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## PERFORMANCE OF NEMATODE RESISTANT PEACH ROOTSTOCKS AGAINST *MELOIDOGYNE JAVANICA* IN CYPRUS

by  
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**Summary.** Field trials revealed that Nemared and Nemaguard peach rootstocks were highly resistant against *Meloidogyne javanica*. Both rootstocks harboured significantly fewer galls than the susceptible local rootstock while yields of the cultivar Swollen grebel, grafted on these two rootstocks, were increased. Trunk circumference for both nematode-resistant rootstocks was larger than the "Local" rootstock.

The cultivation of peaches in Cyprus has increased in recent years and now contributes about 13% in value to the production of deciduous fruit trees. However, peach trees suffer considerable economic losses due to several pests and diseases. Among the most damaging root pathogens are the root-knot nematodes (*Meloidogyne* spp.). They attack the young roots which leads to stunting of the trees and shortens their life span.

Several root-knot resistant rootstocks are now available for use with peach, nectarine, plum, apricot and almond cultivars and have been used extensively in Florida (Foster *et al.*, 1972). Trials have been undertaken in Cyprus to evaluate, under local field conditions, the resistance to *Meloidogyne javanica* (Treub) Chitw. of Nemaguard and Nemared peach rootstocks in comparison with the "Local" peach rootstock *Prunus persica* Batsch. The results of the trials are reported here.

### Materials and methods

Seeds of Nemaguard and Nemared were imported from the USA and after they were germi-

nated they were placed in small, black plastic bags containing a small quantity of sterilized sand until seedlings had developed. In February 1984, seedlings of uniform size (20 cm high) were planted in plots at the Zakaki and Achelia government nurseries. In June 1987 and June 1988 for Zakaki and Achelia, respectively, when the rootstocks were well established, they were grafted with cv. Swollen grebel. A total of ten and eight trees of each of the rootstocks and comparable numbers of the local rootstock were planted at Zakaki and Achelia, respectively, at 4x4 m spacing in a Randomized Completed Block Design with two trees in each of the four (Achelia) or five (Zakaki) replicates. Seeds of Okinawa and Florida 14-11 rootstocks were also imported from the USA but the seedlings failed to establish after planting in the field so that they could not be included in the trial. Growth of the rootstocks was assessed by estimating the circumference of the trunk at 15-20 cm distance from the soil using a scale of 1 to 6. This was done each year, in the autumn, from 1986. Root samples were taken every other year from 1987 until 1993 to determine the degree of nematode infestation; approximately



Fig. 1 - Roots of "Local" peach rootstock heavily infested by *Meloidogyne javanica* (roots of "Nemared" on right).

10 g of roots were taken from each tree and the extent of galling determined using a binocular microscope. The number of galls per g of root was recorded and gall size compared with the diameter of the adjacent root (Table I). Commercial yields from each tree were recorded in mid-June from 1990-1993.

## Results and discussion

Overall, the nematode infestation of the rootstocks was more pronounced at Zakaki than at Achelia because of the higher nematode infestation in the soil at planting at the former nursery. At both nurseries, however, Nemaguard and

Nemared harboured considerably fewer galls than the local rootstock (Table I). Also, galls on the local rootstock were considerably larger than those on the nematode-resistant rootstocks (Fig. 1). Although root-galling caused by root-knot nematodes is not necessarily the best criterion for assessing resistance it can be used to make relative comparisons of resistance to *Meloidogyne* spp. within the same plant species. Previous work (Phillis, 1989) has shown that an increase in the number of galls induced by *M. javanica* on several peach rootstocks coincided with increased egg production, thus suggesting a close correlation between the severity of galling and host susceptibility to nematode attack. Sharpe *et al.* (1969) classified rootstocks with

TABLE I - *Number and size of galls produced by Meloidogyne javanica on peach rootstocks.*

| Rootstock   | Galls/gr root <sup>a</sup> |         | Gall size <sup>b</sup> |      |      |         |     |     |
|-------------|----------------------------|---------|------------------------|------|------|---------|-----|-----|
|             | Zakaki                     | Achelia | Zakaki                 |      |      | Achelia |     |     |
|             |                            |         | 1                      | 2    | 3    | 1       | 2   | 3   |
| Nemaguard   | 2.8 a                      | 1.3 a   | 1.4                    | 1.4  | 0.0  | 1.3     | 0.0 | 0.0 |
| Nemared     | 2.2 a                      | 1.6 a   | 1.4                    | 0.8  | 0.0  | 0.9     | 0.7 | 0.0 |
| Local peach | 27.9 b                     | 12.3 b  | 4.8                    | 11.2 | 11.9 | 2.8     | 3.9 | 5.6 |

a, Average of four root samples (1987-89-91-93).

b, 1, 2, 3. Gall diameter less, equal or larger than thickness of adjacent root, respectively.

Figures in a column followed by the same letter do not differ significantly ( $P = 0.05$ ).

TABLE II - *Growth performance and yield of peach rootstocks grafted with Swollen grebel at Zakaki and Achelia.*

| Rootstock   | Zakaki          |                                       |                                    |                              | Achelia         |                                       |                                    |                            |
|-------------|-----------------|---------------------------------------|------------------------------------|------------------------------|-----------------|---------------------------------------|------------------------------------|----------------------------|
|             | Number measured | Trunk <sup>a</sup> circumference (cm) | Tree <sup>b</sup> appearance (1-6) | Yield <sup>c</sup> (kg/tree) | Number measured | Trunk <sup>a</sup> circumference (cm) | Tree <sup>b</sup> appearance (1-6) | Yield <sup>c</sup> kg/tree |
| Nemaguard   | 5               | 25.7 a                                | 4.0                                | 1.4 b                        | 7               | 44.5 a                                | 5.6                                | 8.4 a                      |
| Nemared     | 5               | 25.4 a                                | 4.1                                | 3.4 a                        | 5               | 50.9 a                                | 5.7                                | 11.3 a                     |
| Local peach | 10              | 22.2 b                                | 3.6                                | 1.2 b                        | 7               | 37.5 a                                | 5.1                                | 7.7 a                      |

a, Refers to measurements of 1993.

b, Mean of eight and seven years after grafting for Zakaki and Achelia, respectively.

Based on a scale from 1 (very poor growth) to 6 (excellent growth).

c, Mean of four years (1990-93).

Figures in a column followed by the same letter do not differ significantly ( $P = 0.05$ ).

small galls caused by root-knot nematodes as resistant and without any galls as immune.

Tree losses at Zakaki were 33% and at Achelia 21%. The high rate of loss at Zakaki was mostly due to inadequate cultural practices, especially during the first few years after planting.

At Zakaki, the high nematode infestation together with the poor soil fertility greatly reduced the yield of fruit (Table II). At Achelia, the relatively low initial nematode infestation and substantially better cultural conditions resulted in higher yields. At Zakaki, Nemared al-

most trebled yields and Nemaguard increased them by 17% compared with the local rootstock. At Achelia, the relative yield increases were 47 and 9% (Table II). The nematode resistant rootstocks also improved tree appearance and increased trunk growth compared with the local rootstock.

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## Literature cited

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