Propagation of *Magnolia virginiana* 'Santa Rosa' by Stem Cuttings

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Nature of Work: 'Santa Rosa' magnolia, a selection of the native Magnolia virginiana L. (Sweet Bay magnolia) introduced by Woodlanders Nursery, Aiken, S.C. in 1979, is an upright, evergreen tree with an open growth habit. Leaves of 'Santa Rosa' are larger than the species as are the lemon scented flowers (Raulston, personal communication). These attributes along with height growth that approaches 1 to 1.5 m (3 to 4 ft) per year make 'Santa Rosa' a desirable landscape plant. However, production of 'Santa Rosa' magnolia has been hindered due to propagation difficulties associated with rooting stem cuttings.

Propagation of magnolias by stem cuttings is reported to be optimized when cuttings are collected soon after the terminal bud is formed and the wood has hardened (semi-hardwood) (1,2). Likewise, treatment of cuttings with naphthaleneacetic acid (NAA), alone or in combination with indolebutyric acid (IBA) also has improved adventitious rooting (1,2).

In many cases, stem cuttings of 'Santa Rosa' have proven difficult or impossible to root (Allen, Burns, and McCartney, personal communication). Following insertion into a rooting medium, softwoood cuttings drop their leaves and soon die, whereas semi-hardwood cuttings retain their leaves, yet fail to root. Propagation of magnolias by hardwood cuttings is not normally practiced. Rooting of 'Santa Rosa' magnolia can vary widely from year to year indicating a narrow window of opportunity may exist for optimum rooting. Therefore, the objectives of this research were to evaluate the influence of stock plant growth stage, auxin form, and auxin concentration on rooting stem cuttings of 'Santa Rosa' magnolia.

Due to a shortage of stock material, softwood and hardwood terminal cuttings were collected from stock plants growing in three separate locations: (1) JC Raulston Arboretum, North Carolina State University, Raleigh, (2) Tar Heel Native Trees, Clayton, N.C., and (3) Gilbert's Nursery, Chesnee, S.C. Softwood, semi-hardwood, and hardwood terminal cuttings were taken in June, November, and February 1997, respectively. All semi-hardwood cuttings were collected from plants at Tar Heel Native Trees.

From the initial cutting material, 10 to 15 cm (4 to 6 in) long terminal cuttings were prepared. Leaves were removed from the lower half of the cuttings and the remaining leaves were cut in half. The basal 1 cm (0.4 in) of the cuttings was then treated for 1 sec with 0.0, 6.15, 12.3, 24.6, or 49.2 mM (0.0%, 0.13%, 0.25%, 0.5%, or 1.0%) IBA in factorial combination with equivalent mM concentrations of NAA (0.0%, 0.11%, 0.23%, 0.46%, or 0.92%) in 50% isopropanol. Hardwood cuttings were not treated with the 6.15 mM concentration. Due to basal stem necrosis on hardwood cuttings at the highest auxin concentration (49.2 mM), softwood and semi-hardwood cuttings were not treated with this concentration.

Following auxin treatment, cuttings were allowed to air dry for 15 min before inserting the basal 5 cm (2 in) into a raised greenhouse bench containing a medium of 2 perlite : 1 peat (v/v) with bottom heat maintained at 24°±2°C (75° ± 4°F). Intermittent mist operated daily for 5 sec every 6 min during daylight hours. Cuttings were maintained under natural photoperiod and irradiance with day/nights of 24° (5°C (75° ± 9°F)/ 18°± 5°C (65° ± 9°F).

For each growth stage the experimental design was a randomized complete block with a factorial arrangement of treatments, 4 IBA concentrations x 4 NAA concentrations x 6 cuttings per treatment x 5 replications. After 14 weeks for each growth stage, cuttings were harvested and data recorded. Data included, percent rooting, number of primary roots≥1 mm (0.04 in), and root lengths. All data except rooting percentages were based on the actual number of cuttings that rooted (at least one primary root). Data were subjected to analysis of variance and regression analysis.

Results and Discussion: The majority of softwood cuttings died within 3 weeks. Overall rooting of softwood cuttings was poor (22%) and was unaffected by auxin treatments (data not presented).

An interaction between IBA and NAA was observed with semi-hardwood cuttings. When NAA was absent from the treatment solutions, rooting increased linearly with increasing IBA concentration (Fig. 1) with a maximum of 83% at 24.6 mM (0.5%) IBA. Addition of increasing concentrations of NAA, never stimulated rooting greater than that of 24.6 mM IBA alone.

Similar to softwood cuttings, hardwood cuttings rooted poorly. At this growth stage, increasing NAA concentrations significantly reduced rooting linearly whereas rooting was unaffected by IBA (Fig. 2). Averaged across IBA concentrations, rooting of 29%, 21%, 16%, and 3% was observed for hardwood cuttings treated with 0, 12.3, 24.6, or 49.2 mM NAA, respectively. This was unexpected given the previously mentioned reports that NAA increases rooting in species of *Magnolia* (1,2).

Root number and root length were unaffected by auxin treatments. Mean root number for all growth stages and across all treatments varied from 1.9 to 3.2 roots per cutting while mean root length ranged from 7 to 14 cm (2.8 to 5.5 in).

Significance to Industry: Results demonstrate that stem cuttings of *Magnolia virginiana* 'Santa Rosa' can be rooted in high percentages. However, a key factor in successful rooting is the growth stage. The best rooting (83%) was achieved with semi-hardwood cuttings collected once terminal growth ceased (mid-November, Clayton, N.C.) and treated with 24.6 mM (0.5%) IBA in 50% isopropanol for 1 sec. Softwood and hardwood cuttings rooted poorly with the best rooting never exceeding 36% for both growth stages. In contrast to reports that NAA is an effective root-promoting compound for some species of *Magnolia*, our results demonstrated that NAA was of no benefit, and in some cases, inhibited rooting of stem cuttings of 'Santa Rosa' magnolia. Thus, growers should exercise caution when using popular commercial rooting formulations that contain NAA when attempting to root stem cuttings of 'Santa Rosa' magnolia.

Literature Cited:

1. Dehgan, B., M. Gooch, F. Almira, and B. Poole. 1988. Vegetative propagation of Florida native plants: *Acer rubrum, Gordonia lasianthus, Magnolia virginiana, and Styrax americana.* Proc. Fla. State Hort. Soc. 101:293-296.

2. Dirr, M.A. and B. Brinson. 1985. *Magnolia grandiflora*: A propagation guide. Amer. Nurseryman 162(9):38-51.

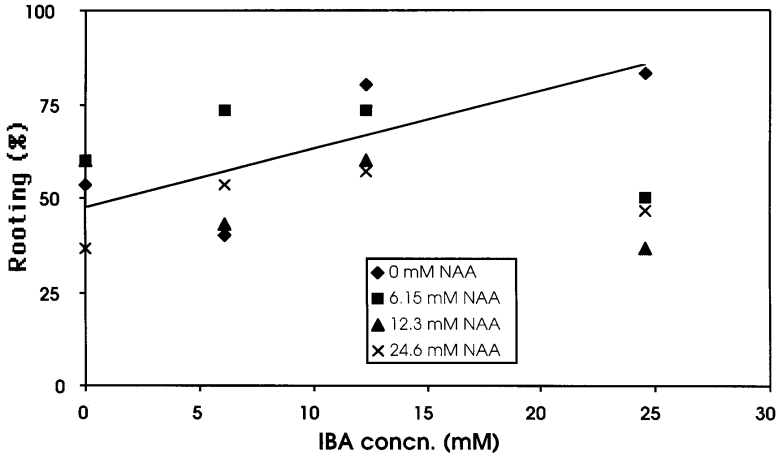

Fig.1. Influence of IBA and/or NAA treatment on rooting semi-hardwood cuttings of 'Santa Rosa' magnolia. Symbols represent means, n=5. Regression line represents predicted response where NAA=0. $LSD_{0.05}$=28

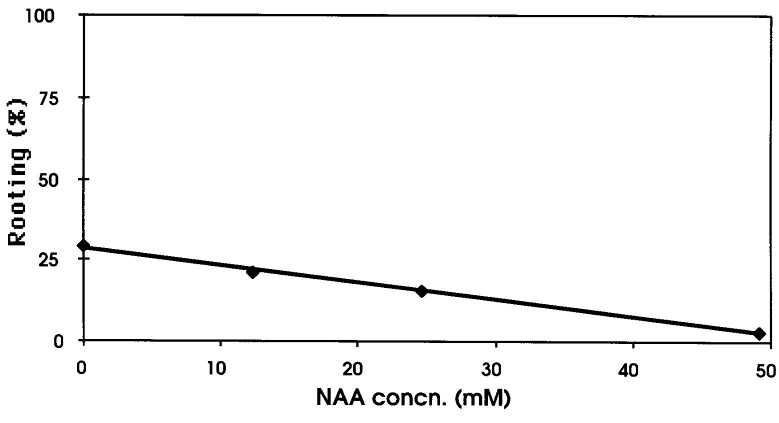

Fig. 2. Influence of NAA treatment on rooting hardwood cuttings of 'Santa Rosa' magnolia. Symbols represent means, n=20. Regression line represents predicted response at a given concentration of NAA. $LSD_{0.05}$=12.