Cutting Propagation with Auxin Applied via the Rooting Substrate

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Nature Of Work: Cutting propagation typically involves a basal quick-dip in an auxin solution prior to sticking cuttings. While the amount of auxin absorbed is often adequate for easy-to-root species, other species benefit from a prolonged period of exposure to auxin that maintains auxin levels in the tissue throughout the extended period of sensitivity. The rooting of stem cuttings could potentially be enhanced by applying auxin via the rooting substrate, providing the cutting base with auxin over an extended period of time. In addition, the technique could permit the elimination of the dipping procedure during the cutting process and allow use of lower chemical concentrations. The objective of our trials was to evaluate the effectiveness of this cutting propagation technique with various ornamental species.

Q Plug™ rooting plugs, stabilized organic substrate units containing peat and a polymer binder, were utilized as rooting substrate units, along with their corresponding plug trays as containers (International Horticultural Technologies, Hollister, CA). All plugs were dried for 24 hr at 46C (115F), then soaked by submergence for 24 hr in deionized water or in auxin solutions, and placed into plug tray cells in a completely randomized design. Auxin solutions were prepared by dissolving K-IBA (Sigma Chem. Co., St. Louis, MO) in deionized water to provide K-IBA at 30, 45, 60, or 75 ppm. Plug and tray types were selected based upon the species and expected size of root systems. Uniform cuttings were prepared, then stuck in cell trays, and placed under intermittent mist in a polyethylene-covered structure.

Rooting trials were conducted during the early winter of 2003 at Auburn University and early summer of 2004 at CANR. Rooting percentage was evaluated with logistic regression, while number of roots per rooted cutting was calculated using least-squares means and evaluated with linear regression using SAS® Release 8.2 (SAS Institute, Inc., Cary, NC).

Species: *Euonymus japonicus* 'Aureo-marginatus'
Cuttings Stuck: June
Stem Cutting Type: Softwood, 2.5-inch, terminal, 2 basal leaves removed
Cutting Source: Outdoor container-grown plants
Rooting Time: 42 days
Plug Type: Round (19 cm^3 vol.)
Tray Type: 200-cell

Species: *Juniperus conferta* 'Blue Pacific'
Cuttings Stuck: December
Stem Cutting Type: Hardwood, 2.5-inch subterminal, basal branchlet removed
Cutting Source: Outdoor landscape plants
Rooting Time: 84 days
Plug Type: Hexagonal (16.5 cm^3 vol.)
Tray Type: 144-cell

Species: *Rhaphiolepis indica* 'Alba'
Cuttings Stuck: June
Stem Cutting Type: Semi-hardwood, 2-inch, terminal, 2 basal leaves removed
Cutting Source: Outdoor container-grown plants
Rooting Time: 42 days
Plug Type: Round (19 cm^3 vol.)
Tray Type: 200-cell

Species: *Rosa* 'Red Cascade'
Cuttings Stuck: December
Stem Cutting Type: Semi-hardwood, 2-inch, subterminal,
Cutting Source: Indoor container-grown plants
Rooting Time: 57 days
Plug Type: oval (4 cm^3 vol.)
Tray Type: 384-cell

Results and Discussion: Rooting response was similar among all treatments with cuttings of *Euonymus japonicus* 'Aureo-marginatus' (Table 1). However, data suggested that rooting percentage might be optimized with the use of some auxin; a repeat of the trial on a larger scale would be necessary to confirm this. Cuttings of *Juniperus conferta* 'Blue Pacific' showed an increase in rooting percentage and number of roots per rooted cutting with increasing auxin concentration, with optimal response in plugs treated with around 60 ppm K-IBA. Number of roots also increased with increasing auxin concentration on cuttings of *Rhaphiolepis indica* 'Alba', with optimal response in plugs treated with around 60 ppm K-IBA; lack of rooting on some cuttings may have been due to causes other than auxin treatment. Overall rooting response with cuttings of *Rosa* 'Red Cascade' was optimized in plugs treated with K-IBA at 30 to 45 ppm.

Significance to the Industry: Results indicate that stem cuttings may be successfully rooted with auxin applied via the rooting substrate. The optimal rate of auxin appears to differ from species to species, just as it does using a conventional basal quick-dip application. Rooting response in this and similar studies appear to be comparable to those generally obtained using a basal quick-dip, but using lower concentrations of auxin when the auxin is applied via the substrate. The technique is compatible with automated production systems where manual steps in the propagation process may be reduced or eliminated.

Table 1. Rooting response of cuttings stuck in K-IBA-treated plugs.

	Euonymus japonicus 'Aureo-marginatus'		*Juniperus conferta* 'Blue Pacific'		*Rhaphiolepis indica* 'Alba'		*Rosa* 'Red Cascade'	
K-IBA (ppm)	Rooting (%)	Roots per Cutting	Rooting (%)	Roots per Cutting	Rooting (%)	Roots per Cutting	Rooting (%)	Roots per Cutting
0	83	5.8	67	7.8	100	3.6	100	4.6
30	78	6.1	80	14.5	83	4.1	87	6.6
45	94	4.8	87	15.9	89	4.5	93	6.6
60	94	5.8	93	21.8	83	4.7	100	3.6
75	94	4.8	93	16.5	89	4.4	60	2.1
Sig.[1]	NS	NS	L*	L***	NS	L**	NS	L**Q***

[1] Not significant (NS) or significant linear (L) or quadratic (Q) response at significance level 0.05 (*), 0.01 (**), or 0.001 (***).