Combined Proceedings IPPS 71:125-129. 2021.

Rooting Response of Piedmont Azalea (*Rhododendron canescens)* Softwood, Single-node Cuttings to a Basal Auxin Quick Dip

Jenny B. Ryals, Patricia R. Knight, Christine E. H. Coker, Gary R. Bachman, Jim M. DelPrince, Patricia R. Drackett, Scott Langlois, David Brand and Anthony T. Bowden

Coastal Research and Extension Center, South Mississippi Branch Experiment Station
P.O. Box 193, Poplarville, Mississippi 39470

j.ryals@msstate.edu

Keywords: Propagation, IBA, Hortus IBA water soluble salts

Summary

Piedmont azalea (*Rhododendron canescens)* is a deciduous azalea native to the southeastern United States as well as areas in Maryland and Pennsylvania. Cutting propagation reduces the variability observed when propagating from seed. As a whole, deciduous azaleas are known to be difficult to root via cuttings, however, piedmont azalea has been reported as moderate to easy to propagate from softwood cuttings. Piedmont azalea has been observed to root as softwood cuttings treated with a range of indole-3-butyric acid (IBA) quick dips from 5,000 to 10,000 ppm. The objective of this research was to determine rooting response of very soft single node cuttings to a basal auxin quick dip in order to provide growers with relevant cutting propagation recommendations. Naturally occurring auxins are produced in newly forming tissues. Therefore, a low dose of endogenous auxin might encourage young plants to root faster and more efficiently than older cuttings. Results indicate that single node Piedmont azalea cuttings will root with or without the use of an auxin basal quick dip.

INTRODUCTION

Propagation of native deciduous azaleas (*Rhododendron* spp.) can be done by seed, cutting, and layering. Deciduous azaleas are considered to be a difficult to root plant species. Due to trait variability observed in seed-grown azaleas, cutting propagation is preferred; however, cutting propagation recommendations can vary (Hyatt, 2006; Sommerville, 1998). According to Dirr and Heuser (2018), slightly firm, 15.2 cm (6 in.) cuttings should be taken from the beginning to the end of April. Dirr and Heuser (2018) also recommend using a fungicide with 4000 ppm IBA dip; however, recommended auxin concentrations can vary with different cultivars. Hyatt (2006) recommends taking 5 to 8 cm (2 to 3 in.) softwood cuttings in late May to early June while the plants are actively growing. Bir (1992) achieved successful rooting with softwood cuttings taken after new growth had ceased and treated with 1000-2500 ppm IBA. Ryals et al. (2019) achieved low percentages of rooting when cuttings of new plant tissue were taken after flower senescence and treated with 2500 ppm IBA.

Besides being difficult to root, deciduous azaleas can also be problematic to break dormancy and put on new growth (Brown, 2017). According to Hyatt (2006), the stronger the rooting hormone used, the more difficult it is for cuttings to break dormancy and start actively growing. Piedmont azalea, (*Rhododendron canescens* [Michaux.] Sweet) has been reported to be anywhere from moderate-to-easy to propagate as softwood cuttings, according to Galle (1987). Treatment of Piedmont azalea softwood cuttings with 10,000 ppm K-IBA resulted in successful rooting performance (Knight et al., 2005). Also, rooting with lower rates of K-IBA (7500 ppm) occurred and an increase of rooting percentage was observed. Berry (1998) also observed rooting when new soft growth was treated with 5000 ppm K-IBA.

Transport of auxins occurs basipetally, from the shoot apices downward to the root apices (Goldsmith, 1977; Petrášek and Friml, 2009; Robert and Friml, 2009). Based on the location of naturally occurring auxins and the transport path, it could be possible to take new, young plant tissue cuttings and utilize these naturally occurring auxins. Addition of a low dose, synthetic auxin treatment to young deciduous azalea cuttings might encourage the plant to root faster and more efficiently than with a hardwood cutting. Successfully rooting softwood cuttings with lower doses of auxin could also potentially provide a solution to the dormancy problem. Thus, the objective of this study was to determine if rooting response was improved when softwood, single-node Piedmont azalea cuttings were treated with a basal quick dip in a range of IBA concentrations.

MATERIALS AND METHODS

A randomized complete block experimental design was utilized with eight cuttings per treatment, n=8. Piedmont azalea cuttings were taken on 3 April 2020 from a native population at The Crosby Arboretum located in Picayune, MS (lat. 30°30’11” N, long. 89°39’53” W, elevation 17 meters USDA hardiness zone 8b). Cuttings were taken around 7:00 am after a recent rain to ensure they were turgid to aid in reduction of transpiration stress on the cuttings (Bir, 1996). Using the method that was described by Jenkins (2007), the softwood cuttings were taken from tissue soft enough to be removed via pinching with fingers. Cuttings were single-node with an average length around 2.54 cm (1-in.). Immediately after pinching, cuttings were placed and stored in a cooler of water until being stuck with the respective treatments (Jenkins, 2007). At sticking, cuttings were turgid and showed no signs of wilting or stress.

Hortus (Hortus IBA Water Soluble Salts™, Phytotronics, Inc.®, Earth City, MO) was applied as a quick dip to the cuttings at four different auxin levels (0, 50, 250 or 400 ppm). Cuttings were then stuck in a growing mix (Jolly Gardner® Pro Line C/B Growing Mix, Old Castle Lawn & Garden, Atlanta, GA) in 5.7 cm (2.3 in.), 38 cell propagation tray inserts. The growing mix contained Canadian sphagnum peat, processed pine bark, coarse perlite, and medium vermiculite. Cuttings were then placed under intermittent mist for 6-sec every 6-min during daylight hours. Sixty days after sticking, mist intervals were reduced to 2-sec every

6- min. Data collected after 120 days included rooting percentage, total root number, root length (cm), root surface area (cm^2), average root diameter (mm), root volume (cm^3), number of root tips, number of root forks, number of root crossings, and root quality (1-5, with 1=no roots and 5=healthy, vigorous root system). Roots were washed by gently spraying with water, then were separated from the stem of each plant. The cleaned individual root systems were floated in tap water in a 10 by 15 cm (4- by 6-in.) Plexiglas tray and gray-scale root images were acquired. Roots were untangled and separated with a paintbrush to minimize root overlap. The tray was placed on top of a specialized dual-scan optical scanner, linked to a computer. Gray-scale root images were acquired by setting the parameters to high accuracy (resolution 800 by 800 dpi). Acquired images were analyzed for root length, root surface area, average root diameter, root volume, and number of tips, forks, and crossings using winRHIZO Pro software (Regent Instruments, Inc., Quebec, QC, Canada). Data were analyzed using PROC GLM and Tukey's HSD at $P \leq 0.05$ in SAS version 9.4 (SAS Institute INC., Cary, NC).

RESULTS AND DISCUSSION

Rooting percentage, total root number, and root quality were similar among treatments (Table 1). Rooting percentages ranged from 72 to 91% depending on treatment with overall rooting percentages of 83% across all treatments. In other studies, Piedmont azalea rooting percentages have ranged from 75 to 100% (Knight et al., 2005; Thompson, 2018). Even though rooting percentages are very similar, previous studies used older cuttings compared to this study and required high concentrations of IBA (7500 to 10000 ppm) to achieve these percentages.

Propagation methods that will provide the grower with a quality liner at maximum efficiency are highly beneficial for success of Piedmont azalea in the market. Based on the results in this study, it would appear that new growth, softwood, single node cuttings of Piedmont azalea can be successfully rooted without an additional exogenous auxin application. Successfully propagating hard to root species without the use of exogenous auxins can benefit propagation nurseries financially and in management practices. Plant production without the use of auxin can provide a savings in input costs spent on auxins and labor costs. Knowing that Piedmont azalea can be propagated without the use of auxin will reduce the time it takes to stick cuttings by eliminating the hormone dipping process. Growers can also reduce the spread of disease by being able to stick cuttings directly into growing media without the possibility of contaminating them in the hormone dipping process. Also, knowing how to propagate Piedmont azalea from different cutting types gives growers the flexibility to propagate at the most efficient time during their crop rotations.

Table 1. Influence of auxin basal quick dip on root percentage, number of roots, and root quality of Piedmont azalea.

Treatment	Rooting[w] (%)	Roots (no.)	Root quality rating[x]
Untreated	91a[z]	5.8a	3.6a
IBA			
50 ppm	88a	4.7a	3.3a
250 ppm	81a	4.8a	3.1a
400 ppm	72a	4.1a	2.7a
Significance (p-value)[y]	0.2318	0.3180	0.2411

[z]Means followed by the same letter within a column are similar and not significantly different (α = 0.05).
[y]P values for differences between means were obtained using Tukey's honest significant difference (HSD) at $P \leq 0.05$.
[x]Root quality (visual rating of 0-5, with 0=dead, no callus and 5=healthy, vigorous root system).

LITERATURE CITED

Berry, J. (1998). Commercial propagation of southern native woody ornamentals. Comb. Proc. Intl. Plant Prop. Soc. *48*:643–650.

Bir, R.E. (1992). Growing and propagating showy native woody plants. Chapel Hill (NC): University of North Carolina Press.

Bir, R.E. (1996). Rooting stem cuttings of some eastern native *Rhododendrons*. J. Amer. Rhododendron Soc. 50 (2). https://scholar.lib.vt.edu/ejournals/JARS/v50n2/v50n2-bir.htm

Brown, B. (2017). Fungal associations and improving micropropagation of native *Rhododendron* spp. Master's Thesis, Auburn University.

Dirr, M.A. and Heuser, Jr.. C.W. (2018). The reference manual of woody plant propagation. Timber Press. Portland, Oregon.

Galle, F.C. (1987). Azaleas. Timber Press. Portland, Oregon.

Goldsmith, M. H. M. (1977). Polar transport of auxin. Annu. Rev. Plant Physiol. Plant Mol. Biol. *28*:439-478.

Hyatt, D.W. (2006). Propagation of deciduous azaleas. Comb. Proc. Intl. Plant Prop. Soc. *56*:542-547.

Jenkins, M.Y. (2007). Rooting stewartia and native azaleas using softwood cuttings. Comb. Proc. Intl. Plant Prop. Soc. *57*:646-647.

Knight, P., Coker, C., Anderson, J., Murchison, D. and Watson, C. (2005). Mist interval and K-IBA concentration influence rooting of orange and mountain azalea. Native Plants Journal. *6*:111-117.

Petrášek, J. and Friml, J. (2009). Auxin transport routes in plant development. Development *136*:2675-2688.

Robert, H.S. and Friml, J. (2009). Auxin and other signals on the move in plants. Nature Chemical Biology *5*:325-332.

Ryals, J. B., Knight, P.R., Chastain, D.R., Ryals III, L.E., Coker, C.E., Bachman, G.R., DelPrince, J.M., Drackett, P.R., and Bowden, A.T. (2019). Effect of cutting submersion duration and auxin concentration on survivability and root response of Florida azalea. Comb. Proc. Intl. Plant Prop. Soc. *69*:295-300.

Sommerville, E.A. (1998). Propagating Native Azaleas. J. Amer. Rhododendron Soc. *52*:126-127.

Thompson, P. (2018). Rooting response of deciduous azaleas, *Rhododendron* section *Pentanthera*, stem cuttings to mist regimes and media mixes. Master's Thesis, Auburn University.