

## Multiple Propagation Techniques of Simpson Nurseries®

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### INTRODUCTION

There is some aspect of propagation going on at Simpson Nurseries during at least 10 months out of each year. Multiple propagation techniques have enabled us to grow and adapt to changes in the nursery business over the last hundred years. I will briefly cover four techniques of propagation used by our nursery.

### PROPAGATION BY WHIP GRAFTING

**Bench Grafting (Apples and Crabapples).** We order 1-year domestic seedling apples from Washington State and receive them in January. Bundles of 1-year seedlings are cut into root and root stem pieces on a table saw. We start cutting 2 cm (0.75 inch) above the original soil line, cutting the roots into 5-inch long pieces. The root or root/stem pieces are made just long enough for the grafter to be able to hold them and make the desired cut. The same is done with the scion wood. After the long 1-year-old shoots are removed from the apples and crabapples, the leaves are stripped off and the shoots are cut into 13-cm (5-inch) long sticks using a table saw. The scion and understock are stored at approximately 60 °F, in waxed boxes filled with moist vermiculite.

The scion wood and understock are removed from the storage boxes as needed. The bench grafter selects a root to match the diameter of the scion wood as closely as possible so the cambium layer can be lined up on both sides. One smooth sloping cut should be made ranging in length from 3 to 4 cm (1 to 1.5 inches). The surface on the understock and scion need to be flat and, preferably, the same length. A second cut, the tongue, is made on both pieces starting approximately one third of the way down from the tip on both pieces so the tongues will interlock tightly and smoothly. If the diameter and the cuts on both the scion and understock are exactly the same, the cambium layer will line up exactly on both sides. If that is not possible, the cambium layer is to be matched on one side only. The graft is then passed on to a "wrapper" who will wrap the graft union with 1-cm (0.5-inch) wide adhesive tape and place it in a waxed box with moist coarse vermiculite to be stored at approximately 16 °C (60 °F) for 30 days. At that time the boxes are placed in our walk-in cooler [3 °C (38 °F)] until planting time. We have also bench-grafted some pecans using the same method, but have had mixed results.

**Field Grafting (Pecans and Japanese Persimmons).** For the pecan understock we plant the varieties "Candy" or "Elliott" seed in rows of two, which are 28 cm (11 inches) apart. The double rows are 1.8 m (6 ft) apart, center of double row to center of double row. The seed are planted in December or January and grown for 2 years before we graft them. We begin grafting in January and start by cutting the scion wood from our stock trees. We also purchase wood from other pecan growers. The scion wood is cut into 20-cm (8-inch) long pins and tied in bundles. The tops are dipped in wax to seal them and keep them from desiccating. As the grafters enter

the field the “digger,” as we call them, has already pulled the soil back from the seedling and has wiped the seedling down, removing the dirt from the stem. The grafter makes the same cut as the bench grafter, except usually longer, 1 to 5 cm (0.5 to 2 inches) long. The longer cut, along with the tongue cut, is made, and the scion placed in the understock. Following the grafter is the “wrapper,” who wraps the graft with green 1-cm (0.5-inch) plastic tape, then ties it off. The wrapper then mounds the soil back up on the graft, leaving only the top  $\frac{1}{3}$  of the pin showing. The soil keeps the graft moist and somewhat warm while the graft healing (knitting) process begins. We graft between 20 to 25 cultivars of pecans and usually around 100,000 per year. The grafting process for Japanese persimmons is similar to that of pecans, except that the persimmon seed is planted in three rows in 1.2-m (4-ft) raised field beds. We graft approximately 15,000 persimmons per year.

### PROPAGATION BY SEED

**Seed in Containers (Oaks, Redbud, Chinese Pistache, Bald Cypress, and Eucalyptus).** We plant approximately 100,000 containers with seed. We order the majority of our seed from four different seed companies. The rest we collect and clean ourselves. Depending on the seed, we have various methods of cleaning, treating, and storing. Some, such as live and Shumard oaks are planted fresh. All other seed must be treated in some manner. We moist stratify the remainder of the oaks, pistacia, bald cypress, pear, and persimmon seed. We dry stratify the redbud and eucalyptus. Before we plant the redbud seed we scarify with 70% sulfuric acid for approximately 4 to 5 h, then soak it in warm water overnight.

The majority of our seed, approximately 85,000, is planted in 32 cell Rootmaker® pots measuring  $6 \times 6 \times 10$  cm ( $2.25 \times 2.25 \times 4$  inch) per cell. We continue to plant about 16,000 in bottomless containers measuring  $5 \times 5 \times 13$  cm ( $2 \times 2 \times 5$  inch). Relying on our experience, we know how many seed we need to plant in each pot to give us a good stand. In most cases that means more than one seedling per pot. We pull the smallest, weakest plants out, leaving a strong, healthy plant in the middle of the pot. The oaks, pistacia, redbud, and bald cypress are planted in pots in the greenhouse in January. They are thinned in March and April and potted in 19-L (5-gal) containers in May and June. The earlier we plant the more growth we get by fall. Approximately 30% to 50% of our oak, pistacia, and redbud will be saleable by fall, and 100% of the bald cypress.

**Seed in Beds (Pear and Persimmon).** Pear and persimmon seed are planted in raised field beds in March and April. The pear seedlings will be chip budded in the fall around September. The persimmon seedlings will be grafted in the spring around March and April.

### PROPAGATION BY SOFTWOOD CUTTINGS

We stick approximately 1.3 million softwood cuttings a year. One hundred seventy thousand (170,000) are stuck in Rootmaker 32-cell trays. We also stick 1.1 million softwood cuttings in #881 Jiffy peat pots, which measure  $5 \times 5 \times 8$  cm ( $2 \times 2 \times 3$  inch). The insert holds 81 peat pots and fits perfectly in the  $46 \times 46$  cm ( $18 \times 18$  inch) Nursery Supplies flat. Our propagation mix consists of fine milled pine bark [ $\leq 1$  cm (0.5 inch)], coarse perlite, Canadian peat moss, and coarse sand (6 : 2 : 1 : 1, by volume).

Buster Corley, our propagator, oversees all of our softwood propagation as well as our raised field bed production. Buster's softwood propagation team starts getting their cuttings early, between 7:30 and 9:00 AM. His crew of four, sometimes five, women will cut and stick as many as 24,000 cuttings per day. Their goal is 75,000 per week. Most of the cuttings are gathered from our container production area. The shoots they take are piled on a nursery trailer and wrapped in wet burlap. They are off-loaded into a heavily shaded, protected area where they are heavily misted. As the team needs cutting material they remove an armful of shoots and place them in a bathtub filled with water and Zerotel. The Zerotel is used as a disinfectant. After dipping, the cutting material is placed on tables. The tables are sloped towards the middle and tilted away from the cutters so the liquid will drain away from them. We have three women who make cuttings, while a fourth dips the cuttings in rooting hormone and sticks them.

Most of our cuttings are 7 to 13 cm (3 to 5 inches) long, with the bottom 2 cm (0.75 inch) stripped clean of leaves. Some of our cuttings, such as oaks and southern magnolias, are scarred on the ends. The cuttings are then dipped in rooting hormone and placed in trays. When the trays are filled, the cuttings are taken to the mist area and stuck in the appropriate propagation container. The cuttings are to be stuck 2 cm (0.75 inch) deep and no deeper than 2.5 cm (1 inch) on the large cuttings.

The open shade area holds approximately 440,000 cuttings, and the four greenhouses hold about 40,000 cuttings each. The numbers vary depending on the propagation container. We fill our shade area and greenhouses two or three times each summer because of limited space. After the plants are rooted they will either be planted in the raised field bed area or in containers.

## **PROPAGATION BY CHIP BUDDING**

**Chip Budding (Fruiting Pears, Flowering Pears, Purple Leaf Plum, and Japanese Persimmon).** We chip bud in September and again in March and April. For our understock we plant 1-year liners in 1.2-m (4-ft) raised field beds in February and seed in March and April. The plants will grow until September, when they will be chip budded. As the chip budding season approaches, we prepare the understock by removing any lower branches or leaves from the main stem and cut the tops back. Seven to ten days later we begin cutting the scion wood from our container production area or stock blocks. The shoots, which closely match the diameter of the understock at 1 to 2.5 cm (0.5 to 1 inch), are cut into sticks approximately 30 to 38 cm (12 to 15 inch) long. Then the leaves are trimmed off. The sticks are rolled in bundles of 30 to 35 in wet newspaper. The bundles are stored in the walk-in cooler until needed.

A chip of bark is removed near the base of the understock and replaced by another chip from the budstick containing the desired cultivar. The chip cut out of the understock and the replacement chip should be as close to the same size as possible. Both chips are cut out making the exact same cut. The first cut is made just below the bud and barely down into the wood at a 30° to 40° angle. The second cut starts approximately 2.5 cm (1 inch) above the bud. The cut is made inward and downward behind the bud until it meets or intersects the first cut. The chip from the understock is removed and replaced by a chip from the budstick. Just as is done in grafting, it is important to match the cambium layer of the chip with that of the understock. If the budder can make similar cuts in similar-size scion and understock

wood, the cambium layer on both sides of the chip will line up with the cambium layer of the understock. If that is not possible then one side should be lined up.

The next step is for the “wrapper” to follow close behind and wrap the chip. It is very important that the chip bud be wrapped to seal the cut edges as well as to hold the chip tightly in place. We use a clear tape that completely covers from below the chip all the way up above the chip. The tape is removed in approximately 28 days. If this process is done in the fall the top is not removed until the following spring. During the first 2 weeks in March the live-budded trees are cut back just above the live chip. The plants with dead chips are left alone and rebudded at the end of March or early April. We chip bud approximately 90,000 plants per year.