
PEKMEZ (MOLASSES): A TRADITIONAL FOOD IN TURKEY

Abdullah Badem

Dr., Selcuk University, Veterinary Faculty, Department of Food Hygiene and Technology, Campus of Alaaddin
Keykubat, TR-42075 Selçuklu/Konya – TURKEY

ABSTRACT

Pekmezs (molasses) are produced traditional or fabrication of different flavor, structure and appearance in Turkey. Pekmez composition and structure vary according to fruit and production process. Pekmezs are classified two main groups as liquid and solid pekmez. There are also different classifications. Pekmezs are especially rich in carbohydrates and minerals, also pekmezs contain vitamins, antioxidants and flavonoids. Pekmez is an energy store and food source. It is also consumed for protective or therapeutic purposes due to its contribution to human health. Pekmezs can affect positively many diseases such as diabetes, diarrhea, liver, kidney, stomach, intestine, lung, mouth and throat diseases, flu, cough, asthma, bronchitis, jaundice, measles, reflux, vascular occlusion, angina, cholesterol and anemia. In this review, information was given about the effects of pekmez produced in Turkey on the production, composition and human health.

Keywords: Pekmez (molasses) production, compounds of pekmezs, effect of pekmez on human health, grape, mulberry, carob, samphire, hawthorn

INTRODUCTION

Several types of pekmez (molasses) are produced from kind of fruits at different taste, texture and appearance by different methods in many parts of Turkey. Pekmez's description is given as "Grape, mulberry and fig molasses are prepared by vacuuming or no vacuuming after intensification in accordance with their technique, after filtering-clarifying with tannin gelatin or suitable enzymes, without reducing the acidity of fresh or raisin, mulberry and fig extracts or by reducing its acidity with calcium carbonate or sodium carbonate is a viscous liquid food material produced by mixing with the addition of substances such as honey, cobbler, milk, milk powder, egg white." by The Turkish Standards Institute (TSI, 1989, 1996, 1997).

Pekmez is produced as a traditional product in Turkey for many years. Pekmez is produced a lot of kind of fruits which is contains high sugar as grape, apple, carob, plum, watermelon, apricot, fig, sugar beet, hawthorn, mulberry, corn, sugar cane, pumpkin and samphire (Üstün and Tosun, 1997, Şimşek and Artık, 2002, Özdemir et al., 2004, Karababa and Işıklı, 2005, Sengül et al., 2007).

In this review, it is aimed to give information about the production of pekmezs which are widely produced in Turkey, the composition of pekmezs and the effects on human health.

CLASSIFICATION OF PEKMEZS

Pekmez compound varies from fruit to fruit but its main composition substance is carbohydrates (Şimşek and Artık, 2002). Grape pekmez is the most produced pekmez in Turkey, followed by mulberry pekmez (TMFAL, 2016). Kırşehir, Zile, Kastamonu, Sivrihisar, Balıkesir, Afyon, Karamanmaraş, Gaziantep and Hatay are popular places in Turkey with production of pekmez. Produced pekmezs in this places are called-named with regional names. For example; pekmez of zile in Zile, pekmez of ağda in Gaziantep, pekmez of çalma in Kırşehir, pekmez of bulama in Balıkesir and pekmez of masara in Kahramanmaraş (Karaca, 2009). The amounts of pekmezs produced in Turkey are given in Table 1.

Table 1. The amounts of pekmez produced in Turkey (TMFAL, 2016).

Pekmez Kinds	Plant (number)	Total Installed Capacity (tonne/year)	Total Produce Amount (tonne/year)
Grape	117	43.773,88	16.085,41
Tahini*	12	1.268,00	1.221,50
Mulberry	63	16.514,60	5.077,37
Other	75	27.818,90	10.701,69

* A Middle Eastern paste or sauce made from ground sesame seeds.

There are several kind of pekmez classification. Grape pekmez, is classified as, according to taste status; sweet and sour pekmez, according to solidification state; liquid and solid pekmez. If pekmez is produced without acidification, sour pekmez can obtain or and sweet pekmez is obtained when it is produced with acidification. In the production stage of pekmez, the liquid obtained from fruit is called liquid pekmez when the final product is obtained by evaporation until a certain viscosity is reached. In the production of solid pekmez, pekmez is obtained by the co-addition of one or several substance such as egg white, dry yogurt, starch, sea cucumber, powdered sugar, old solid pekmez, honeycomb and honey. Solid pekmez is a textured material that can be taken from a bowl to another but with a spoon or knife.

Solid grape pekmez should be in a color ranging from light white to yellowish brown, solid appearance, no phase separation at the time of cutting, no fluid tendency, and liquid grape pekmez should be a dark brown and fluid structure with a color ranging from light brown to dark brown. In addition, pekmez is also classified as light pekmez and dark pekmez, according to the colour (TSI, 1989). According to the grape pekmez notification (TMFAL, 2007); pH value at liquid and solid sweet pekmez: $\leq 5.0-6.0$; and at liquid and solid sour pekmez the pH value should be between $3.5-5.0$. The production of pekmez, which is a traditional or fabrication production, is almost the same. The general pekmez production flow chart is given in Figure 1.

In addition to grape pekmez production, grape is also produced in traditional products such as bulama, pestil, köfter, sucuk, bastık, tarhana, lokum and is consumed as dried snack (Uçar, 2007). Besides, pekmez is often consumed by mixing with tahini in Turkey.

Mulberry fruit is traditionally used in Turkey for the production of pekmez and is also dried and consumed as a snack. In addition to this, black mulberry and red mulberry kinds are also used in the jam production (Akbulut et al., 2004). In addition, traditional products like pestil, walnut sausage and keşi are also produced (Bakkalbaşı et al., 2004).

THE EFFECTS OF PEKMEZS ON HUMAN HEALTH

Pekmez contains concentrated nutrients in its that it is produced fruit kind. Molasses contains concentrated nutrients in the fruit of the fruit it is produced. Pekmezs are very rich in terms of carbohydrates and minerals, as well as many vitamins and other nutrients. For this reason, especially for children in the age of growth, pregnant and suckling moms, athletes and workers who need high energy food is an important ingredient. All pekmezs have the blood-forming and energizing qualities (Demirözü et al., 2002, Şimşek and Artık, 2002, Vekiari et al., 2011).

It is recommended that grape molasses be found in the diet of pregnant women, workers or especially operated sick people. Some minerals (such as calcium, iron, potassium, and magnesium) found in molasses contain enough to cover a significant portion of a person's daily needs. Molasses contains (+2) valuable iron minerals that can easily be absorbed in human digestive system (Batu, 1993, Batu, 2006). Pekmez contributes to the regular functioning of the blood and nervous system, the blood doesn't clot and the normal functioning of the heart muscles. Antioxidant flavonoids found in grapes are the protective mechanism (Batu, 2006). Grape polyphenols reduce atherosclerosis and inflammation, regulate blood pressure, activate new proteins (Slavin and Lloyd, 2012). It is stated that regular consumption of grapes and products in the Mediterranean traditional diet may contribute to the reduction of chronic diseases such as cancer, cardiovascular diseases, stroke, nervous disorders and aging (Iriti and Faoro, 2009).

Mulberry molasses is rich in mineral substances and contains minerals such as potassium, calcium, phosphorus, magnesium, sulfur and iron. Mulberry fruit is also rich in total phenolic substances (Akbulut et al., 2007). Mulberry fruit has a positive effect on many diseases (anemia, mouth, throat, stomach diseases, ulcers, asthma, bronchitis, etc.). It helps the mental and physical development of infants and children to increase the resistance of the human body to cold (Karaca, 2009). It also has a hypoglycemic, hypolipidemic and antioxidant effect and has a positive effect on neurological, cardiovascular diseases and cancer (Ramesh et al., 2014).

Carob bean (*Ceratonia siliqua* L.) has a wide range of medical applications; for the treatment of nausea, flu, cough, asthma, bronchitis, jaundice, measles, reflux, anemia, blood diseases, prostatitis, malaise, cholesterol, diabetes, diarrhea, liver, kidney, stomach, intestine and lung diseases, intestinal draining, intensifier, urinary tract infections (Bulut, 2006, Güneş, 2010, Gürdal, 2010, Dakia, 2011, Akbulut and Bayramoglu, 2013, Yıldırım and Kargioğlu, 2015).

Samphire (*Juniperus drupacea* L.) pekmez is used for medical purposes (in public) in respiratory tract infections such as asthma, bronchitis, cough, urinary tract infections, antihelment, against diarrhea, anal fistul, amenorede, hemaroid, against abdominal pain, oral and dental health treatment (Gürhan and Ezer, 2004, Kocakulak, 2007, Karaca, 2009, Sarı et al., 2010, Sert et al., 2015). In addition, because of the sugars and vitamins carried by samphire pekmez, it is consumed for the purpose of forcing and aphrodisiac as it is in other pekmezs (Karaca, 2009).

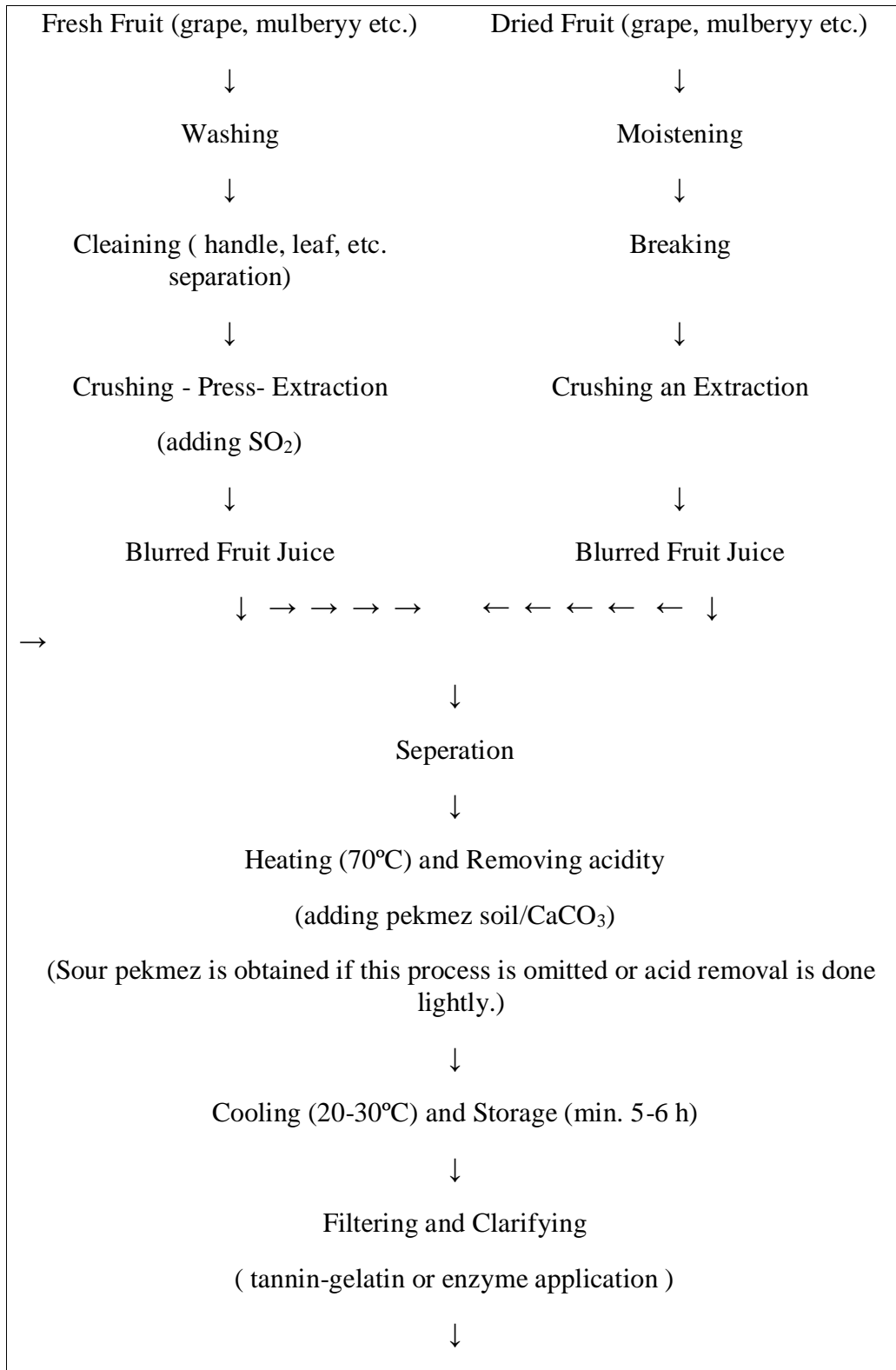
Hawthorn (*Crataegus oxyacantha*) pekmez is used in the treatment of many diseases such as heart failure, vascular occlusion, angina, atherosclerosis, anti-spasmodic, diuretic, cholesterol (da Silva et al., 2000, Batu et al., 2007, Verma et al., 2007, Emrem, 2008).

In addition to the hawthorn, mulberry, grape, carob bean and samphire, the production of pekmez is also made from apples, plums, watermelons, apricots, figs, sugar beets, corn, sugar canes, squash and similar fruits. Composition values of some pekmezs are given in Annex 1.

CONCLUSION AND SUGGESTIONS

Pekmez has been produced in Turkey for many years by traditional and fabricated methods. The fruit in which the pekmez is produced determines the composition of the pekmez. Pekmezs are rich in carbohydrates, minerals, some vitamins and antioxidants, and are energy storage and food source. In addition, due to many positive effects on human health, it is also used pharmacologically in the medical field for preventive or therapeutic purposes.

Turkey is one of the few countries in the world with its rich fruit kinds used in pekmez production. In this context, pekmez is becoming important for the promotion of the national and international environment. Pekmez should be introduced to the whole world with activities such as festivals. It is necessary to increase the researches about pekmez. With these investigations, the health effects of each pekmez kind should be determined in detail and the health protective effect should be used for the international field presentation.



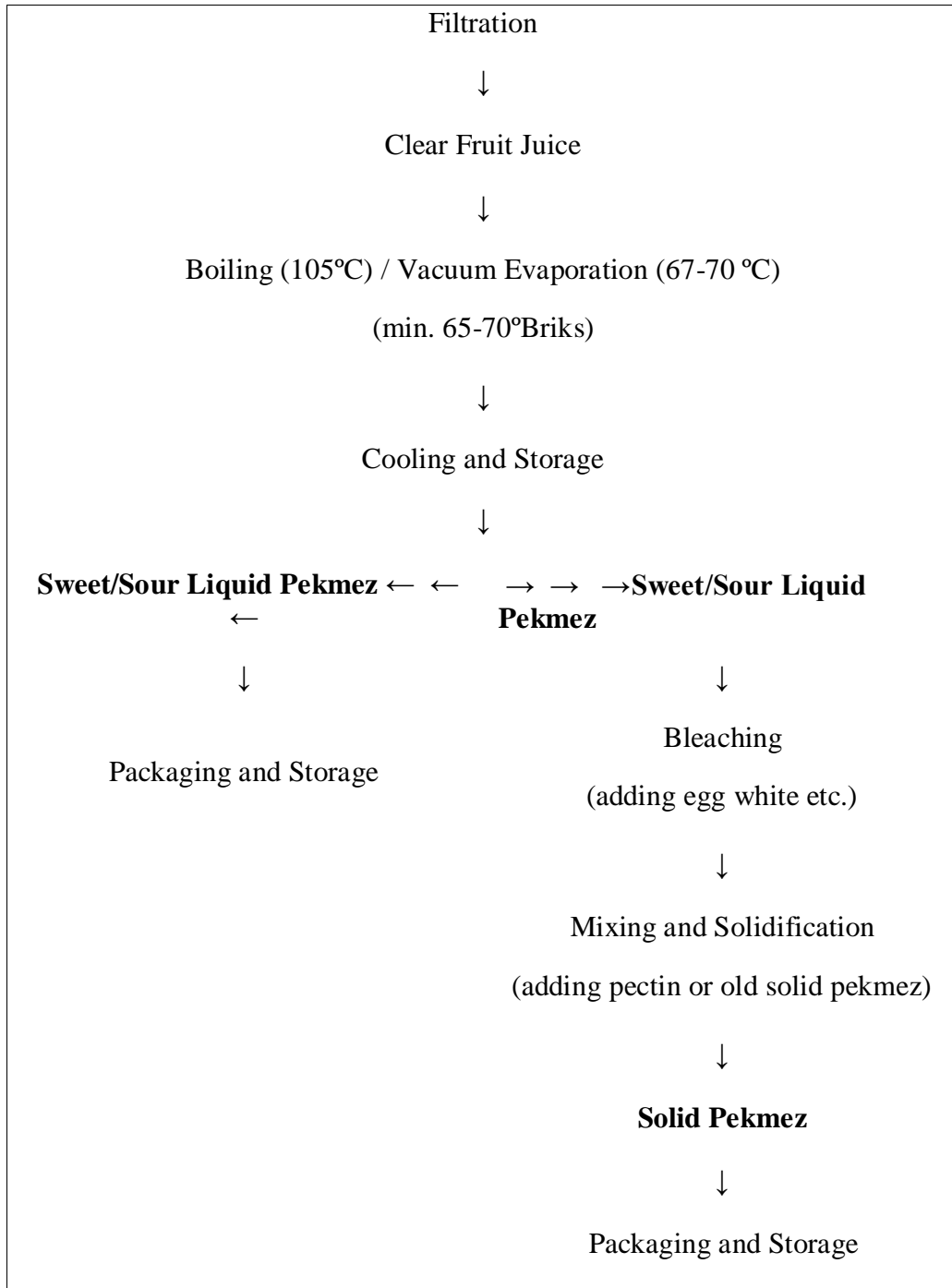


Figure 1: The general pekmez production flow chart.

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Annex 1. Some values of some pekmez produced from different fruits

Fruit	Resear cher	TS M (%)	Tota l D M (%)	Tota l Sug ar (%)	İnv ert Su gar (%)	Sacc aros e (%)	Tota l Aci dity (%)	pH	Prot ein (%)	Ash (%)	HM F (mg/ kg)	For mol nu mber	Ca mg / 100 g	Na mg / 100 g	Mg mg / 100 g	P mg / 100 g	Fe mg / 100 g	Cu mg / 100 g	Zn mg / 100 g	Mn mg / 100 g
Üzüm	Üstün ve Tosun, 1997	68, 6- 78, 3	71, 90- 84, 40	49, 76- 76, 81	16, 80- 67, 95	0- 32, 37	0,0 8- 0,9 7	4,3 6- 5,1 2	0,1 8- 1,8 5	0,4 1- 2,4 4	7,3 8- 166 ,05	0- 43	50, 86- 206 ,13	25, 38- 83, 22	11, 03- 68, 31	0- 95, 06	2,6 2- 16, 30	0,2 9- 0,9 4	0,1 8- 0,7 4	-
Dut	Şimşe k ve Artık, 2002	66, 5	69, 70	60, 12	55, 41	8,0 2	0,5 0	5,4 9	-	1,8 8	19, 1	3	96	52	67	54	0,9 3	0,4 4	0,4 8	0,4 3
Keçiboy nuzu	Şimşe k ve Artık, 2002	71, 7	75, 01	64, 11	53, 28	1,4 5	0,6 1	5,3 5	-	1,4 5	5,3	10	135	14	50	55	0,3 4	0,3 6	0,1 2	0,4 5
Andız	Özdem ir vd., 2004	72, 85	72, 91	-	-	-	0,9 7	5,3 1	0,7 2	3,7 9	-	-	149 ,9	3,5 5	84, 38	144 ,5	0,6 9	0,3 8	-	1,0 7
Alıç	Emre m, 2008	-	57, 40	9,4 3	8,8 6	0,5 7	0,4 6	5,8 9	2,8 6	2,2 7	-	-	-	-	-	-	-	-	-	-
Kayısı	Karaca , 2009	75, 00	-	-	-	-	-	4,7 4	-	2,5 4	-	-	287	648	104	-	56, 8	6,0	27, 2	5,2
Hurma	Karaca , 2009	68, 75	-	-	-	-	-	4,6 4	-	2,3 5	-	-	186	419	102	-	35, 2	5,0	26, 0	3,4
İncir	Şimşe k ve Artık, 2002	70, 5	73, 78	54, 45	54, 45	0	1,0 1	4,7 8	-	3,1 2	30, 7	4	528	79	87	46	1,7 2	0,3 8	0,5 2	1,0 5
Panca r	Yıldırı m, 2008	75, 36	82, 35	62, 13	34, 51	26, 24	-	4,3 1	2,3 4	1,3 8	23, 18	-	12, 27	156 ,61	-	92, 94	2,8 6	-	-	-
Sorgu m	Akbulut ve Çoklar, 2007	72, 56	78, 18	71, 12	65, 02	5,8 2	0,6 2	5,9 4	2,1 4	4,4 2	1,6 0	-	-	-	-	-	-	-	-	-