The Propagation of Rose Stem Cuttings in Three Propagation Media

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INTRODUCTION

There are innumerable factors which have an effect on the success of a propagation trial, including the method of propagation, propagation environment, medium composition, water availability, and pH.

This paper compares the rooting percentage and root quality of rose stem cuttings in three different propagation media to determine a successful and reliable medium for the standard propagation of several different rose cultivars by cuttings.

MATERIALS AND METHODS

Propagation Media Used. Three different propagation media were compared in this experiment.

1) Medium A—bark mix. This was a purchased mix composed of bark, sand, and peat (9 : 2 : 9, by volume), pH=6.0. This mix was contained in Jiffy peat pots.
2) Medium B—Oasis rootcubes. This ready-made growing medium was purchased from Oasis Grower Products and was contained in plastic cube trays, pH=5.5 to 6.5.
3) Medium C—sand and peat (4 : l, v/v). This was a homogeneous mixture of coarse sand and sifted peat which was contained in plastic plug trays. Medium C is the standard mix used for cutting propagation at the Royal Botanical Gardens.

Rose Cultivars Propagated. Nine each of 13 different rose cultivars were propagated in each of the media (A, B, or C) to determine the most successful rooting medium. The rose cuttings were obtained from the Royal Botanical Gardens rose collection in Hendrie Park (accession numbers are available)—Table 2 contains a list of rose cultivars used.

Preparation of the Cuttings. Cuttings were collected on the mornings of July 16 and 17, 1995. The air temperature was 20C and it was an overcast day. Terminal stem cuttings, 10 to 14 in. long, were removed from the parent plant using clean secateurs, dipped in lukewarm water, and placed in plastic bags. All cuttings were stored in a cold storage room (approximately 10C) until the afternoon of July 17 when the cuttings were prepared for sticking. A basal cut was made just below a node leaving a 4.5- to 6-in. stem. Basal leaves were removed exposing two to three nodes for rooting and thorns were also removed from the base. A shallow, 1/2-in.-long wound was made just above the bottom node to increase the surface area available for rooting. The remaining three to four upper leaves were reduced by one third in size to reduce water loss from the leaves.

Auxin Treatment. All cuttings were dipped in Stim-root 5000 liquid rooting hormone (0.5% indole-3-butyric acid) for 4 sec. Cuttings were stuck immediately into the three trial media.

Propagation Environment. The propagation environment used was a shaded fiberglass propagation greenhouse with a two-clock, solenoid-valve misting system set to maintain 100% relative humidity. The first clock operates on a 24-h cycle and turns the second clock on and off. This clock was set to come on from 8AM to 8PM. The second clock runs on a 30-min cycle with 30-sec intervals. This clock was usually set to release mist for one 30-sec interval every 30 min except on extraordinarily hot or humid days during which mist was released for 30 sec every 15 min. B10 brass misting nozzles were suspended 18 in. above the propagation benches and were spread 36 in. apart. Mist benches and electric-heating cables were covered with fibre cloth and maintained a bottom heat of 22 to 24C. The City of Hamilton water used for misting was alkaline.

Cuttings were monitored daily to ensure that proper environment was maintained and to note rooting progress, remove dead leaves, etc. Results were recorded on August 29, 1995.

RESULTS

Two criteria, rooting percentage and root quality, were used to determine the effectiveness of each medium.

$$\text{Rooting (\%)} = \frac{\text{number of cuttings rooted}}{\text{total number of cuttings in each medium}} \times 100$$

Root quality was determined qualitatively using a scale of 0 to 3 with the following criteria: "0", no roots or rotted roots; "1", some roots, may die; "2", several roots, should live; "3", many healthy roots, no root rot; "2" and "3" = superior quality rooting.

Other factors taken into consideration were root size (length and diameter), degree of root rot, and evenness of rooting around the stem. The root quality rating is an average of the root-quality numbers assigned to each cutting in a particular medium.

Table 1. Rooting percentage and root quality of rose-stem cuttings propagated in three different media.

Medium	Composition	Rooting (%)	Root quality
A	Bark mix	81.2	2.48
B	Oasis rootcubes	71.8	1.92
C	Sand and peat	71.8	2.35

DISCUSSION

Table 1 shows that the Oasis rootcubes and the sand and peat mix were equally successful in rooting percentage with 71.8% of cuttings developing roots. However, there was a substantial degree of variance in root quality obtained. The bark mix surpassed both the Oasis rootcubes and sand and peat mix in both rooting percentage and root quality.

Root development trends in the Oasis rootcubes tended to be a small number of strong, thick roots. The roots were often bound and folded around the bottom of the cube signifying that the plastic container the cubes were in did not allow maximum root growth. This could be partially overcome by earlier transplanting of cuttings to pots. Roots also tended to be one-sided, having uneven spread around the stem. Root quality was significantly decreased due to root rot caused by excessive water in the cubes. This is attributable to the high water-holding capacity of the cubes. William Shakespeare® rose had many roots develop above the medium level in the oasis cubes which is a sign of excess water, but did not show this symptom in either the bark or sand and peat mix.

The most notable observation about the rooted cuttings in the sand and peat mix was the long, even spread of root growth the plug trays allowed. Many cuttings had roots up to 3 in. long. Some degree of root rot was observed.

Roots of the cuttings propagated in the bark mix were plentiful and virtually unaffected by the container size, as the roots were able to penetrate through the peat pots. Very little root rot occurred suggesting that drainage was sufficient.

Table 2. Rooting percentage by cultivar and medium in the propagation of rose stem cuttings.

Cultivar	Rooting (%)		
	Bark mix	Oasis rootcubes	Plug trays
'Ausbred', Bredon® rose	100	100	100
'Ausmas', Graham Thomas® rose	100	77.8	100
'Golden Wings'	77.8	44.4	44.4
'Schneewittchen'	88.9	100	77.8
'Ausroyal', William Shakespeare® rose	88.9	88.9	88.9
'Morden Ruby'	0	0	0
'Bucbi', Carefree Beauty® rose	100	66.7	66.7
'Country Dancer'	77.8	77.8	77.8
Charles Austin® rose	77.8	77.8	66.7
Stadt Rosenheim® rose	55.6	11.1	22.2
'Nearly Wild'	100	100	100
Lyric	88.9	100	100
The Fairy	100	88.9	100

Figure 1 provides a graphical presentation of the results in Table 1. It depicts the percentage of cuttings having superior root quality (root quality ratings 2 and 3) to show the percentage of cuttings that will produce a quality saleable plant with standard care after transplanting, as compared to those that may require special handling, additional nutrients, longer time to maturity, etc. The data implies that propagation in the bark mix will produce 12.8% more superior quality plants than the Oasis cubes and 13.7% more than the sand and peat mix.

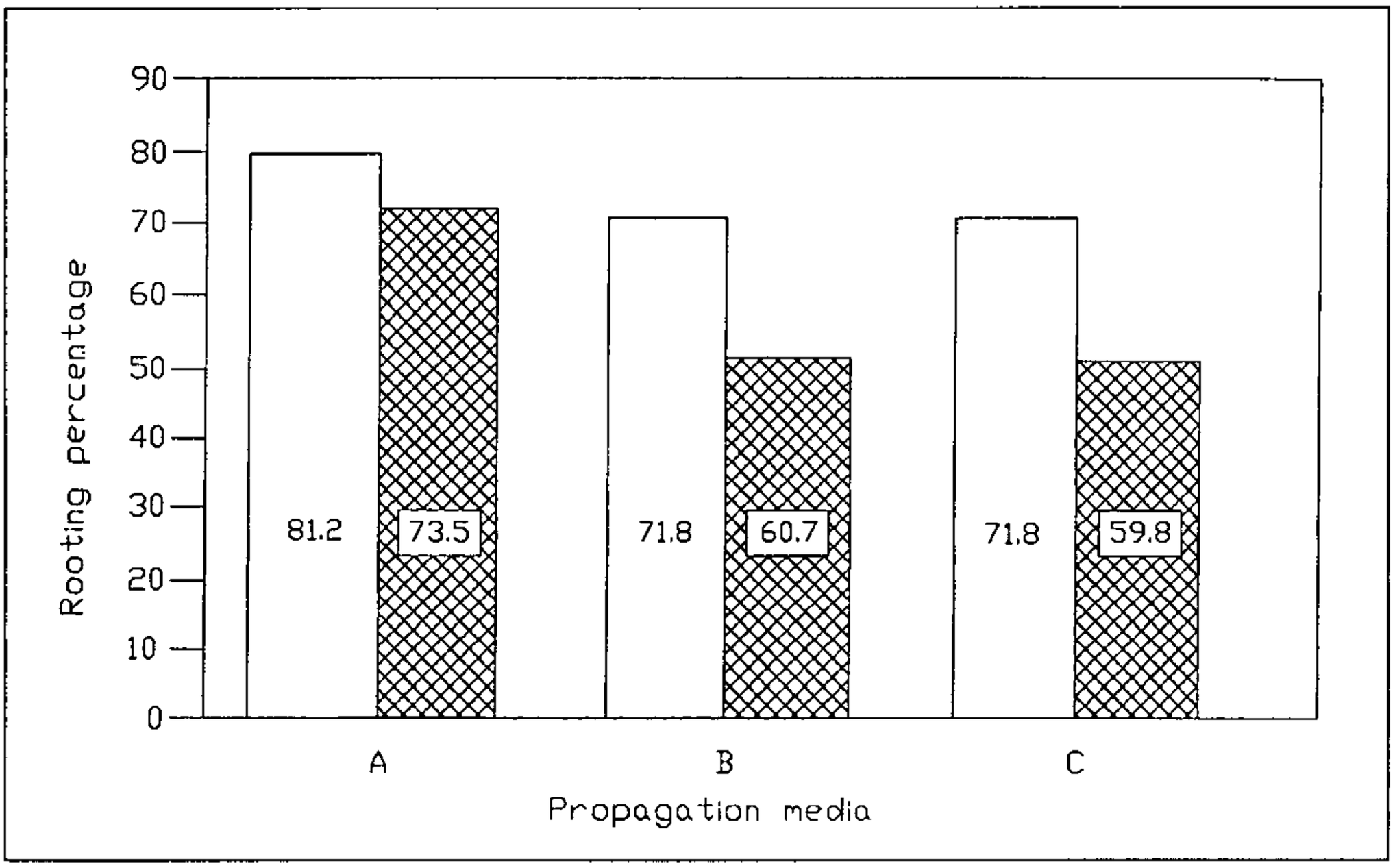

Figure 1. Comparison of total rooting percentage and superior quality rooting percentage for rose stem cuttings in three propagation media. Non hatched = total rooting (%), hatched = superior quality rooting (%).

Table 2 shows that with only two exceptions the rose cultivars were relatively easy to root from cuttings. Propagation medium had no effect on the rooting success of 'Morden Ruby' which failed to root at all, but caused significant variation in the rooting percentage of Stadt Rosenheim® rose. For Stadt Rosenheim® rose, 33.4% more rooted cuttings were obtained in the bark mix than in the plug trays and 44.5% more than in the Oasis cubes. This cultivar is likely more vulnerable to deviation from optimum conditions. This is an important factor to consider when choosing an effective propagation medium for several cultivars. It is interesting to note also that Graham Thomas® rose obtained 100% rooting in all media except the Oasis rootcubes, in which rooting decreased by 22.2%

Another notable observation was the importance of wounding and removing the basal thorns. Roots initiated far more frequently from the knife and thorn wounds than from the nodes. For example, the difficult-to-root Stadt Rosenheim® rose had roots initiating only from the wounds and showed no evidence of root growth from the nodes.

CONCLUSION

On the basis of the results obtained, it stands out that the bark mix was the most successful and reliable medium for the cutting propagation of several different *Rosa* cultivars. It can be seen from these trials that propagation medium is a moderate factor in root development. A great deal of the variation in root quality was due to other controllable factors, such as container size and water requirements, so it may be desirable to investigate these media further under conditions where water availability, for example, is the variable.

Improvement of rose propagation by cuttings will be aided by this experiment and subsequent investigation into propagation factors taken on by other interested parties.