Softwood Propagation "How We Do It" at Sheridan Nurseries©

Jody Edwards
Sheridan Nurseries Limited, 9829 Winston Churchill Blvd. Brampton, Ontario L6X 0A4 Canada
Email: jedwards@sheridannurseries.com

Good afternoon and thank you for having me here. As mentioned my name is Jody Edwards, I work for Sheridan Nurseries and have been with them for close to 10 years working in their propagation facility. Currently my title is Assistant Manager of Operations which is a fancy way for saying that I plan and coordinate the taxa and quantities to be propagated for the company's shrubs and evergreens. We are currently propagating over 350 taxa of woody plants and starting to dip our toe into the pond of perennial propagation as well.

Today I've been asked to speak about softwood propagation and will let you in on "How we do it." We propagate 1.5 million plants every year. 1 million of those plants are made as softwood cuttings throughout the spring, summer, and fall months, which are mostly shrubs, perennials, and broadleaf evergreens. The other 500,000 are conifers made as hardwood cuttings in the winter.

Ninety-five percent of our cuttings are collected from container- and field-grown plants located 15 min north of our propagation facility. We have a crew of four people driving up to the facility each day to scout good clean crops to collect from. Since the container and field growing operations consist of over 900 acres of land we have detailed maps and inventories of all taxa located there. The crews are trained to select a good stem on the plant that can be cut off without changing the shape of the plant or making any holes within the plant body. They are also shown and taught not to collect any wood that looks as though it may be under stress or have pest problems. Importantly, in any crops that have variegation in the leaf they only collect stems that look consistent and have the right blend of color. For example, with *Euonymus fortunei* 'Emerald Gaiety' we only collect cuttings showing a good amount of white and green balance and not those with little white formed around the edges of the leaf. It is important to make sure that we're not changing the look of the next generation and will select only the cuttings that have the proper coloring to keep the plant true to name.

The crew is equipped with buckets of water to hold the cuttings in while collecting since our cuttings will not be placed into a cooler right away. Once the buckets are full we spread out on the ground wet burlap pieces and lay the cuttings all facing the same direction within it. We then fold and roll up the burlaps and place them into a truck or van. Throughout the day a crew of four will collect up to 20,000 cuttings so it is important to keep them fresh and turgid. On extra hot days we will make special trips to bring the cuttings back to our cooler early. At the end of each day the truck will be unloaded and all burlap bundles will be laid down and rolled out on the floor of our cooler. We will then water each and cover with another sheet of burlap. Typically we will stick these cuttings the very next day but can hold them up to 1 week in the cooler. The temperature within is set to 6 °C (43 °F).

The propagating crews will remove the cuttings from the cooler and roll the burlaps out onto a table in our propagation room to be prepared for sticking. Eight to ten people stand around the table and pull the plants from the middle lining up the bottoms and the tops. We remove the leaves from the bottom 2 to 3 inches of

the stem to create an ease for sticking into the propagation medium as well as to reduce fungal breakdown of the leaves. All the cuttings are cut to a similar size using a stick or tool so as not to compete for light or moisture within the house. The bottoms of the stems are given a fresh cut and then are dipped into a fungicide preventative and a rooting hormone. The hormone strength will vary dependent upon the maturity or woodiness of the cutting although some taxa could root without hormone our business relies on good yields and the hormone helps to ensure a more consistent crop.

The theme for this year's conference is look to the future trends, challenges, and opportunities. A trend formulating in our nursery business is that many people have been shifting from field production to container production. I've also noticed something similar in the case of propagation. Many companies that I have visited over the past 5 years have been shifting their propagation from bulk substrates like sand to an alternative celled plugs and containers. This has been a positive experience for us and has proven to produce better and more consistent yields. This was not only the case in propagation but later in production we have observed less transplant shock then that of a bare-root cutting. Our window for transplanting, because of this, has become greater allowing us to pot and/or plant in the middle of the summer whereas before we were struggling in order to finish up by the long weekend in May. Having the plants in trays also gives us the ability to move crops if we see that one taxon is not benefiting from the same environment as another. We are experiencing better space utilization from the propagation areas turning three to four crops over in the same house in a year. When we stick into sand we typically do not dig those plants until they are dormant and that limits us to only 1–2 crops per year in comparison. Trays also make it easy to perform trials with different media and fertilizer since flats can be better separated. Although we know plugs have many benefits they are not without some disadvantages. Our materials costs for inserts and media has increased as well as labor to fill the flats and move them in and out of the house. We also have to deal with more recycling when using more material. Depending on the amount within a tray they can take up more space as well. Our justification to this is that the higher yields do compensate for the added expense and rotating the crops through alleviates the extra space needed.

All and all we are quite happy with the change and stick over 85% of our cuttings in trays leaving only 15% to be stuck into open benches filled with sand. To fumigate the sand we use a product called Basamid®. This is done annually before we can plant in the house. We will rototill in the Basamid, which needs to stay on for 1 week and then we need another full week to ventilate the house before we can start planting.

Our flats are composed of different mixes made up of peats, perlite, and sometimes bark which are premixed by our suppliers. Some come packaged compressed in bales while others comes loose in a bulk mixes. The compressed bales will be put into our mixer which will break them apart as we add water to increase moisture.

We do not add any type of fertilizer to our propagation media. Even though some others growers do, we prefer to leave our mixes without it and will liquid feed the plants later once they have formed roots.

We use a range of packages to propagate into from peat products to polystyrene inserts all of which are self filled by us in the nursery. We have trialed other prod-

ucts and do make some cuttings in the well known Elle and fertile pre-filled pots. They are good but to keep our own costs down we prefer still to fill our own.

The different inserts chosen will be put into a 10 × 20 tray and hold anywhere from 98 to 18 plants per flat. We also make some trays without any insert and it's more cost effective for us as long as the end user doesn't mind receiving the plants that way. To fill the trays the medium comes through a shoot that we custom made in house. We will assemble the flat with the insert and place it onto a conveyor belt that feeds the tray under the shoot and down through the line. The rest of the work is done by hand packing each individual cell to get the right amount of density to encourage some air space but never too much.

Each cutting is also stuck by hand into the different packages. Each planter will be very careful not to plant the cutting too deep. We will not plant any deeper than $^{2}/_{3}$ of the way into the medium to avoid the risks of stem rot. Stickers also add a little pinch around the base to ensure there is contact between the soil and the cutting.

When sticking into the sand bench, we have special spacers for the crew to use in order to draw lines in the sand. The spacers are just made up of a plank of wood with nails to draw lines vertically and horizontally creating a checkerboard. The crew will insert a cutting at each cross point. This keeps consistent space between each plant to eliminate overcrowding.

Our trays also need a little extra help at times. Some cuttings stems are fragile and thin which will break when sticking into each cell. To help them along we have a template made again of wood and nails. It will press holes into each cell making it easier to slide the cutting in.

In a flat or bench we will add a label identifying the plant name, source of where the cutting was taken, the strength of hormone, and the date it was planted. The same information along with other notes is also recorded into logs to ensure that we keep our plants true to name and can trace back where the crops originally came from.

Our propagation houses vary from a gutter-connects style to a freestanding poly-house and are equipped with many sensors to record data and relay information through our environmental Argus control system. The Argus system is set up and monitored by the propagator for heating, cooling, and misting set points. All the equipment in the house will then be activated by the Argus controls based on these set points and the sensor readings. For example, if the sensor reads too cool the heater will come on, if the sensor read it to be too warm the vents will open, and the mist will burst if the humidity sensor reads too low. In the winter time when we are propagating hardwoods or have stuck cuttings a little late in the summer we also require bottom heat to keep the medium temperature at 21 °C (70 °F). Heating tubes running through the cement or sand floor carry 50% water 50% antifreeze. In the winter our boilers systems heat the water and we run a continuous loop to keep the floor at the appropriate temperatures.

Now we have not always had these luxuries and still do propagate in houses without an Argus system. We also use small tents within some of our gutter connects for crops that can handle a little more heat than others and they produce roots just as well but take a little more work for the propagator. The tents build up condensation on the underside of the plastic so they need to be flipped and the trays can also develop dry spots so they will need to be misted by hand.

Each house is covered with a polyethylene plastic and will either consists of a percentage of white within or we will shade paint the clear plastic to reduce the amount of light so not to stress the plants during rooting.

The temperature within the houses is maintained to not go below 10 °C (50 °F) although we rarely need to worry about turning on heaters in the summer and will begin to vent at 28 °C (82 °F). Humidity ideally will be kept up between 87% and 100%. If the vents are open it decreases the humidity reading on our leaf sensors which will active our misting systems. We have a range of misters in different houses to do the job. We have thought about trying fogging systems for our softwood perennial propagation in the winter but have not yet installed anything.

During the rooting stage the plants will be consistently monitor by not only the sensors but by our propagator. Edges need to be touched up and set points need to change depending on the time of the year. After anywhere from 3–6 weeks crops will begin to form roots. Since we propagate a range of plants in the same house there is a lot of work shuffling the crops around and removing each from mist at just the right time.

When the mist can be completely turned off and the plants have a good enough root system we will begin the hardening-off period by opening the vents fully and rolling up the sides of the house. It is at this time that we will also start liquid fertilizing with 10–52–10 NPK to encourage root growth. We fertilize through a dosmatic injector while watering at a concentration of 100 ppm and increase to 150–200 as time goes on. We regularly perform IPM monitoring and other than the occasional fungicide application the only other problems we have is with fungus gnats which we can control with biologicals such as hypoaspis. The plants will also need some maintenance to create branching. As soon as the crop grows above 6 inches we will prune it back down to 4 inches using a sickle bar mower as seen here.

Well now that the plants are ready for theirs next stage in life you should be ready to hear then next speaker so this concludes my talk on softwood propagation.