



The Varieties and Characteristics of Grapes Grown in Southeast Anatolia Region

Abdulkadir LEVENT¹ 

¹Batman Üniversitesi, Fen Edebiyat Fakültesi, Kimya Bölümü, Batman, Türkiye,

leventkadir@hotmail.com

Zülküf DEMİR² 

²Batman Üniversitesi, Mühendislik ve Mimarlık Fakültesi, Batman, Türkiye,

zulkuf.demir@batman.edu.tr

Geliş Tarihi/Received:

19.10.2019

Kabul Tarihi/Accepted:

03.12.2020

Yayın Tarihi/Published:

30.12.2020

ABSTRACT

Grape is a fruit, called Vitis. Turkey replaces in the first sixth in growing grape, in the world. Grape has a significant place in the food industry. The antioxidants in grape seed have the effect of preventing and treating many diseases. In Turkey, the percentages of grapes, consumed in the form of wort, is about 30 %, annually. The 25 % of grape garbage is seeds. Approximately 3-6 % of grapes seeds (44000 tons) wasted annually. The foreseeing designing and manufacturing the grape squeezing machine will facilitate the work of the grape grower and will achieve the grape seeds to the economy. While the sieve diameter of grape seeds separator, separated the seeds from the garbage of the grape will be less than or equal to 2 mm (≤ 2 mm), the garbage from the wort is greater than or equal to 8.5 mm (≥ 8.5 mm), according to the seeds geometrical dimensions, gained.

Key words: Grape, Vitis, Grape seed, Kinds of Vitis, Geometrical properties of grapes

Güneydoğu Anadolu Bölgesinde Yetişen Üzüm Çeşitleri ve Geometrik Özellikleri

ÖZ

Üzüm, asma olarak bilinen bir meyvedir. Üzüm yetiştiriciliği alanında Türkiye, dünyada ilk altıda yer alır. Üzüm, gıda endüstrisinde oldukça önemli bir konuma sahiptir. Üzüm çekirdeği, bünyesindeki antioksidanlar yardımıyla, birçok hastalığı önleyici ve bu hastalıkları tedavi etme etkisine sahiptir. Türkiye’de şıra şeklinde yıllık tüketilen üzüm miktarı üretilen toplam üzüm miktarının % 30’dur (735000 ton). Üzümün yaklaşık olarak % 25’ini oluşturan çekirdek, yüksek oranda doymamış zengin antioksidan içerir. Türkiye’de şıra şeklinde tüketilen üzüm tanesinin yaklaşık olarak % 3 – 6’sını oluşturan (44000 ton) üzüm çekirdeği, atık ile birlikte çöpe atılmaktadır. Tasarımını ve imalatını öngördüğümüz üzüm sıkma makinesi ile üzüm yetiştiricisinin işinin kolaylaştırılması ve atık ile çöpe atılan üzüm çekirdeğinin ekonomiye kazandırılması hedeflenmektedir. Bu çalışma, üzüm sıkma makinesi için yapılmış bir ön çalışmadır. İncelenen üzümlerin çekirdek boyutlarına göre üzüm sıkma işleminde çekirdeği atıktan ayırıştırın eleğin delik çapı ≤ 2 mm, çekirdek dışında kalan atığı şıradan ayıran eleğin çapı ise ≥ 8.5 mm olmalıdır.

Anahtar kelimeler: Üzüm, Asma, Üzüm çekirdeği, Üzüm çeşitleri, Üzümün geometrik boyutları

1. Introduction

Turkey has suitable soil and climate for viticulture. With its 660 thousand Ha vineyard area, it ranks 5th in the world and 6th in the world in age grape production (Akgün and Akgün, 2006). Italy and France, which are in the first ranks of the world in the field of grape cultivation, consume 80-90% of the high-quality grapes they produce in wine production. However, the ratio of grape consumed of Turkey's wine manufacturing is % 5. The remainder produced in Turkey is consumed in the manufacture of grape musts and other products (Şenuy et al., 2014). Quality grapes produced in Turkey, unlike Italy and France in the manufacture of wine consumption as high as 80% - %90 is consumed in the manufacture of products and musts (Şenuy et al., 2014). Grapes are a fruit called Vitis in botany. More than 10000 varieties in the world with more than 1200 varieties of grapes are grown in Anatolia. The calorie value of grapes is high. High sugar content, calcium (Ca), potassium (K), sodium (Na), phosphorus (P), iron (Fe), also A, B1, B2, Niacin, vitamin C, water sugar, organic acids, antioxidant poly-phenol compounds, pectic substances, flavoring agents and enzymes are found in structure. These enzymes include 22-25% mineral, 70-90% malic acid, 65-85% water, sucrose, glucose and fructose. The aroma in the grape is found in the form of esters, terpene compounds, aromatic alcohols, carbonic and nitrogenous compounds. The great proportion of this aroma is in grape peel with 2-3% of enzymes and minerals (Akgün ve Akgün, 2006; Cabaroğlu and Yılmaztekin, 2010; Şenuyar et al., 2014).

Grape increases breastfeeding, strengthens the immune system, improves the function of the kidney and liver, removes anemia, dilutes and cleanses the blood, runs the cardiovascular system regularly, melts the fat and prevents the accumulation of capillaries, lowers bad cholesterol and blood pressure, and removes harmful substances from the body, it contributes to balanced nutrition. In addition, resveratrol substance in the body protects the body against cancer, increases the body's resistance to viruses, the shell and nuclei accelerate the digestion without harming the stomach and the intestinal system runs regularly (Cabaroğlu and Yılmaztekin, 2010).

Grape seed prevents arteriosclerosis, reduces the risk of hypertension, heart attack and stroke, protects eye health, prevents allergy, reduces the risk of cancer, improves rheumatic diseases, tightens the skin's connective tissue and makes it elastic. Also, the grape, in addition to beauty potion, brain food and slimming effect, thanks to fructose content allows storage the body's energy spent (Cabaroğlu and Yılmaztekin, 2010). On the other hand, 2/3 of grapes produced in Turkey approximately 30% of the 2.45 million tons is edible (about 735,000 tons), 35% (about 857,500 tons) drying, 30% (about 735,000 tons) must and the product of wort and 5% is consumed as wine grapes (Akgün and Akgün, 2006; Kamiloğlu, 2014; Anonymous, 2014-b; Anonymous, 2015).

15 - 20% of the grapes are the shell, 3 - 6% of the seed and 74 - 90% of grape must and waste constitute. The size of the grape seed is between 2,38 - 4,76 mm. One grape contains 1 - 4 seeds and one tonne of grapes contain one million grains. 1/3 of the approximately 30 ft³ (about 0.85 m³) of a tonne of grapes is a shell and a seed. Grape seeds can be separated from the grain by heating them quickly and then being cooled by thermal shock (Margolis and Gallo, 2007).

The seed comprises approximately 25% of the grape waste, including the highly unsaturated, rich antioxidant binders, oleic and linoleic fatty acids. Grape seed oil with a length of 5.70 - 6.89 mm, a width of 3.74 - 4.82 mm and a thickness of 2.75 - 3.56 mm, produces approximately 90% of the unsaturated fatty acid. The chemical composition of the seed contains 28-40% by weight water, 28% cellulose, 0.8-1.2% nitrogen, 10-25% fat, 2-4% mineral structures and 4-6% other compounds. Linoleic and oleic acids in grape seed protect grape seed against oxidation and increase storage life. Grape seed contains 85-90% unsaturated fatty acids, prevents platelets that raise cholesterol, opens vessels and balances autonomic nerves. Antioxidants increase the shelf life of fat and fat-containing foods. Grape seed contains a powerful antioxidant that prevents premature aging and protects the body. These antioxidants are molecules that prevent cancer, heart diseases and chain reactions that cause premature aging by neutralizing free radicals which are oxygen-derived metabolites in the body (Baydar and Akkurt, 2001; Mironeasa et al., 2010; Çelik et al., 2014; Anonymous, 2013).

Grapes consumed in the production of must and products can be separated from waste by using different machines. Tightening and grape sorting from grape are given below in the literature. Grapes fed to the machine from the banker, broken through the lower part of their axis around the rotating rollers. The shredded grapes were compressed between the pressurized cylinders while they were conveyed forward with the help of the tapered band and the must is separated from the waste (Valentini and Grenet, 1994). Two large-pitched spiral spindles with a diameter of 240 mm, rotating at

their own axis at a speed of 700 rpm, were separated from the waste grape juice by turning the grapes inside the sieve with a diameter of 286 mm (Spinato, 1984). In the vertical direction, the machine is manufactured by using the spirals mounted on the ground and moving downwards, after breaking the grapes and separating the juice from the waste (Coffelt et al., 1971; Arthur, 1981). The grape stalks are sour and bitter taste, so they are separated from the grape grains by the machine and then squeezed by the spiral motor shaft and squeezed with agitator plates on the rotating spindle and rotating and the must is separated from the waste (Etal, 1965; Rafanelli, 1969; Dimitriou and Fed, 1993). Another machine, which was produced, was broken down with bunches of grapes and then bunches of garbage were separated. The remaining grains were heated together with the mustard in another medium at 60 °C and then mixed with the cellulose paper and the must is separated from the waste (Bosy, 1967). The grains of grapes separated from the bunch were broken down by a shaft and then separated from the waste by the help of the rotational motion including 4 shaft of the cylindrical chamber. In order to prevent clogging in the sieve holes of the cylinder, the machines are equipped with sieve spiral, grooved shaft and cylindrical brushes which can make circular motion around its axis. (Ferrari, 1939; Ferrari, 1951; Roberto and Afonso, 1994). After the chopping process, grape is produced with the cylindrical sieve chamber which is able to move circularly around its own axis and the machine which can separate the water of fruits from the waste is made by squeezing fresh vegetables–fruits (Tichy and Meissner, 1988; Coffelt, 1963; Bosh, 1999; Hunt and Hunt, 1982).

The effect of phenol and elemental compositions of white and red grape mustard cultivated in Brazil on lipid peroxidation and its effect on human health were determined separately. Red grapes (*Vitis Labrusca L. Grape*) grown in the south of Brazil have been found to have a high rate of slowing down of lipid peroxides in the area of health (Toaldo et al., 2015).

The purpose of this study, 3.6 million tons of grape production with world rankings in the first six located in Turkey, for the manufacture of vintage era grape growers to facilitate the work of the nutritional value and high in antioxidants and flavor store after separating grape must from the waste that grape seed and shell will save the economy for building machinery to determine the dimensional and chemical properties of seeded grapes grown in Southeastern Anatolia. To determine the hole diameters of the separating screens of the machine to be produced according to the size of the grape seed. This study is a preliminary study for the grape squeezer which is intended to be manufactured. When calculated based on the results obtained from studies in the literature within the red grape seed quantity consumed in the production of must and must products of Turkey approximately 44 thousand for years and the amount of the grape skin is about 110 thousand tons. Grape seed with full of vitamin, mineral and antioxidant, high nutritional value, which can be used in many food and pharmaceutical industries and grape peel with high aroma value are disposed with waste every year. In order to bring the grape seed and grape peel into the economy every year, it is foreseen to produce the grape squeezer which can separate them from the waste separately. For this purpose, the geometric and dimensional characteristics of nucleated grapes grown in southeastern Turkey researched and presented in this study. Manufacturing these machines is foreseen, as can be used in other parts of

Turkey, also the world's exports of other countries can be made. In this study, the names of the grapes in the world literature as well as the local (known among the people) names are also mentioned.

2. Materials and Methods

In the Southeastern Anatolia region, especially in Diyarbakir Ergani, Çüngüş, Çermik, Elazığ, Maden, Sivrice, Gezin, Batman, Siirt and Mardin grape varieties grown in the region, grape ripening samples were taken from each grape variety and necessary analyzes were made. Photos of grape bunches were taken. The seeds of the examined grapes were separated from the grapes. 100-300 seeds were collected from each grape variety. The thickness of these collected nuclei (Fig. 1a), their width (Fig. 1b) and lengths (Fig. 1c) was measured by the digital caliper with a precision of 1/100 as shown in (Fig. 1). The minimum and maximum values of the measured values were taken into consideration and the range of the seed sizes of the examined grapes was determined. Thus, the hole diameters of the sieves to be used in the grape squeezer machine which can be separated from the wastes by adding them to the economy can be determined.



Figure 1. Method of measuring grape seeds a) method of measuring the thickness of the seed, b) method of measuring the width of the seed, c) method of measuring the length of the seed.

Şekil 1. Üzüm çekirdeklerini ölçme yöntemi a) çekirdeğin kalınlığını ölçme yöntemi, b) çekirdeğin genişliğini ölçme yöntemi, c) çekirdeğin uzunluğunu ölçme yöntemi

3. Results and Discussion

Turkey takes first place in the ranking sixth in the world with production of 3.6 million tons of grapes. Approximately 1 million tons of this grape is produced in Southeastern. Since 30% of this grape is consumed in the production of products and must be consumed in this region every year about 240 thousand tons of grape must is consumed by squeezing grape juice. About 5% (12 thousand tons) of these grape forms grape seed. Grape seed that is produced in Southeastern Anatolia with high vitamins, minerals and antioxidant values is disposed every year with its high aroma value of skin. The most widely grown grape varieties and properties in Turkey's Southeast Anatolia are described below.

3.1. Vanki (Vagi, Ceyin) Grapes

Vanki grape, Ceyin, also called Vagi, grown in Diyarbakir Ergani region, dried in the form of dry grapes consuming in the winter months, cylindrical grain, white and red colors are available, one of which has 2-3 seeds. The length of the seed is 6.2 - 7.40 mm, width is 3.5 - 4.5 mm and its

thickness is 2.5 - 3.5 mm. Figure 2 a) shows the white vanki, b) the red vanki grape bunches and the pictures of the seeds in the c. Although Vanki grape is consumed generally dried, recently it is also consumed intensively in the production of must and must products.



Figure 2. Vanki (Ceyin, Vagi) grape, a) White vanki, b) Red (red) vanki, c) White and Red Vanki grape seed

Şekil 2. Vanki (Ceyin, Vagi) üzümü, a) Beyaz vanki, b) kırmızı (kırmızı) vanki, c) Beyaz ve Kırmızı Vanki üzüm çekirdekleri

3.2. Délçemçik or Böğül in Southeast Anatolia, İzabella in the Black Sea, Vitis Labrusca Grape in the Eastern Anatolia Region

Vitis Labrusca grape is consumed a grape variety that is black color close to purple, long seed, edible, and raisins. The grape bunch is shown in Figure 3a, the seeds are shown in Figure 3b. The seed has a length of 6,20 - 8,4 mm, a width of 2,5 - 4,8 mm, and a thickness of 2,2 - 3,5 mm.



Figure 3. Böğül grape (İzabella, Razaki, Vitis Labrusca), a) Grape, b) Seed

Şekil 3. Böğül (İzabella, Razaki, Vitis Labrusca) üzümü, a) Üzüm, b) Çekirdeği

3.3. Long Seed Black Grape

Long seed black grape, long elliptical grain, 1-2 grains of seed is edible and dried grape variety. The grape bunch is shown in Figure 4a, the seeds are shown in Figure 4b. The core has a length of 5.7 - 7.20 mm, a width of 3.3 - 4.7 mm and a thickness of 2.3 - 3.5 mm.



Figure 4. Long Grain Black grapes, a) Grapes, b) Seeds

Şekil 4. Uzun Taneli Siyah üzüm, a) Üzüm, b) Çekirdeği

3.4. Southeast Red (Alphonse Lavallée, Red Globe) Grape

Red grape, in the literature Alphonse Lavallée, also known as Red Globe, is a purplish red grape variety commonly consumed as edible and dried. Each of the grains of red grapes having a round shape has 3 - 4 cores. The grape cluster is shown in Figures 5 a, b and c and the seeds are shown in Fig. 5d. Its core length is 6.50 - 8 mm, width is 3.3 - 5 mm and thickness is between 2.9 - 3.7 mm.



Figure 5. Red (Red Globe) Grapes a, b and c) Grapes, d) Seeds

Şekil 5. Kırmızı (Red Globe) Üzümü a, b ve c) Üzüm, d) Çekirdeği

3.5. Southeast Tahhanebi Grape

Tahhanebi grape is a type of grape that can be consumed as table and dried, consumed at the earliest maturing during the year and especially consumed as edible. Yellowish colored grains are long and ellipse. Each grain contains 1-2 cores The bunch of grapes are shown in Fig. 6 a and b, the seeds are shown in Fig. 6c. The length of the core varies from 7.50 to 8.5 mm, the width is 3.5 - 5 mm and the thickness is between 2.8 - 3.7 mm.



Figure 6. Tahhanebi Grape a and b) Grapes, c) Seeds
 Şekil 6. Tahhanebi Üzümü a ve b) Üzüm, c) Çekirdeği

3.6. Mardin and Ergani Must Grape

Must grape have cultivated in Mardin and Diyarbakır Ergani region is, round and oval-shaped, yellowish color, each with 1-2 cores, maturing in September and October, in the manufacture of must and must products and also consumed as a edible of grape . Because there is a high rate of must within products, it is consumed intensely in must and must products. This grape seed which is prescribed in the production of vitamins, minerals and antioxidant stores during the squeezing will be separated from the waste with the help of the grape squeezing machine and earnable to economy. The grape bunch and grains are shown in Figure 7 a, the seeds are shown in Figure 7b. Its seed length is 5.9 - 7.4 mm, its width is 3.5 - 5.20 mm and its thickness is between 2.7 - 4.7 mm.



Figure 7. Mardin and Ergani must grape a) Grape bunch and grains, b) Grape seed
 Şekil 7. Mardin ve Ergani şıra üzümü a) Üzüm salkımı ve taneleri, b) Üzüm çekirdeği

3.7. Chardonnay (Avık Meaning Juicy Grape in Local Language) Grape

This grape, a grapevine of French origin grown in Diyarbakır Ergani region, green-yellow colored, high alcoholic (13%), edible, dried and consumed as must, has 1-3 cores in each of the oval-shaped. In this grape, there is a high rate of just like must grape. Therefore, it is a kind of grape which has the potential to be consumed intensely in the production of must and must products. This grape can also be squeezed like a must grape and must, waste and seeds can be separated. In addition, consumption as edible is quite intense. This grape bunch is shown in Figure 8 a, while the seeds are

shown in Figure 8b. The seed has a length of 5.0 - 6.2 mm, a width of 3.5 - 4.4 mm and a thickness of 2.0 - 3.4 mm.



Figure 8. Diyarbakır Ergani Chardonnay (Avık) Grape a) Grape, b) Seed

Şekil 8. Diyarbakır Ergani Chardonnay (Avık) Üzümü a) Üzüm, b) Çekirdeği

3.8. Diyarbakır Ergani Damascus Grape

Damascus grape, grown in Diyarbakır Ergani region, is grape varieties, which have long and elliptical shaped grains, which are consumed as edible and dried, with 2-4 seeds in each one. Grapes, ripening in the second season after the ripening of Tahannebi grape, mostly consumed as an edible and dried grape. Dried grapes are high quality and most consumed grapes. The grape bunch is shown in Figure 9 a and the seeds are shown in Figure 9b. The length of the seed is 5,20 - 8,0 mm, the width is 3,7 - 5,0 mm and the thickness is between 2,7 - 3,7 mm.



Figure 9. Diyarbakır Ergani Damascus Grapes a) Grapes, b) Seeds

Şekil 9. Diyarbakır Ergani Şam) Üzümü a) Üzüm, b) Çekirdeği

3.9. Elazığ and Diyarbakır Bullseye Black Grape

Another name of the Bullseye grape cultivated in Elazığ (also Maden) and Diyarbakır (especially Ergani and Çermik, Çüngüş) regions is Boğazkere. Bullseye, despite the most massive known as the grapes grown in Turkey is not the bigness of the name is because dark colored grapes

such as bullseye. It is round and dark colored, structured, permanent, red fruity, full and light-grained suitable for aging. Recently, it has started to be cultivated around Denizli in the Aegean region and it is commonly cultivated together with Boğazkere in Cal and Güney counties. Bullseye, gray, hazy-colored, grains of coarse and elliptical form of the shell thickness of the middle, sweet flavored, clusters are conical and irid. Although the total acid of the wine is high, the alcohol is low. It is a kind of grape which gives high quality and unique flavored wine. The grape cluster is shown in Figure 10 a and the seeds are shown in Figure 10b. The seed has a length of 6.5 - 7.8 mm, a width of 4.0 - 5.0 mm and a thickness of 3.0 - 3.8 mm.



Figure 10. Bullseye Black Grape a) Grape, b) Seed

Şekil 10. Öküzgözü siyah Üzüm a) Üzüm, b) Çekirdeği

3.10. Diyarbakır Ergani Black Grape

Black grapes grown in Diyarbakır Ergani region are grape varieties with 2 and 4 grains, each of which has round and oval shaped grains, consumed as edible and dried. The grape cluster is shown in Figure 11 a and its seeds in Figure 11b. The seeds of this species are 6.0 - 7.5 mm in length, 3.5 - 5.0 mm in width, and 2.5 - 3.5 mm in thickness.



Figure 11. Diyarbakır Ergani black Grapes a) Grapes, b) Seeds

Şekil 11. Diyarbakır Ergani siyah Üzümü a) Üzüm, b) Çekirdeği

3.11. Mevlana Grape

Mevlana grape is a mid-season grapevine. Fruit grain is white, coarse, long, and sweet. Each core contains 1-2 cores. Because the grain form is long, it is also called *hatun parmağı*. It is a grape variety consumed as edible and dried. The grape bunch is shown in Figure 12a and its seeds in Figure 12b. The seeds of this species are 5.5 - 7.1 mm in length, 3.5 - 4.6 mm in width, and 2.3 - 3.1 mm in thickness.



Figure 12. Mevlana white grapes a) Grapes, b) Seeds

Şekil 12. Mevlana beyaz üzüm a) Üzüm, b) Çekirdeği

3.12. Wine (Black Color) Grape

Black wine grape, wine-made from its must, is a kind of oval and round grains grape which is especially grown in Mardin and Diyarbakır region. In addition, grape molasses is also produced intensively from its must. This grape also matures in the same period (September-October period) with must grape. In the Southeastern Anatolia region, usually with must grape is evaluated by squeezing. The grape bunch is shown in Figure 13 a, the seeds are shown in Figure 13b. The seed has a length of 6 - 8 mm, a width of 3.3 - 5.5 mm and a thickness of 2.7 - 3.6 mm.



Figure 13. Grapes of black wine a) Grapes, b) Seeds

Şekil 13. Siyah şarap üzümü a) Üzüm, b) Çekirdeği

Çizelge 1. Üzüm çeşitleri ve çekirdek boyutları

Table 1. Grape varieties and seed sizes

Grape Name	Grape Seed Length	Grape Seed Width	Grape Seed Thickness
<i>Vanki (Vagi)</i>	6.2 – 7.40 mm	3.5 – 4.5 mm	2.5 – 3.5 mm
<i>Böğül (izabella Vitis Labrusca.)</i>	6.2 – 8.4 mm	2.5 – 4.8 mm	2.2 – 3.5 mm
<i>Long Seed Black Grape</i>	5.7 -7.2 mm	3.3 – 4.7 mm	2.3 3.5 mm
<i>Alphonse (Red, Redglobe)</i>	6.5 – 8 mm	3.3 – 5 mm	2.9 – 3.7 mm
<i>Tahhanebi</i>	7,5 – 8,5 mm	3.5 – 5 mm	2.8 – 3.7 mm
<i>Must Grape</i>	5.9 – 7.4 mm	3.5 – 5.2 mm	2.7 – 4.7 mm
<i>Chardonnay (Avık)</i>	5 – 6.2 mm	3.5 – 4.4 mm	2 – 3.4 mm
<i>Damascus Grape</i>	5.2 – 8 mm	3,7 – 5 mm	2.7 – 3.7 mm
<i>Bulleye (Black Grape)</i>	6.5 – 7.8 mm	4 – 5 mm	3 – 3.8 mm
<i>Ergani Black Grape</i>	6 – 7.5 mm	3.5 – 5 mm	2.5 – 3.5 mm
<i>Mevlana Grape</i>	5,5 – 7,1 mm	3.5 – 4.6 mm	2.3 – 3.1 mm
<i>Wine Grape (Black)</i>	6 – 8 mm	3,3 -5,5 mm	2,7 – 3,6 mm

Table 1 shows the smallest and largest values of the seed sizes of some grapes cultivated in Southeastern Anatolia. The hole diameters of the separating sieves of the grape squeezer machine, which is foreseen in the future, can be designed and manufactured according to these dimensions.

4. Results

Grape seed has a significant impact on prevention of many diseases such as hardening of the arteries, hypertension, heart, paralysis, eye health, allergy, cancer. In our country, approximately 44000 tons of grape seeds rich in minerals, vitamins, energy, and antioxidants are disposed of with waste every year. In literature studies conducted on the grape, it was found that grape seed sizes were in the range of 5.70 - 6.89 mm, 3.74 - 4.82 mm, and 2.75 - 3.56 mm, for length, width, and thickness, respectively. In this study, the seed dimensions of some grapes cultivated in Southeastern Anatolia were measured and the length was determined as: 5 - 8.5 mm, width: 2.5 - 5.5 mm and thickness: 2 - 4.7 mm. These values were in a wider range than the literature values. Thus, the grape squeezer to be manufactured according to these dimensions can be used for squeezing the grapes examined in the literature and the seeds can be separated from the waste.

The smallest and largest seed size of edible, dry-grape and must grapes grown in Southeastern Anatolia were examined. Thus, the smallest and largest values of the seed dimensions were determined. The grape squeezer, which is manufactured according to these seed sizes, can be used in the squeezing of grapes grown in different regions.

The diameter of the sieve holes separating the waste (grape seed and shell) of the grape squeezer which is determined according to the dimensions determined in this study (equal to and greater than 8.5 mm) ≥ 8.5 mm, the diameter of the holes separating the seed from the shells in the waste (small and equal to this value 2 mm) should be ≤ 2 mm.

With production is projected grape squeezing machine, existing must grapes grown in the Southeastern Anatolia region with mainly approximately 14,000 tons of annual grape seed, in Turkey about 44000 tons grape seed can be contributed to the economy.

5. References

- Akgün, N. Akgün, M. (2006). Extraction of grape seed by supercritical carbon dioxide. *Journal of Engineering and Natural Sciences*, 4: 49-58.
- Anonymous, (2013). [http : // adlibilimler . ankara . edu.tr / files / 2013 / 08 / Grape-Seed - Article. pdf](http://adlibilimler.ankara.edu.tr/files/2013/08/Grape-Seed-Article.pdf).
Access date: 01.12.2018.
- Anonymous, (2015). [http : // arastirma . tarim . gov . tr / manisabagcilik / Belgeler / genelbagcilik / SOFRALIK % 20UZUM%20SEKTORU%20HULYA%20UYUSAL. pdf](http://arastirma.tarim.gov.tr/manisabagcilik/Belgeler/genelbagcilik/SOFRALIK%20UZUM%20SEKTORU%20HULYA%20UYUSAL.pdf). Access date: 01.12.2018.
- Anonymous-a, (2014). [http : // www. zmo. org.tr / resimler / ekler / c151c2a9b76f9ef ek. pdf?tipi=14 & sube](http://www.zmo.org.tr/resimler/ekler/c151c2a9b76f9efek.pdf?tipi=14&sube). Access date: 01.12.2018.
- Anonymous-b, (2014). [https : // www . google . com . tr / url?sa=t&rct= j&q= &esrc= s&source=web&cd=&cad=rja&uact=8&ved=0ahUKEwjvmqrutdjRAhWC1iwKHcbQCdUQFggZMAA&url=http%3A%2F%2Fkoop.gtb.gov.tr%2Fdata%2F5342b6ce487c8ea5e4b4d9c1%2F2013%2520Kuru%2520%25C3%259Cz%25C3%25BCm%2520Raporu.pdf&usg=AFQjCNFmp1VU2jXDBL1c5c913SMqaGxLDA&sig2=R9_kj_kmAvbPoQHBjxCntQ&bvm=bv.144686652,d.bGs](https://www.google.com.tr/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=0ahUKEwjvmqrutdjRAhWC1iwKHcbQCdUQFggZMAA&url=http%3A%2F%2Fkoop.gtb.gov.tr%2Fdata%2F5342b6ce487c8ea5e4b4d9c1%2F2013%2520Kuru%2520%25C3%259Cz%25C3%25BCm%2520Raporu.pdf&usg=AFQjCNFmp1VU2jXDBL1c5c913SMqaGxLDA&sig2=R9_kj_kmAvbPoQHBjxCntQ&bvm=bv.144686652,d.bGs). Access date: 01.12.2018.
- Arthur, J.H. (1981). Screw press with positive feed and accessible screens, *US Patent* 4.279.197.
- Baydar, N. G. Akkurt, M. (2001). Oil content and oil quality properties of some grape seeds. *Turkish Journal of Agriculture and Forestry*, 25: 163 – 168.
- Bosch, B., (1999). Process for making juice and juice press, especially wine or fruit press, *US Patent* 5.927.187
- Bosy, G. (1967). Treatment of grape juice, *US Patent* 3.301.684
- Cabaroğlu, T. Yılmaztekin, M. (2010). Üzüm bileşimi ve insan sağlığı üzerine etkileri. *Buldan Sempozyumu 15-17 Nisan 2010 Tekirdağ*, 999-1004.
- Coffelt, R. J. Giannini, G.R. Calif, D. (1971). Machine for separating juice from crushed grapes, *US Patent* 3.568.844.
- Coffelt, R. J. (1963). Continuous fruit press, *US Patent* 3.106.152.
- Dimitriou, M., Fed, B. (1993). Berry stripping machine for grapes, *US Patent* 5.226.35.
- Etal, O. A. (1965). Separator for grain and the like, *US Patent* 3.217.561.

- Ferrari, A. (1939). Juice extraction machine, *US Patent* 2.172.790.
- Ferrari, A. (1951). Grape crusher and stemmer, *US Patent* 2.543.571.
- Hunt, A. J., Hunt, A. J. Jr. (1982) Method of extraction of juice from fruit, *US Patent* 4.323.007.
- Kamiloğlu, Ö. (2014). Bazı erkenci sofralık üzüm çeşitlerinde tane kalite özellikleri. *Tarım Bilimleri Araştırma Dergisi*, 7 (1): 58-63.
- Margolis, G. Gallo, E. J. (2007). Method and apparatus for removal of grape seeds from grape skin, *US Patent* 0104842 A1.
- Mironeasa, S. Leahu, A. Codina, G. G. Stroe, S. G. Mironeasa, C. (2010). Grape seed: Physico-chemical, structural characteristics and oil content. *Journal of Agro alimentary Processes and Technologies*, 16 (1): 1-6.
- Rafanelli, A. C. (1969). Juice extraction machine, *US Patent* 3.478.796.
- Roberto, T., Afonso, G. (1994). Machine for separating the seeds of grapes and similar fruits from the skin. *European Patent Specification, Publication Number: 0 522 238 B1*.
- Şenuyar, C. Demirbaş, N. Saygın, Ö. (2014). Türk şarap sektörünün mevcut durumu ve sektörün gelişimini sınırlayan faktörlerin değerlendirilmesi. *U.Ü. Ziraat Fakültesi dergisi*, 28(2): 1-12.
- Silva, F. C. (1943). Grape stemmer. *US Patent* 2.318.805.
- Spinato, C. (1984). Grape crusher, *US Patent* 4.457.223.
- Tichy, O. J., Meissner, K. E. (1988). Press for extracting juice from comestible solids and semi-solids such as fruits and vegetables, *US Patent* 4.788.910.
- Toaldo, I. M., Cruz, F. A., Alves, T. L., Gois, J. S., Borges, D. L. G., Cunha, H. P., Silva, E. L., Luiz, M. T. B. (2015). Bioactive potential of *Vitis Labrusca* L. grape juices from Southern region of Brazil: Phenolic and elemental composition and effect on lipid peroxidation in healthy subjects, *Food Chemistry*, 173: 527 - 535.
- Valentini, V. Grenet, F. (1994). Machine for the extraction of juice from grapes, *US Patent* 5.365.838.