

MORPHOLOGICAL-POMOLOGICAL CHARACTERISTICS AND ECOLOGICAL REQUIREMENTS OF PISTACHIO (*Pistacia vera* L.)

Hüseyin Tekin¹ I. Didem Karagöz¹ İ.Halil Kılıç¹ Başak Simitçioğlu¹ Fatih YAYLA¹

Gaziantep University Faculty of Science and Arts, Biology Dept., Şehitkamil/GAZİANTEP
htekin@gantep.edu.tr

Abstract

Pistachio (*Pistacia vera* L.) is a perennial, deciduous, generally single-trunk and dioic plant that can grow between 3-10m depending on the rootstock type with a habitus like an open umbrella, with higher lateral branching and 3-7 leaflets per compound leaf. It has a strong root system. The main roots that can go deep and the fibrous root system with multiple roots formed laterally are the plant's safety nets against infertile and arid soil. It has a specific bud and flower structure. In an "on" year, the majority of fruit buds that yields the next year's fruit fall off, due to insufficient cultivation conditions, unsuitable climate, infertile land and characteristics of the cultivar, which constitute the cause of periodicity. The pistachio is a dioic plant. In the pollination season, high relative humidity and excessive rainfall negatively affect fertilization. Parthenocarpy (unfertilized fruit formation) increases. The long pistachio group (Uzun, Kırmızı) that has the richest aroma and taste throughout the world and constitutes the majority of Turkey's current produce, has green kernels when harvested early and has been the raw material of the dessert industry. The oval group (Siirt, Tekin) which has been increasingly produced in Turkey, is used in the nut industry. These cultivars can compete with the round group cultivated in Iran and USA with a much higher yield compared to the long cultivars. Pistachios are not highly selective in terms of soil requirement, but they are selective in terms of climate. Therefore, it does not grow in every climate. It requires a 4-month summer season at 25-30 °C for high-quality fruit after fertilization. Depending on the cultivar, the total temperature and chilling requirements of pistachios are 3607-4405 growing degree days and 750-1000 hours, respectively.

Keywords: Pistachio, morphology, pomology, periodicity, cultivars, ecological requirement.

Introduction

The species of the *Pistacia* genus, included in the cashew or sumac family (Anacardiaceae), grow in suitable microclimates in the northern and southern hemispheres between the parallels of 30-45 degrees. According to Vavilov, *Pistacia vera* L. (pistachio) has two centers of origin (Tekin et al., 2001).

1. **Centers of Origin in Central Asia:** Northern India, Afghanistan, Tajikistan, Pakistan
2. **Centers of Origin in the Near East:** Anatolia, Caucasus Region, Iran and Turkmenistan

According to the data of the last six years (2009-2015), the total pistachio production in Turkey was 117,000 tons/year (Anonymous, 2016), with 95% of the production fields and 91.4% of the production in Gaziantep, Şanlıurfa, Siirt and Adıyaman (Eldoğan and Şahin, 2015). The

production amounts in these cities according to the annual average of the last five years were as follows; Gaziantep: 43,000 tons, Şanlıurfa: 29,600 tons, Siirt: 8,600 tons (entirely Siirt cultivars), Adıyaman: 8,300 tons (Ak, 2014). The Southeastern Anatolia Region, which is the center of origin and the initial cultivation area of pistachio, is where the majority of Turkey's pistachios are produced, which led the way in successful cultivation, spread and development of this fruit due to its unique ecological properties (Ayfer, 1964). Pistachio is a plant that does not require much water and is resistant to poor conditions and aridity (Spiegel et al., 1977). Therefore, it grows in 3rd and 4th class calcareous soil in Southeastern Anatolia and enables farming in areas that are not feasible for growing other cultivated plants (Tekin et al., 1985; Aydeniz, 1990). Water resources are very limited in these areas. Pistachios are an important plant that can grow under such ecological conditions at temperatures higher than 40°C in summer without irrigation, adds value to infertile soil and prevents erosion on steep slopes due to its strong root system.

Pistachio trees are described as the “golden tree” or “green gold” in Turkey, and in other countries in the Middle East (Ayfer, 1990). This mainly stems from the aroma and taste of the pistachios included in the long group, that particularly grow in the Southeastern Anatolia Region of Turkey and that are harvested early. The fact that people in Turkey like and find this pistachio delicious leads to their sale at high prices in the market. Recent studies reported that pistachio contribute to healthy eating, has high nutritional value and also contribute to the development of children and nutrition of older adults due to its high iron and calcium content (Şahan and Tekin, 2013; Güler, 2014). It was found that eating pistachio provides a feeling of fullness due to its high fiber content (4%) Tokuşoğlu (2007) and does not increase the glycemic index as it is slowly absorbed in the stomach and the small intestine (Kepekçi et al., 1991). It was also found that including 20-30 grams of pistachio in the daily diet prevented bad (LDL) cholesterol oxidation in the blood by 12%, and reduced the total cholesterol by 10%, blood glucose level by 8.5% and triglyceride level by 33% (Baltacı and Bağcı, 2009). Pistachios are rich in potassium, phosphorus, magnesium, calcium, iron, as well as in Vitamin E, Vitamin A and Vitamin B complexes (Tekin et al., 2001). It also contains linolenic (omega-3) and linoleic (omega-6) fatty acids, which are important antioxidants that cannot be synthesized in the human body (Tokuşoğlu, 2007).

Pistachio produced in the Southeastern Anatolia Region and consumed as a dried nut, is the best quality nut throughout the world (Anonymous, 2013). According to the latest data, this industry provides employment opportunities for 300,000 people (Anonymous, 2015). Turkey's consumption of pistachio has been increasing each year and pistachio consumption per person reaches 1.66 kg/year in the years of bountiful harvests (Anonymous, 2014).

It has been the raw material of the dessert and food industry due to the above-mentioned health benefits and nutritive properties. Considering all these properties of pistachio, it can be defined as a “**concentrated food pill**”. Moreover, “**it adds quality to a product**” when it is added or used as raw material, thereby increasing the market share of these products and providing added value.

1. Its Taxonomic Status:

Order: Sapindales

Family: Anacardiaceae

Genus: *Pistacia*

Species: *Pistacia vera* L. (pistachio) 2n: 20

There are 11 species of the genus *Pistacia* included in Anacardiaceae family which are valuable as fruit trees and ornamental plants (Özbek, 1978). Grouping between species is based on the development status of the leaf, flower, fruit and tree. Zohari (1952) classified the plants in the *Pistacia* genus as follows:

1. Lenticella group

-*Pistacia mexicana*

-*Pistacia texana*

2. Lentiscus group

-*Pistacia lentiscus* (evergreen cannot be used as rootstock. Mastic gum)

3. Butmela group

-*Pistacia atlantica*

-*Pistacia mutica*

4. Terebinthus group

-*Pistacia terebinthus* L.

-*Pistacia khinjuk* Stocks

-*Pistacia vera* L.

-*Pistacia palaestina* Boiss

-*Pistacia chinensis* Bge

Cultivated and wild type pistachio species are found in the following regions in Turkey (Arpacı et al., 1997):

-Southeastern Anatolia Region:

P. vera, *P. khinjuk* and *P. terebinthus* species are common in this region. In addition, there are new hybrids as a result of interspecific crossing. This region hosts the highest number of trees as well as more than 90% of cultivated *P. vera* (pistachio) production.

-Mediterranean and Aegean Regions:

P. atlantica, *P. mutica*, *P. terebinthus*, *P. palaestina*, *P. vera* and *P. lentiscus* can be found in these regions. All species except for *P. lentiscus* can be used as a pistachio rootstock.

-Passage Region (North Mediterranean- Inner Aegean and Central Anatolia Regions):

P. vera, *P. terebinthus*, *P. mutica* and *P. atlantica* can be found in this region. This region has the least number of species.

In the studies concerning a suitable rootstock selection for pistachio and determination of species that need to be preserved, and grafting, it was observed that the species that can be used as rootstock for pistachio were spread throughout Anatolia, except for the uplands of Eastern Anatolia and coastline of the Black Sea Region.

2. Morphological and Pomological Characteristics:

2.1. Tree properties: A deciduous, single-trunk, perennial and dioic (male and female reproductive systems on separate trees) plant. Crown of the tree: shaped like an open umbrella that grows upwards and laterally. *P. vera* tree can grow up to 3-10 meters (Ayfer, 1964). Crown development depends on soil structure, ecology, rootstock and characteristics of the cultivar. It forms a high and wide crown under suitable ecological conditions and in deep soil. *P. atlantica* may form a high crown and grow up to 20 m (Bilgen, 1973). The grafted cultivar also forms a high crown. *P. terebinthus* exhibits small crown formation. *P. khinjuk* and *P. vera* rootstocks, one the other hand, develop medium-sized crowns. *P. terebinthus* can have multiple trunks. Others have a single trunk.

In general, *Pistacia* species are resinous. *P. lentiscus* yields a high amount of resin. It cannot be used as rootstock. It is used in gum production. It is an evergreen shrub. *Pistacia* species do not like having thick branches pruned. The tree can dry out with excessive loss of resin, i.e. the plant sap.

2.2. Root structure: Pistachio trees have a strong root structure. It has a tap root that can go very deep, and fibrous roots that can mainly develop laterally (Özbek and Ayfer, 1957). A 35-year-old pistachio tree was discovered to have roots as deep as 16 meters, when its roots were identified in a water well in the same orchard (Tekin, 2014). It was also found that the tap root of a seedling rootstock that was 35 cm high above the ground could go as deep as 2 m on the production land of the Pistachio Research Institute. The pistachio first completes root development before the stem development. Dense fibrous roots may be observed at a 20-40 cm depth and moderate fibrous root formation can be seen at a 40-60 cm depth around the tap root (Tekin et al., 1995).

The strong root structure of the pistachio tree increases its resistance to aridity and other harsh conditions. This strong root structure can be considered as the safety net of the plant as it ensures use of groundwater under extremely hot and arid conditions.

2.3. Leaf properties: Pistachios have compound leaves. It always has a terminal leaflet. It is larger than or the same size as the other leaflets (Bilgen, 1968). It has 3-7 leaflets. The rachis is not winged. The leaves are dark green with a bright upper surface and an opaque undersurface.

Female pistachio trees have oval-shaped leaflets. Male pistachio trees have narrower and sharp leaves. It was found that male trees have denser leaves in general.

2.4. Flower bud structure and periodicity: There is one flower bud on each leaf base. These are divided into two, i.e. fruit buds and leaf buds. Fruit buds are distinctly larger than growth buds. In all species of the *Pistacia* genus, flower buds of the male trees are larger than the fruit buds of female trees. Fruit buds and flower buds of pistachio are formed one year earlier. According to Crane and Nelson (1971), flower buds reach their actual size in June and start to fall off in the second half of this month. Crane and Iwakiri (1988) stated that fruit bud drop in pistachio is accelerated with embryo development and ends when fruits are mature. In female trees, in an “on” year or under inadequate care, with the second growth period (start of

embryonic development), fruit buds start to fall off and this continues until the fruits are mature (Tekin et al. 1995). The fruit bud drop varies depending on the crop load of the tree, characteristics of the cultivar and soil structure. In general, the amount of fruit bud drop is lower in the cultivars of the oval group (Tekin and Akkök, 1995). The rate of fruit bud drop is decreased in irrigable well-cared orchards rich in plant nutrients and that have loamy-clay soil that goes deep, whereas it can go up to 98% in barren lands and poorly cared for orchards (Tekin et al., 2001). Therefore, the tree does not yield any products or yields a very low quantity in the following year. This phenomenon called periodicity (alternate bearing) is one of the major problems in pistachio trees. Timely application of a sufficient amount of fertilizers on the soil and leaves reduces fruit bud drop by 38% and significantly contributes to preventing periodicity by increasing yield by 50% in addition to enhancing product quality (Tekin and Güzel, 1992).

Olive and citrus trees also exhibit periodicity. However, these trees do not have fruit buds in an “on” year. On the other hand, pistachio exhibits fruit bud formation and these buds fall off depending on the crop load of the tree, cultivar, soil structure and care conditions. In Turkey, pistachio is mainly grown on arid and infertile lands. Therefore, it is possible to say that the most important cause of fruit bud drop and hence the low yield in Turkey is insufficient cultivation conditions (irrigation, fertilization) besides the characteristics of the cultivar.

2.5. Flower structure and pollination: Male and female flowers can be found on separate pistachio trees (dioic). Flowers are in panicles. Male trees do not bear fruits. They produce pollens. There is no inconsistency between the *Pistacia* species in terms of male and female sexes. In general, male trees blossom earlier and provide pollens (protandry). In pistachios, pollination is achieved via wind. Pollination generally lasts 3-7 days in male trees (Açar, 1997). New cultivars that produce pollens for 8-10 days have been developed in some studies. Blooming starts from the bottom of the panicle and moves upwards. Flowers do not have petals. Male panicles are shorter than female panicles, and have a color ranging from cream to light red. Male panicles can have 200 to 600 flowers (Atlı et al., 1995). Female panicles have nearly 120 to 140 flowers. If 20-25 of these flowers yield fruits that are not hollow, this means adequate crop yield, whereas if 40 of these flowers yield the same, this means high crop yield (Açar, 2012). The blooming period lasts 10-12 days for female flowers (Kuru and Ayfer, 1984). In male trees, blooming starts when anthers produce pollen in 10-15 panicles. In female trees, on the other hand, the day on which 5% of the flowers in a panicle blossom and the stigma portion of the pistil reaches receptive maturity, turning into cream-green color is accepted as the start of blooming. The period in which 75% of the female flowers turn into cream-green color is the full bloom period. When all anthers of the male flowers burst and 90% of the female flower pistils turn green, this is an indicator of bloom end (Ayfer, 1967; Kuru and Ayfer 1984; Tekin et al., 2001).

Pistachio is a dioic plant with a unique flower structure. Male flowers pollinate by wind and spread their pollen. Therefore, in cultivation, it would be more suitable to plan the planting in a manner to have a higher number of male trees in the prevailing wind direction.

2.6. Fertilization and fruit set: In pistachios, flower development should be completed, and pollination and fertilization should occur for seed formation. Each fruit of the pistachio tree has an ovule. Fertilization is required, as the seeds are consumed as fruit. Although the pericarp develops in an unfertilized fruit, there will be parthenocarpy as no seed was formed. This is not desired for pistachio. Most of the pollens are germinated 4 hours after the pollens arrive at the stigma (Ayfer, 1967). Pollen tubes enter the chalaza after growing through the style and the space between the style and chalaza (Okay, 2014). They first grow down within the chalaza, extend to the ovule, enter the vascular tissue and reach the embryo sac after gaining a curvature

together (Figure 1). Pollen tubes penetrate the embryo sac from the micropylar end through the chalaza and nucellus, and hence, this phenomenon is called chalazogamy (Ayfer, 1967). The pollen tube that reaches the embryo sac releases its contents to the sac through the synergids. And fertilization takes place (Okay, 2014). Pollination and fertilization processes occur within 20-28 hours (Ayfer, 1967). Some researchers reported this duration to be 21 hours (Whitehouse et al., 1964). The zygote formed after fertilization goes into a dormant period for 45-50 days. The pericarp starts to develop rapidly during this dormant period of the zygote. The ovule and endosperm are also rapidly developing in this stage. Pericarp development continues for 50-55 days and the endocarp reaches a certain hardness and size. In pistachio, this period when the pericarp is rapidly developing and the zygote is in a dormant period is called the “First Growth Period”, whereas the period nearly 10 days later when the embryo is rapidly developing and the seed matures for 45 to 55 days is called the “Second Growth Period” (Ayfer, 1967). Unfertilized flowers fall off from the pistachio trees. While the entire panicle could fall off, fruits can be obtained from fertilized flowers and hollow fruits from unfertilized flowers that have formed a pericarp. These do not have economic value. The embryo development is finished when the first and second growth periods of pistachio are completed. Maggs (1975) reported that the fruit is fully mature 4-6 weeks after the completion of embryo development, whereas Kuru et al. (1988) reported that fruits completely filled the shell nearly 4 months after pollination.

There should be suitable and adequate number of male trees in the orchard in order to achieve seed formation in pistachio. Since fertilization takes place by wind, rainy weather with high humidity is an important cause of hollow fruit formation. Splitting of pistachio nuts while on the tree is an important indicator of quality. Crops that split while on the tree provide high yield. They are easier to process. Therefore, they have high market price. Harvesting pistachios 3-5 weeks after complete embryo development ensures that the fruit is fully mature and developed, and that the hard shell is split. It is possible to say that pistachio fruits are fully mature and ready to be harvested approximately 4 months after the first bloom.

2.7. Branch structure: Pistachios have 4 types of branches (Tekin et al., 1995).

2.7.1. Water sprouts: They originate directly from the main stem. They entirely contain shoot buds. They cannot be used as scions (embryo development may not be complete). They can grow up to 40-60 cm. They are used for rejuvenation pruning in old trees. These are shoots that emerge after pruning thick branches. In order to apply top working graft to a wild type tree, it is necessary to prune the tree in advance. This system involves a special technique and a thick branch is pruned by leaving a small branch. Many water sprouts develop below the pruned area through the stimulation of adventitious buds. Two to four well-developed water sprouts are left in each sector, depending on the diameter of the branch, and the remaining ones are removed in March-April. Those that reach budding thickness are budded in June within the same year and others within the following year.

2.7.2. Monopodial branch: This branch is formed when the terminal bud from the previous year shoots forth. It contains shoot buds. All of these buds can be used as bud eyes. Using these eyes is more suitable for top working to change the variety of rootstocks for pistachio propagation. A monopodial branch is also referred to as a scion. It can grow up to 1 meter depending on the cultivar and ecology.

2.7.3. Mixed branch: This branch hosts fruit and shoot buds. A distinctly larger and black fruit bud is present on each leaf base on the lower part of the branch and a smaller shoot bud, compared to the fruit bud, is present on each leaf base on the upper part of the branch. There can be 5 fruit buds. The remaining ones are shoot buds. These branches that enable both

generative and vegetative development are of utmost importance. These branches can grow up to 80 cm.

2.7.4. Sympodial branch: This branch has one fruit bud on each leaf base. There is a terminal bud on the branch tip. This is the shortest branch of pistachio trees. It can grow up to 5-20 cm depending on the cultivar and ecology.

3. Pistachio cultivars and important characteristics thereof: Pistachios are divided into three groups according to the shape and size of fruits (Tekin and Akkök, 1995; Erdoğan, 2014). These are:

3.1. Long group: This group originates from Turkey and it is the most commonly grown cultivar which is the favorite of Turkish people as it is very delicious. The main cultivars of this group:

-Uzun (constitutes 60% of Turkey's total production).

-Kırmızı (ranks the second in production)

-Halebi (has low share in production. Suitable for consuming fresh).

-Barak yıldızı (this is the earliest cultivar. One of the new cultivars suitable for consuming fresh).

Important characteristics of the long group:

a-Cultivars with a green kernel used as a raw material in baklava, ice cream and dessert industry are included in this group. They have very rich aroma.

b-Early cultivars suitable for consuming fresh (Barak yıldızı and Halebi) are included in this group.

c-They have rich aroma and green kernels. They are the raw materials of dessert industry.

d-They have thin shells. They are suitable for processing.

3.2. Oval group: This group originates from Turkey and it was recently developed with high yield and quality. The fact that this group has a higher price in the free market and provides higher yield as compared to other cultivars increases the importance of the cultivars in this group. Producer demand is high for these cultivars. The most important two cultivars are Siirt and Tekin. Siirt cultivar is mainly grown in Siirt. It constitutes nearly 9% of Turkey's pistachio production. The Tekin cultivar was recently developed as a clone of the Siirt cultivar with high yield and quality, late-blooming and heat-tolerant properties. Farmers in Gaziantep and Şanlıurfa have high demand for this cultivar. These cultivars are mainly used in new plantations. Tekin cultivar, which was recently developed, can compete with Iran and USA cultivars due to its lower predisposition to periodicity, high rate of natural splitting (while on the tree), high yield and quality (Tahtacı et al., 2012, Tekin et al., 2001). In a study comparing the performance of pistachio cultivars under irrigated conditions, the long cultivar yielded 104 kg/da, whereas the Tekin cultivar, which was recently registered, yielded 232 kg/decare as a result of mean yield comparison of the trees aged between 12 and 16 (Bilgel, 2012).

Its rate of splitting can rise up to 96% under irrigated conditions. The high rate of natural splitting of pistachio nuts is an important indicator of quality. Pistachio shell splits when endocarp dehiscence occurs at the apex of the suture line, since the kernel is fully developed. In the oval group, the kernel is large and the yield is around 43-44%, whereas the yield is around 38-41% in the long group.

Important characteristics of the oval group: a-Pistachios of this group are large and flamboyant, suitable for consumption as dried nuts. They have a dry, red shell, with a fruit size = 75 fruits/100g. Fruit size in the long group is 90-100 fruits/100 grams (Tekin et al., 2001).

a-Rate of splitting (endocarp dehiscence from the apex towards the lower part of the suture line) is high (higher than 90%), whereas the rate of splitting is 60% on average in the long group.

b- Splitting interval is large (3 mm and higher). This is one of the desired properties in export.

c- The yield is high, provides higher income per unit area. Yield can increase incrementally under irrigated conditions compared to the older cultivars.

d- The endocarp is white.

The most important disadvantage of this group is that the endocarp is slightly thicker in comparison to the long group. However, this group has a higher kernel yield and splitting rate as they form fleshy fruits.

3.3. Round group: Kerman grown in the USA, and Owhadi, Akbari and Kellegochi grown in Iran are included in this group. This group can also be cultivated in Turkey. According to Tekin et al., (2001), this group has less aroma and green color formation in comparison to the cultivars grown in Turkey; therefore, Turkish people do not like the taste of these pistachios very much. That's why they are cultivated in limited amounts in Turkey. Some cultivars were only cultivated on research parcels.

4. Ecological requirements:

The strong root structure of pistachios is an important property that reduces soil selectivity. Therefore, pistachios have been grown in third- and fourth-class soils. Pistachio can develop very well on partially calcareous and loamy soil at a pH around 8, and like other fruits, pistachio can also grow on sandy loam, clay loam, deep and partially calcareous soils and provide higher yields (Tekin et al., 1985). Recently, pistachio has been moved to bottom lands especially in Gaziantep and Şanlıurfa, and has started to be cultivated in large plantations. It does not grow in areas with high groundwater level. Pistachio roots decay in still water, since the roots go deep.

Pistachio is not highly selective in terms of soil, but selective in terms of climate. It does not grow in every climate. It requires a long and hot summer with low humidity. Majority (90%) of the flower buds were damaged when scions were held at -15 °C for 4 hours in the winter. During the bloom period in the spring, 30% of the flowers were damaged at -1 °C within 1 hour, and 60% were damaged within 2 and 3 hours (Arpacı et al., 2005). In Chico located in California, USA, temperatures dropping down to -2.2 and -0.5 °C in the bloom and small fruit period negatively affected that year's crops (Joley, 1973). Chilling requirement for pistachio ranges between 750 and 1000 hours (Tekin et al., 1995). It was reported that chilling requirement for Kerman, which is the only cultivar in the USA, is 1000 hours (Moranto and Crane 1982). Although there are no problems in the Southeastern Anatolia Region, which

constitutes 90% of pistachio cultivation, in terms of chilling requirement and frost damage in the winter, late frosts in the spring caused some significant problems in some years. Recent studies have shown that pistachio requires a long, hot and sunny summer for nearly 4 months after fertilization (Kuru and Ayfer, 1984), and that existing species require a total temperature of 3607-4405 growing degree days (Tekin et al., 2001).

Cool and rainy weather that goes on for a long time in the blooming period negatively affects pollen spread. It can lead to lack of fertilization and parthenocarpy (Okay, 2014).

Kanber et al., (1990) stated in their study that the annual water requirement for pistachio is between 754-803 mm, and recommended to irrigate up to 110-150 cm depth, and therefore provide 120 mm of water at each irrigation with 20 to 30-day intervals in the summer. Moreover, in another study by Kanber et al., (2000), it was reported that photosynthetic rate (carbohydrate accumulation) was 32% higher, periodicity was lower and yield was higher in trees that were provided adequate irrigation with suitable timing as compared to the non-irrigated trees. Irrigation water should not be supplied to the root collar. This can damage the vascular bundles.

Although pistachio is not highly selective of soil and can grow on lands with low groundwater level, it can develop better on clay and loam soil. On the other hand, it is selective of climate and cannot develop under every ecological condition. It is highly heat-tolerant. Therefore, the highest pistachio production is observed in the Southeastern Anatolia Region, which has hot and arid summer conditions. It is spread throughout various regions in Anatolia, and can grow in microclimates.

5. Conclusion

11 types of the *Pistacia* species that are fructiferous or ornamental are spread across Anatolia, with prevalence in some regions. Anatolia is one of the major gene centers of this genus.

It is not highly selective in terms of soil, but selective in terms of climate. As it likes hot climates, it cannot be grown in under every ecological condition. Southeastern Anatolia region has ecological conditions under this plant thrives the best. This region has contributed to the growth and spreading of pistachios. Southeastern Anatolia region is dry and hot in the summer. It receives little rain. It receives no rain in some years. The strong root system of the pistachio tree that can extend to great depths protects this genus against drought.

The pistachio is a dioic plant. Formation of parthenocarpic fruits is a major problem of the pistachio tree. A pollinator that blossoms in the right time and provides sufficient amount of pollens is needed for sufficient seed formation.

Cultivation of pistachio from the long group is more wide-spread in Turkey. This group is favored more by Turkish people in terms of taste and flavor. The produce from this group is harvested early and called grey pistachio. They are used as raw materials for the baklava industry. Their use in ice cream and other desserts tend to increase. Pistachio from the oval group are used in the dried nut industry due to their large splitting interval, largeness and flamboyance as demanded by the consumers abroad.

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