

Chip Bud Layering: An Easy Way to Produce Rooted Layers of Hazelnuts

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Abstract. Chip budding and layering are two well known plant propagation techniques that can be effectively used on hazelnuts. Combining these techniques and following the steps below will allow you to propagate hazelnut clones of your choosing, on their own roots, in just one season. You must be able to successfully chip-bud to complete this method of propagation. While not unduly difficult, chip budding does require some practice before one can be successful a high percentage of the time. After your chip bud has callused and a resulting shoot has grown for a couple months, the base of this new shoot must be treated with rooting hormone to initiate root development in a process similar to air layering. The shoot should then be allowed to grow attached to the rootstock until the end of the growing season. At this point it is ready to be detached and repotted as a rooted layer.

Step One: Choosing your rootstock and scion cultivar to be layered

The first thing to do is to select the rootstock that you would like to chip bud. The rootstock should be a healthy, vigorous seedling, with a full year of growth behind it. Dormant one-year-old seedlings grown in one-gallon containers work well. As such, one must plan ahead a year in advance to grow their own seedlings. Once you have rootstocks, you can either choose to do your chip budding at the beginning of the growing season, just before your rootstock wakes up, or you can do it at the end of the first season, just after your rootstock reaches dormancy. If done in the latter, the layering will be performed the following growing season. The method described here follows chip budding performed in the spring. This requires dormant scion wood and rootstocks. With hazelnuts, it is best to collect scion wood in January before

there are any signs of bud swell due to warm weather. Keep your scion wood in a plastic bag with slightly moist paper towels in the refrigerator until needed. Don't forget to clearly label your scion wood!

Step Two: Chip budding

Chip budding is a very useful and straight-forward propagation technique that is described in detail in many propagation textbooks and online (i.e. see Hartman and Kester's *Plant Propagation Principles and Practices*). For this technique, the budding should be done in mid-February to mid-March in a warm greenhouse (70-75 °F day/65-70 °F night). Place the bud as low on the rootstock as you can; two to three inches from the top of the pot works best. If desired, two chip buds can be done on the same rootstock to increase the chances for success. Our preferred material for attaching the buds is a clear, non-sticky ½ inch wide polyeth-

ylene budding tape. This is widely available from several nursery supply companies. Other similar materials can also be used with success. Make sure to cover and seal all exposed areas of the chip with the tape, but leave the bud exposed (Fig. 1). After budding, allow the wound to callus and the new resulting shoot to grow for four to five weeks (Fig. 2). At this time, the rootstock should be cut back on a 45 degree angle just above the chip bud and any lower shoots of the rootstock removed to force the growth of the new shoot (Fig. 3). Make sure to stake the new growth after a few weeks if it does not grow upright. Leave what remains of the plastic budding tape for another 2-3 weeks. At this time it must be removed to prevent girdling the new shoot.

Step Three: Putting down new roots

After the new shoot reaches approximately 18-20 inches tall, it is time to initiate the layering process. First, using shears, remove leaves from the base of the shoot to about twelve inches high. Next, wrap a twist-tie at the base of the shoot. It should be wrapped firmly, but avoid tying too hard as the new shoot can be very fragile (Fig. 4). This will girdle the stem as the layer develops, allowing easier removal of the rooted layer when finished. Next, using a razor, blade gently wound a one inch section just above the twist-tie on opposite sides of the stem. The best way to do this is to attempt to shave off the smallest layer possible on two sides of the stem (Fig. 5). Wounding the stem will allow better access of the rooting hormone into the vascular tissue. Make



Figure 1. Hazelnut chip bud at two weeks; Leaves are beginning to develop. Note budding tape covers all exposed areas of the chip, except the bud, which remains exposed.



Figure 2. Hazelnut chip bud four weeks after budding.

sure you do not make a very deep cut, or you risk losing the new layer. Also, be very careful when handling the new growth, as it is delicate and easy to break at this stage. The wounded area is the main place root formation will occur. Using a small brush, coat the wound and several inches of the shoot thoroughly in a solution of one part Dip N' Grow (commercially available liquid rooting hormone containing IBA and NAA) to 19 parts water, for a final concentration of 750 ppm auxin (<http://www.dipngrow.com>) (Fig. 4 & 5).

Step Four: A place to grow

Now that the shoot has been prepared, cut out the bottom of a second pot and slide it over the new shoot and remaining rootstock. The new growth should extend well above the top of the upper pot. Once in place, carefully fill the pot with a moistened mixture of



Figure 3a & 3b. New shoot eight weeks after budding. Note rootstock has been cut back above bud.

perlite and a peat based potting mix, in a 1:1 ratio (or a similar well-drained porous media), making sure the wounded stem is well covered (Fig. 6). This will be your shoot's new home for the remainder of the growing season. Stake the shoot with a piece of bamboo, if necessary, to keep it growing upright and to secure it from moving around in the pot, which could damage the developing roots. Keep the composite plant in the greenhouse until the threat of frost has

passed in your area. At this point move the plant outside under partial shade. The shoot should continue growing until mid-September, if well cared for. Make sure to check your plants often, as it is important that the potting mix does not dry out. Also, make sure to keep the rootstock well watered, as it can be easy to forget about, as it is hidden by the upper pot. After a month or two, you may be able to see new roots poking out of the drainage holes in the upper pot. This is an excellent sign that the process is going as planned, but don't worry if you see no roots, as most will be hidden.

Step Five: Leaving the nest

This is the final stage of the chip bud layering. Assuming everything has gone well up to this point, by early November abundant roots should have formed at the base of your new shoot and the twist-tie should have begun to girdle the stem connecting your soon-to-be layer to the rootstock. Now it is time to separate the two plants. First, slide the bottom pot off the root ball of the rootstock. Using a small pruning saw, cut the rootstock at the juncture between the upper and lower pots (Fig. 7). You will cut through both the solid woody stem of the rootstock, as well as fibrous roots that developed from your layer and passed into the pot below. For demonstration purposes only we removed all the potting media from the layer to show root development (Fig. 8). After separation, reach into the bottom of the upper pot and remove as much of the remaining rootstock's stem as possible from the new layer using pruning shears. This will greatly decrease the chance of survival of the remaining rootstock stem, which may, although unlikely, send up a shoot if left attached. After doing this, remove the new layer from its pot, trying not to further disturb the root ball (Fig. 9). It is now ready to be repotted into a larger

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Figure 4. Twist-tie tied at the base of the new shoot to be layered, with leaves removed. Stem is being liberally coated with liquid rooting hormone (ratio of 1 part Dip n' Grow concentrate to 19 parts water).

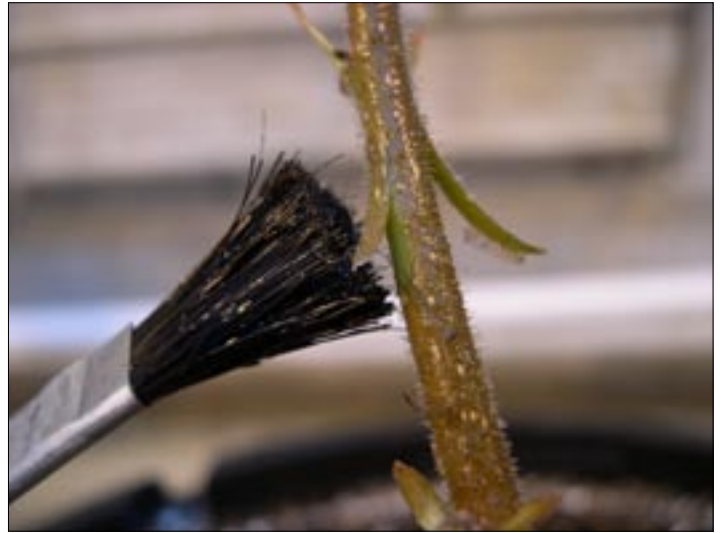


Figure 5. Wounded stem cut by razor blade to allow better access of rooting hormone into vascular system.



Figure 6. Prepared shoot covered by bottomless pot filled with porous media.



Figure 7. Slide off the bottom pot and cut the rootstock at the juncture between the two pots with a pruning saw.



Figures 8a & 8b. Here the potting media has been washed away to show the root development on the shoot. In Fig. 8b the layers have been detached from one rootstock, which originally had two successful chip buds. It is not necessary to bare-root the new layers once the top pot is detached, but it is important to cut away most of the rootstock stem that remains underneath to reduce the chance of it sending up a shoot.

(Layering *cont'd from 16)*

container. The new layer will need to be properly over-wintered in a cool location that does not go below freezing (preferably 34-38 °F), until the spring. At this time the layer should break dormancy and grow vigorously, sending out many roots to colonize its new home. If stepped up into a three-gallon container, by fall it should be ready to go to the field. □



Figure 9. The final product: a well rooted layer that can be potted into a larger container to be over-wintered. By next fall it should be a vigorous plant ready for field planting.
