



## Traditional molasses production from different plants in Anatolia and its ethnobotanical features

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### Abstract

The molasses produced in a widespread manner in Turkey, loved by people, often as simple or traditional breakfast consumed is a product. Molasses, traditionally grapes, mulberries, figs, apples, and sugar from fruits that contain sugar, such as liquid or solid the form are manufactured. In this study, 18 kinds of molasses varieties made of production traditionally in different regions of Turkey have been identified. The survey was carried out in 53 provinces and 74 districts. Molasses types were observed from the mentioned fields and the information regarding local names, medicinal using and production methods obtained questioning the local people. The production of molasses is an important source of income for people in the local region. Fruit and herbal materials collected to make molasses are gathered directly by the local villagers, especially unemployed people with financial difficulties. While grape molasses is consumed for food purposes in almost every province in Anatolia, especially molasses made from plants such as juniper, pine and carob are consumed for health purposes. Gezo (Oak) molasses produced in a very narrow area in Anatolia is interesting molasses produced from acorns and leaves.

**Keywords:** Molasses; ethnobotany; traditional food; Turkey

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### Anadolu'nun farklı bitkilerinden geleneksel pekmez üretimi ve etnobotanik özellikleri

### Özet

Türkiye'de yaygın olarak üretilen pekmez, insanlar tarafından sevilen, genellikle sade veya geleneksel kahvaltılık olarak tüketilen bir üründür. Pekmez, geleneksel olarak üzüm, dut, incir, elma ve şeker pancarı gibi glikoz içeren meyvelerden sıvı veya katı formda imal edilmektedir. Bu çalışmada Türkiye'nin farklı bölgelerinde geleneksel olarak üretim yapılan 18 çeşit pekmez çeşidi tespit edilmiştir. Anket 53 il ve 74 ilçede gerçekleştirilmiştir. Söz konusu alanlardan pekmez türleri gözlemlenmiş ve yerel halkla yapılan yüz yüze görüşmelerle yöresel isim, tıbbi kullanımları ve üretim yöntemlerine ilişkin bilgiler elde edilmiştir. Pekmez üretimi yerel bölge halkı için önemli bir gelir kaynağıdır. Pekmez yapmak için toplanan meyve ve bitkisel malzemeler, başta maddi güçlük çeken işsizler olmak üzere yöre köylüleri tarafından doğrudan toplanmaktadır. Anadolu'da hemen hemen her ilde üzüm pekmezi gıda amaçlı tüketilirken, özellikle ardıç, çam ve keçiboynuzu gibi bitkilerden yapılan pekmezler sağlık amaçlı tüketilmektedir. Ayrıca, Anadolu'da çok dar bir alanda üretilen Gezo (Meşe) pekmezi; meşe palamudu ve yapraklarından üretilen ilginç bir pekmezdür.

**Anahtar kelimeler:** Pekmez; etnobotanik; geleneksel gıda; Türkiye

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## 1. Introduction

Molasses is a sweet thick liquid made by boiling and concentrating fruit juice. “Pekmez” is the name given in Anatolia (current Turkey) to the concentrated fruit syrup made by extracting the juice of sugary fruits and making them thicken by different processes for many years [1-3]. In history, the first studies on the production and processing of molasses were presented by Madsen (1953). Madsen first produced molasses from sugar beet. In later studies, molasses began to be produced from different plants [4,5]. They are considered an important component in human nutrition and a good source for energy intake due to its high contents of sugars (glucose, galactose), minerals, and organic acids [6]. Molasses making, which is common in Anatolia, is one of the important tastes of Turkish Culture. Traditional methods in rural areas produce molasses produced in enterprises with modern production methods and presented to the market. Molasses, which have been produced for a long time in Turkey, are popular and traditional Turkish foods [7-9]. It is produced primarily from grapes [8, 10-14]. They are usually preferred for breakfast in winter [2,15]. Molasses production is around 50 thousand tons in Turkey. Grape molasses constitutes 80 percent of this production. Molasses are most often made from grapes, but local forms of molasses are made from other materials, including mulberries, plums, apples, pears, sugar beets, watermelon sorghum, and pomegranates. As a traditional product, molasses are produced in every region using fruits mostly grown in that region [16-18]. In recent years carob has also been used to make molasses. In Southern Anatolia especially, the boiled ripe berries of a species of juniper known locally as andız (*Juniperus drupacea* Labill.) yield a sweet syrup known as “andız pekmezi”, or juniper molasses [19-21]. Molasses are a very rich food in carbohydrates, organic acids, mineral substances, and partial vitamins. It is also important in terms of nutrition due to its sugars [17,22]. Molasses are popularly used as a tonic and aphrodisiac due to their rich and nutritious content. In addition, some herbal drugs are mixed with molasses and consumed medicinally [23]. In this study, some information is given production stages of molasses, their types, effects on health. In addition, traditional molasses production from different plants and their ethnobotanical properties are also mentioned.

## 2. Materials and methods

This research was carried out in 53 provinces (74 districts) of Turkey between the years 2015-2021. The provinces and their districts where the study was conducted are shown in Table 1. In addition, the region where molasses is produced are marked on the Turkey map (Fig. 1). During the research, face-to-face interviews were conducted with 90 informants. 64 (71%) of the informants are male, and 26 (29%) are female. In Figure 2, the informants' age distributions and educational status are summarized with graphics. Plants used in molasses made by informants were collected in the field and identified from various floristic books [24-26]. Turkish names of the plants are arranged according to Güner et al. [27]. The current names and authors of scientific names are given according to The Plant List [28].

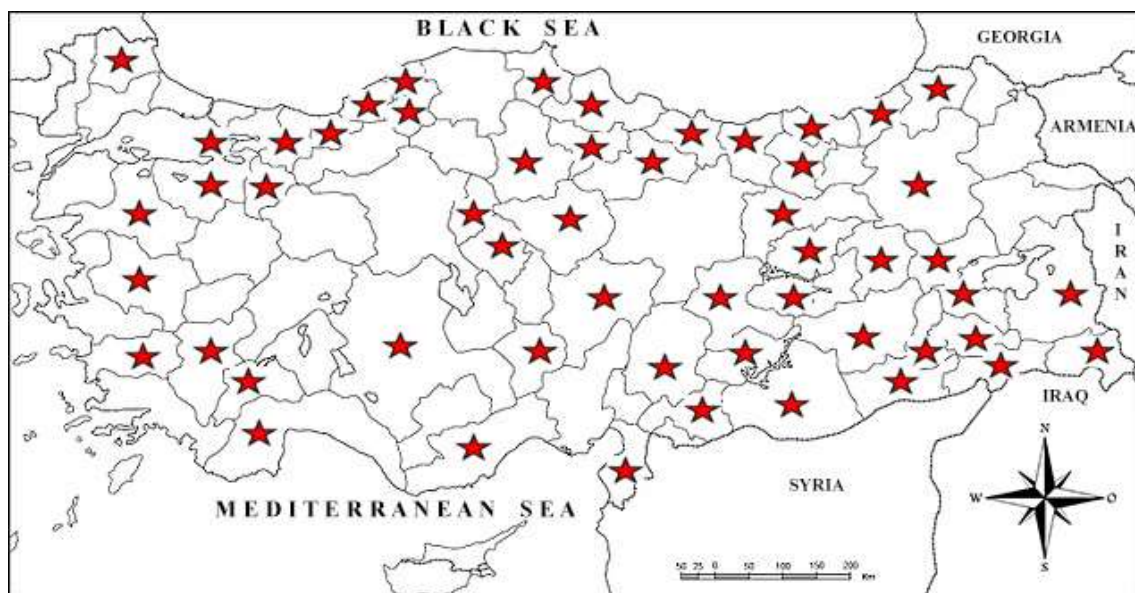


Figure 1. Provinces with traditional molasses production in Turkey (shown with an asterisk)

Table 1. List of provinces and districts where molasses is produced

No	Province	Districts and villages	No	Province	Districts and villages
1	Adıyaman	Dut, Kahta, Gölbaşı	27	Kayseri	Develi
2	Amasya	Center	28	Kırklareli	Pınarhisar, Erenler, Kurudere, Evciler
3	Antalya	Akseki, Alanya, Gazipaşa	29	Kırşehir	,Geçitağzı, Devletliagaç, Armutveren
4	Artvin	Yusufeli	30	Malatya	Center
5	Aydın	Koçarlı	31	Manisa	Center
6	Balıkesir	Havran Manyas-Koçoğlu	32	Mardin	Salihli, Çanakçı, Kırkağaç-Karakurt,
7	Bartın	village	33	Mersin	İlyaslar, Demirci, Alaşehir, Sarıgöl
8	Batman	Center	34	Muş	Midyat, Mazıdağ, Artuklu. Ömerli, Derik,
9	Bilecik	Center	35	Niğde	Zinnar, Akras village
10	Bingöl	Genç	36	Ordu	Bozyazı, Silifke
11	Bitlis	Mutki, Hizan	37	Rize	Malazgirt
12	Burdur	Center	38	Sakarya	Niğde
13	Bursa	Center	39	Samsun	Aktaş
14	Çorum	Sungurlu-Çayyaka, Kavşut	40	Siirt	Gürgentepe, Kumru
15	Denizli	ve Tokullu	41	Sinop	Pazar, Kesikköprü village
16	Diyarbakır	Center	42	Şanlıurfa	Taraklı
17	Elazığ	Eğil, Ergani, Çermik, Hani,	43	Şırnak	Çarşamba
18	Erzincan	Lice, Kulp, Çüngüş	44	Tokat	Center
19	Erzurum	Center	45	Trabzon	Siverek
20	Gaziantep	Uzundere, İspir, Olur, Tortum	46	Tunceli	Center
21	Giresun	Center	47	Van	Zile
22	Gümüşhane	Şebinkarahisar, Piraziz,	48	Yalova	Çaytepe, Şalpazarı, Erbaa
23	Hatay	Dereli, Çalca village	49	Zonguldak	Center
24	Kahramanmaraş	Center	50	Düzce	Balıca
25	Karabük	Andırın, Pınarbaşı	51	Hakkâri	Çukurca
26	Kastamonu	Center	52	Konya	Hadim
		Taşköprü, Kaşı vilage	53	Yozgat	Center

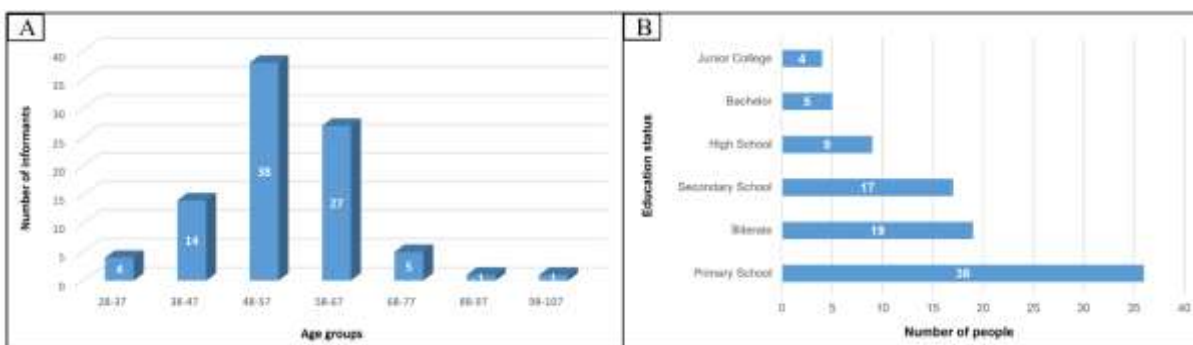


Figure 2. Graphical representation of age distribution (A) and educational status (B) of informants

### 3. Results

As a result of the research; It was determined that molasses was produced by traditional methods from 20 different plants. The families, scientific names, vernacular, Turkish and English names of the plants that included these molasses, the used parts, and the places where they are produced are presented in Table 2. As a result of interviews with informants in 53 provinces; It has been determined that 18 different types of molasses are used in the treatment of 48 different diseases and symptoms. Their list is given in Table 3. Also, Table 4 shows the medicinal uses of molasses by region (province and district). The molasses produced in these provinces are known by the vernacular names of that

region (Table 2). Zile molasses in Tokat Zile, Ağda molasses in Gaziantep, Çalma molasses in Kırşehir, Bulama molasses in Balıkesir, Masara molasses in Kahramanmaraş, Gezo molasses in Mardin and Bitlis are the most famous ones. Provinces where grape molasses is produced the most; Manisa, Denizli, Elâzığ, Gaziantep, Tokat, Amasya, Malatya, Mardin, Diyarbakır and Hatay.

Table 3. Symptoms and diseases in which molasses is used

No	Symptoms and Diseases	Number of Molasses variety	No	Symptoms and Diseases	Number of Molasses variety
1	Anemia	7	25	Sedative	2
2	Bronchitis	6	26	Allergy	1
3	Cardiovascular diseases	6	27	Antipyretic	1
4	Cough	6	28	Appetizing	1
5	Immunization	6	29	Cataract	1
6	Asthma	5	30	Common cold	1
7	Cancer	4	31	Cynanche	1
8	Skin health	4	32	Depression	1
9	Stomachic	4	33	Eye diseases	1
10	Tonic	4	34	Jaundice	1
11	Constipation	3	35	Kidney inflammation	1
12	Gastro-intestinal diseases	3	36	Liver steatosis	1
13	Arthritis	2	37	Lung diseases	1
14	Cholesterol lowering	2	38	Measles	1
15	Diabetes	2	39	Nephritis	1
16	Diarrhea	2	40	Psoriasis	1
17	Diuretic	2	41	Reflux	1
18	Flu	2	42	Sedative	1
19	Hemorrhoids	2	43	Sphagitis	1
20	Hepatoprotective	2	44	Thrush	1
21	Menstrual regulator	2	45	Tuberculosis	1
22	Nausea	2	46	Ulcer	1
23	Osteoporosis	2	47	Urinary tract infections	1
24	Prostatitis	2	48	Arteriosclerosis	1

It has been observed that informants mostly used molasses to treat anemia (7 type). Bronchitis (6 type), cardiovascular diseases (6 type) and cough (6 type) follow, respectively (Fig. 3).

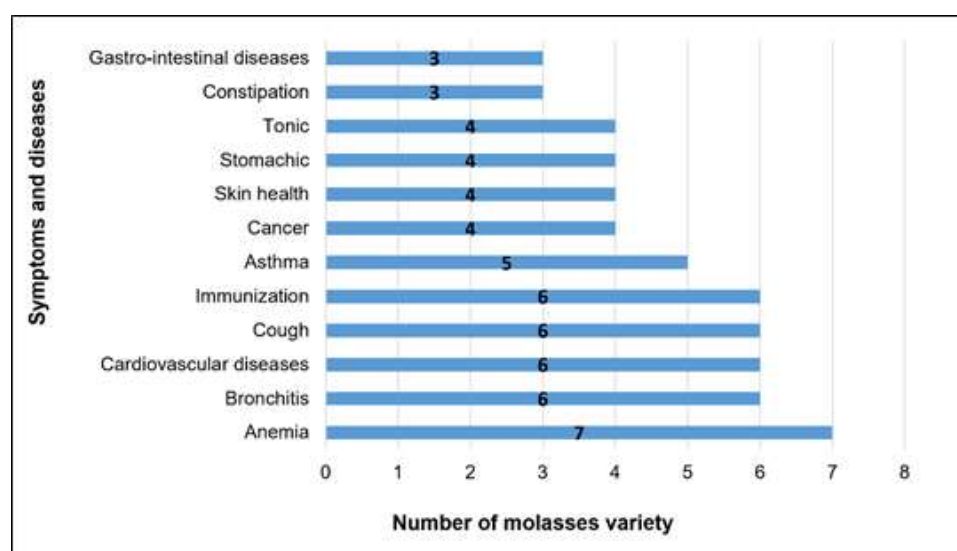


Figure 3. Symptoms and diseases in which molasses are good

Table 2. Traditional molasses production from different plants in Turkey

No	Family	Scientific name/ Voucher number	Names of plant			Used part	Provinces and towns
			Vernacular name	Turkish name	English name		
1	Amaranthaceae	<i>Beta vulgaris</i> L.var. <i>altissima</i> Döll / SV 2380	Şekerpancarı	Şeker pancarı	Sugar beet	Root	2, 28, 41
2	Cucurbitaceae	<i>Citrullus lanatus</i> (Thunb.) Matsum. & Nakai / SV 2383	Karpuz	Karpuz	Watermelon	Fruit	12, 28, 31
3	Cucurbitaceae	<i>Cucumis melo</i> L. / SV 2400	Kavun	Kavun	Melon	Fruit	14, 31
4	Cupressaceae	<i>Juniperus drupacea</i> Labill. / SV 2355	Andız	Ardıç	Juniper	Berries	3,24,33
	Cupressaceae	<i>Juniperus drupacea</i> Labill. / SV 2356	Pıtık	Ardıç	Juniper	Berries	24
5	Ebenaceae	<i>Diospyros kaki</i> Thunb. / SV 2358	Trabzon hurması	Hurma	Oriental persimmon	Fruit	36, 37, 45
6	Elaeagnaceae	<i>Elaeagnus rhamnoides</i> (L.) A.Nelson / SV 2357	Kışhan	Yalancı iğde	Sea buckthorn	Fruit	19
7	Fabaceae	<i>Ceratonia siliqua</i> L. / SV 2362	Harnup	Keçiboynuzu	Carob	Fruit	3,12,33
8	Fagaceae	<i>Quercus brantii</i> Lindl. / SV 2361	Gezo, dımsa, beruya, dımsa gezoyé	Meşe, Kudret helvası	Oak	Acorn	32,43
	Fagaceae	<i>Quercus robur</i> L. subsp. <i>pedunculiflora</i> (K.Koch) Menitsky	Gezo	Meşe, Kudret helvası	Oak	Acorn	10,11,16 32,34,47
9	Lythraceae	<i>Punica granatum</i> L. / SV 2360	Nar	Nar	Pomegranate	Fruit	6,42
10	Moraceae	<i>Morus alba</i> L. // SV 2382	Akdut	Dut	Mulberry	Fruit	1,2,4,5,6,9,13,10, 17,19,22,26,30,36,44,46,48
11	Moraceae	<i>Morus nigra</i> L. / SV 2381	Karadut	Karadut	Black Mulberry	Fruit	21
	Pinaceae	<i>Pinus brutia</i> Ten. / SV 2398	Çam	Çam	Pine	Cone	6
12	Rosaceae	<i>Malus sylvestris</i> (L.) Mill. / SV 2399	Elma	Elma	Apple	Fruit	2,7,35,36,38,45,49
13	Rosaceae	<i>Pyrus communis</i> L. / SV 2363	Armut	Armut	Pear	Fruit	6,7,21,25, 36,41
14	Rosaceae	<i>Mespilus germanica</i> L. / SV 2370	Töngel	Muşmula	Common medlar	Fruit	21,36,39

Table 2. Continues

15	Rosaceae	<i>Prunus x domestica</i> L. / SV 2365	Erik	Erik	European plum	Fruit	21,41,50
16	Rosaceae	<i>Armeniaca vulgaris</i> Lam. / SV 2366	Kayısı	Kayısı	Apricot	Fruit	17,30,33
17	Rosaceae	<i>Cerasus avium</i> (L.) Moench / SV 2367	Kiraz	Kiraz	Cherry	Fruit	31
18	Vitaceae	<i>Vitis vinifera</i> L. / SV 2384	Ağda	Üzüm	Grape	Fruit	26
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2385	Çalma	Üzüm	Grape	Fruit	26
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2386	Çalma	Üzüm	Grape	Fruit	29
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2387	Masara, nardenk, ravenda, günbalı, bal	Üzüm	Grape	Fruit	24
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2388	Zile	Üzüm	Grape	Fruit	44
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2389	Ağda, pekmez	Üzüm	Grape	Fruit	20
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2390	Balbaşı	Üzüm	Grape	Fruit	29
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2391	Bulama, pekmez	Üzüm	Grape	Fruit	6
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2392	Cimin	Üzüm	Grape	Fruit	18
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2393	Çalkarası	Üzüm	Grape	Fruit	15
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2394	Çalpak	Üzüm	Grape	Fruit	23
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2395	Avşile, Dims, Dıbs, Doşav	Üzüm	Grape	Fruit	8,16,32
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2396	Üzüm	Üzüm	Grape	Fruit	1,8,11,16,27,32,40 ,42
	Vitaceae	<i>Vitis vinifera</i> L. / SV 2397	Üzüm	Üzüm	Grape	Fruit	5,31,37,51,52,53

Table 4. The effects of molasses varieties on health and where they are produced

<b>Varieties of Molasses (Turkish name)</b>	<b>Medicinal use</b>	<b>Production region</b>
Andız	Anemia, asthma, bronchitis, cough, hemorrhoids, kidney inflammation, nausea, psoriasis, tuberculosis	3,24,33
Armut	Anemia, arthritis, diuretic, gastro-intestinal diseases, sedative,	6,7,21,25,36,41
Çam	Asthma, bronchitis, cough	3,6,13
Karadut	Asthma, bronchitis, cough, immunization, osteoporosis, stomachic, thrush, ulcer	1,2,4,5,6,9,10,13,17, 19, 21,22,26,30,36,44,46,48
Elma	Immunization, cholesterol lowering, osteoporosis, skin health	2,7,38,35,36,45,49
Erik	Anemia , antipyretic, appetizing, cardiovascular diseases, diuretic, menstrual regulator	21,41,50
Gezo	Bronchitis, cough, tonic	10,11,16, 17,32,34,47
Harnup	Anemia, asthma, bronchitis, cholesterol lowering, cough, diabetes, diarrhea, flu, hepatoprotective, jaundice, gastro-intestinal diseases, lung diseases, measles, nausea, reflux, prostatitis, stomachic, nephritis, tonic, urinary tract infections	3,12,33
Hurma	Anemia, bronchitis, cancer (colon), cardiovascular diseases, common cold, constipation, cynanche, gastro-intestinal diseases, hemorrhoids, tonic	36,37,45
Karpuz	Cancer, cardiovascular diseases, tonic	12,28,31
Kavun	Immunization, asthma, constipation	14,31
Kayısı	Cancer, cardiovascular diseases, cataract, skin health	17,30,33
Kiraz	Immunization, cardiovascular diseases, prostatitis	30,31
Kışhan	Anemia, liver steatosis, tonic	19
Nar	Cough, constipation, diarrhea, eye diseases, skin health, sphagitis	6,42
Şekerpancarı	Anemia, cancer (leukemia), immunization, stomachic	2,26,28,41
Töngel	Antiemetic, cancer (skin), cardiovascular diseases, depression, diabetes, sedative, stomachic	21, 36,39
Üzüm	Allergy, arteriosclerosis, arthritis, hepatoprotective, immunization, menstrual regülatör, skin health	6,8, 15,16,18, 20,23,24, 26, 29,31,32,37,40,44

#### 4. Conclusions and discussion

Molasses are most often made from grapes, but there are local molasses made from other materials, including mulberries, plums, apples, pears, sugar beets, watermelon, sorghum, and pomegranates. While grape molasses is consumed for food purposes in almost every province, andız, pine, and carob molasses are consumed especially for health purposes. Gezo molasses is an oak molasses produced in a very narrow area in Anatolia (Fig. 4). This type of molasses in our country; It is produced in Bingöl, Burdur, Diyarbakır, Mersin Muş, Şırnak and Van. It is obtained from the honey-flavored colorless and sticky must found on the leaves or fruits (acorn) of oak trees in these regions (*Quercus brantii* Lindl. and *Q. robur* L. subsp. *pedunculiflora* (K. Koch) Menitsky). Satil et al. (2021), in a chemical study on Gezo molasses, it was emphasized that Gezo molasses is rich in antioxidants besides its nutritional value [29].



Figure 4. The preparation and fruit (acorn) of Gezo molass

While molasses is usually made with grapes and molasses soil in Anatolia, in some regions, honeycomb honey, egg white, dry pot, yogurt, and milk are added to the molasses content in molasses production. In Kahramanmaraş, molasses thickened in direct sunlight without boiling are called “day honey” or honey [30-31]. Those that are not darkened or bleached are called “Nardenk”, those that are lightened and hardened are called “Ravenda”. In Balıkesir, Niğde, and Afyonkarahisar regions, molasses, which has been thickened to a certain consistency without adding any yeast, is tempered by pounding only with wooden spoons and sticks. In the Thrace region, ground mustard is added, the acidity is removed with molasses. Important molasses varieties produced by traditional methods in Turkey are shown in Fig. 5.

After grapes, mulberry molasses is preferred the most. Although mulberries are grown in every region in Turkey, mulberry molasses is more common in Elazığ, Tunceli, Malatya, Balıkesir, Aydın, Yalova, Bursa, Bilecik, Tokat, Amasya, Çorum, Kahramanmaraş and Erzincan. Especially the mulberry molasses produced in Zile district of Tokat is the most famous. Carob molasses is widely produced in Antalya (Alanya, Gazipaşa), Mersin and Burdur. Apple molasses is produced in regions such as Isparta, Denizli, Karaman and Amasya where apples grow abundantly. Apricot molasses is consumed more in Malatya, Elazığ and around Mersin. Fig molasses, on the other hand, is famous in Aydın, where the most figs are produced (Table 2). In Turkey, traditional methods are common way to obtain homemade grape molasses in villages. Briefly, the production process starts by squeezing molasses product, and the liquid part is filtered to remove the rape. Then the filtrate is boiled until the pH 3-4 where it becomes blurred and viscous. Finally, a special soil (named as “molasses soil”) with high calcium carbonate ( $\text{CaCO}_3$ ) content is added to adjust the pH value and to fix the turbidity [32].

The production technique of traditionally produced molasses has not changed much since the past in Turkey. There are many types of molasses with different names and different flavors, structures and appearances with some changes in their production techniques in different regions of Turkey (Fig. 1). In producing apple, fig, and juniper molasses, the respective fruits are smashed by a hammer after being cut in halves or quarters, then put into water to extract the soluble solids. The mixture of juniper or fig and water is kept for 3 days, whereas the apple and water mixture can be boiled immediately in an open vessel. After the extraction of soluble solid, the extract is filtered from a muslin cloth to obtain the must. Wood ash is added to the juniper must to clarify it, and the must is concentrated in a similar manner as for mulberry pekmez. The concentrated must is called apple, fig, or juniper molasses. 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.





Figure 5. Examples of various molasses made by local people In different provinces of Turkey. A. Juniper molasses, (in Kahramanmaraş), B) Black mulberry molasses (in Giresun), C) Apple molasses (in Niğde), D) Sea buckthorn molasses (in Erzurum), E) Common medlar molasses (in Samsun), F) Watermelon molasses (in Manisa), G) Oak molasses (Bitlis)

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. 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.

Molasses made by traditional methods are divided into 2 groups as liquid and solid. In addition to these, there are local names according to the region where it is produced. For example, they are named as ringing in Kırşehir, bell molasses in Zile, and smearing in Balıkesir [33]. The production stages of liquid (sweet) and solid (sour) molasses by traditional methods are given in Fig. 6. These methods have been demonstrated in grape molasses.

While in Anatolia, grape molasses are usually made with only grape and molasses soil, it has been determined that it is added to molasses content in different products in some regions. Antep molasses, which is widely produced in Gaziantep region, 10-15% of its weight, old molasses, 1-2% honeycombed honey and egg whites in Kahramanmaraş region, molasses were known as 'Balbaşı' in Kırşehir region, 50 egg whites for 100 kilograms of must. In the same region known as 'Çalma', pekmez is a mixture of dried soapwort with yogurt. "Agda", produced in the Kastamonu region, is added as yeast mixed with eggs in milk.

Molasses is one of the most important food products produced from different plants and different methods all over Turkey and consumed widely due to its rich minerals and vitamins. Since molasses is an extremely important food item in terms of nutrition, it is important to inform our people about their correct and conscious consumption. In addition, it is known that it has a healing effect with completely natural nutrition in the treatment of 48 different symptoms and diseases, especially anemia, bronchitis and cardiovascular diseases. But; It is seen that molasses is produced in traditional and very primitive conditions in our country. Therefore; By establishing modern enterprises, the production of molasses with higher quality and higher nutritional value, following the standards, will contribute to both an economically significant income and healthier nutrition of our people.

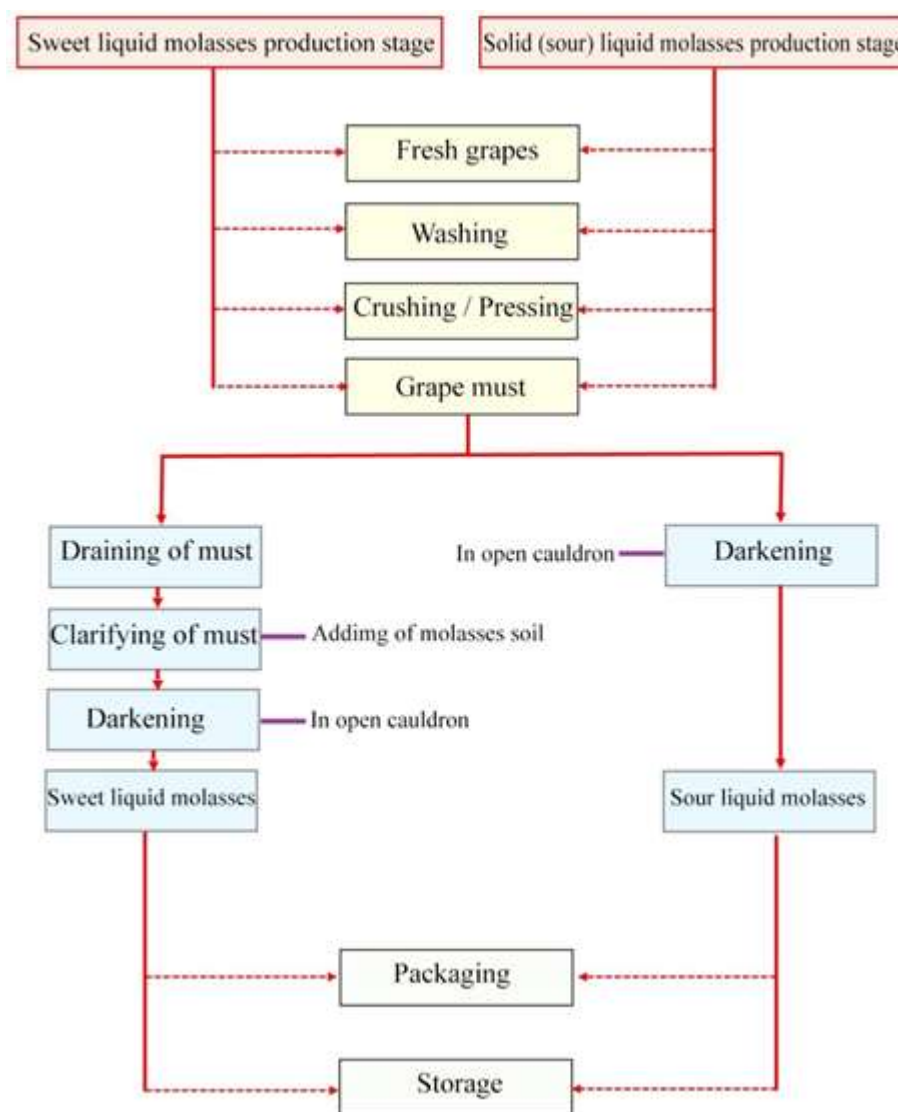


Figure 6. The production stages of liquid (sweet) and solid (sour) molasses by traditional methods

## References

- [1] Nas, S. & Nas M., (1987). Pekmez ve pestilin yapılışı, bileşimi ve önemi, *Gıda*, 12 (16), 347-352, 1987.
- [2] Tosun, İ. (2004). Color changes and 5-hydroxymethyl furfural formation in zile pekmezi during storage, *Grasasy Acetias*. 55, 254-263.
- [3] Sarıtepe, Y. (2018). *Farklı bileşimsel özelliklere sahip üzümlerden elde edilen pekmezlerin kalite kriterlerinin araştırılması*. (Unpublished master's thesis). İnönü University, Malatya, Turkey.
- [4] Madsen, I.L. 1953. Feed uses of sugar beet by-products. *Feedstuffs* 25(2):17.
- [5] Akan, Lale. (2018). Production and Characteristics of a Traditional Food: Molasses (Pekmez). *Food Science and Nutrition Studies*. 2. 25. 10.22158/fsns.v2n2p25.
- [6] Özcan, M., Alpar, Ş. & Juhami-Al, F. (2015). The effect of boiling on qualitative properties of grape juice produced by the traditional method. *J Food Sci Technol.*, 52, 5546-5556.
- [7] Tosun, I. & Ustun, N.S. (2003). Nonenzymic browning during storage of white hard grape pekmez (Zile pekmezi). *Food Chemistry*, 80(4), 441-443.
- [8] Sürücüoğlu, M.S. & Çelik, L.S. (2005). (2005). Pekmez. In Toygar, K., & Berkok Toygar, N. (Eds.), *Ankara'da bağcılık ve bağ kültürü*. pp.123-148.

- [9] Türkben, C., Suna S., İzli G., Uylaşer, V. & Demir, C. (2016). Physical and chemical properties of pekmez (molasses) produced with different grape cultivars. *Tarım Bilimleri Dergisi*, 22(3), 339-348.
- [10] Alpaslan, M. & Hayta, M. (2002). Rheological and sensory properties of pekmez (Grape Molasses Tahin [sesame paste] Blends). *Journal of Food Engineering* 54(1), 89-93.
- [11] Arici, M., Gümüş, T. & Kara, F. (2004). The fate of ochratoxin a during the pekmez production from mouldy grapes. *Food Control*, 15(8), 597-600.
- [12] Batu, A., Karagöz, D. D., Kaya, C. & Yıldız, M. (2007). Dut ve harnup pekmezlerinin depolanması süresince bazı kalite değerlerinde oluşan değişimler. *Gıda Teknolojileri Elektronik Dergisi*, 2, 7-16.
- [13] Demir, M. K. (2014). Effect of the replacement of sugar with spray dried grape pekmez (pekmez powder) on some properties of cookies. *Quality Assurance and Safety of Crops & Foods*, 6(2), 229-235.
- [14] Dag, B. & Tarakçi, Z. (2016). Comparatives of physico-chemical composition, mineral and heavy metal properties of the grape juices, grape pekmez and dried grape products in difference plant. *Journal of Current Research in Science*, 4(3), 147.
- [15] Kuşçu, A. & Bulantekin, Ö. (2016). The effects of production methods and storage on the chemical constituents of apple pekmez. *Journal of Food Science and Technology*, 53(7), 3083-3092.
- [16] Ekin, İ. & Çelikezen, F.Ç. (2015). Bitlis ilinde geleneksel olarak üretilen gezo pekmezinin bazı kimyasal özelliklerinin incelenmesi, *Bitlis Eren Üniversitesi Fen Bilimleri Dergisi*, 4(2), 38-149.
- [17] Keleş, P.Ş., Gürses, M. & Erdoğan, A. (2019). Traditional Sugar Cane Molasses. *Tr. J. Nature Sci.* 8(1), 43-46.
- [18] Tüzün, S., Baş, İ., Karakavuk, E., Karaca Sanyürek N. & Benzer, F. (2020). Comparison of antioxidant activities detected by different methods in various molasses. *Turkish Journal of Agricultural and Natural Sciences* 7(2), 323–330.
- [19] Aladı İnci, H., Satıl, F., Selvi, S. (2019). Wild fruits sold in the public bazaars of Edremit Gulf (Balıkesir) and their medicinal uses. *Biological Diversity and Conservation*, 12(1):89-99.
- [20] Polat, R., Selvi, S., Çakılcıoğlu, U., Açar, M. (2012). Investigations of ethnobotanical aspect of wild plants sold in Bingöl (Turkey) local markets. *Biological Diversity and Conservation*, 5(3):155-161.
- [21] Özdemir, F., Topuz, A., Gölükcü, M. & Şahin, H. (2004). Andız (*Juniperus drupacea*) pekmezi üretim tekniğinin geliştirilmesi üzerine bir araştırma. *Gıda*, 29(1), 33-40.
- [22] Demiröz, B., Sökmen, M., Uçak, A., Yılmaz, H. & Gülderen, S. (2002). Variation of copper, iron, and zinc levels in pekmez products. *Bulletin of Environmental Contamination and Toxicology*, 69, 330–334.
- [23] Baytop, T. (1999). *Türkiye’de bitkiler ile tedavi, geçmişte ve bugün*. İstanbul, Nobel Tıp Kitabevleri: II. Baskı, p 480 s.
- [24] Davis, P. H. (Ed.) (1965-1985). *Flora of Turkey and the East Aegean Islands* (Vol. 1-9). Edinburgh, Edinburgh University Press, U.K.
- [25] Davis, P. H., Mill, R. R. & Tan, K. (Eds.) (1988). *Flora of Turkey and the East Aegean Islands* (Vol. 10) (Supplement), Edinburgh, Edinburgh University Press, U.K.
- [26] Güner, A., Özhatay, N., Ekim, T., & Başer, K. H. C. (Eds.) (2000). *Flora of Turkey and the East Aegean Islands*, (Vol. 11.). Edinburgh, Edinburgh University Press, U.K.
- [27] Güner A, Aslan S, Ekim T, Vural M. & Babaç MT. (2012). *Türkiye bitkileri listesi (Damarlı Bitkiler)*. İstanbul: Nezahat Gökyiğit Botanik Bahçesi ve Flora Araştırmalar Derneği Yayınları.
- [28] The Plant List, <http://www.theplantlist.org/1.1/cite/> Accessed 21 April 2021.
- [29] Satıl, F., Akan, H., Karaaslan, M., Balos, M.M. & Başıyigit, B (2021). Ethnobotanical and chemical studies on Gezo molasses from *Quercus brantii* Lindl. acorns in Turkey. *Acta Societatis Botanicorum Poloniae*, 90, 1-14.
- [30] Ünal, F. (1991). *Türkiye’de çeşitli bölgelerden toplanan bal ve pekmezlerin içeriğinde bulunan thiamin, riboflavin, askorbik asit ve demir miktarlarının araştırılması*. (Unpublished master's thesis). Hacettepe University, Ankara, Turkey.
- [31] Beykaya, M., & Artık, N. (2020). The effect of different processing techniques in production of mulberry and apricot molasses (pekmez). *European Journal of Science and Technology*, 20, 587-601.
- [32] Atabey E. (2011). Pekmez ve Pekmez Toprağı. *Popüler Bilim Dergisi*, 19, 38-43.
- [33] Ekmekçioğlu Erdoğan, B. (2019). *Geleneksel pekmez üretiminde kullanılan toprakların karakteristik özellikleri*. (Unpublished master's thesis). Nevşehir Hacı Bektaş Veli University, Nevşehir, Turkey.