

## Original Paper

# Production and Characteristics of a Turkish Traditional Food in Another Country (Jonkoping-Sweden): Molasses

Lale S. Akan<sup>1\*</sup> & Yahya Özdoğan<sup>1</sup>

<sup>1</sup> Department of Nutrition and Dietetics, Ankara Yildirim Beyazıt University, Ankara, Turkey

\* Lale Sariye Akan, Faculty of Health Sciences, Department of Nutrition and Dietetics, Ankara Yildirim Beyazıt University, 06450, Ankara, Turkey

Received: September 15, 2018 Accepted: September 28, 2018 Online Published: October 4, 2018

doi:10.22158/fsns.v2n2p33

URL: <http://dx.doi.org/10.22158/fsns.v2n2p33>

### Abstract

*Pekmez, which has been produced for a long time in Turkey, is one of the popular and traditional Turkish foods (Tosun & Üstün, 2003; Celik & Surucuoglu, 2005). Although it is not very common, it is being tried in houses and production places in some countries where Turks live. Pekmez is produced primarily from grapes (Alpaslan & Hayta, 2002; Siric ioglu & Celik, 2005; Batu et al., 2007). Grapes suitable for fruit juice yield, sugar content, acid value and ripening time are suitable for molasses production. Turkey, approximately 4185.126 tons of grapes are produced per year (TUIK, 2012), and approximately 30% of the grapes produced in Turkey are used for pekmez, wort and sausage with pekmez production in a year. In this study, some information is given on Molasses (produced in another country), production stages, effects on health and the relevant regulations and in terms of product chemical and microbiological characteristics.*

### Keywords

*molasses, traditional food, Kulu, Jonkoping, Sweden*

## 1. Introduction

Our country has suitable climatic and soil conditions due to its viniculture in terms of its geographical position on the world. Almost all regions have Anatolian lacquerware, and the date of the lacquering of this region extends to 3000 BC (Şimşek, 2000; Didin et al., 2000; Çelik & Sürücüoğlu, 2005). Anatolia, which is the motherland of grape, has been famous for its rich grape varieties since ancient times and almost everywhere in the country is suitable for viniculture (Çelik & Sürücüoğlu, 2005). In the past years molasses, which is one of the basic nutrients of human beings, has become less productive in the changing world conditions. In our country molasses is made between at the end of September and the

beginning of October when the grapes are mature and this time is called molasses time. Pekmez is a concentrated and extended shelf-life form of several fruit juices, and it is formed by boiling without the addition of sugar or other food additives (Yoğurtçu & Kamışlı, 2006; Celik & Surucuoğlu, 2005; Ekin & Celikezen, 2015).

Jonkoping, Sweden's 10th largest city, is very similar to our country in terms of eating habits. The city that is established in the 13th century, is centrally located on the coast of Vattern in south of Sweden. Sweden has many immigrants from Turkey, especially from Kulu. Since 1965 it has been migrating. The total population of Kulu, which is a district of Konya province, is over 70.000 and this number is doubled in summer with the majority population coming from Sweden. Kulu families have adopted Swedish culture as well as introducing their diets and traditional foods to the Swedes. Molasses consumption is very high, especially in athletes whose has high energy consumption, so it has started to be produced at many home. This production is done only to meet their own consumption. Kulu people coming to Turkey for the summer period, for the grape harvest in early October period, take grapes with themselves which are requested to take along Sweden. Since Swedish families have already made wine, vinegar, etc. from grapes, they have quickly adopted this idea together with its taste and energy value. (Erişim tarihi: September 12, 2018, <https://www.ju.se/en>). Pekmez is a good energy and carbohydrate source due to its high sugar content (up to 50%-80%) in the form of glucose and fructose; therefore, it easily passes into the blood without digestion (Karababa & Isikli, 2005; Akbulut et al., 2008; Karaca, 2009; Ekin & Celikezen, 2015). According to the Turkish Standards Institute (TS 3792), grape molasses are defined as a product that is produced by the addition of dark-matter substances obtained by vacuum or lightening according to the method of the present invention, without reducing the acidity of fresh or raisin syrup, or by reducing the acidity with calcium carbonate (Tetik et al., 2010; Turkben et al., 2010). Table 1 shows the chemical and microbiological properties of grape molasses according to TS3792 (TSE, 1989).

**Table 1. Chemical and Microbiological Properties of Grape Molasses**

Chemical properties	Limits
1. Water soluble solids minimum %	65
2. Sucrose	0
3. Total ash max %	2.0
4. The max % of ash that is not soluble in % 10 HCl solution	0.3
5. Artificial colours	0
6. Preservative	0
7. Max Arsenic (mg/kg)	0.2
8. Max Copper (mg/kg)	5.0
9. Max Zinc (mg/kg)	5.0

10. Max Iron (mg/kg)	15.0
11. Max Tin (mg/kg)	150.0
12. Max Lead (mg/kg)	0.3
13. Max sum of Copper, Iron and Zinc (mg/kg)	20.0
Microbiological properties	
1. Max number of mesophilic aerobic bacteria (Ad / g)	$10^4$
2. The number of yeast and mold (Ad / g)	$10^3$
3. The number of osmophilic yeast (Ad / g)	$10^2$

## 2. Production of Molasses, Regulations and Analysis Methods

In the production of traditional molasses, the grapes are filled with nuts and the slaves are removed by chewing with the feet in boats made of wood or concrete. For deacidification, excess lime, white or neaby white molasses soil are used (Guldas et al., 2004; Toker & Hayoğlu, 2004; Tetik et al., 2010; Koca, 2014; Ekin & Çelikezen, 2015). The grape syrup is boiled on a strongly burning stove to provide easy and quick effect of the soil to the syrup, to prevent the action of the yeasts and to speed up the clarification; this is called the curdling of a grape syrup. After the curdling, the syrup is left to rest, after resting the clear part is separated from the sediment and clear syrup is obtained. The syrup is darkened on the open flame in boilers. In the case of increased acidity in the open boiler method, it is stated that the reducing sugars in the medium during the concentration process are decomposed by HMF to formic acid and levulinic acid when the pH level is lowered (İzgi, 2011).

At the beginning of the molasses cooking process, foams are formed on the surface of the must, called skimmed fat, and they must be taken from the medium with the flat cheeks in order to provide a clear molasses appearance. The syrup which have been cleaned from their skimmed fat are left to boil in their own form for a while to darken. Even if there is a sudden foaming on the syrup surface during this time, it is only a temporary foaming which does not boil and is not in the form of skimmed fat. However, in order to avoid caramelization in this excess molasses, it is necessary to constantly mix it (Vardin, H. & Vardin, B. C., 2004; Batu, 2005; Koca, 2014).

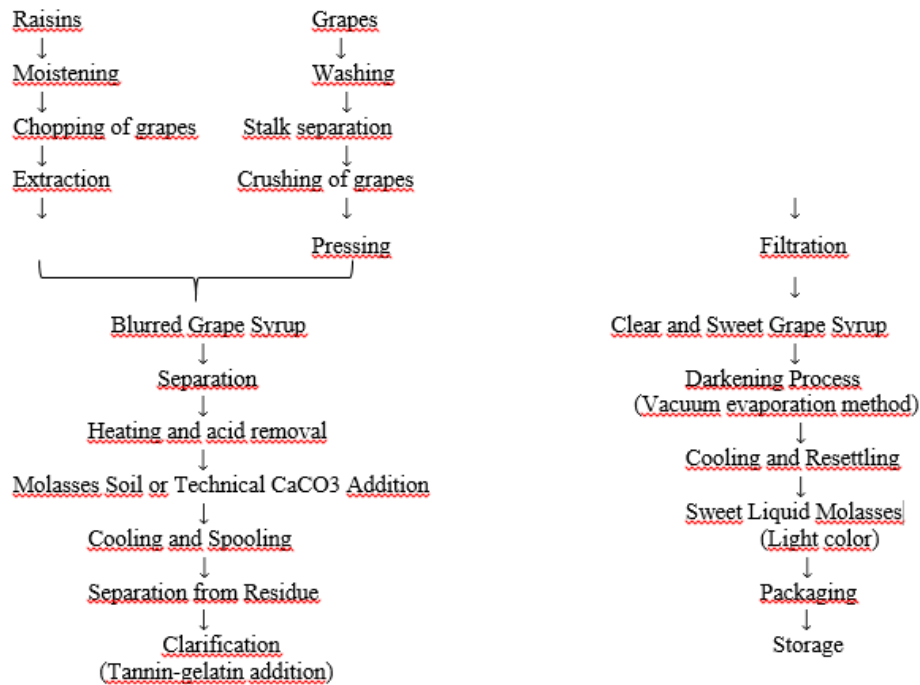
In the modern method, the raisins are first moistened and passed through the mincing machine. The minced raisins are extracted according to the principle of reverse flow. In grapes obtained from fresh grapes, the grapes that have been cleaned are separated from their stems by being passed through the stalk separating machine, pounded, and crushed by passing through the grape crushing mill. In order to obtain syrup, the grapes are passed through a separator to separate prestine and coarse materials. After the seperation process, molasses soil or calcium carbonate ( $\text{CaCO}_3$ ) is added for acidity. The grape syrup is heated to  $70^\circ\text{C}$  to provide easy and quick effect of the soil to the syrup, to prevent the activity of the yeast and to speed up the clarification. Clarification is carried out so that the grape syrup can be clarified and the bitter flavors can be removed. The sieving process can be carried out by applying heat, by tannin-gelatin application or enzymatically. After clarification, the syrup is concentrated by vacuum and

the desired dry matter value is reached (Aydınlık, 2012; Koca, 2014).

Acid removal and clarification of fresh grapes after pressed and raisins after extraction become cloudy. Grape juice blurring is caused by organic molecules that give rise to a viscous structure in the product with the crust particles, the fiber, the cell and the cell fragments in various dimensions of the fruit juice, and these suspension particles give stability to the particles (Şengül et al., 2007; Koca, 2014). The organic molecules in the colloidal dimensions that are responsible for the formation of a stable suspension of turbidimetric particles are: pectic substances, polyphenols, proteins, starch and arabindIn these, the pectic substances have a separate prescription due to their protective colloid properties. For this reason, for a successful cleaning process, it is first necessary to break down the pectic substances to galacturonic acids, which are building blocks with pectolytic enzymes (Kayışhoğlu, 2001; Batu, 2005; Karaca, 2009; Aydınlık, 2012; Koca, 2014).

The obtained juice contains various turbidity materials which cause a large majority to form tartaric acid and cause the syrup to have a blurred appearance as well as the free acidity which leads to the pH being between 3-4. For this reason, the free acidity of the syrup should be neutralized to the 6-6.5 pH level, so that the syrup can be produced at the desired sweetness level. In the meantime, it is still possible to obtain a clear view of the molasses by removing the various turbidity materials contained in the syrup. In order to accomplish this, a suitable practice is to use a high (over 80%) soil of calcium carbonate content called molasses soil (Batu & Aktan, 1993; Batu et al., 2007; Tetik et al 2010; Ekin and Çelikezen 2015). This process takes place by adding the soil to the syrup and heating it for 5-10 minutes to neutralize the free acidity in the environment with  $\text{CaCO}_3$  contained in the soil. Thus, the precipitate can be easily separated as a result of the reduction of the colloid substances causing the turbidity in the medium, the loss of the isoelectric point due to the change of the pH level of the medium and the calcination of Ca ions in the medium as calcium tartrate (Zengin, 2006; Turhan et al., 2007; Akaydın, 2009; Koca, 2014; Ekin & Çelikezen, 2015).

### *2.1 Grape Molasses Production Flow Chart*



**Figure 1. Stages of Molasses Production**

As a physical analysis, homemade liquid-solid and fabricated liquid-solid molasses samples were examined for the presence of foreign substances in the molasses. Fabrikasyon pekmez Türkiye’den Satın alınmış olup hazır katı ve hazır sıvı pekmezdir. Sensory analyzes of the molasses samples were evaluated for appearance, texture, taste and smell. For microbiological analysis, 10 grams of molasses samples were weighed, 90 ml of sterile physiological saline (0.85% NaCl solution) was added to them, and the mixture was homogenized for 1 minute and then a dilution series was prepared up to  $10^{-5}$ .

As a microbiological analysis, the total number of mesophilic aerobic microorganisms of molasses samples was measured at 35 °C for 48 hours in Plate Count Agar (PCA-Merck), mold-yeast number at 25°C in Potato Dextrose Agar (PDA-Merck) 5 days, Staphylococcus aureus in Baird Parker Agar (BPABiomerieux) at 37 °C for 24 hours and the number of Escherichia coli was determined by incubating for 48 hours at 44 °C in Coli ID (Biomerieux). Determination of microorganism numbers; the most probable number method was used for the coliform group and the bulk sowing method was used for the others.

### 3. Results

#### 3.1 Product Features

The sensory analysis results of the product characteristics of the molasses samples studied are as follows: The samples are suitable for appearance and have no burning odor or foreign matter. Its appearance is unique and homogeneous, without sediment and sugar. Solid molasses is not fluid and looks bright. Microbiological analysis results of four molasses samples are given in Table 2.

**Table 2. Microbiological Analysis Results of Molasses Samples (cfu / g).**

Company		Total count of				
		mesophilic aerobic bacteria	Yeast-mold	Coliform (MPN)	E.coli	S.aureus
A	Liquid-Homemade	$6.7 \times 10^2$	$1.5 \times 10^5$	3	Unidentified	<10
	Solid-Homemade	$4.8 \times 10^3$	$1.2 \times 10^3$	<2	Unidentified	$1.9 \times 10^1$
B	Liquid-fabrication	$6.5 \times 10^2$	$1.4 \times 10^3$	9	Unidentified	$2.1 \times 10^1$
	Solid-fabrication	$1.3 \times 10^2$	$1.5 \times 10^4$	9	Unidentified	$4.0 \times 10^1$

The total number of mesophilic aerobic microorganisms generally provides information on food quality, not only the safety of food, but also the quality of food, shelf life and post-heat transmission (Colak et al., 2007). The total number of mesophilic aerobic microorganisms in molasses samples ranged from  $8.0 \times 10^1$ - $6.9 \times 10^4$  cfu / g and the number of yeast and mold was  $1.0 \times 10^2$ - $1.4 \times 10^5$  cfu / g.

The presence of coliform group bacteria in foods is considered a sign of poor sanitation conditions, inadequate or incorrect pasteurization practices, re-infection after cooking and pasteurisation (Colak et al., 2007). Since all of the coliform group bacteria are not of fecal origin, E.coli has been sought as a marker of fecal contamination. E. coli can not be detected in this study.

The presence of *Staphylococcus aureus* in foods is considered a sign of personnel hygiene (Colak et al., 2007). The number of *S. aureus* in the molasses samples was <10- $5.0 \times 10^1$  cfu / g. As a result, the samples included in the study are scarce to give a general conclusion. However, it is a fact that the molasses has some disadvantages in terms of microbiological properties if it does not cause any problems in terms of sensory properties. Problems can be solved if hygiene and sanitation rules are obeyed in production and marketing and the regulations are taken into consideration. Adversities are not encountered in large businesses that fit into hygiene rules and are named for packaging. Grape production which occupies the most important place in every period of Turkish history, grape molasses which is made with grapes, and many other products are required to be made in conformity with the standards and quality. Many companies have been selling molasses through the internet, but there is not enough information about their content and product quality.

## References

- Akaydn, M. (2009). *Ticari Olarak Üretilen Bazı Sıvı ve Katı Üzüm Pekmezlerinin Özelliklerinin Belirlenmesi*. Yüksek Lisans Tezi, Gaziosmanpaşa Üniversitesi Fen Bilimleri Enstitüsü, Tokat.
- Akbulut, M., Çoklar, H., & Özen, G. (2008). Rheological characteristics of *Juniperus drupacea* fruit juice (pekmez) concentrated by boiling. *Food Science and Technology International*, 14(4), 321-328. <https://doi.org/10.1177/1082013208097193>

- Aydınlık, Z. (2012). *Niğde İlinde Üretilen Üzüm Pekmezi Örneklerinin Fenolik Madde İçeriğinin Belirlenmesi*. Yüksek Lisans Tezi, Niğde Üniversitesi Fen Bilimleri Enstitüsü, Niğde.
- Batu, A. (2005). Production of liquid and white solid pekmez in Turkey. *Journal of Food Quality*, 28(5-6), 417-427. <https://doi.org/10.1111/j.1745-4557.2005.00045.x>
- Batu, A., & Aktan, N. (1993). Üzüm Pekmezlerinde Asit ve pH Değerleri Üzerinde Bir Araştırma. *Gıda ve Yem Dergisi*, 4, 38-43.
- Batu, A., Karagöz, D. D., Kaya, C., & Yıldız, M. (2007). Dut ve Harnup Pekmezlerinin Depolanması Süresince Bazı Kalite Değerlerinde Oluşan Değişmeler. *Gıda Teknolojileri Elektronik Dergisi*, 2, 7-16.
- Didin, M., Kızılaslan, A., & Fenercioglu, H. (2000). Suitability of some cornelian cherry cultivars for fruit juice. *Gıda*, 25(6), 435-441.
- Gökçe, K., & Çizmeci, M. (1965). *Pekmez*. Tarım Bakanlığı Ziraat İşleri Genel Müdürlüğü Yayınları, Ankara.
- Guldas, M., Gucbilmez, M., & Dokuzlu, C. (2004). HACCP model application in the production of canned grapefruit segment. *Food Technology (Turkey)*.
- İbrahim, E. (2015). *Bitlis İlinde Geleneksel Olarak Üretilen Gezo Pekmezinin Bazı Kimyasal Özelliklerinin İncelenmesi* (Master's thesis). Bitlis Eren University, Bitlis, Turkey.
- İzgi, N. (2011). *Ev Yapımı Andız Pekmezinin Bileşimi, Reolojik Özellikleri, Antioksidan ve Antimikrobiyal Aktivitelerinin Belirlenmesi*. Yüksek Lisans Tezi, Namık Kemal Üniversitesi Fen Bilimleri Enstitüsü, Tekirdağ.
- Jönköping University (JU)*. (n.d.). Retrieved September 12, 2018, from <https://www.ju.se/en>
- Karababa, E., & Develi Isikli, N. (2005). Pekmez: A traditional concentrated fruit product. *Food Reviews International*, 21(4), 357-366. <https://doi.org/10.1080/87559120500222714>
- Karaca, İ. (2009). *Pekmez Örneklerinde Vitamin ve Mineral Tayini*. Yüksek Lisans Tezi, İnönü Üniversitesi Sağlık Bilimleri Enstitüsü, Malatya.
- Kayısoğlu, S. (2001). *Tekirdağ İlinde Farklı Yöntemler ile Üretilen Üzüm Pekmezlerinin Bazı Özellikleri Üzerine Depolamanın Etkisinin Saptanması Üzerine Bir Araştırma*. Doktora Tezi, Trakya Üniversitesi Fen Bilimleri Enstitüsü, Tekirdağ.
- Koca, İ. (2014). Pekmezden üretilen çerezlerin bazı fiziksel ve kimyasal özellikleri. *Gıda Teknolojileri Elektronik Dergisi*, 9(1), 36-39.
- Koch, J., & Klesaat, R., (1960). *Zeitschrift Für Lebensmitteluntersuhung Und Troschung 130 Band Heft 5abgeschlossen*, 2, 45.
- Sengül, M., Fatih Ertugay, M., Sengül, M., & Yüksel, Y. (2007). Rheological characteristics of carob pekmez. *International Journal of Food Properties*, 10(1), 39-46. <https://doi.org/10.1080/10942910600627996>
- Şimşek, A., (2000). *Farklı Hammaddelerden Üretilen Pekmezlerin Bileşimi Üzerine Araştırma*. Yüksek Lisans Tezi, Ankara Üniversitesi, Fen Bilimleri Enstitüsü Ankara.

- Tetik, N., Turhan, İ., Karhan, M., & Öziyici, H. R. (2010). Keçiboynuzu Pekmezinin Karakteristiği ve 5-Hidroksimetilfurfural İçeriği (İngilizce). *Gıda Dergisi*, 35(6).
- Toker, A., & Hayoğlu, İ. (2004). Şanlıurfa Yöresi Gün Pekmezlerinin Üretim Tekniği ve Bazı Fiziksel Kimyasal Özellikleri. Harran Üniversitesi. *Ziraat Fakültesi Dergisi*, 8(2), 67-73.
- TUIK. (2012). *Türk 2012 yılı istatistik raporu*. Meyveler, içecek ve baharat bitkilerin üretim miktarları (Seçilmiş ürünlerde). Retrieved from <http://www.tuik.gov.tr/>
- Turhan, İ., Tetik, N., & Karhan, M. (2007). Keçiboynuzu Pekmezinin Bileşimi ve Üretim Aşamaları. *Gıda Teknolojileri Elektronik Dergisi*, 2, 39-44. 37.
- Türkben, C., Uylaşer, V., & İncedayı, B. (2010). Influence of traditional processing on some compounds of rose hip (*Rosa canina* L.) fruits collected from habitat in Bursa, Turkey. *Asian Journal of Chemistry*, 22(3), 2309-2318.
- Vardin, H., & Vardin, B. C. (2004). *Kuru Üzümden Doğal Pekmez Üretimi*. Geleneksel Gıdalar Sempozyumu, Van.
- Yoğurtçu, H., & Kamışlı, F. (2006). Determination of rheological properties of some pekmez samples in Turkey. *Journal of Food Engineering*, 77(4), 1064-1068. <https://doi.org/10.1016/j.jfoodeng.2005.08.036>
- Zengin, S. (2006). *Kahramanmaraş Gün Pekmezlerinin Bazı Fiziksel, Kimyasal, Organoleptik ve Mikrobiyolojik Özellikleri* (pp. 6-7). Yüksek Lisans Tezi, Sütçü İmam Üniversitesi Fen Bilimleri Enstitüsü, Kahramanmaraş. Kahramanmaraş Sütçü İmam Üniversitesi Fen Bilimleri Enstitüsü