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ROSE ROOTSTOCKS AND MINIPLANT PROPAGATION: PRELIMINARY RESULTS AND OBSERVATIONS

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The Israeli miniplant system uses simultaneous rooting and grafting to produce a rose plant in five weeks. Conventional rose plants take a year or more to produce, and are much larger than miniplants. We have started experiments to determine the best methods for propagation of miniplants under Colorado conditions, and to compare miniplant production with conventionally propagated plants. It should be possible to supply growers with a plant in less time, at a lower price, and perhaps on a better rootstock.

Rose Propagation

U.S. roses are currently rooted and budded in the field. Rootstock cuttings are stuck in the fall, and begin to grow in late winter and early spring. From May through June the scion is budded onto the rootstock and forced into growth by topping the rootstock above the scion. The bushes are then dug the following fall, pruned, graded according to size and quality, and put into cold storage until shipped. One or more years may elapse between sticking the rootstock and final planting in the greenhouse.

The miniplant system uses greenhouse-grown rootstocks and scions, and cuttings of each are grafted and rooted under mist in the greenhouse. Paz, Levy, and Levy were granted a U.S. patent for miniplant propagation in 1979, and assigned the process to the Conard-Pyle Co. According to the patent description, a scion with at least one leaf attached is side grafted to a rootstock which also has at least one leaf. Claims are that 200 to 400 plants can be produced per square meter in five weeks. Paz (personal communication) suggested using a bottom heat of 68° to 80°F for best rooting, and Mor (unpublished manuscript) indicated that 20 ppm IBA applied to the scion base aids in a quicker and stronger graft union. Fig. 1 illustrates the patented process of PAZ, *et. al.* compared to that which we feel is a simpler and quicker method.

Rose Rootstocks

R. manetti is considered to be very adaptable to raised benches where the soil volume is restricted and shallow. As roses are usually grown in the ground today, *manetti's* usefulness is reduced. According to DeVor (personal communication), *manetti* is still used because it is very resistant to injury in cold storage.

R. odorata is the American name for the European *R. indica* 'Major'. 'Major' is used extensively in Europe and Israel because it apparently tolerates high pH and is also deep rooted. Some U.S. propagators have reported better quality plants and flower production on *odorata* than on

Figure 1: Two grafting methods for miniplants. A: Method described in the patent of Pax, *et. al.* B: Method used in CSU experiments.

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manetti, but, unfortunately, *odorata* is very susceptible to cold storage injury. Given the present system of rose propagation in the U.S., propagators seem locked into the use of *manetti,* regardless of the benefits of other rootstocks, because *manetti* tolerates cold storage so well. Cold storage is essential because plants are dug in the fall, and may not be shipped to the grower for several months.

'Dr. Huey' is the variety most often used when the scion cultivar is incompatible with *manetti.* Most yellows, pinks, whites, etc. are budded onto 'Dr. Huey'. 'Fredica' is another new rootstock currently being tested in the U.S.

Preliminary Work

'Samantha' and 'Cara Mia' are currently being tested on *manetti, odorata,* 'Major', and 'Dr. Huey'. Two- to four-inch rootstock cuttings are taken from 12 week-old canes, and two- to four-inch scion cuttings are taken from canes which have flowered. A grafting tool (Fig. 2) allows a 'V' shaped cut to be made in the apical end of the rootstock, and a corresponding bevel in the basal end of the scion. The two pieces are then cleft grafted (Fig. 1). This method is easier than the side graft described in the patented system. Experiments have used Rootone®. as a rooting hormone, with cuttings stuck in Speedling flats filled with a 2:1 perlite:peat (v:v) medium plus calcium carbonate at 5 lbs. per cubic yard. Rooting and graft union are evaluated after four weeks.

Results and Observations

Growth of Rootstocks. R. odorata, 'Major', and 'Dr. Huey' have shown themselves to be much more vigorous than *manetti* under CSU greenhouse conditions. *R. manetti* appears to be much slower growing, prone to chlorosis, and has a tendency to defoliate. We have found it very difficult to obtain sufficient and good cutting wood from *manetti* because of its growth habit, and supplements of iron chelate and calcium have been found necessary. Review of the literature, and discussion with propagators, suggests that *manetti* is not tolerant to high pH's.

Rooting differences. Miniplants of *odorata* and 'Major' have rooted best, followed by 'Dr. Huey', with *manetti* a very poor fourth (Table 1). Rooting was graded on a scale of zero to five, with a score of three or greater representing a saleable plant. While the treatments with no bottom heat resulted in the best rooting scores, they were not significantly different from any of the bottom heats employed. Bottom heat does not seem necessary for rooting of miniplants. But, our trials so far have been during the summer and fall when temperatures and light levels during growth of the mother plants are higher than in the winter. It may be that bottom heat may be required in the winter. Initial work on growth regulators applied to the union suggests that treatments can be devised which will promote faster healing of the union and a stronger union.

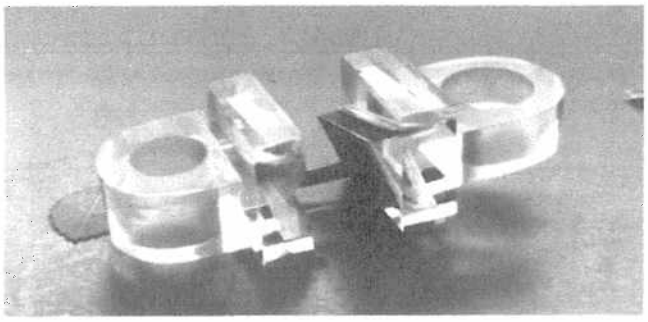

Figure 2: Grafting tool used to make miniplants of 'B' in Fig. 1.

Table 1. Mean rooting scores of scions,[x] rootstocks,[y] and miniplants.[z] Values bracketed by the same line are not significantly different from each other. Rooting score based on a scale of zero (no roots) to five.

Treatment	$\bar{x}$
odorata[y]	4.22
'Cara Mia'/*odorata*[z]	3.92
'Samantha'/*odorata*[z]	3.82
'Cara Mia'/'Major'[z]	3.66
indica 'Major'[y]	3.18
'Samantha'/'Major'[z]	3.08
'Samantha'/'Dr. Huey'[z]	2.66
'Dr. Huey'[y]	2.54
'Samantha'[x]	2.50
'Cara Mia'/'Dr. Huey'[z]	2.24
'Cara Mia'[x]	2.02
'Samantha'/*manetti*[z]	1.08
'Cara Mia'/*manetti*[z]	0.98
manetti[y]	0.62

Table 2. Mean rooting score of miniplants at various bottom heat temperatures. Rooting score based on a scale of zero (no roots) to five.

Treatment	$\bar{x}$
no bottom heat	3.01
60° F	2.71
70° F	2.71
80° F	2.70
10-15° warmer than air	2.24

Future experiments. We plan to perform further testing of the effects of growth regulators on the graft union, and also their influence on rooting. Other root promoting compounds may prove to be more effective in rooting than Rootone®. We also wish to examine the effect of medium pH, size of cuttings, as well as the number of leaves on those cuttings, which will result in the best rooting of miniplants.

For the future we hope to test these miniplants in selected rose ranges in Colorado. In particular, we believe that *manetti* may contribute to the serious chlorosis problem we have experienced in Colorado in the past years. One difficulty to be faced is the considerable difference in size of miniplants and conventionally propagated rose plants. We expect to plant at twice the usual density, and also anticipate a longer time for miniplants to reach full production. The miniplant system will represent a radical conversion of techniques and cultural methods for propagators. But it also represents a means of getting greenhouse rose production onto what we believe are better rootstocks, possibly at a lower cost of replanting.

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