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Bazı Üzüm Çeşidi Çekirdeklerindeki Mineral Madde İçeriklerinin Belirlenmesi

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Özet

Bu çalışma, 2008 yılında Konya'da ticari olarak yetiştiriciliği yapılan 5 üzüm çeşidi çekirdeklerinin makro ve mikro mineral madde içeriklerini belirlemek için gerçekleştirilmiştir. Mineral madde içerikleri ICP-MS cihazında tespit edilmiştir. Çeşitlerin tamamında önemli miktarda kalsiyum, potasyum, çinko, manganez ve demir elementleri bulunmuştur. Mineral elementlerce zengin bu üzüm çekirdekleri, insan beslenmesinde gıda kaynağı olarak kullanılabilir.

Anahtar Kelimeler: *Üzüm çeşitleri (Vitis vinifera L.), makro mineraller, mikro mineraller*

Determination of Mineral Substance Contents in the Seed of Some Grape Varieties

Abstract

This study was conducted on 5 local grape varieties of Vitis vinifera L. grown in commercial vineyards in Konya in 2008 to determine macro and micro mineral substance contents in their seeds. Mineral substance contents were determined using ICP-MS. It was found that all of the varieties had calcium, potassium, zinc, manganese and iron elements in considerable amounts. The grape seeds that are rich in mineral elements can be used as a food source for human nutrition.

Keywords: *Grape varieties (Vitis vinifera L.), macro minerals, micro minerals*

Introductıon

Turkey has the genetic sources for vine and at the same time possesses a very old and established viticulture tradition. The grape production of Turkey is 4.264.720 tons on 479.024 hectares of viticulture area (FAO, 2009). 40 % of the grapes produced in our country are consumed fresh, 35 % are dried, 23 % are used in the making of various products such as molasses, dried fruit sheets and sherbet while 2% are processed to be made wine (Başkan and Pala, 2008).

Approximately 71 %, 27 % and 2 % of world grape production are consumed as wine, fresh and dried fruit respectively (Anonymous a., 2008). Grape seeds are a by-product of the winemaking or juice industry. Most of the total amount is obtained from winemaking. 10 million tons of grape pomace arises within a few weeks of the harvest campaign (Schieber et al., 2002). It could be thought that the production capacity of grape seeds annually is approximately 30,000 tons in Turkey (Gök Tangolar et al., 2009).

The grape seed extract is a natural antioxidant that is 50 times as strong as vitamin E and 20 times as strong as vitamin C. Antioxidants neutralise harmful substances, i.e. free radicals, that have formed in our body as a result of chemical reactions or that have been received from outside through stress, sun rays, cigarettes, alcohol and environmental pollution. It helps skin texture to keep its elasticity, prevents wrinkles and adds beauty. Thus, they play a vital role in slowing the ageing process. 50 kg of grape seed is needed to obtain a litre of cold pressed grape seed oil (Khanna et al., 2002).

Due to their Iron, Potassium, Magnesium and Boron contents, grape and grape seeds have been used as supplementary foods (Anonymous b., 2008). The Potassium mineral assists in the formation of pressure in body liquids and ensures acid-base balance. Grape seed is extremely useful for those who use birth control pills, but those are allergic to grape are advised not to eat grape seeds; neither are they recommended during pregnancy and breast-feeding (Zeybek, 2008).

The present study aimed at investigating mineral substance contents of grape seeds extracted from five grape varieties. It further aims to explore possibilities of using pulp residues and especially seeds of pulp residues, which are by-products of wine, grape juice

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and molasses factories and which were not utilised economically until very recently, because they can be used as a new source of food for humans due to their high antioxidant and phenolic substance contents. It also aims to determine how factory product costs can be reduced and whether the properties that were examined have any effect on one another or not.

Materials and Methods

Collection of plant material

Ripened grapes from Ak üzüm (white color table grape), Dökülgen (white color table grape), Hesap Ali (white color table grape), Ekşi kara (red color table grape and raisin) and Kızıl üzüm (red color table grape) varieties grown in Hadim district were collected from producer vineyard (Konya, Turkey), 15th September in 2008. The seeds were excised from berries and air-dried at the room temperature under shade conditions. They were stored at room temperature until their analysis.

Mineral analyses

Samples of 0.5 g were taken from grape seeds and ground to powder in order to determine the mineral contents of grape seeds. Then, 0.5 gram was taken for each sample and subjected to wet decomposition with 10 mg of concentrated nitric acid (H_2O_2-HNO_3) in a microwave oven (Cem Mars Expres) for 20 minutes at 180 ºC. Dilution factor was taken to be 250 and appropriate dilution was performed. NMKL 186 method was used to determine the mineral contents (Anonymous, 2007) and readings were performed on the ICP-MS (Inductively Coupled Plasma–Mass Spectrometer-Agilent 7500cx) device. The analyses that were conducted examined the Sodium (Na), Phosphorus (P), Potassium (K), Calcium (Ca), Magnesium (Mg), Iron (Fe), Zinc (Zn), Manganese (Mn), Copper (Cu), Arsenic (As), Cadmium (Cd), Lead (Pb) and Tin (Sn) contents of the seeds. 3 parallels were established and values of macro nutrient elements were given in percentage (Table 1), while values of micro nutrient elements were given in mg/kg (Table 2). The mean and standard deviation values of the results of analyses (X ± SD) were calculated using Microsoft Excel 2003 programme.

The research was planned in the completely randomized block design as simple factorial experiment and variance analyses and multiple comparison tests were done by JMP statistical package program (version 7.0; SAS Institute, Cary, NC, USA)

Results and Discussion

The analysis results are given in Table 1 (macro nutrient element contents) and Table 2 (micro nutrient element contents).

Table 1. Macro nutrient element contents of grape seeds*

Variety	Macro nutrient elements (%)				
	Sodium	Phosphorus	Potassium	Calcium	Magnesium
Ak üzüm	0.190 b	0.197 ab	0.447 bc	0.820 a	0.077 c
Dökülgen	0.193 b	0.143 c	0.413 c	0.487 d	0.083 bc
Hesap Ali	0.223 a	0.203 a	0.470 b	0.750 b	0.123 a
Ekşi kara	0.230 a	0.187 b	0.527 a	0.540 c	0.093 b
Kızıl üzüm	0.166 c	0.197 ab	0.460 b	0.547 c	0.087 bc
LSD 5%	0.02	0.010	0.04	0.04	0.01

**a–d Mean values within the same row sharing a common superscripts are not significantly different at LSD 5%*

Table 2. Micro nutrient element contents of grape seeds*

Variety	Micro nutrient elements (mg kg^{-1})			
	Iron	Zinc	Manganese	Copper
Ak üzüm	51.14 a	345.67 d	90.26 b	9.39 d
Dökülgen	49.23 b	363.67 c	22.68 e	11.68 c
Hesap Ali	45.81 c	394.00 b	97.00 a	16.67 a
Ekşi kara	42.66 d	419.00 a	44.77 c	8.00 d
Kızıl üzüm	51.07 ab	394.00 b	30.45 d	13.76 b
LSD 5%	1.84	10.09	2.01	1.70

**a–e Mean values within the same row sharing a common superscripts are not significantly different at LSD 5%*

Calcium content is the lowest in Dökülgen variety with 0.487% and the highest in Ak üzüm variety with 0.820%. Sodium content is the lowest in Kızıl üzüm variety with 0.166% and the highest in Ekşi kara variety with 0.230%, while phosphor content is the lowest in Dökülgen variety with 0.143% and the highest in Hesap Ali variety with 0.203%. Potassium content is the lowest in Dökülgen variety with 0.413% and the

highest in Ekşi kara variety with 0.527%. On the other hand, magnesium content is the lowest in Ak üzüm variety with 0.077% and the highest in Hesap Ali variety with 0.123%. Among the identified macro minerals, calcium content was found to be higher than sodium, phosphorus, potassium and magnesium contents. The results of similar studies are as follows: (phosphorus: 0.29-0.44%, potassium: 0.33-0.50%, calcium: 0.48-0.79%, magnesium: 0.13-0.17% (Gök Tangolar et al., 2009).

Among the micro minerals that were identified, the zinc content of grape seeds was found to be much higher than iron, manganese and copper contents. Depending on varieties, iron content was the lowest in Ekşi kara variety with 42.66 mg kg^{-1}, and the highest in Ak üzüm variety with 51.14 mg/kg. The zinc content is the lowest in Ak üzüm variety with 345.67 mg kg^{-1} and the highest in Ekşi kara variety with 419.00 mg kg^{-1}, while the manganese content is the lowest in Dökülgen variety with 22.68 mg kg^{-1}, and the highest in Hesap Ali variety with 97.00 mg kg^{-1}. On the other hand, the copper content is the lowest in Ekşi kara variety with 8.81 mg kg^{-1}, and the highest in Hesap Ali variety with 16.67 mg kg^{-1}. The results of similar studies are as follows: (iron: 33.50-35.00 mg kg^{-1}, copper: 9.10-17.80 mg kg^{-1}) (Kamel, 1985), (iron: 17.30-27.00 mg kg^{-1}, manganese: 11.13-23.86 mg kg^{-1}, copper: 7.27-13.04 mg kg^{-1}) (Gök Tangolar et al., 2009).

The highest Ca and Fe (in Ak üzüm), Na, Zn and K (in Ekşi kara), P, Mg, Mn and Cu (in Hesap Ali) were found to be statistically. The differences observed among the grape cultivars are related to the genetic structure, soil types and cultivation. The grape seeds had high nutritional value in terms of macro and micro element. Consequently, the seeds of these grape cultivars can be used as human food.

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