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Effects of rootstocks on the bud-take, growth and development of some Turkish and foreign pistachio cultivars under Kahramanmara_ ecological conditions

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SUMMARY – In Turkey pistachio nut yield per tree is quite low. In order to improve it a comprehensive experiment was designed by taking varieties, rootstocks, pollinators and irrigation into consideration. In this paper the effects of the rootstocks on the bud-take and the growths of the scions will be presented.

Key words: Pistachio, rootstocks, bud-take.

RESUME – "Effets des porte-greffes sur le greffage, la croissance et le développement de quelques cultivars de pistachiers turcs et étrangers dans les conditions écologiques de Kahramanmaras". En Turquie, le rendement en pistaches par arbre est très faible. Afin de l'améliorer, une expérience d'ensemble a été conçue prenant en considération certaines variétés, porte-greffes, pollinisateurs et modalités d'irrigation. Dans cet article sont présentés les effets des porte-greffes sur la prise du greffage et la croissance des greffons.

Mots-clés : Pistachier, porte-greffes, greffage.

Introduction

Although number of pistachio trees and area devoted to this nut is quite high its yearly production (which is about 40 thousand tons) is much lower than Iran and USA. There are 4 main reasons in this matter: (i) lack of irrigation; (ii) shortage of pollination; (iii) varieties; and (iv) rootstocks.

In Turkey almost none of the pistachio trees are irrigated. In the main production area (southeast Anatolia) the annual precipitation is about 300 mm. Pollination is irregular that means there are not enough pollinator trees in orchards. On the other hand planted male trees were not suitable for the female varieties. However, recently pollinator problem for different varieties were solved. The prevailing varieties grown in the southeast Anatolia are bearing alternately. The predominantly used rootstock is *P. vera*. Since this rootstock is sensitive to *Phytophthora* the growers are afraid of killing their trees if they are irrigated.

In order to help solving of these problems, an integrated project was prepared and applied in Gaziantep (in two locations), _anlıurfa (Harran Plain) and Kahramanmara_. In this paper the results of Kahramanmara_ experiment will be presented.

The objective of this project is to grow Turkish, Iranian and American varieties budded on various rootstocks, proper pollinators for the experimental varieties under drip irrigation and to compare their bud-take percentages, scion diameters and lengths.

Materials and method

In the experiment 5 rootstocks (*P. vera*, *P. khinjuk*, *P. terebinthus*, *P. atlantica* and UCB-1), 2 Turkish (Siirt and Sel-14), 2 Iranian (Ohadi and Kallehgouchi) and 1 American (Kerman) variety were used. *P. vera* seeds are taken from Siirt variety. *P. khinjuk* seeds were obtained from Siirt province (Kafkas and Ka_ka, 1997a) and *P. terebinthus* seeds were obtained from Adiyaman province (Ka_ka et al., 1993). *P. atlantica* seeds were obtained from Manisa province (Kafkas and Ka_ka, 1997b) and

UCB-1 seeds were supplied from Davis University (Ferguson *et al.*, 1996). Potted seedlings of the rootstocks were planted on 30th of April 1997. When the diameter of the rootstocks reached 0.6 to 0.7 cm they were budded either by shield (in Summer 1997) or chip (in Spring 1998) budding methods. The experiment was set up in a randomized block design with 4 replicates. In each replicate 3 plants were used. For 8 female trees 1 male tree (proper for the chosen variety) was planted (Fig. 1). All the plants are being drip irrigated.

In 1998 the number of sprouting buds of each variety on different rootstock were counted. At the winter period of 1998 the scion diameters and their lengths were measured by using a digital caliper and a ruler.

Results and discussion

Percentages of sprouting of the taken buds of Ohadi, Kallehgouchi and Se-14 were higher on *P. vera* rootstocks than the others (Fig. 2). The highest sprouting percentages of taken buds were obtained on *P. terebinthus* with Siirt variety. It is followed by Ohadi variety on *P. vera* rootstock. Sprouting of Siirt buds on *P. atlantica*, *P. terebinthus*, *P. vera* and *P. khinjuk* were quite satisfactory in comparison to the other varieties. Sel-14 has given the lowest percentage of sprouting buds.

The stem diameter growths of Ohadi variety on different rootstocks were found better and more regular than the other varieties (Fig. 3). The thickest diameters were obtained from Ohadi and Siirt scions on *P. atlantica*. Ohadi's diameter growth on *P. khinjuk* was found better than the other varieties budded on the same rootstock. Kallehgouchi's and Sel-14's stem diameters on 4 and 2 rootstocks, respectively, were found to be 8 to 9 mm.

Extension growths of scions of the 4 experimental varieties are shown in Fig. 4. As it is clearly seen in this figure, the lengths of the scions are the longest in Siirt on *P. atlantica* (74.3 cm), and it is followed by *P. khinjuk* (67.6 cm) and *P. vera* (64.0 cm). Siirt was followed by Ohadi, which showed a similar performance on *P. atlantica* and *P. vera* but low growth rate on *P. khinjuk*. In this variety *P. terebinthus* has given better results. Similar to scion diameter growth, the growth of Kallehgouchi's scions on *P. terebinthus*, *P. khinjuk* and *P. vera* rootstocks are quite similar. Sel-14 on *P. terebinthus* has produced a little longer scion than *P. vera*.

It is quite early to reach the expected results from the experiment yet. Up to now we were able only to check bud-takes, and the growths of the scions. In this stage, Siirt variety seemed to be the best grown one in comparison to the other varieties tested on *P. atlantica*. However, *P. khinjuk* looked also a good rootstock for at least Siirt and Kallehgouchi. Until now none of the *P. vera* seedlings were killed by any disease. Drip irrigation had a very satisfactory effect on the growth of all the experimental plants.

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T1 T2 T3 T4 T5 T2 T5 T1 E T3 T4 E T2 T5 T1 T2 T3 T4 T5 T2 T5	A1 A2 A3 A4 A5 A2 A5 A1 E A3 A4 E A2 A5 A1 A2 A3 A4 A5 A2 A5	K1 K2 K3 K4 K5 K2 K5 K1 E K3 K4 E K2 K5 K1 K2 K3 K4 K5 K2 K5	V1 V2 V3 V4 V5 V2 V5 V1 E V3 V4 E V2 V5 V1 V2 V3 V4 V5 V2 V5
V1 V2 V3 V4 V5 V2 V5 V1 E V3 V4 E V2 V5 V1 V2 V3 V4 V5 V2 V5	T1 T2 T3 T4 T5 T2 T5 T1 E T3 T4 E T2 T5 T1 T2 T3 T4 T5 T2 T5	A1 A2 A3 A4 A5 A2 A5 A1 E A3 A4 E A2 A5 A1 A2 A3 A4 A5 A2 A5	K1 K2 K3 K4 K5 K2 K5 K1 E K3 K4 E K2 K5 K1 K2 K3 K4 K5 K2 K5
K1 K2 K3 K4 K5 K2 K5 K1 E K3 K4 E K2 K5 K1 K2 K3 K4 K5 K2 K5	V1 V2 V3 V4 V5 V2 V5 V1 E V3 V4 E V2 V5 V1 V2 V3 V4 V5 V2 V5	T1 T2 T3 T4 T5 T2 T5 T1 E T3 T4 E T2 T5 T1 T2 T3 T4 T5 T2 T5	A1 A2 A3 A4 A5 A2 A5 A1 E A3 A4 E A2 A5 A1 A2 A3 A4 A5 A2 A5
A1 A2 A3 A4 A5 A2 A5 A1 E A3 A4 E A2 A5 A1 A2 A3 A4 A5 A2 A5	K1 K2 K3 K4 K5 K2 K5 K1 E K3 K4 E K2 K5 K1 K2 K3 K4 K5 K2 K5	V1 V2 V3 V4 V5 V2 V5 V1 E V3 V4 E V2 V5 V1 V2 V3 V4 V5 V2 V5	T1 T2 T3 T4 T5 T2 T5 T1 E T3 T4 E T2 T5 T1 T2 T3 T4 T5 T2 T5

Rootstocks = A: *P. atlantica*; K: *P. khinjuk*; T: *P. terebinthus*; V: *P. vera*.
 Varieties = 1: Siirt; 2: Ohadi; 3: Sel-14; 4: Kallehgouchi; 5: Kerman.

Fig. 1. Pistachio orchard plan in Kahramanmara_.

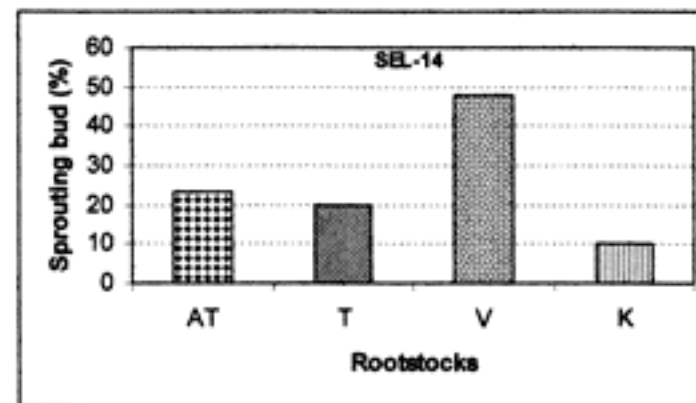
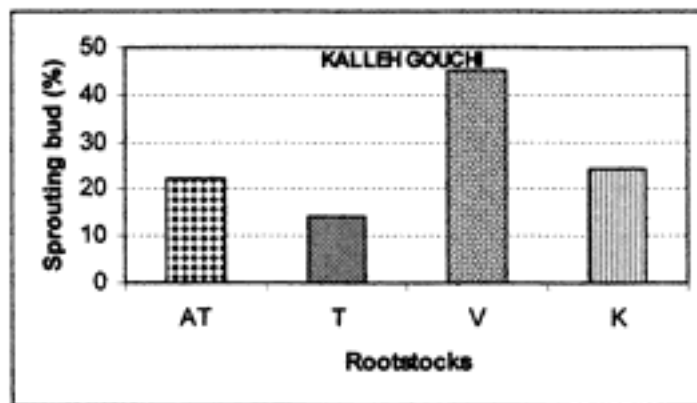
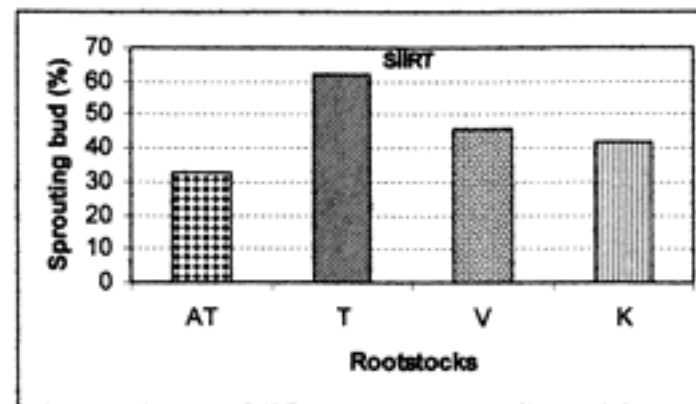
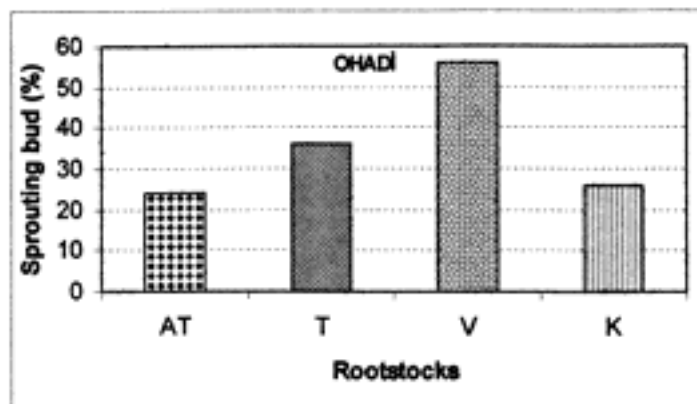


Fig. 2. Percentages of sprouting buds of pistachio cvs on different rootstocks. AT: *P. atlantica*; T: *P. terebinthus*; V: *P. vera*; K: *P. khinjuk*.

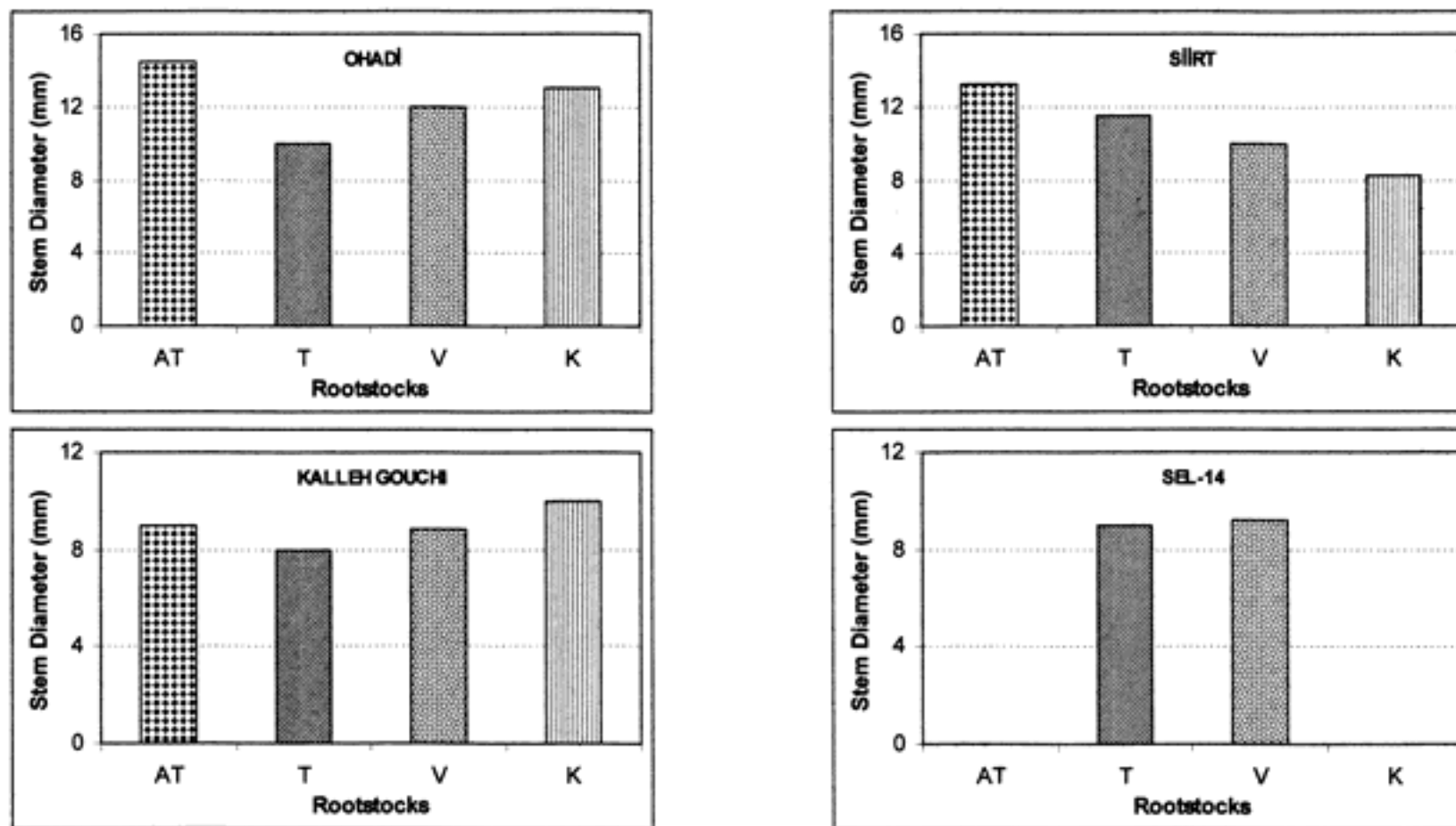


Fig. 3. Growth in stem diameter on different rootstocks. AT: *P. atlantica*; T: *P. terebinthus*; V: *P. vera*; K: *P. khinjuk*.

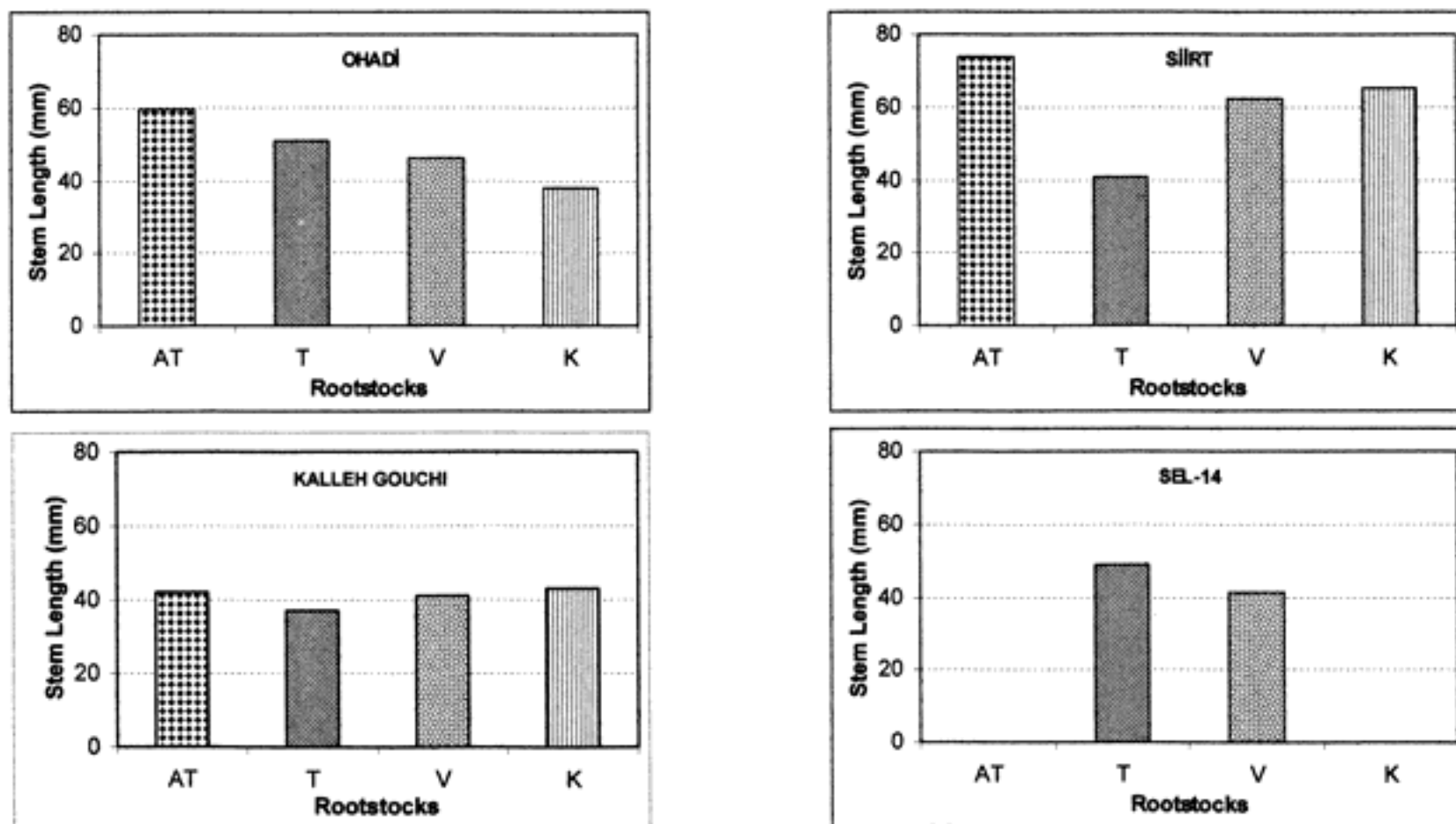


Fig. 4. Growth in stem length on different rootstocks. AT: *P. atlantica*; T: *P. terebinthus*; V: *P. vera*; K: *P. khinjuk*.