

Multiplying *Syringa* Propagules... Easy as One, Two, Ethylene[®]

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Growing plants generated from tissue culture is an effective way to ensure plants are true to type and to attain percentages of rooted stock sometimes difficult to obtain through traditional softwood cutting propagation. Growing plants started from tissue culture can also be expensive.

In the Spring 2001 Bailey Nurseries, Inc. began increasing the number of softwood *Syringa* cuttings for harvest by applying Florel[®] Brand Pistil, Ethephon, [(2-chlorethyl)-phosphoric acid], to juvenile stands of rooted cuttings in the greenhouses. This technique increases the number of branches per plant and allows us to maximize the propagules we are able to grow, harvest, and root for our softwood schedule. Our goal has been to reduce the number of plants we grow that are started from tissue culture, and over the past three seasons we have steadily made headway with this goal.

Beginning in mid November unrooted, Stage-2 *Syringa* microcuttings generated from tissue culture are delivered to our propagation facility in Cottage Grove, Minnesota. The majority of the *Syringa* cultivars we buy in for this type of propagation are of the *S. vulgaris* species, however several cultivars from the *S. ×hyacinthiflora*, *S. ×chinensis*, and *S. laciniata* species are also purchased (Table 1).

Upon arrival, the boxes of microcuttings are placed in our cooler and samples of each cultivar are carefully inspected. Cuttings are then stuck into 12.5 × 12.5 × 1.75 inch 400-cell foam trays pre-filled with bonded rooting medium. No rooting hormone is applied to the microcuttings. Each tray is placed in a growing chamber equipped with thirty 6-inches-deep, watertight shelves with clear plastic lids for humidity control. Between the cuttings and the top of the shelves a thin layer of Seed Guard[®] cloth is placed. This permeable cloth layer is used to minimize airflow, reduce the water needed to maintain the turgidity of the cuttings, and reduce the amount of stress each cutting is exposed to while allowing mist to pass through to the cuttings. Above each of the shelves, two 40-watt cool white florescent tubes provide light to the trays of cuttings 12 h, increasing to 16 h a day. Temperatures are maintained between 74 and 78 °F. Misting begins immediately after the cuttings are placed into the growing chamber. In the beginning, all of the cuttings are misted once at mid-day over the Seed Guard cloth. Edges and other hot spots created by ballast are misted under the Seed Guard cloth three to four times as determined by the grower. In each case an 80067 nozzle is used. Weekly preventative applications of fungicide and bactericide are applied. During this time shelves remain closed and vented only slightly as needed. A grower monitors temperature and humidity throughout the day and wipes condensation from the shelf lids as needed. As the cuttings age and become more acclimated to the growing chamber, misting is reduced, and venting occurs more frequently. Roots begin to emerge after 10 to 14 days. Between Days 20 and 25, plants are weaned from mist, Seed Guard cloth is removed, and the shelves remain open 24 h a day. At this time cuttings receive a 60 ppm 20N-10P-20K fertilizer application by lightly flooding the shelves. Water is acidified to a desired pH of 6 by adding sulfuric acid. This continues weekly until they are ready to be planted in the greenhouse, at approximately Day 40.

Table 1. *Syringa* species and cultivars produced by stage 2 microcuttings at Bailey Nurseries, Inc.

<i>Syringa vulgaris</i> Cultivars	<i>Syringa</i> <i>×hyacinthiflora</i> Cultivars	<i>Syringa</i> <i>×chinensis</i> Cultivar	<i>Syringa</i> <i>lacinata</i> Cultivar
'Albert F. Holden'	'Asessippi'	'Lilac Sunday'	'Cutleaf'
'Arch McKean'	'Blanche Sweet		
'Avalanche'	'Excel'		
'Krasavitsa Moskvyy', beauty of Moscow lilac	'Maiden's Blush'		
'Charm'	'Mount Baker'		
'Charles Joly'	'Pocahontas'		
'Dappled Dawn'			
'Edith Cavell'			
'Katherine Havemeyer'			
'Andenken an Ludwig Späth'			
'Marie Frances'			
'Michel Buchner'			
'Madame Lemoine'			
'Monge'			
'Montaigne'			
'Miss Ellen Willmott'			
'Président Grévy'			
'President Lincoln'			
'Primrose'			
'Sarah Sands'			
'Sensation'			
'Wedgwood Blue'			
'Wonderblue'			
'Yankee Doodle'			
var. <i>alba</i> (syn. 'Common White')			

When the crop is removed, the shelves are washed with a 10% bleach solution and then sterilized with Green-Shield disinfectant before the next cycle of plants is brought in. We run three cycles during each season. The first cycle begins in November and the last cycle begins in February.

Greenhouses are first prepared by sterilizing the sand with Basamid approximately 2 weeks prior to planting. Crews transplant these rooted cuttings at 2⁵/₈ inch spacing. Plants are then misted by an irrigator fitted with 8001 nozzles as needed until plants are acclimated and are able to remain turgid on their own — usually just a few days. Temperatures are maintained at 75 °F night/day to accelerate the growing process. Two weeks after transplant a Plantshield® drench is applied to protect the roots. As the plants are growing they are fertilized with 150 ppm of 20N–10P–20K whenever the sand becomes dry and needs booming.

When plants reach approximately 4 to 6 inches tall they receive a foliar application of 1000 ppm Florel. As cultivars grow at different paces, it is sometimes necessary to treat cultivars individually even though the whole house will be scheduled to receive Florel treatments. Applications are made with a hose and reel sprayer or

a backpack sprayer depending on the size of area to be treated. It is important to apply Florel when the plants are sizeable as this treatment will inhibit internode elongation and may cause stunting if done too early. Plants must not be under any sort of environmental stress when applying Florel as it may accentuate the stress and cause damage to the plants. Ensuring the pH of the final solution is below 5.0 is necessary to achieve maximum effectiveness. Florel is very acidic and with water of moderate quality the desired pH of the solution should not be difficult to attain, however testing the pH of the final solution will help ensure the intended rate is applied. It is recommended to spray to drip to guarantee correct coverage. The chemical applicator must wear long sleeves and pants, shoes plus socks, and chemical-resistant gloves as instructed by the label. The re-entry interval (REI) is 48 h. Approximately 2 weeks later this application is repeated. A 150 ppm of 20N-20P-20K liquid fertilizer is applied every time the crop is watered. Beginning the 1st week of September, the fertilizer rate is decreased weekly until 1 Oct. when the plants receive their last fertilizer treatment of 50 ppm. First signs of the effects of ethylene become evident in 2 to 4 weeks following the second application. As the season moves on, basal buds develop at and below the sand surface and begin to elongate slightly as a result of the Florel application. Over the first growing season these rooted cuttings begin to take form.

When the fall comes and many of our softwood crops are harvested, graded, and stored in our cooler, these treated lilacs are overwintered in the greenhouse. The process of overwintering begins 1 Nov. by cutting the plants back to approximately 4 to 6 inches tall and watering them thoroughly. The greenhouse is then covered with black and white poly to keep the light out and maintain more constant temperatures. Vents and doors remain open until the house is thoroughly frozen. Rodent bait is scattered every 10 ft and the doors are closed and left for the winter. There is no supplemental heating that occurs until we wake the plants up in mid-February.

Approximately February 15th the greenhouse is awoken to 35 °F and over the next 6 weeks brought up to 65 °F in increments of 5 °F every week. We wake the plants up slowly so the growth is not too soft and the stems and foliage are toned. After 4 weeks, when the temperatures reach 55 °F, an early morning -10 °F negative diff is included in the temperature regimen for 2 h after sunrise. This helps keep the new growth more toned. Another method to ensure that the growing tips are not too soft is by rubbing the plants with plastic sheets after the tips emerge. After the house is treated with Phyton-27[®] for *Pseudomonas* prevention, poly is hung from the boom arms to the desired height of the plants and repeatedly drug across the growing tips for 6-8 h a day, being careful that the foliage is dry when this is initiated. If the tender foliage is wet when the poly is pulled over it damage may occur on the leaf margins and tips. The risk of transferring bacterial spores is also greatly reduced by only rubbing the plants when they are dry. These are the growing tips we harvest for our first round of cuttings the first week of April. As the lateral buds that were initiated by Florel in the spring and summer, and set in the fall begin to grow many more growing tips are produced and are able to be harvested. We believe that the addition of Florel to this program allows us to increase the number of cuttings we are able to harvest by 100% to 300%.

Although pruners and shears are sometimes used to take cuttings on smaller lots, the most efficient means of harvesting these small juvenile cuttings is with the SuperCut2000NT. It is a large, motorized scissor-like set of blades with a blower

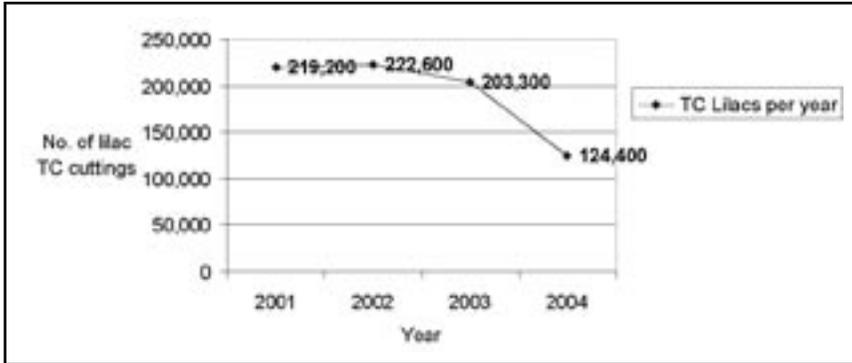


Figure 1. Annual *Syringa* microcutting order by year.

and bagger that enables us to harvest and collect cuttings in a fraction of the time. It is operated by three people and has proven itself a solid investment in time and labor savings. This process is repeated the 1st week of May.

These cuttings are taken and stored in our cooler for up to 3 days before crews sort them and dip them in 750 ppm IBA. Another crew plants the cuttings in 128-cell trays filled with soilless growing medium, and waters them in. The trays are then taken to a greenhouse and placed on Dutch tray-style benches above forced-air bottom heat set to keep an ambient air temp of 74 °F. Age of the cuttings, current weather conditions, etc., determine misting cycles. Within 7 to 10 days, stems begin to callous and show signs of root initialization. The first couple crops take approximately 40 to 45 days to root. The third and possible fourth crops may take 60 to 70 days. The cuttings taken later are more reluctant to root quickly and typically have less of a final percentage of rooted cuttings than the ones taken earlier. After the cuttings taken from ethylene-treated stock plants are fully rooted, they are taken and planted into the sand beds and the cycle described above begins again.

Unpredictable crop failures, the introduction of new cultivars, unforeseen jumps in our sales forecasts, and the need to keep some taxa in culture so stock is always available are all reasons why we never see ourselves entirely weaned from our dependence on tissue-culture plants. However, we are realizing a trend of decline and see the numbers we produce from this source are dramatically less than just 3 years ago (Fig 1). Above, as the graph illustrates, is a season-by-season account of our *Syringa* microcutting orders. It starts in 2000 when we placed our order for the upcoming season. In 2001 we began treating these crops with ethylene in the greenhouse.

Applying Florel Brand Pistil to juvenile stands of *Syringa* cuttings in the greenhouse has proven to be an effective tool in increasing the number of *Syringa* propagules we are able to generate. This technique coupled with sound crop management practices has enabled us to produce high percentages of *Syringa* cultivars that are true to type and has lessened our dependence on microcuttings generated from tissue culture.