Replacing Manual Dips with Water Soluble IBA©

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Seeking out ways to improve efficiency and reduce labor remain important tools for any business. Rising labor costs, an unpredictable labor pool, and an increasingly competitive marketplace make this especially relevant in the nursery industry today. Automatic transplanters, conveyors, boom style irrigators, and other forms of mechanization have all become common tools of the trade in reducing labor and help make our jobs easier. For the past three seasons at Bailey Nurseries, Inc. we have experimented with replacing manual IBA, (indole-3-butyric acid) and IBA-K salt (indole-3-butyric acid, potassium salt) dips with overhead water-soluble IBA applications as another way to trim labor expenses and make our jobs more efficient.

INTRODUCTION

The traditional method of hand-dipping softwood cuttings in IBA solutions is time consuming and requires many people to complete. Between 19 May and 19 Aug. of this year, an average of nine people spent approximately 3400 h dipping cuttings in rooting hormone at our Minnesota propagation facility. During this same time period we planted approximately 8.4 million softwood cuttings, of which, 88% required some form of IBA treatment. The aim of this trial was to evaluate the performance of water-soluble K-IBA applied directly over top of the softwood cuttings versus this hand-dip method. The impetus of the trial is to reduce labor and improve efficiency. Ultimately the quality, i.e., the root mass, top growth, etc., of each rooted cutting produced with this new technique must equal or surpass the quality of the rooted cuttings we currently produce.

MATERIALS AND METHODS

Beginning in mid-May crews harvested and prepared softwood cuttings in our production fields, placed them in trailers and transported them back to our propagation facility in Cottage Grove, Minnesota. From these trailers cuttings were loaded into our cooler where they awaited IBA or K-IBA hormone dips. After each of the cuttings received their IBA bath they were taken to the greenhouse, planted into sand beds at $2\frac{3}{4}$ inch spacing, and put under mist. Age and type of crop, current weather conditions, etc., determined misting cycles until weaned from mist.

In this trial all of these same steps were performed except the initial IBA dip. After placing the nondipped cuttings in the sand beds adjacent to the remainder of the crops cuttings received an application of Hortis IBA water-soluble salts. This water-soluble IBA was sprayed directly over the cuttings. Rates applied were identical to the rates used in the traditional hand-dip method (Table 1). Applications were made either immediately after sticking or the morning after the cuttings were stuck. The difference in the timing of application was due to the completion of the planting itself. All applications were made when the entire lot of cuttings had been planted. Two methods were used to apply the water-soluble IBA over the cuttings.

Table 1. Rates and type of rooting hormone used by control species.

Acer tatarica subsp. *ginnala*	750 ppm IBA
Cotoneaster lucidus	1500 ppm IBA
Diervilla sessilifolia 'Butterfly'	750 ppm IBA
Hydrangea paniculata 'Grandiflora'	750 ppm IBA
Juniperus horizontalis 'Wiltonii'	1500 ppm IBA
Lonicera ×*brownii* 'Dropmore Scarlet'	750 ppm IBA
Physocarpus opulifolius 'Monlo'	1500 ppm IBA
Rhus aromatica 'Gro-low'	750 ppm IBA
Rosa 'Belle Poitevine'	1500 ppm K-IBA
Rosa 'Bucbi', Carefree Beauty™ rose	1500 ppm K-IBA
Rosa 'Chuckles'	1500 ppm K-IBA
Rosa 'Dwarf Pavement'	1500 ppm K-IBA
Rosa 'Radrazz'	1500 ppm K-IBA
Rosa 'Nearly wild'	1500 ppm K-IBA
Rosa rugosa 'Alba'	1500 ppm K-IBA
Spiraea japonica 'Anthony Waterer' (Syn. *S.* × *bumalda* 'Anthony Waterer')	750 ppm IBA
Syringa × *prestoniae* 'Donald Wyman'	750 ppm IBA
Syringa pubescens subsp. *patula* 'Miss Kim'	750 ppm IBA
Syringa vulgaris 'Monge'	750 ppm IBA
Syringa × *chinensis* 'Lilac Sunday'	750 ppm IBA
Syringa 'Bailbelle'	750 ppm IBA
Thuja occidentalis 'Pyramidalis'	1500 ppm IBA
Thuja occidentalis 'Techny'	2500 ppm IBA
Viburnum trilobum 'Alfredo'	1500 ppm IBA
Viburnum lantana 'Mohican'	1500 ppm IBA
Viburnum sargentii 'Onondaga'	1500 ppm IBA
Viburnum opulus 'Roseum'	1500 ppm IBA
Viburnum trilobum 'Wentworth'	1500 ppm IBA
Weigela 'Minuet'	1500 ppm IBA
Weigela 'Red Prince'	1500 ppm IBA

On smaller sections a backpack sprayer fitted with an 8005 nozzle was used to deliver the solution. On larger sections a greenhouse boom/irrigator fitted with 8005 nozzles was used. In both cases 1 L of water-soluble IBA solution treated approximately 60 ft^2. The label directed us to "spray the solution evenly over the cuttings until drops go down to the media." Many different genera were included in these trials so a broad picture could be painted and evaluated on a species by species basis.

RESULTS

There was no increase in rooting time with the over-the-top spray. All of the cuttings treated with IBA prior to sticking and those that were sprayed with the water soluble IBA after being stuck were taken off mist at the same time.

In the majority of trials rooting percentages differed by only a few points. Some of the varieties treated conventionally had a higher percentage of successfully rooted cuttings while some of the varieties that were treated with overhead IBA solutions had an increased percentage of successfully rooted cuttings. Many varieties did not seem to favor a specific delivery method.

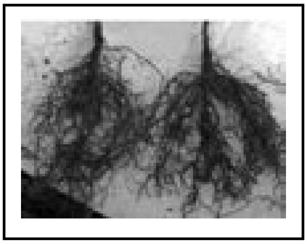

Figure 1. Rooting of *Viburnum sargentii* 'Onondaga' cuttings.

The appearances of most of the sections of cuttings were indistinguishable from one another when off-mist (Fig. 1). Trial blocks mirrored control blocks in almost every way (Fig. 2). Top growth, stem caliper, and leaf sizes were scrutinized. Color, height, foliage density were almost identical. A few exceptions were seen. Both *Weigela* cultivars treated with the overhead IBA spray appeared more dense and full. *Physocarpus opulifolius* 'Monlo' treated with the overhead IBA spray were noticeably shorter.

When unearthed from the sand beds the different cuttings appeared very similar to each other. Twenty rooted cuttings representative of the entire trial section were dug and compared with the control section. Rooted cuttings from each treatment block were set down in order from lightly rooted to heavily rooted and then compared with one another.

One variety did show modest differences when comparing the roots. *Acer tataricum* subsp. *ginnala* cuttings treated with water-soluble IBA were longer but less fibrous and dense than the cuttings dipped by hand. This was not seen with any of the other varieties.

DISCUSSION

These results are extremely promising and could make a significant impact on the number of people needed to complete our summer propagation schedule. The positions filled for dipping these cuttings could be considerably reduced or eliminated. The people in these positions could be used to complete other tasks within the nursery or simply not hired in the spring. Although the cost of each water-soluble IBA application is dependent on the rates used, the cost of applying IBA to cuttings in each of these separate trials was less than the traditional hand dip method. The highest concentration of IBA used in this experiment was 2500 ppm. Chemical costs for 25 gal of 2500 ppm Hortis water-soluble salt solution used to treat a 6000 ft^2 greenhouse are $327. The lowest concentration of IBA used in this study was 750 ppm. Treating the same size greenhouse with the same volume of prepared solution

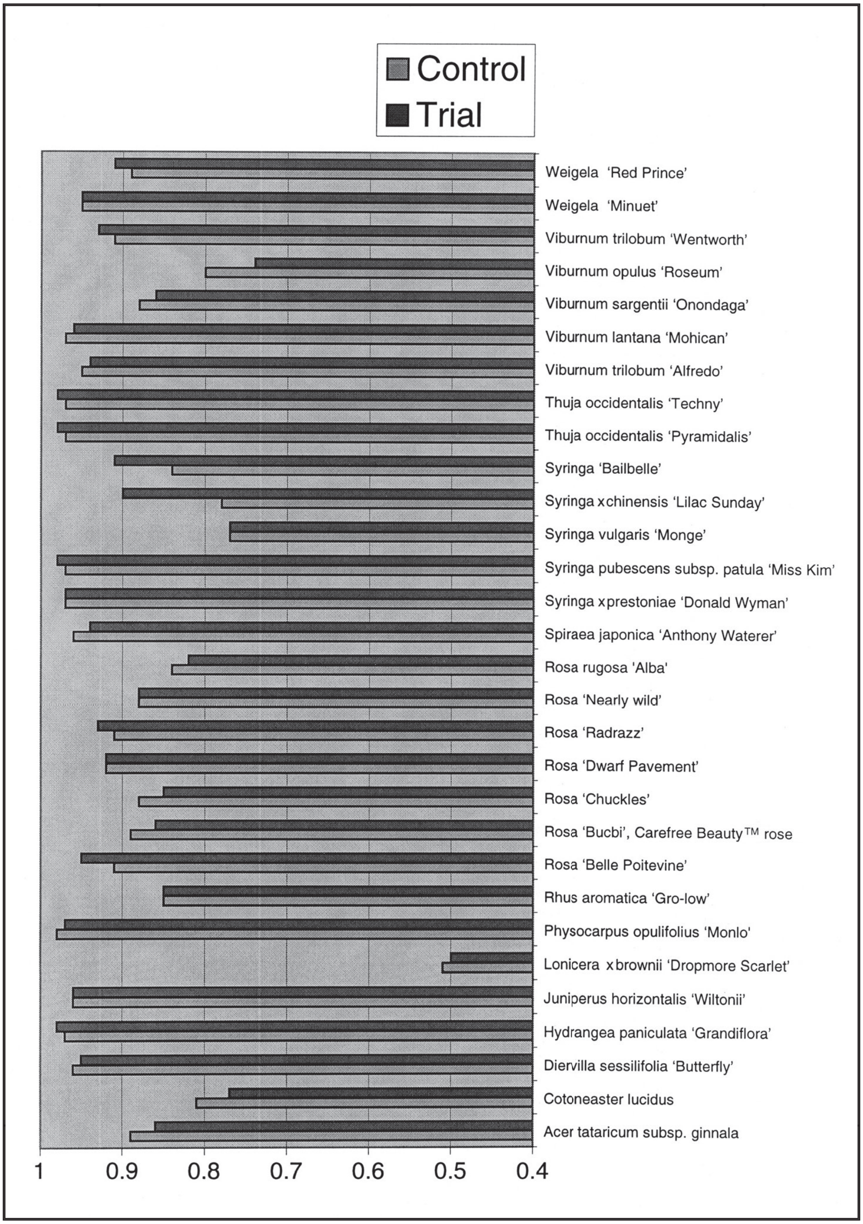

Figure 2. Final rooting percentages, control, and trial cuttings by plant.

at this rate would cost $98. It takes approximately nine people 4 h, or 36 labor h, to prepare a similar number of cuttings for planting. Further trials will be conducted to confirm or disprove the results gleaned from this experiment. We feel it is very important to replicate this data repeatedly before switching production methods. Over the past three seasons both the number of varieties and total numbers of cuttings within a given variety have increased and were equally successful. However, there are many more varieties to trial. In addition to a replication of these methods other factors will be investigated to further refine our methods. There is a need to repeat this trial later into the season when the IBA rates we use increase and the propagation wood can be more difficult to root. Reducing volumes and rates could be another tool in the reduction of input costs and may provide equally successful results.

The Essential Bugcrafter: A Practical Primer for Biological Control©

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INTRODUCTION

Long before humans battled pests in greenhouses and nurseries, armed combat occurred daily amongst insects and mites that feed on plants. For millions of years, this leaf-to-leaf combat pitted hungry predators and parasites against a range of insects familiar to us all. It is truly a bug-eat-bug world. How can we harness this activity for our own good? As with anything worth achieving, it involves knowledge, persistence, and focused endeavor to bring about results that are not only worthwhile in suppressing pest outbreaks but might also improve the quality of plants.

Greenhouses, with their controlled environments, provided important study sites for research and implementation of augmentative biological control (Hussey and Scopes, 1985). It is with this early work that useful biological control programs targeting key greenhouse pests such as aphids, fungus gnats, mites, and whiteflies were developed. One can find use of similar programs today in large and small commercial greenhouse facilities throughout the world including sites in North America such as Florida, California, Ohio, New York, Ontario, British Colombia, and here in Oregon.

This paper emphasizes key components of a biological control program without which success is unlikely. Experience working with numerous growers trying to implement biological control in a variety of situations has shown there are important factors contributing to success. Those factors include: pest identification, pest monitoring, prior management planning, proper timing, and evaluation. Not listed, but extremely critical, is the initial attitude of nursery management. Biological control takes commitment on a level surpassing that of ordinary management schemes. It requires enthusiasm, creativity, consistency, good communication, an understanding of the biology of the pest and the biological control agent, and, dogged persistence. Though in the beginning using natural enemies may feel unfamiliar, confusing, and complex the rewards of success can create a biocontrol adherent for life. Let's look more closely at the factors contributing to successful generals in this arthropod warfare.