

growth flush in early July and treated it the same as previously. Fifty-seven cuttings rooted out of 231 stuck. The cuttings that did not root had rotted at the base very shortly after being stuck. Realizing that excess water was detrimental, we stuck the next years crop in sand (#400 silica sand) to minimize moisture retention. There was a marked decrease in the amount of rotting, but very little rooting occurred. We believe the coarseness of the sand caused the cuttings to produce excessive callus, but no roots. In February 1991, we stuck hardwood cuttings taken from bareroot plants. They were stuck in 92 cell plug trays using a peat moss and styrofoam mix (1 : 1, v/v). Cuttings were treated with 2,500 ppm K-IBA solution and given 55°F forced-air bottom heat. The cuttings rooted 82% in eight weeks. Successful rooting was also achieved in June 1991 with softwood cuttings in a peat and styrofoam mix, 5,000 ppm IBA talc, but with only hand misting. In January 1992, we repeated our hardwood procedure with favorable results. We are confident that with proper attention to cutting wood maturity, rooting medium, and soil moisture, these systems will continue to work well for us.

Propagation Methods at Berthold Nursery

Nancy Gillian

Berthold Nursery, Woodstock, Illinois

I would like to share with you the hardwood and softwood propagation methods we use at Berthold Nursery which is located in Woodstock, Illinois, on approximately 400 acres.

We start our season with hardwoods, doing approximately 5 to 6 thousand cuttings. Cuttings are taken December through March when the outside temperature is above freezing. We propagate plants such as dogwood, privet, spirea, honeysuckle, and currant by this method.

Until a couple of years ago all our hardwoods were lined directly into the field after they were fully callused in our cooler. However, after returning from our 1989 I.P.P.S. meeting in Toronto Canada, I wanted to try a technique I saw being used at Canon Nursery. They were sticking their hardwoods into media in 5-gal cans, and keeping them in their container area. This idea appealed to me. I like this method because I can control their environment. I also have easier access in the spring and can keep an accurate check on rooting success. This allowed me to better schedule my softwood cutting propagation. When its time to line them out into the field these plants do not have to be harvested first. The planting crew can take the cans to the field at planting time, separate them there, use what they need, and return the unused plants to the container area for later planting.

My first attempt in a 8-gal container was fairly successful. However, because I put 100 cuttings per can the plants were too small. The second season I cut the number in half and that gave us fuller plants. This year was my third try and I liked what I saw. We had better than 80% take in most plants. However, because we are conservative, we still line some of all hardwood propagated plants into the field. As we become more confident of our container propagation method, we plan on eliminating direct field production all together.

Our primary propagation method is by softwood cuttings. We do about 100,000 cuttings per season. We begin softwood production in early May, as soon as I see that

the plants in the stock blocks have flushed. I prefer to begin taking cuttings as soon as the wood is ready and want my cuttings to be no less than 6 to 10 in. long. We leave as much leaf area as possible. This usually means taking only the bottom one third of the leaves off. We then dip them into a hormone powder and stick directly into sand beds. I have found that I don't have as large a plant when I wait too long to take cuttings—timing is everything.

I start my softwood propagation with *Spiraea*, *Potentilla*, *Berberis*, and *Cotoneaster*. We do softwoods in both 1- and 2-year beds. The 1-year plants are stuck in hoop houses that are 24 × 50 ft. The 2-year cuttings are in beds in self-contained houses. After the first season with 2-year cuttings, we remove the plastic and hoops, and allow them to continue growing in the beds for another year. All our in-ground propagation beds are 4 ft × 50 ft × 8 in. and filled with #2 grade sand. The 2-year beds, however, have a compost mix below the sand to support expanded rooting and allow for easier harvesting. Both the 1- and 2-year beds run on the same water system. Misting is provided by floral mist nozzles spaced every 3 ft on 2-ft risers set on top of ½-inch PVC water lines. These nozzles cause almost a fogging effect and the humidity stays at approximately 85% to 90%. I keep these houses sealed shut at all times. Until last year both 1- and 2-year cuttings were spaced on 1 in. centers. We felt that the 2-year plants did not have appropriate spacing so we increased the spacing to 2 in. on center. This produced a much fuller plant with extra branching after the second year. Once rooting occurs we start the hardening off process by first opening the houses so the air can move through, next the plastic is removed and replaced with black shade cloth. Then I begin to cut the mist back until it is stopped and then we go to manual monitoring and watering. By this time we are approaching the middle of August. The first stuck *Spiraea* and *Potentilla* are now ready to be potted into quarts. We move through each house taking all the plants that are ready for potting. We leave the types that may not transplant well in the fall and those that need additional rooting time are allowed to remain in the bed until the following spring.

Many people question us as to why we stick into sand and then pot into quarts. Why the extra step? We feel this extra step is worth it because most of our fields are a heavy clay soil type. We have seen plants that were too small, such as 2 ¼ in. peat pot and grow plug size, struggle in such soil, and we have witnessed phenomenal losses with such small root systems. Our 1-quart plants are at least 10 in. tall and have a larger root system. This larger root system helps the plants become established in the field. These plants take off better in the field for us with a doubling or tripling in size during the first season. We also have another use for the quart container plants. Many times we move the plants up into larger containers for our sales yard. These quarts are large enough to move into 1- and 2-gal containers. This eliminates shifting two or three times to get a plant into a 5-gal can. As in the field, we see much greater vigor from these quarts. As winter comes on the houses are once again covered with plastic. We water everything and hope for a freeze. I do not seal my houses for the winter. Instead, I try to keep the cuttings frozen by venting through wing windows. I have found that our houses can be as warm as 60°F on a sunny calm day even if the temperature outside is only 20°F. I close the houses when the snow comes or the temperature drops into the lower teens or single digits during the night and reopen when the sun comes back and begins to warm the houses. Our overwintering losses have been greatly reduced since starting this procedure.

In conclusion, we know that the procedures outlined are more time consuming than other methods, but we feel the product produced is more successful. We additionally feel we have a much greater control over our products.

Freeze Damage on *Taxus* Cutting Wood

Edward R. Fox and Bill Molter

Home Nursery, Inc., P.O. Box 307, Edwardsville, Illinois 62025

Recently, we experienced a propagation problem at Home Nursery when freeze damaged *Taxus* cutting wood was used. Historically, we have always taken taxus cuttings from field grown plants rather than the container grown ones. In the fall of 1990, we switched and began taking our cuttings from container grown plants because harvesting was easier and quicker due to closer plant spacing. In addition, because the plants were in covered polyhouses, the cuttings could be taken during bad weather.

Last fall we planned to compare the performance of cutting wood taken from containers with that from field plants. We began with cuttings from field plants and then proceeded to take them from the containers. However, in early November we experienced several days of record to near record lows. A record low of 8°F on November eighth was 7°F below the previous record on that day. At the time there were no visible signs of damage to the taxus and we were more concerned about the fate of some of our container grown broadleaved plants.

Problems began to appear in late December with the field cuttings in the propagation beds. Some cuttings were showing basal rot with many more exhibiting necrotic spots up and down the stems. Needle drop was also occurring. For a while we thought we might lose all of the field cuttings. As it turned out our losses from the field cuttings were 16% versus 4% from the cuttings taken from the protected container yews. The field cuttings also exhibited more uneven bud break this last spring. The following spring the longer shoots left on field plants die back to the body of the plant.

This near miss, so to speak, just served to reinforce something that we already knew—beware if anything changes, such as the occurrence of a freeze of this magnitude. In hindsight we should have made a conscious decision as to whether or not to use the wood from the field grown plants before we ever began to take the cuttings.

Overwintering Rooted Cuttings of *Viburnum carlesii*

Jon D. Pickerill

The Wilson Nursery Group, 43W967 State Route 72, Hampshire, Illinois 60140

Viburnum carlesii, and its hybrids and cultivars, have typically been a high-demand and short-supply item at Wilson Nurseries. As a propagator, I'm sure I'm not alone in having been frustrated countless times by this plant. Numerous mistakes and many dead plants later, I have learned a few things about these viburnums which I would like to share.