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ROSE MINIPLANT PROPAGATION

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Following the preliminary report (CGGA Bul. 364), studies on simultaneous rooting and grafting of rose plants continued. Bottom heat was not required in the summer, as bottom temperatures were usually above 70°F. In the winter months, 70°F had to be maintained with additional heat. Rootone was the only rooting hormone examined. Other studies with three growth regulators on the graft showed no consistent effect of dips or sprays. Recommendations at this time are to use a good rooting hormone on the base of the understock. With a 2:1 rooting mixture of peat and perlite, 8 pounds per cubic yard of calcium carbonate is suggested. Stripping leaves and reducing nodes on the scion and understocks will reduce rooting. Materials with two nodes and two good sets of 5 leaflet leaves are recommended. The faster the understock roots, the faster graft healing will proceed. Understock buds or sprouts are removed after rooting and grafting. There was no need to protect the graft union by wrapping with parafilm or grafting wax. A good mist system with heavy mist was required to prevent scion damage — especially during high light periods. A preliminary trial of different light sources in the winter showed no effect, although it was likely that the high intensity sodium light damaged the roses due to excessive heat.

Two trials of 'Royalty' on *R. odorata* have been started at Crestview Floral and Longs Peak Greenhouses. This is a direct comparison with 'Royalty' on *R. manetti,* produced in the traditional method. In addition, we will be starting a comparison of yields of 'Royalty' on *odorata,* 'Dr. Huey' and *indica* 'Major'. The understock *manetti* has not performed well under greenhouse conditions, and we no longer grow that understock. We hope to examine different rooting hormones this winter. But, technique in grafting appears to be the most single important factor in obtaining uniform results. Rooting in 'Speedling' flats seems to us the most efficient way for handling miniplants.

Growth Regulators

In one experiment, IBA, NAA and BA[2] were tested on the graft unions by either dipping the scions in the growth regulator, or spraying the scion. Concentrations were 5, 50, 500 and 5000 ppm with dipping for 0.05, 0.5, 5, 50 and 500 minutes. As a general rule, low concentrations of auxins as long-term dips resulted in the best rooting and grafting scores. The requirement to dissolve the chemicals in alcohol resulted in severe damage at high concentrations and long exposures. Some BA treatments at 50 and 500 ppm resulted in higher graft scores but reduced rooting scores.

Nine auxin treatments resulted in both graft and rooting scores higher than untreated. These treatments were retested, and with 50 and 500 ppm BA (Table 1). In this experiment, only four treatments resulted in plants with better grafting and rooting scores than untreated. The results, however, were not statistically significant.

pH Adjustment

Most recommendations for rooting media containing peat suggest 5 pounds calcium carbonate per cubic yard to raise the pH. Preliminary result with ungrafted roses showed that best rooting occurred in the range of 7 to 9 lbs. per cu.yd. (2:1 perlite-peat medium). A second experiment resulted in best rooting and grafting at a rate of application of 8 lbs. per cu. yd. (Table 2). This corresponded to a medium pH of 6.9 at the end of the experiment. Application rates of 6.0 and 10.0 lbs/cu. yd. resulted in reduced rooting and grafting.

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[2]IBA = Indolebutryic acid; NAA = Napthaleneacetic acid; BA = Benzyladenine

Table 1. Four growth regulator treatments of the scion which resulted in graft and rooting scores greater than untreated miniplants. Rooting score based on a scale of zero to five, and grafting score on a scale of zero to four. Rootone powder used on base of understock.

Treatment	Graft Score	Root Score
500 ppm IBA, 0 ppm BA, .5 min. dip of scion	2.7	3.0
5 ppm NAA, 0 ppm BA, spray	2.6	3.2
500 ppm IBA, 50 ppm BA, .5 min. dip of scion	2.6	2.8
5 ppm NAA, 50 ppm BA, 5 min. dip of scion	2.6	2.7
Control	2.4	2.5

Table 2. Rooting and graft response of miniplants to rate of application of $CaCO_3$ in a 2:1 perlite:peat medium.

Lbs. $CaCO_3/yd^3$	pH at end of experiment	Root Score	Graft Score
6.0	6.3	2.2 ab	2.1 a
7.0	6.6	2.3 ab	2.5 a
8.0	6.9	2.7 a	2.5 a
9.0	7.2	2.5 a	2.4 a
10.0	7.6	1.1 b	0.8 b

$HSD_{.05}$ = 1.3 (root), 0.7 (graft).

Letters following results show significant differences if different.

Table 3. Effect of node number on grafting and rooting responses of miniplants.

Number of Nodes and Leaves

Scion	Rootstock	Root Score	Graft Score
2	2	3.6	2.7
2	1	2.4	2.6
1	2	2.4	2.2
1	1	1.9	2.0

Scores not significantly different at a 5% chance of being wrong.

Table 4. Rooting and graft response of miniplants to graft union protections.

Treatment	Graft Score	Root Score
None	2.6	3.0 a
Grafting Wax	2.5	3.3 a
Parafilm	2.4	2.4 b

Graft scores not significantly different at a 5% chance of being wrong.
$HSD_{.05}$ = 0.5 (root)

Number of Nodes and Leaves

For many crops, removing leaves and reducing the number of nodes, in cuttings, will slow rooting. This also was true with rose cuttings propagated under mist. Rooting and graft healing of miniplant combinations of one or two node understock and scions were evaluated. One node cutting of both scion and understock resulted in reduced rooting and grafting (Table 3). The results, however, were not statistically significant.

Protection of Graft Union

Protecting the graft union with grafting wax or parafilm did not aid in graft union healing (Table 4). The rooting score was reduced on plants protected with parafilm. In general, it appeared that no protection was required if the mist system was operated properly to prevent drying. The cleft graft was usually sufficient to hold the scion, and grafts showed no sign of excessive drying.

Rooting Temperature

Initial studies, started in the late summer and early fall showed no benefit of applying heat to the bottom of shallow Speedling trays. To provide better contact with the heating system, we removed one inch from the bottoms of the Speedling trays. But, temperature measurements at two inches below the rooting medium surface showed temperatures at that time to be always above 60 to 65°F. When a following study in December and January failed to root, temperature measurements showed values below 60°F, approaching 50°F. When heat was applied to these cuttings, rooting proceeded. Additional studies showed that temperature of the medium should be in the range of 65 to 70°F. During the summer, temperatures are sufficiently high to meet this requirement, but, beginning in the late fall and winter in Colorado, bottom heat must be applied to avoid delay in rooting.

Summary

The miniplant system offers a number of possible advantages to the greenhouse producer of cut roses. For the first time, it may be possible to obtain new plant material on understocks of suitable choice. The fact that *manetti* is capable of withstanding long term cold storage may have tended to lock producers into a single understock. Due to the fact that existing culture in Colorado is now in the ground, *manetti* may not be the most suitable understock. Colorado's semi-arid conditions result in high pH soil, and the literature and discussions with various propagators indicate that *odorata* is capable of tolerating high pH's as well as providing a more extensive root system than *manetti*. The main disadvantage for the commercial cut flower producer is a longer time (3 to 5 months) to bring the smaller miniplant into full production. However, we think the miniplant should be cheaper to produce as well as allowing us to use better understock. So far, we can produce good understock of *odorata, indica* 'Major' and 'Dr. Huey' under our greenhouse conditions. *R. mandetti* did not perform well, and we discarded it.