PISTACHIOS

Prepared by
Gülay BABADOĞAN
2010

Export Promotion Center of Turkey

Originating from the genus Pistacia, the species *Pistacia vera* is native to the Near East, Mediterranean and Western Asia. The green seed, which is the pistachio nut, is in a crusty shell that is being cracked during consumption. Pistachio kernels are very popular as a snack, but also are used as an ingredient in meat products like salami or sausages, or in the confectionary industry as a part of chocolate, cakes, Turkish Delight, baklava, ice cream and other traditional Turkish sweets.

History

Pistachio cultivation began around 7000 B.C. and pistachios have been consumed by different civilizations. There are records that this plant was planted in Southeastern Anatolia during the Hittites and served as a snack for kings and members of the royal family. It is further recorded in ancient documents that this tree was also planted in the fabulous Hanging Gardens of Babylon. In the documents of the Assyrians and ancient Greeks, pistachios were recommended as an aphrodisiac and against the bites of poisonous animals. Because of its distinctive beautiful color, many efforts were made to use this nut as a dying agent during these periods.

As a result of its unique nutritious properties and long shelf life, pistachios also became one of the first internationally traded agricultural goods that were exported to China via the

Silk Road. In the following centuries, pistachios were then extensively used by the soldiers of the Roman Empire, from where they spread to Italy and France around the first century A.D. The usage of pistachios as a medicinal remedy also continued during the Middle Age; Avicenna suggested their use against liver diseases.

Today, as a result of the desire for a healthy life style, consumers in many different parts of the world have begun to rediscover the extraordinary taste of pistachios together with their various health benefits, which are now being studied with modern laboratory techniques.

PISTACHIOS IN THE ANCIENT ÇATALHÖYÜK SİTE

The Neolithic city of Çatalhöyük was first identified in the late 1950's. The excavations showed that there existed fourteen levels of occupation in the larger mound, created by people rebuilding new houses on the old ones. About 160 buildings have been identified, where it was estimated that in each one one family of 5-10 people lived. Generally one house consists of one main room for major activities like living, eating, cooking etc. and storage rooms. Pistachios were also a part of the diet of the of people living in Çatal Höyük. Since the climate is not suitable for growing pistachios, it is thought that pistachios were brought from places where the climatic conditions were more suitable.

The Pistachio seed remaining were identified as *Pistacia atlantica* and *Pistacia terebinthus* species.

Health Benefits of Pistachios

In addition to the excellent taste of Turkish pistachios, as was suggested in ancient times, there are numerous reasons for consuming pistachios on a regular basis.

Even though with the development of various technologies has made human life easier, it is still recommended by many physicians to consume food with a minimum of processing in order to gain the maximum health benefits of these foods. Other than roasting and salting, which are necessary to distinctive that certain flavor of Turkish pistachios, no other treatment is applied; therefore vitamins and minerals as well as valuable fatty acids are retained at a maximum level.

Pistachios are recommended for cardiovascular diseases, one of the most common diseases in the world, especially to lower the LDL cholesterol level in the blood as a result of their fatty acid content and to increase the "good" HDL cholesterol level. Their Vitamin E content is a further factor for the prevention of heart diseases.

Nutritional Properties of Pistachios (per 100 gr)

PROPERTY	QUANTITY (GR)
Edible Portion	55 %
Humidity (gr)	1,1
Protein (gr)	21,9
Fat (gr)	56,8
Carbohydrates (gr)	4,6
Energy (kcal)	597
Total Nitrogen (gr)	1,86
Saturated Fatty Acids (gr)	4,1
Monounsaturated Fatty Acids (gr)	15,2
Polyunsaturated Fatty Acids (gr)	9,8
Starch (gr)	1,4
Total Sugar (gr)	3,2
Dietary Fiber (gr)	3,3

Source: TÜBİTAK-MAM

As a result of the unsaturated fat content and having a low glycemic index, pistachios are also believed to help prevent obesity.

In addition, the pytosterol content in pistachios prevents the development of prostate cancer.

It has also been proven that regular consumption of pistachios lower the blood pressure and therefore might be recommended for hypertension.

They decrease the absorption of glucose and therefore lower the blood sugar.

As a result of many vitamin and minerals, they are especially recommended for children for a healthy physical and mental development.

Recent studies have found that pistachios also contain resveratrol, an antioxidant that is effective and the prevention of cardiovascular diseases and cancer.

Table: Vitamin Content of Pistachios (per 100 gr, roasted and salted)

NAME	QUANTITY (MG)
Vit. A (IU)	24
Vit. B1 (mg)	0,423
Vit. B2 (mg)	0,246
Vit. B3 (mg)	1,41
Vit. B5 (mg)	1,21
Vit. B6 (mg)	0,255
Vit. B12 (mg)	0
Folic acid (mcg)	59,1
Vit. C	7,3

Source: TÜBİTAK-MAM

Table: Mineral Content of Pistachios (per 100 gr)

NAME	QUANTITY (MG)
Sodium	290
Potassium	570
Calcium	139
Magnesium	142
Phosphorus	230
Iron	1,70
Copper	1,03
Zinc	2,78
Chlorine	450
Manganese	1,21

Source: TÜBİTAK-MAM

70% of the fatty acids in Pistachios are monounsaturated fatty acids, which are considered as one of the fats most beneficial to the human body.

Production

Being one of the important producers of pistachio, growers continue to invest in pistachio tree plantations to satisfy the international and domestic demand.

Pistachio cultivation on a professional basis started with the Ceylanpınar State Farm, which was established in 1948 with 114 da of land. Today, where this farm has become one important part in pistachio research in Turkey, the total area dedicated to this purpose has reached 10,7 million ha.

The ideal growing conditions for pistachio trees are hot, dry summers and moderately cool, short winters. These climatic conditions are found particularly in the Southeastern part of Turkey; although today pistachios are grown in 56 provinces in Turkey, from the Mediterranean; Aegean and even though the Central Anatolian regions. But in the provinces of Gaziantep, Kahramanmaraş, Adıyaman, Şanlıurfa, Mardin, Diyarbakır and Siirt the production of pistachios is relatively higher. Generally, no irrigation is done in the growing process of pistachios.

Table: Production of Pistachios in Turkey by Year

Year	Quantity (tons)
2001	30 000
2002	35 000
2003	90 000
2004	30 000
2005	60 000
2006	110 000
2007	73 416
2008	125 000

Source: Turkish Institute of Statistics, Southeastern Exporters Union

According to the Pistachio Research Institute, it is estimated that the production of pistachios in 2009 was realized as 62 thousand tons.

As it can be seen from the production statistics, pistachio trees are alternate-bearing trees, where the production amount can greatly. However, as a result of high demand from both the domestic and international markets, it is expected that the average production will increase in the coming years.

Table: Cultivation of Pistachio in Turkey with Respect to Years

Year	Number of Bearing Trees (000)	Number of Non-Bearing Trees (000)
1986	18 640	12 670
1987	18 977	13 715
1988	19 343	14 034
1989	20 067	16 940
1990	20 067	16 940
1991	20 385	17 033
1992	21 080	15 793
1993	22 000	16 600
1994	22 948	17 883
1995	23 340	18 349
1996	23 850	18 910
1997	24 480	19 600
1998	25 340	19 200
1999	26 380	16 630
2000	25 445	16 875
2001	25 900	16 400
2002	26 200	15 800
2003	26 300	16 400
2004	26 500	16 000
2005	28000	18 491
2006	28 264	18 462
2007	28 464	14 939
2008	28 668	14 033

Source: Turkish Institute of Statistics

Organic pistachio production has become popular as well as a result of the search for healthier food consumption. Organic agricultural production in Turkey is conducted in accordance with EU Directive 2092/91. In 2008, 860 tons of organic pistachios were produced and 3 tons were exported. In the coming years it is expected that these numbers will continue to grow.

Pistachio Cultivars

Located in an area where pistachio cultivation has been done for centuries, many different cultivars continue to be grown today as well.

The most popular pistachio cultivars in Turkey are:

Uzun: meaning “long” in Turkish, this domestic cultivar with a green seed, has a small size and is known for its extraordinary taste worldwide. It ripens later than the other cultivars, has a higher yield and is very popular as an ingredient for the food industry.

Uzun is the major pistachio cultivar produced in Turkey originating from the Antep region.

Kırmızı: with it unique red crust (kırmızı means “red” in Turkish) and green seed, it is mainly grown in the Province of Gaziantep. It is especially grown at higher altitudes and is preferred for its early blooming.

Siirt: Named after the Turkish province, it is most commonly grown in Siirt and Şanlıurfa. Having bigger nuts, this cultivar is also a popular appetizer as a result of its high split shell ratio. Apart from the other varieties, this cultivar is known to have a moderate alternate bearing tendency.

Halebi: having small and tasty nuts, this cultivar is also preferred as an ingredient for the food industry as well as an appetizer. As a result of its early blooming, it is generally grown in regions with warm temperatures.

Ohadi: It has a large, round shape and is planted in warmer climates. Since this cultivar is late- blooming, long growing period is required. It is generally consumed as an appetizer.

Aside from the cultivars named above, the pistachio cultivars Keten Gömleği, Beyaz Ben, Değirmi, Çakmak, Sultani, Vahidi, Mümtaz, Sefidi, Hacı Şerifi are also grown in Turkey.

Properties of Turkish Pistachio Cultivars

Property	Name of Cultivar				
	UZUN	KIRMIZI	HALEBİ	SİİRT	OHADİ
Shape	long	long	flat- long	oval	spherical
Split Ratio %	70	67	78	92	94
Weight of 100 Pistachios (gr)	110,69	120,96	126,72	134,38	143,08
Length (mm)	22,48	23,96	23,48	23,46	20,83
Width (mm)	11,66	14,31	11,86	13,08	13,17
Thickness (mm)	10,77	11,841	13,53	12,55	13,09
Shell Color	Dark Ivory	Dark Ivory	Dark Ivory	Ivory	Ivory
Crust Color	Purple-Pink	Red-Purple	Violet-Pink	Red	Dark Rosé
Nut Color	Green-Pale Pink	Green-Pale Pink	Pale Pink	Yellow	Yellow
Yield %	42,48	40,37	42,05	42,64	44,53
Periodicity	Yes	Yes	Yes	Yes	Yes

Source: Southeast Anatolian Exporters Union

Chemical Analysis of Pistachios by Cultivars (%)

Cultivar	Humidity	Ash	Protein	Fat %	Iodine Value
Uzun	4,30	2,50	19,25	59,20	93,70
Siirt	4,50	2,45	20,45	57,50	96,65
Kırmızı	3,90	2,60	18,70	60,05	94,70
Ohadi	4,20	2,35	18,90	59,10	93,40
Halebi	4,10	2,45	17,65	62,60	92,70

Source: TÜBİTAK-MAM

Table: Fatty Acid Contents of Major Pistachio Cultivars

Cultivar	SATURATED FATTY ACIDS			UNSATURATED FATTY ACIDS			
	Palmitic	Stearic	Miristic	Palmitoleic	Oleic	Linoleic	Linolenic
Uzun	11,70	3,15	0,00	1,30	65,15	18,70	0,39
Siirt	8,95	2,45	0,17	1,40	68,70	18,50	0,32
Kırmızı	8,50	3,25	0,10	1,40	70,15	16,70	0,64
Ohadi	9,45	3,50	0,02	1,45	69,15	16,45	0,38
Halebi	9,40	3,15	0,06	1,50	70,65	15,30	0,25

Source: TÜBİTAK-MAM

Table: Fatty Acid Content of Pistachios

	Pistachio Type (not roasted)		
	Uzun	Siirt	Ohadi
Fatty Acid Type (%)			
Miristic acid	0,09	0,10	0,09
Palmitic acid	9,10	9,16	9,57
Palmitoleic acid	0,68	0,81	0,79
Heptadecanoic acid	0,04	0,03	0,05
Heptadecenoic acid	0,07	0,06	0,07
Stearic acid	1,69	2,16	2,10
Oleic acid	64,86	72,75	68,11
Linoleic acid	22,39	13,88	18,11
Linolenic acid	0,31	0,32	0,34
Arachidic acid	0,15	0,41	0,45
Gadoleic acid	0,15	0,41	0,45
Behenic acid	0,08	0,10	0,10
Lignoceric acid	0,04	0,04	0,05
Omega–3 Fatty Acids.	0,31	0,32	0,33
Omega–6 Fatty Acids	22,71	14,19	14,50
Omega–7 Fatty Acids	0,68	0,81	0,80
Omega–9 Fatty Acids	0,51	0,41	0,40
Monosaturated Fatty Acids	0,09	0,10	0,09
Monounsaturated Fatty Acids	0,10	0,15	0,57
α- tocopherol ppm	9,07	2,96	10,27
β-tocopherol ppm	868,8	852,77	813,86
Sterols %			
Cholestrol	0,16	0,20	0,17
Brassicasterol	--	--	0,05
24-Methilene Cholesterol	0,05	0,08	0,07
Campesterol	3,98	3,12	3,82
Campestanol	0,12	0,11	0,10
Stigmasterol	0,66	0,77	0,83
Δ7-Campesterol	0,06	0,05	0,48
Clerosterol	0,95	1,08	1,11
β -Sitosterol	84,12	84,15	84,80
Sum-βitosterol	93,92	94,92	93,66
Sitostanol	1,67	1,27	1,46
Δ 5-Avenasterol	6,24	7,80	7,11
Δ 5.24 Stigmastadienol	0,93	0,60	0,58
Δ 7-Stigmastanol	0,59	0,53	0,51
Δ 7-Avenasterol	0,44	0,22	0,31
Total sterol ppm	2882	2482	3148

Source: Pistachio Reasearch Institute

Amino Acid, Vitamin and Mineral Content of Pistachio Cultivars

Amino Acid Type (mg/100g)	Kırmızı	Uzun	Siirt
Lysine	956	815	993
Histidine	410	345	448
Arginine	1677	1388	1852
Aspartic acid	1438	1354	1548
Threonine	490	461	535
Serine	930	839	1184
Glutamic acid	5008	4423	6078
Proline	765	552	849
Glycine	828	632	808
Alanine	650	518	801
Sistine			132
Valine	1222	749	986
Methionine	184	175	253
Isoleucine	791	644	918
Leusine	1277	1006	1438
Tyrosine	599	484	610
Phenylalanine	1059	861	1137
Calcium	139,7	131,3	111,5
Zinc	2,78	2,32	2,49
Sodium	0,40	0,38	0,33
Iron	4,51	3,63	3,84
Potassium	690,7	689,8	660,85
Manganese	1,21	1,00	1,16
Copper	1,03	0,94	1,24
Magnesium	112,8	111,6	116,2
Vitamin B1	1,24	1,28	1,25
Vitamin B2	0,16	0,17	0,16
Niacin	1,50	1,54	1,44

Source: TÜBİTAK-MAM

Quality

Quality is one issue that Turkish exporters give priority to. As a result of integration with the EU, Turkish Food laws are being harmonized with the relevant EU Directives, ensuring that all consumers have access to safe products. In addition, Turkey is actively taking part in the FAO/WHO Codex Alimentarius Commission in the establishment of international standards for aflatoxin levels for Almonds, Hazelnut and Pistachios and dried Figs.

In addition, many firms are applying quality systems like HACCP, ISO 22000 or ISO 9000 standards and trying to satisfy further demands of their customers.

Exports

Turkey is the third largest exporter of pistachios in the world. Depending on the production output, Turkish pistachios have always been in demand in international markets as a result of their distinctive taste and aroma.

Total Turkish Pistachio Exports (Q: kg, V: $)

(in bulk, in- shell, roasted, in Packages < 1 kg, in- shell, roasted, in Packages > 1 kg)

	2007	2007	2008	2008	2009	2009
COUNTRY	Q	V	Q	V	Q	V
GERMANY	729.674	7.083.102	591.031	7.030.768	498.537	5.720.906
ITALY	603.280	8.228.742	511.374	7.046.565	342.790	4.788.423
SYRIA	1.440	8.640	731.686	5.465.131	728.799	4.092.079
S. ARABIA	16.311	129.521	71.856	777.562	252.093	2.647.085
BELGIUM	103.426	711.413	332.073	3.887.198	217.472	2.219.908
MEGYPT	0	0	91.416	929.612	212.010	2.142.096
THE NETHERLANDS	103.894	906.867	98.588	1.046.249	143.438	1.552.492
AZERBAIJAN.	50.529	377.864	104.049	972.266	178.564	1.456.821
GREECE	8.612	86.202	89.334	694.196	187.337	1.441.557
ISRAEL	3.249	31.303	194.849	2.013.055	105.600	1.364.909
U.S.A.	259.975	1.995.570	183.001	1.514.128	146.769	1.257.640
FRANCE	117.703	1.023.519	94.179	1.047.480	93.497	1.104.200
BULGARIA	0	0	60	1.775	55.900	960.478
T.R.N.C.	71.287	574.007	84.303	754.882	90.101	915.373
ISTANBUL FREE TRADE ZONE	720	5.400	58.080	439.152	82.645	721.106
JORDAN	0	0	41.395	299.146	66.248	581.904
U.K.	63.559	681.574	40.830	525.799	49.163	550.441
TACIKSTAN	3.500	26.208	47.520	308.330	56.450	504.691
ROMANIA	77.666	1.066.601	96.164	1.557.097	45.255	453.872
RUSSIAN FED.	2.790	24.563	2.475	25.519	21.300	420.770
TOTAL (OTHERS INC.)	2.217.615	26.210.167	3.464.263	42.376.015	3.573.968	39.382.255

Source: Turkish Institute of Statistics

Relevant Organizations:

Antep Pistachio Promotion Group
Southeast Anatolian Exporters Union
İnönü Cad. Keleşhoca Sokak No:1/1 Şahinbey 27200 GAZİANTEP
Tel: +90 342 2200010 Fax: +90 342 2200015/16
Web Site: www.aftg.org.tr
E-mail: aftg@gaib.org.tr, info@aftg.org.tr