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A COMPARISON BETWEEN MEXICAN AND WEST INDIAN ROOTSTOCKS FOR THE ETTINGER CULTIVAR AT KVUTZAT SHILLER, ISRAEL

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A long term, large-scale field study of avocado rootstocks was described in the California Avocado Society Yearbook in 1972[1]. The setting up of field experiments was continued until 1978, and most of them were concluded after 10-12 years. About 350 experiments were included in the system, involving more than 100,000 trees. As a result of this huge experimental system, the number of seedling avocado rootstocks in use in Israel was reduced from 630 to 30. Some of the experimental results were published in English-language literature[2,3], but most appeared in Hebrew. In the present article, a relatively simple experiment is described. It includes only two selected rootstocks, one of each race: the Mexican and the West Indian. Since Oppenheimer's discovery[4], West Indian rootstocks have been recognized in Israel as having salt resistance; and when the avocado growing area increased in size, to include regions with low quality irrigation water, the use of these rootstocks became essential. After a few years, we found that the effect of the West Indian rootstock on tree productivity could be negative in many cases, and rootstock selection for productivity became important.

Methods

Kvutzat Shiller is a communal settlement (kibbutz) located in the southern part of the Coastal Plain of Israel. The avocado orchard is planted on variable soils of relatively coarse texture. The water quality is deteriorating and the chlorine content is increasing. To be on the safe side, in 1975 the growers decided to plant the Ettinger avocado orchard on two different rootstocks in an alternating planting pattern. The selected Mexican rootstock, Shiller 1, was planted alternately with the West Indian rootstock, Shiller 10. Both rootstocks were originated in the same kibbutz. The experiment followed the "randomized blocks" design, with 39 blocks each containing two trees of each rootstock.

Monitoring of the experiment was continued until the age often and covered six harvests. In the ninth year (1984), a survey of leaf necrosis was done using grading on a scale of 0-5, in which grade 2 represented partial necrosis of most of the leaves. Analysis of variance was applied to the yield data, and the coefficient of variance (CV) was calculated. The degree of alternate bearing was calculated as a percentage by a method suggested by Dr. A. Genizi of the Department of Statistics at the Volcani

Center.

Table 1. Data collected at Kvutzat Shiller, Ettinger cultivar experiment

Rootstock	Rootstock race	Number of trees	6 years accumulated yield (1980-85) kg/tree[(1)]	CV%<[2]>	Leaf Burns grade. 1/94<[2]>
Shiller 10	West Indian	60	233	21.7	0.24
Shiller 1	Mexican	75	205	34.6	1.45

[(1)]The yield difference was highly significant.

<[2]>CV% and leaf burns grading are explained in the text.

Table 2. Current data from the groups and outstandingly productive trees

Rootstock	Annual average (yield kg/tree) 1980	1981	1982	1983	1984	1985	Average	Alternate Bearing
Shiller 10								
• 60-tree average	11.8	56.7	71.4	25.3	40.7	30.8	39.9	47%
•tree 16/7	50	100	68	44	36	36	55.7	17%
•tree 15/8	10	100	60	48	72	40	55	33%
Shiller 1								
• 75-tree average	8.6	49.9	76.6	19.2	31.3	23.8	34.7	50%
•tree 16/6	15	75	128	32	72	24	57.7	48%
•tree 11/23	0	110	128	28	44	32	68.4	27%

Results

Experimental results are presented in Table 1. Trees grafted on the West Indian rootstock, Shiller 10, produced significantly higher and more uniform yields. They did not suffer from leaf necrosis, whereas those grafted on Mexican rootstocks showed severe damage. In Table 2, data of tree populations and of outstanding trees are presented. The most productive trees among those grafted on West Indian rootstocks produced 40% more than the average for this group, while among trees grafted on Mexican rootstocks the advantage was 66%. Trees of outstandingly high productivity

Tree size was not measured routinely in the experiment, as the trees were too crowded and were subject to pruning, but in a rough evaluation we found the trees grafted on the West Indian rootstock to be much smaller than those grafted on the Mexican one.

Discussion and conclusion

The experiment described here was aimed to determine whether new West Indian rootstock can replace traditional Mexican rootstock from the point of view of productivity under local conditions of drained soil and semi-saline irrigation water. According to the experiment results, the answer is positive. The West Indian rootstock Shiller 10 induced better productivity from smaller trees, with less fluctuation among trees. The uniformity of trees grafted on West Indian rootstocks made it difficult to identify outstanding productive trees. A very clear advantage of the West Indian rootstock was the elimination of leaf burns. From other experiments, it is well known that leaf burns are highly correlated with the chlorine content of the leaves. The chlorine content is reduced by West Indian rootstocks. The West Indian rootstock Shiller 10 is recommended for use under soil and water condition such as those prevailing at Kvutzat Shiller. It is also recommended that propagation material be taken from rootstocks of several outstanding trees in order to duplicate it as clonal rootstocks. The fact that trees grafted on West Indian rootstocks are more uniform in their productivity than those on Mexican rootstocks is known from previous experiments, also (Ben Ya'acov 1976). This makes the identification of excellent trees more difficult, but it is still worth while.

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