Influence of Misting Interval and Hormone Concentration for Propagation of Native Azaleas©

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Fifteen cm (6 inch) terminal softwood cuttings of *Rhododendron austrinum* (Small) Rehd. were taken 28 April 2000, from an established native stand at the Crosby Arboretum in Picayune, Mississippi. All cuttings were placed in a propagation house under two intermittent mist regimes: 8 sec 4 min^{-1} followed by 6 sec 6 min^{-1}, or 4 sec 2 min^{-1} followed by 2 sec 4 min^{-1}. Cuttings were daily misted from 8:00 to 16:30. The experiment was a two-way factorial (auxin concentration 5 mist interval) arranged in a randomized complete block design. Six single plant replicates were utilized. The auxin used was K-salt of IBA (K-IBA). Cutting vigor at approximately 2 months after sticking was not influenced by K-IBA concentration or misting interval. Root length and root ratings were not influenced by misting interval, but there was an interaction between K-IBA concentration and misting interval for root number. As K-IBA concentration increased, the lower mist intervals produced more roots.

INTRODUCTION

Native azaleas add a particular beauty to the landscape with their delicate trumpet-shaped flowers that typically emerge prior to their leaves in the early spring. One of the earliest blooming native azaleas is *Rhododendron austrinum* (Small) Rehd., the Florida azalea (Bir, 1992). This azalea is a branched shrub that may reach 4.6 m (15 ft) in height. The native range of the Florida azalea is northern Florida, southern Georgia, and Alabama, and southeastern Mississippi. Florida azalea has yellow-orange flowers and may be fragrant.

Although native azaleas are very popular with gardening enthusiasts, little information is available concerning their propagation, and the information that is available is often contradictory.

Hartmann et al. (1997) report that native azaleas in general are difficult to propagate from cuttings. Bir (1992) reported that ease of propagation is species dependent, but recommended using IBA concentrations ranging from 1000 to 2500 ppm and softwood cuttings. Dirr and Heuser (1987) reported that the stoloniferous species often root easier compared to the nonstoloniferous azaleas and suggest the use of wounded terminal softwood cuttings treated with 4000 ppm IBA plus fungicide and mist. Conversely, Galle (1987) reported that *R. austrinum* (Small) Rehd. cuttings were easy to propagate using softwood cuttings.

The use of exogenous auxins is generally accepted to enhance root initiation (Arteca, 1996), but Spethmann (1998) reports four additional factors that govern propagation success for difficult-to-root species. Effective age stage refers to juvenility, age of the stockplant, and position of the cutting. Sticking date refers to when the cutting is collected and propagated. Humidification method relates to the mist

Table 1. The influence of K-IBA concentration and misting interval on root length and root rating.

	Root length (cm)	Root rating visual[1]
Interval		
8 sec 4 min^{-1}	3.2a	2.5a
4 sec 2 min^{-1}	3.0a	2.3a
Rate (ppm)		
0	1.3c	0.7d
2000	1.8c	1.4cd
4000	2.4bc	1.6cd
6000	3.1b	2.6bc
8000	4.2ab	3.5ab
10,000	5.7a	4.1a
Significance[2]		
Interval	NS	NS
Rate	**	**
Interval * Rate	NS	NS
Rep	NS	NS
Regression		
Linear	**	**
Quadratic	NS	NS

[1]A visual rating was taken on a scale of 1 to 5 with 1 being unhealthy with mostly callus and 5 being extremely healthy.
[2]NS, *, or ** means nonsignificant or significant at the 5% or 1% level respectively.

system utilized. Finally, method of overwintering relates to the survival of the cutting and subsequent initiation of spring growth. Most literature does address the effective age, stage, and sticking date for propagation of native azaleas since terminal softwood cuttings are recommended. Although humidity control has been identified as one of the most important factors governing rooting of difficult-to-root species (Batson, 1998), the literature gives no specific recommendations for mist intervals. Bir (1992) mentions that rooted cuttings should be left undisturbed until new growth starts in the spring. Since the literature makes no specific recommendations concerning hormone levels or misting intervals for *R. austrinum* (Small) Rehd., the objective of this experiment was to determine the effects of six concentrations of K-IBA and two misting intervals on rooting of Florida azalea.

MATERIALS AND METHODS

Fifteen-centimeter (6-inch) long terminal softwood cuttings of *R. austrinum* (Small) Rehd. were taken 28 April 2000, from an established native stand at the Crosby Arboretum in Picayune, Mississippi (U.S.D.A Zone 8B). Cuttings were stored at 100% relative humidity prior to being stuck on 29 April 2000. All leaves except 2 to 4 terminal leaves were stripped from each cutting, and the base of each cutting was double-wounded to a length of 2.5 cm (1 inch). The basal end of each cutting was dipped into the appropriate K-IBA solution for 5 sec and then inserted into the propagation medium to a depth of 2.5 cm (1 inch).

Propagation containers were 8.8 cm (3.5 inch) containers, and the propagation medium was 100% pine bark amended with 5 lbs yd^{-3} (2.9 kg m^{-3}) dolomitic limestone and 1.5 lbs yd^{-3} (0.9 kg m^{-3}) Micromax. All cuttings were placed in a propagation house under two intermittent mist regimes. Cuttings were daily misted from 8:00 to 16:30. Greenhouse temperatures were maintained at 35/20°C (95/68°F) max/min and maximum light intensity was 1200 mmol m^{-2} sec^{-1}.

Treatments consisted of six K-IBA rates (0, 2000, 4000, 6000, 8000, and 10,000) and 2 mist intervals (8 sec 4 min^{-1} followed by 6 sec 6 min^{-1} or 4 sec 2 min^{-1} followed by 2 sec 4 min^{-1}). Beginning 20 May 2000, 3 weeks after sticking, all treatments were fertilized bi-weekly with 200 ppm N from a water soluble 20N-4.4P-16.6K (20-10-20) fertilizer. Fertilization was based on visual observations of root initiation. Two months after sticking, the mist intervals were reduced to 6 sec 6 min^{-1} or 2 sec 4 min^{-1}. Treatments were organized in a 2 × 6 factorial (mist interval × K-IBA rate)

Table 2. The influence of K-IBA concentration and misting interval on root number.

Concentration (ppm)	Misting interval	Root number
0	low	6.6 de
high	3.0 e	
2000	low	9.0 cde
high	9.1 cde	
4000	low	7.6 cde
high	20.0 cde	
6000	low	20.8 cde
high	28.3 bc	
8000	low	58.6 a
high	18.8 cde	
10,000	low	48.5 ab
high	31.2 cd	
LSD		3.6

Significance rating needs to be added for a-e.

Table 3. The influence of K-IBA concentration and misting interval on rooting percentage.

Interval	Rooting (%)
8 sec 4 min^{-1}	75
4 sec 2 min^{-1}	67
Rate	
0	42
2000	67
4000	67
6000	75
8000	75
10,000	100

arranged in a randomized complete block design with 12 single plant replicates. Six replicates were harvested on 8 Aug. 2000, and evaluated for root number, root length (cm), and a root rating for root health with 1 being poor root health and 5 being excellent root health. Rooting percentages were also calculated. The remaining 6 replicates were transplanted into trade gallon containers for growth evaluation the following spring. All data were subjected to analysis of variance (ANOVA) and treatment means were separated by Fisher's Protected Least Significant Difference (LSD, $P < 0.05$).

RESULTS AND DISCUSSION

Root length and root ratings were not influenced by mist interval (Table 1). Both root length and root ratings increased linearly as K-IBA rate increased. However, increasing the hormone level from 8000 to 10,000 ppm did not result in an increased root length or root rating for cuttings when means were compared.

There was an interaction between mist interval and K-IBA concentration for root number. Misting interval did not influence root number within a hormone concentration when concentrations were lower than 8000 ppm (Table 2). However, when K-IBA concentrations were 8000 ppm or more, the lower mist intervals resulted in higher numbers of roots.

Rooting percentages were 75% and 67% for the high and low mist interval, respectively. Since the low mist interval resulted in higher root numbers at 8000 and 10,000 ppm K-IBA although fewer cuttings rooted, these results suggest that the low mist interval may have resulted in a more vigorous root system compared to cuttings grown in the high mist interval. Similarly, failure of mist intervals to impact root length and root ratings in spite of lower rooting percentages, suggests that cuttings under low mist intervals may have been more vigorous.

Rooting percentages were 42%, 67%, 67%, 75%, 75%, and 100% for cuttings treated with 0, 2000, 4000, 6000, 8000, and 10,000 ppm K-IBA, respectively (Table 3). These percentages mirror the root lengths, root ratings, and root numbers. Although the rooting percentage was lower, cuttings without K-IBA had root lengths, root ratings, and root numbers that were similar to cuttings treated with 2000 or 4000 ppm K-IBA. These results indicate that the 0 ppm cuttings that did root probably had fairly vigorous root systems. Data were similar for cuttings grown using 2000 and 4000 ppm K-IBA, and cuttings exhibited identical rooting percentages. Similarly, root lengths and root ratings were equal for plants grown using 6000 or 8000 ppm K-IBA, and these cuttings had identical rooting percentages.

Use of K-IBA in concentrations of 6000 ppm or greater resulted in greater root lengths and root ratings compared to cuttings not treated with auxin. Conversely, only the use of 8000 or 10,000 ppm K-IBA and low mist intervals improved root numbers compared to cuttings grown using no hormone. Since increasing the hormone concentration from 8000 to 10,000 ppm did not result in increased cutting performance, 8000 ppm K-IBA can be recommended as a economically suitable hormone concentration for propagation of *R. austrinum*. Similarly, low mist intervals can also be recommended, since the high intervals reduced root numbers at the optimum hormone range.

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