

Description of fruit characteristics of some *Pistacia* spp. in Manisa-Yunt Mountain area. Preliminary results

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SUMMARY – Pistachio is one of the important export products of Turkey. Although this species is mostly cultivated in the southeast region, different *Pistacia* spp. are distributed in the other regions, as well. One of these areas is the Yunt Mountain in Manisa province. Orchards are established with pistachio cultivars which are grafted at the place where they grow. To prevent probable cultivar disorder at grafting, the description of varieties is important. Taking this into consideration, the current study has been started. A pomological evaluation was carried out according to the pistachio and *Pistacia* spp. descriptors of IPGRI (International Plant Genetic Resources Institute) for cultivars and species, respectively. Nut and kernel characteristics were evaluated in terms of hull dehiscence, hull consistency, hull tip, hull colour, hull colour homogeneity, the length, width, thickness and shape of nut, shell apex, pedicel scar shape, suture elevation, split nut, suture opening, blank production, 100-nut weight, number of nuts in 100 g, 100 kernel weight, kernel dry weight/nut dry weight x 100, the length, width and thickness of kernel. Some differences in relation to investigated characteristics were found in Kirmızı and Uzun cultivars.

Key words: *Pistacia* spp., pistachio, description, fruit characteristics.

RESUME – "Description des caractéristiques du fruit chez quelques espèces de *Pistacia* dans la zone montagneuse de Manisa-Yunt. Résultats préliminaires". Les pistaches sont l'un des grands produits d'exportation de la Turquie. Malgré le fait que cette espèce soit principalement cultivée dans la région du sud-est, différentes espèces de *Pistacia* sont également distribuées dans d'autres régions. L'une de ces grandes zones est constituée par les montagnes de Yunt de la province de Manisa. Les vergers sont établis avec des cultivars de pistachier qui sont greffés là où ils poussent. Pour éviter d'éventuels problèmes des cultivars au greffage, la description des variétés est importante. C'est dans ce sens qu'a été entamée la présente étude. L'évaluation pomologique a été menée en accord avec les descripteurs des pistachiers et des espèces de *Pistacia* de l'IPGRI (Institut International de Ressources Phytogénétiques) pour les cultivars et les espèces, respectivement. Les caractéristiques du fruit et de l'amandon ont été évaluées en termes de déhiscence de la coque, consistance de la coque, pointe de la coque, couleur de la coque, homogénéité de la couleur de la coque, longueur, largeur, épaisseur et forme de du fruit, apex de la coque, forme de la cicatrice du pédicelle, élévation de la suture, fruits doubles, ouverture de la suture, production de vides, poids de 100 fruits, nombre de fruits dans 100 g, poids de 100 amandons, poids des amandons secs/poids des fruits secs x 100, longueur, largeur et épaisseur des amandons. Quelques différences concernant les caractéristiques étudiées ont été trouvées chez les cultivars Kirmızı et Uzun.

Mots-clés : Espèces de *Pistacia*, pistachier, description, caractéristiques du fruit.

Introduction

Turkey is one of the main pistachio nut producing country in the world and pistachio is an important export product for our country. Although Turkish varieties are smaller both in shell and kernel, these varieties are preferred in many European and USA markets owing to their better taste and more uniformly green kernels (Woodroof, 1982). One of the origin places of pistachio is Anatolia. Therefore, it is grown in all over Turkey. However, this species is mostly cultivated especially in southeast Anatolia where the annual precipitation is very low, the summers are hot, winters are cold and the soil is generally poor. Beside this region, it can also grow and produce marketable nuts in the Mediterranean, Aegean, Marmara regions (Ka_ka, 1995).

One of these areas is Yunt Mountain in Manisa province of Aegean region. The ecology of this area has been appeared suitable for pistachio growing. *P. atlantica* and *P. terebinthus* are scattered here. There is a rather large population top-worked on wild rootstocks. According to the statistics, in Manisa province, total tree number and production is 675,998 and 405 ton, respectively (Anonymous,

1995). In Manisa-Yunt Mountain, there are 78,000 bearing trees and 117,000 non-bearing trees and the production is 80,000 kg.

In this place, since sum of the summer temperatures is low, it is sufficient to fill the kernels. But kernels are green colour due to high chlorophyll content. Green kernel is one of the most desired characteristics. Turkey exports some of its pistachios as green kernel (Ka_ka, 1995).

Cultivar confusion and lack of information exist about identification and characterization of pistachios. Taking into consideration, probable cultivar confusion order at budding, this study was designed to describe cultivars in that district.

Materials and methods

This study was carried out in two orchards of Yunt Mountain district. Average of 20 fruit samples at harvest time (September) were collected from different types of Kırmızı and Uzun varieties. Similarly, two types of *P. atlantica* were evaluated.

Pomological evaluation was done according to the pistachio (Anonymous, 1997) and *Pistacia* spp. (Anonymous, 1998) descriptors of International Plant Genetic Resources Institute (IPGRI) for cultivars and species, respectively.

Investigated characteristics according to descriptor for pistachio are summarized as follows:

(i) *Hull*: hull dehiscence, hull consistency, hull tip, hull colour, hull colour homogeneity.

(ii) *Nut*: nut length (mm), nut width (mm), nut thickness (mm), shell apex, depression of shell near pedicel scar, nut abscission, pedicel scar colour, pedicel scar shape, pedicel scar elevation, suture elevation, split nut, tendency to early, nut splitting, position of suture, opening, suture opening, tendency to shell staining, 100 nut weight (g), number of nuts in 100 g (g).

(iii) *Kernel*: 100 kernel weight (g), kernel length (mm), kernel width (mm), kernel thickness (mm), kernel dry weight/nut dry weight x 100.

The evaluation of *Pistacia* spp. based on the descriptor is as follows: hull tip, hull consistency, hull wrinkles, fruit thickness (mm), fruit length (mm), fruit width (mm), fruit shape, 20 fruit weight (g).

Results and discussion

The fruits characteristics of pistachio cultivars in Yunt Mountain district are given on Table 1.

Some differences in relation to investigated characteristics were found in Kırmızı and Uzun cultivars, as could be seen in the Table 1. In the evaluation of hull at maturity, hull dehiscence is slightly dehiscent in Kırmızı and types, but is dehiscent in Uzun types. Hull consistency is determined as dry in all cultivars. Uzun types have pronounced hull tip, Kırmızı types have strongly pronounced hull tip. Hull colour is red-purple in Kırmızı-I, is yellow-red in the others. Hull colour homogeneity is present in Uzun types, is absent in Kırmızı types.

In the evaluation made in respect to nut characteristics, nut length values ranged between 17.78 and 9.98 mm in Kırmızı types, 21.36 and 21.38 mm in Uzun types. Nut width were determined to range between 10.80-11.34 mm for Kırmızı types, 11.08-12.98 mm for Uzun types. All types possessed flattened shell apex except Uzun-II. Nut thickness were measured between 9.28 and 10.95 mm for Kırmızı, 10.20 and 10.97 mm for Uzun. It was seen that depression of shell near pedicel scar is absent and pedicel scar shape is ovate. Suture elevation and suture opening were observed as low and narrow in Kırmızı and Uzun types, respectively.

Since pistachio is sold as shelled nuts, split nut proportion accepted as an attribute affecting quality is very low. For example, it is 3% in Kırmızı-III, 23% in Kırmızı-II, 7% in Uzun-I and 23% in Uzun-II. Tendency to early nut splitting was not observed in these samples.

Table 1. Fruit characteristics of pistachio cultivars in Yunt Mountain area

Cultivar	Hull dehiscence	Hull consistency	Hull tip		Hull colour	Hull colour homogeneity	
Kırmızı-I	Slightly dehiscent	Dry	Strongly pronounced		Other (yellow-red group)	No	
Kırmızı-II	Slightly dehiscent	Dry	Strongly pronounced		Other (yellow-red group)	No	
Kırmızı-III	Slightly dehiscent	Dry	Strongly pronounced		Other (yellow-red group)	No	
Uzun-I	Dehiscent	Dry	Pronounced		Red-purple group	Yes	
Uzun-II	Dehiscent	Dry	Pronounced		Other (yellow-red group)	Yes	
Cultivar	Nut length (mm)	Nut width (mm)	Nut thickness (mm)		Shell apex	Depression of shell near pedicel scar	
Kırmızı-I	19.98	11.34	10.95		Flattened	Absent	
Kırmızı-II	17.78	11.10	9.28		Flattened	Absent	
Kırmızı-III	18.86	10.80	10.60		Flattened	Absent	
Uzun-I	21.38	11.08	10.20		Flattened	Absent	
Uzun-II	21.06	12.98	10.97		Flattened and asymmetrically pointed	Absent	
Cultivar	Nut abscission	Pedicel scar colour	Pedicel scar shape		Pedicel scar elevation	Suture elevation	
Kırmızı-I	Medium	Darker than shell colour	Ovate		Protruding	Low	
Kırmızı-II	–	Similar to shell colour	Ovate		Flattened	Low	
Kırmızı-III	Medium	Darker than shell colour	Ovate		Protruding	Low	
Uzun-I	Easy	Similar to shell colour	Ovate		Flattened	Low	
Uzun-II	–	Darker than shell colour	Ovate		Flattened	Low	
Cultivar	Split nuts (%)	Tendency to early nut splitting	Position of suture opening		Suture opening	Tendency to shell staining	
Kırmızı-I	5	–	Dorsal and ventral side completely		Narrow	Low	
Kırmızı-II	23	–	Mainly dorsal side		Narrow	Low	
Kırmızı-III	3	–	Dorsal side only		Narrow	Low	
Uzun-I	7	–	Dorsal and ventral side completely		Narrow	Intermediate	
Uzun-II	23	–	Dorsal side only		Narrow	Low	
Cultivar	100-nut weight (g)	Number of nuts in 100 g	100-kernel weight (g)	Kernel dry weight/nut dry weight x 100	Kernel length (mm)	Kernel width (mm)	Kernel thickness (mm)
Kırmızı-I	86.19	115.96	30.60	35.50	12.23	6.53	6.77
Kırmızı-II	82.06	121.86	34.63	42.20	14.66	7.99	7.13
Kırmızı-III	82.29	111.40	33.15	40.28	13.17	7.38	7.96
Uzun-I	80.50	126.82	34.97	43.44	15.08	6.55	7.33
Uzun-II	102.42	97.96	44.12	43.07	16.31	8.25	7.87

Position of suture opening varied between dorsal side only mainly dorsal side and dorsal and ventral side. Although Uzun-II had the highest 100 nut weight with 102.42 g, the others had the lower value. Similarly, the highest 100 kernel weight was found in the same type. Kernel length and width of Uzun types were bigger than Kırmızı. Kernel thickness was different according to the types. Kernel proportion was higher in Uzun-I (43.44%) and Uzun-II (43.07%).

In cultivars located in Yunt Mountain place, 100 nut weight, kernel production and split shell percentages are lower than the domestic and foreign varieties (Ak, 1992; Karaca and Nizamo_lu, 1995). Mostly, splitting proportion is low due to influence of water during kernel growth (Ka_ka, 1990).

The evaluation of *P. atlantica* is given on Table 2. It was seen to find two different types in this species. *P. atlantica*-I had higher fruit weight than *P. atlantica*-II.

Table 2. Fruit characteristics of *P. atlantica* in Yunt Mountain area

Species	Hull tip	Hull consistency	Hull wrinkles	Fruit thickness (mm)	Fruit length (mm)	Fruit width (mm)	Fruit shape	20-fruit weight (g)
<i>P. atlantica</i> -I	Absent	Juicy	Reticulate	3.76	6.12	5.52	Obovoid-globular	2.24
<i>P. atlantica</i> -II	Absent	Juicy	Reticulate	3.64	5.15	5.02	Globular	1.70

Conclusion

Modern cultural techniques are not applied in pistachio growing. Pistachio are grown with no irrigation, fertilizers or pest control. Characterization is of great importance to obtain true information on existing germplasm. It may be helpful for standardization.

It was seen that there is a variation in Kırmızı and Uzun cultivars grown in Yunt Mountain. Since there is not any investigation in this area, this study was performed to evaluate the natural populations of pistachio.

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