

## Rooting Rhododendron Without Mist: Subirrigation and Medium pH

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### INTRODUCTION

Mist systems have been widely used in the rooting of cuttings. They enable propagators to root cuttings with both ease and flexibility. However, mist is not without its problems. Some of these problems include leaf chlorosis, nutrient leaching, salt build-up, leaf rot, algal growth, water quality, clogging of nozzles, and other maintenance tasks. A method of rooting cuttings using subirrigation instead of mist was reported by Zhang and Graves (1995). It was recently reported that rhododendrons are difficult to propagate in subirrigation systems (Cuny, 1996). Tissue culture research shows that the optimum pH for root embryogenesis is between pH 4.0 to 5.0 (Smith and Krikorian, 1990). However, little research has been conducted on the effects of pH on the rooting of stem cuttings. We report on the use of a subirrigation system to root cuttings of Rhododendron 'PJM' without mist and to determine the role of the pH on rooting.

### MATERIALS AND METHODS

Five-inch terminal stem cuttings of Rhododendron 'PJM' were collected on 2 August 1996 from a single plant and trimmed to 6 or 7 leaves. They were wounded on one side and treated with in a 1 : 10 dilution of Dip 'n Grow (1.0% IBA, 0.5% NAA) for 5 sec. The cuttings were propagated in a greenhouse under 80% shade. The propagation system consisted of 1-gal nursery containers (15 cm × 18 cm) placed in a flat (50 cm × 35 cm) that was lined with 6-mil plastic and filled with 5 cm of water. There were two treatments, each with four reps of 10 cuttings. The first treatment consisted of a perlite medium in the pots and tap water (pH=7.5) in the lined flat. The second treatment consisted of acid-washed perlite medium in the pots and tap water adjusted to pH 4.5 with 1 N sulfuric acid. Water was added to each system to account for evaporation on a weekly basis. In the pH 4.5 treatment the pH of the water was adjusted to a pH of 4.5. On 18 September 1996 the cuttings were harvested and percent rooting was recorded. The rooted cuttings were gently washed to dislodge loose perlite, and submerged in a 100 ml graduated cylinder to record volume displacement.

### RESULTS

The pH of the subirrigation system had a dramatic effect on root development and growth of Rhododendron 'PJM' (Table 1). The pH 4.5 treatment had 100% rooting with an average root ball water displacement of 7.6 ml. The pH 7.5 treatment had 52.5% rooting with an average root ball water displacement of 0.8 ml. The pH 7.5 treatment produced no commercially acceptable cuttings, while in the pH 4.5 treatment 90% of the cuttings were commercially acceptable.

**Table 1.** Rooting percent and root volume of *Rhododendron* 'PJM' after 6 weeks in subirrigation at two pH levels.

Volume displacement of <i>Rhododendron</i> 'P.J.M.' cuttings (ml)									
pH 4.5 subirrigation treatment					pH 7.5 subirrigation treatment				
Rep 1	Rep 2	Rep 3	Rep 4	Rep 1	Rep 2	Rep 3	Rep 4	Rep 3	Rep 4
0.3	0.1	9.5	10.6	NR	NR	NR	NR	NR	NR
8.1	0.3	11.7	4.5	NR	NR	NR	NR	NR	NR
6.4	0.3	10.9	9.2	NR	NR	NR	NR	NR	NR
7.8	7.9	10.6	12.8	NR	NR	NR	NR	0.2	NR
6.9	9.0	9.7	5.5	0.1	NR	NR	NR	0.5	NR
10.3	6.8	7.3	6.8	0.2	NR	NR	NR	0.6	NR
6.6	7.0	12.8	9.2	0.2	0.1	0.7	0.1	0.7	0.1
7.3	5.4	8.4	11.8	1.8	0.4	1.1	0.2	1.1	0.2
3.2	9.2	11.9	12.6	1.6	2.3	0.6	0.1	0.6	0.1
10.7	4.5	7.5	3.2	2.4	2.1	2.1	0.6	2.1	0.6
Column means					Column means				
6.8					1.3				
Grand mean 7.6 ± 1.9					Grand mean 0.8 ± 0.4				
Percent rooting of <i>Rhododendron</i> 'PJM' cuttings									
100	100	100	100	60	40	70	40	70	40
Mean % rooting 100 ± 0					Mean % rooting 53 ± 13				

The cuttings in the pH 4.5 treatment showed no visible sign of wilting stress throughout the experiment. Cuttings in the pH 7.5 treatment showed signs of wilting stress after the 2nd week. This is likely due to increased resistance to water uptake at the base of the stem. It was observed that roots started to emerge from the cuttings in the pH 4.5 treatment after 10 days. Roots did not emerge from the pH 7.5 treatment until 20 days after the cuttings were stuck.

## DISCUSSION

The success of the subirrigation system is due partly to the use of perlite as a rooting medium. In subirrigation the water flows from the reservoir to the base of the stem cutting by capillary action. Perlite is unique in that its water is loosely held and readily available to the plant roots. Peat and vermiculite hold water tighter and make it less available (Grange and Loach 1983). Preliminary studies showed that perlite and peat or perlite and vermiculite combinations were unsatisfactory media in subirrigation (data not presented).

In addition to the *Rhododendron* 'PJM' we have been successful in rooting *Ilex xmeserveae*, *Cotoneaster adpressus*, *R.* 'Catawbiense Album', along with other taxa in this subirrigation system. All of the plants rooted with acceptable percentages and showed little or no water stress. We are currently working on the effects of different levels of irradiance, pH, and particle size to fine tune the subirrigation system. It should be possible to root many kinds of softwood cuttings with equally well or better rooting percentages than under mist.

## LITERATURE CITED

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