Vegetative Propagation of Oconee Azalea (*Rhododendron flammeum*)

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Significance to Industry: The native, Eastern North American deciduous azaleas (*Rhododendron* spp.) possess a plethora of ornamental characteristics in flower form, duration, color, timing, and fragrance. Adaptability and landscape merit are also found within the group. Stem cutting propagation is the principle method for mass production of clonally derived plant material, however, vegetative propagation of many of the deciduous azaleas native to the Eastern United States has been difficult (1). The utility of these plants in the landscape on a commercial scale is dependent upon reliable, productive propagation protocols.

Nature of Work: Mound layering is a method of in-field propagation whereby stock plants are hedged severely and emerging shoots are covered with substrate allowing for adventitious root formation. Subsequent roots grow into the surrounding substrate and rooted stems can then be severed from the stock plant. The severe pruning helps to maintain vegetative, juvenile growth that typically has a higher capacity for adventitious root formation (3). Covering the shoots also results in etiolation, which can decrease the light-induced breakdown of endogenous indole acetic acid (IAA) and retard tissue differentiation, resulting in more parenchyma cells with greater potential for root initiation and development (2). Wounding, an application of a rooting hormone, or a combination of both can be used during mounding to increase rooting percentages (4). Mounding is a viable option for propagating difficult-to-root plants and is utilized extensively with temperate fruit trees and *Aesculus* species (5, 6). This technique also lends itself to mechanization in field situations. Upright habit and the ability to produce many new shoots following pruning are characteristics of plants that could be successfully propagated by mound layering (3). The objective of this study was to evaluate the potential of successful propagation of *Rhododendron flammeum* (Michx.) Sarg., Oconee azalea, by mound layering and to determine the effects of timing of mounding, wounding or the application of the potassium salt of indole butyric acid (K-IBA) on rooting percentage, the number of plants produced, and root system quality.

Three gallon plants (12l) were field planted in fall 2005 and pruned to 6 in (15 cm) above the root collar the following March 2006. Plants were then mounded either in mid-March or mid-June. Mounding consisted of covering plants with 18 in (46 cm) of composted pine bark that was held in place by a 24 in (61 cm) diameter cylinder constructed from chicken wire. Prior to mounding in June, stems on each plant were

either wounded or not wounded and treated or not treated with 5,000 ppm K-IBA using a spray bottle, which represented a 2 × 2 factorial.

All shoots were harvested in March of the subsequent year and evaluated for rooting percentage, number of rooted plants produced per mound, root collar diameter (RCD), relative root score, and root system symmetry. Root system quality was analyzed using the RCD, root score, and root system symmetry measurements. Root collar diameter was measured at the stem to root interface using a caliper. A relative root score was based visually on size of the root ball with small roots systems receiving a 0, intermediate sized root systems receiving a 1, and large root systems receiving a 2 (Fig. 1). Symmetrical root systems had at least two roots 130° apart around the stem (Fig. 1). The experimental design was a randomized complete block design with 5 blocks of 10 plants. The treatments were randomly applied to pairs within the blocks with one set of two being mounded in early March and the other 4 sets of 2 pairs (8 plants total per block) being mounded in June. The experiment was repeated over two years and the data presented represents harvests from 2007 and 2008.

Results and Discussion: Mound layering of *Rhododendron flammeum* was successful for both the March and June mounding times. Rooting percentage and the number of rooted plants produced per mound were not significantly different for either mounding time (Table 1.). Additionally, within the June mounding time, neither rooting percentage nor number of rooted plants was affected significantly by wounding, K-IBA application, or their interaction (Table 1.). Regardless of mounding season or treatment, mound layering had a 50% success rate that produced around 6 rooted plants per mound.

Similarly to the rooting percentages and number of rooted plants, there was no effect of timing, wounding, or K-IBA application on root system symmetry (Table 2.). Approximately 60% of the root systems of successfully propagated plants were found to be symmetrical. Significant differences were observed between the March and June mounding times for root collar diameter and relative root scores (Table 2.). March mounding resulted in rooted plants with an average RCD of 5.3 mm and a root score of 1. Plants in the June mounding treatment had a mean RCD of 4.6 mm and a root score of 0.80. Within the June mounding time, RCD was affected by the interaction of wounding and K-IBA treatment. Relative root score was unaffected. Wounding plus K-IBA spray application resulted in a mean RCD of 4.2 mm, which is 0.4 mm less than the overall mean RCD of June mounded plants, and may not be biologically significant because wounding or K-IBA did not affect any other variables measured.

The results of this study indicate mound layering is a practical approach for successful propagation of Oconee azalea. Both mounding times were effective and the use of wounding, K-IBA applications, or both is not necessary to improve rooting percentages, number of rooted plants, or percentage of symmetrical root systems. The earlier March mounding time did allow for slightly larger root collar diameters and visually superior root systems. This effect is probably attributed to a longer root development time throughout the year when compared to the later June mounding time. For the grower,

this information provides flexible timing in the in-field propagation of *Rhododendron flammeum*. Because mounding in March on a yearly basis might prove stressful for plants, growers can alternate mounding times during production to allow for plants to recover between mounding. Plants could be mounded in March during year one, but be mounded in June during year two.

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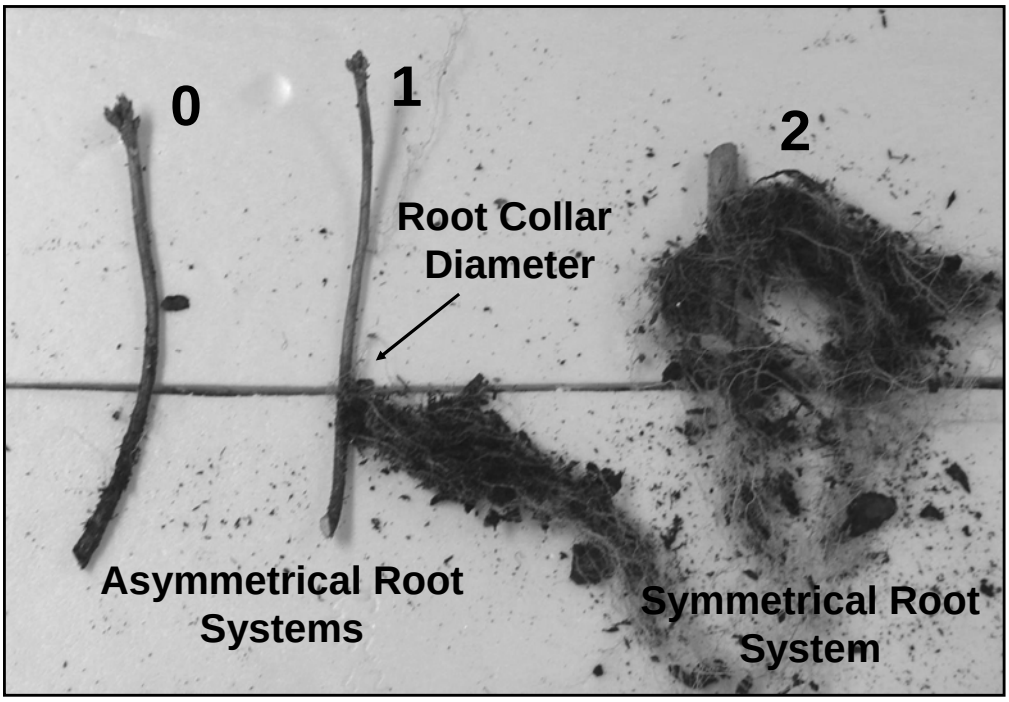

Figure 1. Root system quality for *Rhododendron flammeum* illustrating relative root score (0, 1, or 2), root collar diameter (RCD), and determination of root system symmetry (symmetrical root systems have two or more roots at least 130 degrees apart).

Table 1. Rooting percentage and number of plants produced per mound for March and June mounding treatments of *Rhododendron flammeum.*

Treatment	Rooting %	Number Rooted[1]
March Mounding	48.4±8.3 A	7.3±1.9 A
June Mounding	50.5±4.3 A	5.7±0.7 A
Wounding and K-IBA	60.0±9.1 a	5.6±1.1 a
No Wounding and No K-IBA	44.7±9.3 a	4.9±1.5 a
Wounding and No K-IBA	53.3±9.1 a	7.3±1.6 a
No Wounding and K-IBA	45.4±7.5 a	5.3±1.2 a

[1]Values represent means ± 1 SEM for 10 replications (5 replications × 2 years). Means followed by a different letter, within columns, represent significant differences at $P<0.05$. Upper case (A) within a column denotes comparison between March and June mounding, whereas lowers case (a) denotes comparisons between wounding and K-IBA treatments during June mounding.

Table 2. Root system quality of *Rhododendron flammeum* indicated by root system symmetry, root collar diameter, and relative root score (see Figure 1 for visual descriptions).

Treatment	Symmetry[1]	RCD[2] (mm)	Root Score
March Mounding	0.59±0.05 A	5.3±0.3 A	1.0±0.1 A
June Mounding	0.60±0.03 A	4.6±0.1 B	0.8±0.0 B
Wounding and K-IBA	0.54±0.05 a	4.2±0.2 b	0.8±0.1 a
No Wounding and No K-IBA	0.60±0.05 a	4.7±0.2 ab	0.7±0.1 a
Wounding and No K-IBA	0.66±0.04 a	4.7±0.2 a	0.9±0.1 a
No Wounding and K-IBA	0.58±0.06 a	4.8±0.3 a	0.8±0.1 a

[1]Values represent means ± 1 SEM for 10 replications (5 replications × 2 years). Means followed by a different letter, within columns, represent significant differences at $P<0.05$. Upper case (A) within a column denotes comparison between March and June mounding, whereas lowers case (a) denotes comparisons between wounding and K-IBA treatments during June mounding.
[2]RCD = Root collar diameter.