PROCEEDINGS OF

RESEARCH CONFERENCE

Fifty-Fourth Annual Report

2009

Compiled and Edited By:
Dr. Nick Gawel
Tennessee State University
School of Agriculture and Consumer Sciences
Nursery Research Center
472 Cadillac Lane
McMinnville, TN 37110

Cutting Propagation of Rose Using Basal and Foliar Applications of Wood's Rooting Compound

Eugene K. Blythe[1] and Jeff L. Sibley[2]

[1]Coastal Research and Extension Center
Mississippi State University,
South Mississippi Branch Experiment Station,
Poplarville, MS 39470
[2]Department of Horticulture, Auburn University, Auburn, AL 36849

blythe@pss.msstate.edu

Index Words: Adventitious rooting, auxin, root-promoting compounds, *Rosa* 'Red Cascade'

Significance to Industry: Foliar application of auxin is an acceptable alternative to a conventional basal quick-dip for rooting stem cuttings of some nursery crops. In two experiments, cuttings of *Rosa* 'Red Cascade' were treated with Wood's Rooting Compound (WRC) at selected rates of auxin using both methods of application. Cuttings receiving the control treatment of WRC at 1030 ppm IBA + 660 ppm NAA (a 10% dilution of the concentrated product) as a basal quick-dip produced the best overall rooting and initial shoot growth responses compared with cuttings receiving a basal dip with lower rates of auxin (IBA + NAA at 515 + 330 or 103 + 66 ppm), while use of a foliar spray application with these same three rates of auxin was detrimental. Results comparable to those of the control treatment were subsequently obtained using a foliar application with much lower rates of auxin (10.3 ppm IBA + 6.6 ppm NAA or less). Use of a foliar spray application of auxin with certain crops can lower production costs and reduce the number of employees who work with these chemicals.

Nature of Work: A variety of auxin formulations is available to the commercial propagator, including indole-3-butyric acid (IBA) as powders and water-soluble salts, as well as combinations of IBA and 1-naphthaleneacetic acid (NAA) as alcohol-based, liquid concentrates (6, 10). The basal quick-dip and powder application methods have historically been the most popular for treating stem cuttings with auxin (6, 10). In recent years, foliar application of auxin after sticking cuttings has been examined for propagation of a number of woody and herbaceous ornamental nursery crops (1, 2, 3, 5). The foliar spray application method has been reported to be useful in commercial practice (7, 8) as nursery professionals strive to reduce labor needs, production costs, and the number of employees that work with agricultural chemicals.

Foliar applications of auxin for rooting cuttings of *Rosa* 'Red Cascade' have previously been evaluated using Dip 'N Grow (DNG) (Dip 'N Grow, Clackamas, OR) and the potassium salts of IBA (K-IBA) and NAA (K-NAA), with results showing similar or reduced rooting and initial shoot growth responses in comparison with a conventional basal quick-dip (5). The commercial product Wood's Rooting Compound (WRC) (Earth

Science Products, Wilsonville, OR) has not previously been evaluated for foliar auxin application. WRC contains IBA and NAA with isopropanol as a cosolvent (9) and has a higher NAA:IBA ratio (0.64:1) than DNG (0.5:1). The objectives of this study were to evaluate the response of cuttings of *Rosa* 'Red Cascade' to Wood's Rooting Compound using: 1) basal and foliar applications of auxin at rates typically used for a basal quick-dip and 2) foliar applications of auxin at levels that are lower than those normally used for a basal quick-dip.

Cutting material of *Rosa* 'Red Cascade' was collected from greenhouse-grown stock plants and prepared as 0.75-inch, single-node cuttings during spring of 2001. Cuttings were stuck into Fafard 3B (a blend of peat, perlite, vermiculite, and pine bark; Conrad Fafard, Inc., Agawam, MA) in cell trays. In Expt. 1, auxin solutions were applied to cuttings as either a 1-second basal dip (prior to sticking) or by spraying the cuttings to the drip point using a plastic hand-pump spray bottle (after sticking) using WRC diluted to IBA + NAA concentrations of 1030 + 660, 515 + 330, or 103 + 66 ppm, for a total of six treatments. In Expt. 2, cuttings in one treatment received a 1-second basal dip (prior to sticking) in WRC diluted to 1030 ppm IBA + 660 ppm NAA, while cuttings in the other five treatments were sprayed (as in Expt. 1) using WRC diluted to IBA + NAA concentrations of 41.2 + 26.4, 20.6 + 13.2, 10.3 + 6.6, 1.03 + 0.66, or 0.52 + 0.33 ppm. Deionized water was used for diluting the WRC. Cuttings receiving the basal dip in 1030 ppm IBA + 660 ppm NAA served as the control treatment in both experiments, representing a commonly used rate for commercial cutting propagation. Cuttings were stuck in the late afternoon, allowing sprayed cuttings to dry overnight. Cuttings were placed inside a high-humidity enclosure within a greenhouse for a rooting period of 23 days. There were 50 cuttings per treatment in each experiment. Rooting and initial shoot growth responses were compared among treatments using Fisher's Exact Test (percentage rooted and percentage of rooted cuttings with shoots) and permutation tests (total root length) adjusted for multiple comparisons using the MULTTEST procedure of SAS (SAS version 9.1.3; SAS Institute, Inc., Cary, NC).

Results and Discussion: In Expt. 1, cuttings receiving a basal dip in 515 ppm IBA + 330 ppm NAA exhibited a lower total root length than cuttings receiving the control treatment of a basal dip in 1030 ppm IBA + 660 ppm NAA, while rooting percentages and percentages of rooted cuttings with shoots developing from the axillary buds were similar between the two treatments (Table 1). Cuttings receiving a basal dip using the lowest level of auxin (one-tenth the rate of the control treatment) showed reduced rooting, total root length, and shoot development in comparison to cuttings receiving the control treatment. These results indicate no advantage in reducing the auxin rate below the level of the control treatment when using a basal quick-dip for this cultivar.

Applying auxin to the cuttings as a foliar spray in Expt. 1 resulted in significantly fewer rooted cuttings and, on the cuttings that did root, reduced the size of the root systems and inhibited shoot development from the axillary buds (Table 1). A majority of the unrooted cuttings were dead (data not presented). Results demonstrate that levels of auxin that may be satisfactory for application to cuttings as a basal dip can result in phytotoxicity and inhibition of axillary shoot development when applied as a foliar spray.

Similar negative effects have been reported previously when auxin was applied to cuttings via the rooting substrate (4).

Evaluation of results from Expt. 1 led to selection of lower auxin rates for foliar spray treatments in Expt. 2, these selected rates being much lower than would typically be used for use with a basal quick-dip. In Expt. 2, all cuttings receiving the foliar spray treatments rooted, while all but one cutting rooted using the basal dip control treatment (Table 1). Compared with results using the control treatment, total root length and percentage of rooted cuttings with shoots were significantly less using foliar sprays with IBA + NAA at rates of 41.2 + 26.4 ppm and 20.6 + 13.2 ppm, but were similar using the three lowest rates of auxin (10.3 ppm IBA + 6.6 ppm NAA or less).

Results from this study indicate that foliar spray applications and basal quick-dips on cuttings of *Rosa* 'Red Cascade' using Wood's Rooting Compound provide comparable rooting and initial shoot growth responses provided that the foliar spray contains 1% or less of the auxin used in the 1030 IBA + 660 NAA ppm basal quick-dip. Spray application at rates normally used with a basal quick-dip can result in phytotoxicity or reduced root and shoot development.

Literature Cited:

1. Blythe, E.K., J.L. Sibley, J.M. Ruter, and K.M. Tilt. 2004. Cutting propagation of foliage crops using a foliar application of auxin. Scientia Hort. 103:31-37.
2. Blythe, E.K., J.L. Sibley, K.M. Tilt, and J.M. Ruter. 2002. Evaluation of an alternative method of auxin application in cutting propagation. Proc. Southern Nursery Assn. Res. Conf., 47th Annu. Rpt. p. 348-351.
3. Blythe, E.K., J.L. Sibley, K.M. Tilt, and J.M. Ruter. 2003. Foliar application of auxin for rooting cuttings of ornamental crops. J. Environ. Hort. 21:131-136.
4. Blythe, E.K., J.L. Sibley, K.M. Tilt, and J.M. Ruter. 2004. Auxin application to stem cuttings of selected woody landscape plants by incorporation into a stabilized organic rooting substrate. J. Environ. Hort. 22:63-70.
5. Blythe, E.K., J.L. Sibley, K.M. Tilt, and J.M. Ruter. 2004. Rooting of rose cuttings in response to foliar applications of auxin and surfactant. HortTechnology 14:479-483.
6. Blythe, E.K., J.L. Sibley, K.M. Tilt, and J.M. Ruter. 2007. Methods of auxin application in cutting propagation: A review of 70 years of scientific discovery and commercial practice. J. Environ. Hort. 25:166-185.
7. Drahn, S.R. 2003. Replacing manual dips with water soluble IBA. Comb. Proc. Intl. Plant Prop. Soc. 53:373-377.
8. Drahn, S.R. 2007. Auxin application via foliar sprays. Comb. Proc. Intl. Plant Prop. Soc. 57:274-277.
9. Earth Science Products. 2008. Wood's Rooting Compound: Material Safety Data Sheet. Earth Science Products, Wilsonville, OR.
10. Hartmann, H.T., D.E. Kester, F.T. Davies, Jr., and R.L. Geneve. 2002. Hartmann and Kester's Plant Propagation: Principles and Practices, 7th ed. Prentice Hall, Upper Saddle River, NJ.

Table 1. Root and shoot development responses of single-node, softwood cuttings of *Rosa* 'Red Cascade' treated with Wood's Rooting Compound [indole-3-butyric acid (IBA) + 1-naphthaleneacetic acid (NAA)] as either a basal quick-dip or a foliar spray. Cuttings were rooted in Fafard 3B substrate[z] in a warm, high-humidity rooting environment inside a greenhouse.

Application method; IBA + NAA (ppm)	Rooting (%)	Total root length (mm)	Rooted cuttings with shoots (%)
Expt. 1[y]:			
Basal quick-dip; 1030 + 660 (control)	84	280	88
Basal quick-dip; 515 + 330	84[NSx]	190**	79[NS]
Basal quick-dip; 103 + 66	52**	84***	46***
Foliar spray; 1030 + 660	14***	131**	14***
Foliar spray; 515 + 330	8***	93**	0***
Foliar spray; 103 + 66	16***	76***	0***
Expt. 2[y]:			
Basal quick-dip; 1030 + 660 (control)	100	255	96
Foliar spray; 41.2 + 26.4	98[NS]	105***	22***
Foliar spray; 20.6 + 13.2	100[NS]	178***	76*
Foliar spray; 10.3 + 6.6	100[NS]	204[NS]	96[NS]
Foliar spray; 1.03 + 0.66	100[NS]	222[NS]	100[NS]
Foliar spray; 0.52 + 0.33	100[NS]	233[NS]	100[NS]

[z]A blend of peat, perlite, vermiculite, and pine bark.
[y]Expt. 1 was initiated on April 17 and evaluated on May 10. Expt. 2 was initiated on May 14 and evaluated on June 6. There were 50 cuttings per treatment in each experiment.
[x]Not significantly different (NS) or significantly different [$p \leq 0.05$ (*), 0.01 (**), or 0.001 (***)] from the control treatment. Significance was based on *p*-values obtained using Fisher's Exact Test (for percentage rooted and percentage of rooted cuttings with shoots) and permutation tests (for total root length) adjusted for multiple comparisons.