P.C., Brodbeck, B.V., 1991. Influence of fertilization on xylem fluid chemistry of *Vitis rotundifolia* Noble and *Vitis* hybrid Suwannee. Amer. J. Enol. Vitic. 42(3): 161–165.

Bajva, G.S., Bindra, A.S., 1984. Mineral nutrients contents in bleeding of Thompson Seedless and Perlette grapevines. Indian Journ. Hort. 41 (3/4): 2006–2009.

Branas, J., 1974. Viticulture. Imprimerie Déhan, Montpellier.

Currle, O., Bauer, O., Hofaecker, W., Schumann, F., Frisch, W., 1983. Biologie der Rebe. D. Meininger Verlag und Druckerei GmbH, 6730. Neustadt.

Çelik, S., 2007. Bağcılık (Ampeloloji). Cilt–1. Namık Kemal Üniversitesi, Tekirdağ Ziraat Fakültesi Bahçe Bitkileri Bölümü. 428 s. Tekirdağ.

Galet, P., 1970. Précis de Viticulture. Imprimerie Paul Déhan, Montpellier.

Glad, C., Regnard, J.K., Querou, Y., Brun, O., Morot-Gaudry, J.F., 1992. Flux and chemical composition of xylem exudates from Chardonnay grapevines temporal evolution and effect of recut. Amer. J. Enol. Vitic. 43 (3): 275–282.

Kökbulut, U.Z., 1996. Asmalarda kanama suyunun içeriği üzerinde bir araştırma. Ankara Üniversitesi, Fen Bilimleri Ens. (Yüksek Lisans Tezi). Ankara.

Marangoni, B., Vitagliano, C., Peterlunger, E., 1986. The effect of defoliation on the composition of xylem sap from Cabernet Franc grapevines. Amer. J. Enol. Vitic. 37(4): 259–262.

Nitsch, J.V., Nitsch, C., 1965. Précence de phytokinines et autres substances de croissance dans la séve d'Acer saccharum et de Vitis vinifera. Bull. Soc. Bot. France. 112: 11–18.

Nosul'chak, E.A., 1984. Sap flow in grapevines in the Sumbar valley (South Western Turkmenia). Sbornik-Nauch. Trudov-po-Prikladnoi Botanike, Genetike-i Selektsii. 83: 22–27.

Oraman, M.N., 1972. Bağcılık Tekniği II. Ankara Üniversitesi Ziraat Fakültesi Yayınları: 470. Ders Kitabı: 162. 402 s.

Popa, E., Popa, T., 1980. Biochemical characteristics of the bleeding sap of the vine. An. Inst. Cercet. Viticult. Vinificatie Valea Calugareasca. 9: 83–90.

Reuther, G., Reichardt, A., 1963. Temperatureinflüsse auf blutung und stoffwechsel bei *Vitis vinifera*. Planta. 59: 391–410.

Schwickerath, A., 1974. Einfluss der Unterlage auf die Blutung der Rebe. Diplomarbeit Lehrstuhl für Weinbau, Hohenheim, Stuttgart.

Türkmen, C., Dardeniz, A., Müftüoğlu, N.M., Tunçel, R., 2013. Müşküle Üzüm Çeşidinde Ağlama Suyu Özellikleri. 6. Ulusal Bitki Besleme ve Gübre Kongresi–Kapadokya 2013. (In press)

Uzun, İ., 2004. Bağcılık El Kitabı. Hasat Yayıncılık Ltd. Şti. 156 s. İstanbul.

Vollmer, W., 1976. Der Cytokiningehalt in den vegetativen Organen der Rebe. Diss. Univ. Hohenheim, Stuttgart.

Winkler, A.J., Cook, J.A., Kliewer, W.M., Lider, L.A., 1974. General Viticulture. University of California Pres, Berkeley, California.