

Comparison of seedling characteristics of some *Pistacia* species

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SUMMARY – This study was carried out to determine seedling characteristics of some *Pistacia* species under Gaziantep ecological conditions. The seeds of *Pistacia vera* L. (cv. Kirmizi), *Pistacia khinjuk* Stocks, *Pistacia terebinthus* L., *Pistacia atlantica* Desf., UCB-1 and PG were used as material. The diameter growth of trunk and height of the seedlings and budding success were investigated. The best seedling growth was measured on *Pistacia vera* (cv. Kirmizi) in the first period (first four months). The best diameter growth of trunk occurred on UCB-1 and was followed by PG, *Pistacia vera* (cv. Kirmizi), *Pistacia khinjuk* Stocks, *Pistacia terebinthus* L. and *Pistacia atlantica* Desf. respectively at the end of the vegetation period. The highest seedling height was obtained from the seedlings of UCB-1 and followed by the seedlings of *Pistacia vera* L. (cv. Kirmizi), PG, *Pistacia atlantica*, *Pistacia terebinthus* L., *Pistacia khinjuk* Stocks. The budding success occurred on *Pistacia atlantica* Desf., *Pistacia vera* L. (cv. Kirmizi), PG and was followed by *Pistacia terebinthus* L. and *Pistacia khinjuk* Stocks.

Key words: *Pistacia* spp., pistachio, rootstock, seedling growth, budding.

RESUME – "Comparaison des caractéristiques de plants de quelques espèces de *Pistacia*". Cette étude a été menée pour déterminer les caractéristiques des plants de quelques espèces de *Pistacia* sous les conditions écologiques de Gaziantep. Les semences de *Pistacia vera* L. (cv. Kirmizi), *Pistacia khinjuk* Stocks, *Pistacia terebinthus* L., *Pistacia atlantica* Desf., UCB-1 et PG ont été utilisés comme matériel. La croissance du diamètre du tronc et la hauteur des plants ainsi que la réussite du bourgeonnement ont été étudiées. La meilleure croissance des plants a été mesurée sur *Pistacia vera* (cv. Kirmizi) à la première période (quatre premiers mois). La meilleure croissance du diamètre du tronc a été obtenue sur UCB-1 suivi par PG, *Pistacia vera* (cv. Kirmizi), *Pistacia khinjuk* Stocks, *Pistacia terebinthus* L. et *Pistacia atlantica* Desf. respectivement, à la fin de la période végétative. La meilleure hauteur des plants a été obtenue à partir de UCB-1, suivi par *Pistacia vera* L. (cv. Kirmizi), PG, *Pistacia atlantica*, *Pistacia terebinthus* L., et *Pistacia khinjuk* Stocks. La réussite du bourgeonnement a été obtenue sur *Pistacia atlantica* Desf., *Pistacia vera* L. (cv. Kirmizi), PG, suivis par *Pistacia terebinthus* L. et *Pistacia khinjuk* Stocks.

Mots-clés : Espèces de *Pistacia*, pistachier, porte-greffe, croissance des plants, bourgeonnement.

Introduction

In the genus of *Pistacia* which belonged to the family of *Anacardiaceae* there are 11 species which some of them used as ornamentals and some valued as fruit tree. *Pistacia vera* L., *Pistacia terebinthus* L., *Pistacia khinjuk* Stocks, *Pistacia atlantica* Desf., *Pistacia mutica*, *Pistacia lentiscus* and *Pistacia palaestina* species grown naturally in Turkey (Ozbek, 1978; Atli et al., 1999) (Table 1).

The origin of *Pistacia vera* L. species is southeastern Anatolia. They are generally grown as trees (Ozbek, 1978). The height of the trees are about 3 to 8 meters. In Turkey, the seedlings of *P. vera* cvs Uzun and Kirmizi are mostly used as rootstocks. But the seedlings of Siirt cultivar reach rapidly than others to the suitable thickness for budding (Atli and Kaska, 1997).

P. khinjuk is widely spread in the provinces of Siirt, Hakkari, Bitlis, Gaziantep and some part of Mardin in the southeast Anatolian region of Turkey. The trees of *P. khinjuk* may grow up to 10 meters (Bilgen, 1973).

Pistacia terebinthus is widely spreading in the areas of Mediterranean and temperate zone climates in Turkey. The seedlings of *P. terebinthus* can grow in stony, calcarous and dry areas. They are resistant to cold and drought. For that reason, the seedlings of *P. terebinthus* growing naturally in

non-agricultural areas can be grafted with pistachio cultivars and benefited from them (Tekin *et al.*, 1995).

Table 1. Wild *Pistacia* species in Turkey (Arpaci and Atli, 1996; Atli *et al.*, 1999)

Trait	<i>P. terebinthus</i> (Melengic)	<i>P. vera</i> (Kus fistigi)	<i>P. khinjuk</i> (Buttum)	<i>P. atlantica</i> (Atlantik sakizi)	<i>P. lentiscus</i> (Mezdeki sakizi)	<i>P. palaestina</i> (Filistin sakizi)
Habit	Multi-stem	Semi-erect	Erect	Erect	Bush	Semi-erect
Inflorescence	Intermediate	Intermediate	Late	Early	–	Intermediate
Ripening period	Intermediate	Intermediate	Late	Early	–	Early
Nut length (mm)	5.7	15-21	6.6-12.3	5.9-8.5	4.7	5.9
Nut width (mm)	4.2	6-9	4.8-9.6	4.2-6.2	3.9	3.6
Nut suture (mm)	5.1	10-11	5.6-11.4	5.9-7.7	4.9	4.9
100 nuts weight (g)	4.00-4.70	40.00-75.00	10.02-65.04	8.34-15.43	3.85	4.70
Nut shape	Rounded	Elongated	Rounded	Rounded	Rounded	Rounded
Hull colour	Green	Red group	Green	Green	Black	Green

The trees of *P. atlantica* are spread in the Mediterranean and Aegean region of Turkey. They grow naturally in the same areas with *P. mutica* which has rounded tree shape and different from *P. atlantica* trees but *P. atlantica* is accepted synonymous to *P. mutica*. The trees of *P. atlantica* may grow up to 15-20 m (Ozbek, 1978).

There are five rootstocks in ABD, three different *Pistacia* species and two interspecific hybrids. The rootstocks are *P. terebinthus*, *P. atlantica* and *P. integerrima* (PG) and two hybrids (PG II, UCB-1) with *P. atlantica* and *P. integerrima* (Table 2) (Krueger and Ferguson, 1995).

Table 2. Some characteristics of pistachio rootstocks in ABD†

Rootstock	Cold tolerance	Disease resistance		Vigour	Early yield	Nutritional efficiency		
		Armillaria	Verticillium			Zn	B	Cu
<i>P. terebinthus</i>	*	*	****	**	***	*	**	*
<i>P. atlantica</i>	**	****	****	**	***	**	***	**
<i>P. integerrima</i>	****	***	*	*	**	***	*	***
PG II	***	***	***	*	**	*	**	*
UCB-1	***	*	**	*	*	***	***	***

†From most* to least****.

The seedlings of *Pistacia* species grow very slow. In general, it takes 2-3 or 4 years to reach to the suitable diameter for budding in open field conditions in Turkey. For that reason, to propagate young pistachio trees sometimes we needed 4 to 6 years. This study was conducted aiming to investigate the characteristics of seedlings of *Pistacia* species and rootstocks grown in greenhouse and possibilities of propagation of pistachio trees in short time.

Materials and methods

The seeds of *Pistacia vera* L. (cv. Kirmizi), *Pistacia khinjuk* Stocks, *Pistacia terebinthus* L., *Pistacia atlantica* Desf., UCB-1 and PG were used as material. The seeds of these rootstocks were sown at the time in February 1998 into the plastic tubes in greenhouse.

The diameter growth of trunk of seedlings were measured on the 30th of April, the 25th of June and 10th of December. The height of seedlings were measured on the 30th of April and 10th December.

All seedlings except UCB-1 were budded in June at the same time. T budding was used as budding method and budding point was 10 cm above from the ground level.

Results

The best seedling growth was measured on the *Pistacia vera* (cv. Kirmizi) at the first period (first four months). The best diameter growth of trunk was occurred on UCB-1 and followed by PG, *Pistacia vera* (cv. Kirmizi), *Pistacia khinjuk* Stocks, *Pistacia terebinthus* L. and *Pistacia atlantica* Desf. respectively at the end of the vegetation period (Table 3). Among the rootstocks, the seedlings of *Pistacia vera* L. (cv. Kirmizi) and UCB-1 had the largest trunk diameter at the June budding time.

Table 3. The diameter of seedlings trunk of different rootstocks (mm)

Rootstocks	Months		
	30 April 1998	25 June 1998	10 December 1998
<i>Pistacia vera</i>	3.05 A	5.64 A	5.74 BC
<i>Pistacia khinjuk</i>	2.37 B	4.87 BC	5.50 C
<i>Pistacia terebinthus</i>	2.36 B	4.31 C	5.34 C
<i>Pistacia atlantica</i>	1.79 C	4.41 D	5.01 C
PG	1.63 C	4.53 C	6.74 AB
UCB-1	2.55 B	5.34 AB	7.15 A
LSD %5	0.449	0.690	1.165

The best result on the seedling height was obtained from the seedlings of UCB-1 and followed by the seedlings of *Pistacia vera* L. (cv. Kirmizi), PG, *Pistacia atlantica*, *Pistacia terebinthus* L., *Pistacia khinjuk* Stocks. The seedlings of *P. vera* L. (cv. Kirmizi) grew rapidly at the first months of season but at the end of the vegetation period UCB-1 and had the highest seedlings (Table 4).

Table 4. The length of seedlings of different rootstocks (cm)

Rootstocks	Months	
	30 April 1998	10 December 1998
<i>Pistacia vera</i>	47.3 A	91.8 B
<i>Pistacia khinjuk</i>	16.3 C	45.7 D
<i>Pistacia terebinthus</i>	18.3 C	46.3 D
<i>Pistacia atlantica</i>	18.7 C	47.0 C
PG	15.6 C	66.7 C
UCB-1	30.3 B	108.3 A
LSD %5	4.477	14.420

The budding success rates were averaged over 47.3%. There were no significant differences for the budding success rates among the rootstocks. However, The best budding success were occurred on *Pistacia atlantica* Desf., *Pistacia vera* L. (cv. Kirmizi), PG and followed by *Pistacia terebinthus* L. and *Pistacia khinjuk* Stocks respectively (Fig. 1).

According to these results, the rootstocks which are originated from USA, UCB-1 and PG had better seedling growth compared to the seedling growth of native *Pistacia* species diameter for June budding and some further rootstock breeding studies are needed to develop new hybrid rootstocks for south Anatolia region of Turkey.

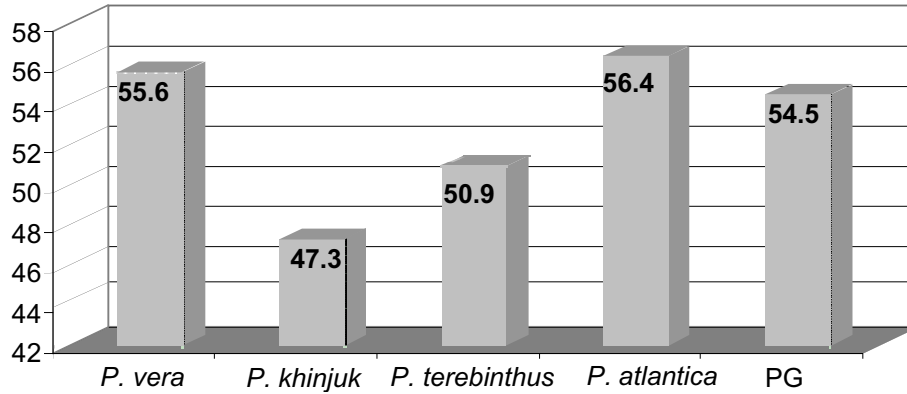


Fig. 1. The budding success of seedling of different rootstock (%).

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