

How to Propagate Hybrid Hazelnuts by Mound Layering

Mound layering is a simple method of producing new plants that are genetically identical to the parent plants. The problem with producing new plants from seeds is that they won't come true. That is, their genes will be shuffled, or recombined from their parent. If you plant seeds from your best hazelnut bush, only 50% of the genes in the resulting seedlings will be from that outstanding mother bush. The other 50% will come from the paternal parent. Unless you have controlled pollination, the paternal parent is likely to be of inferior quality, and thus the offspring are likely to be inferior. A few might be superior, but most will not. And overall, your planting will be exceedingly variable, as variable as brothers and sisters in a human family. Vegetative propagation, also called cloning, is a way around this. In many woody crops, such as apples, this is done by grafting, but grafting doesn't work with hybrid hazelnuts. Stem cuttings don't work very well either.

Mound layering does not work on all hybrid hazelnut plants. It seems that some plants simply won't make roots. But most will. So here's how to do it.

Supplies needed:

- Heavy duty loppers or other tool to coppice stems
- "Twist-tie" wires, of the type used to close bread bags
- Rooting hormone.
- Alcohol
- Small paint brush or cotton swab with which to apply hormone
- Sawdust or other light-weight material to mound up over plant, 5 to 6 five-gallon buckets per plant, depending on size of plant
- 9 inch wide x 7-10 ft long strips of tarpaper (or substitute) and stapler
- Hose or buckets to water mound layers

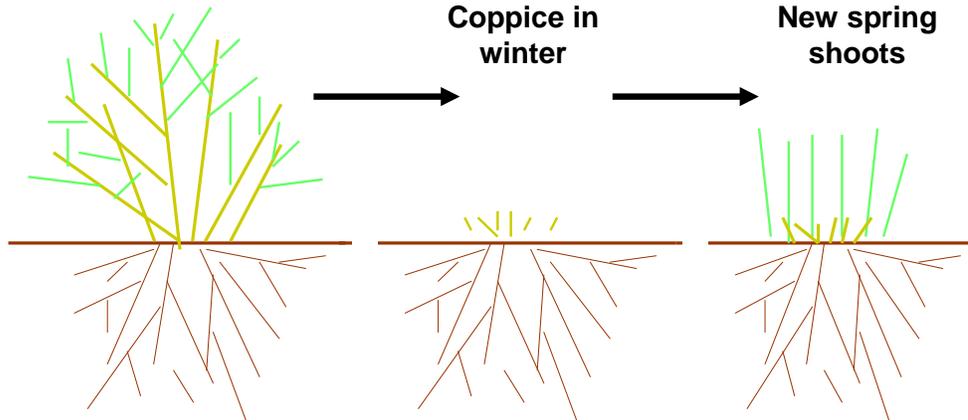
Outline of Steps:

1. Coppice bushes in the winter.
2. In the spring, when new shoots are about as thick as a pencil:
 - a. Girdle them with a "twist-tie" wire
 - b. Use a small paintbrush or cotton swab to apply 2000 ppm IBA dissolved in 50% ethanol to a band about 1 inch wide, just above the girdle.
3. Construct a ring of tarpaper or similar material, about 12 inches tall, large enough to encircle all of the stems of a plant, with about 4 inches extra.
4. Fill the tarpaper with sawdust or a similar light weight material to a depth of about 9 inches.
5. Water the sawdust well, and keep it moist throughout the growing season.
6. In the fall after dormancy, or the following spring before bud-break, dig up the new rooted shoots and transplant them to their new location.

Before you start

Select your best hazelnut bush or bushes. These should be bushes that have performed well over several seasons, not just one. Ideally, they should be bushes in good health. It may help to water the bush the year prior to mound layering to be sure it is vigorous.

Step 1: Coppicing



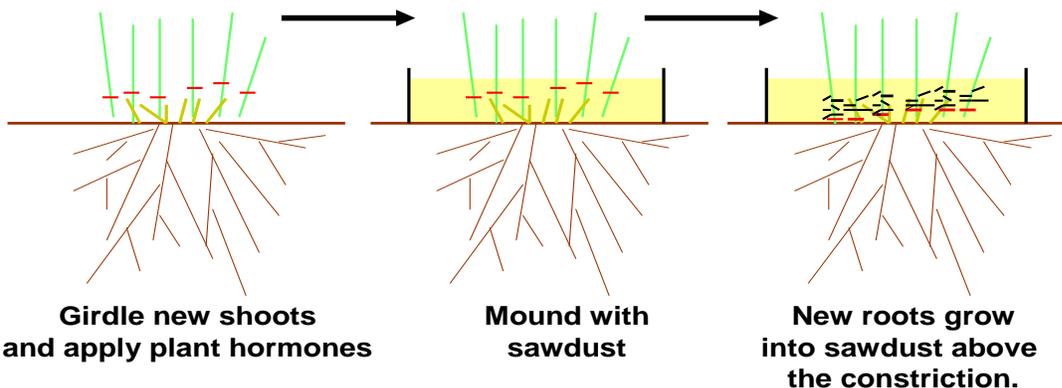
The first step is to cut the bush down to the ground, in the winter. This is called “coppicing”. This will stimulate the plant to send up the new tender shoots in the spring. Each of these will become a new plant.

Coppicing can be done any time that the bush is dormant, when most of the nutrients and energy of the plant are stored underground in the roots. You can still coppice in early spring, after buds have begun to break, but if you do it this late repetitively you’ll weaken the plant.

If you like, you can leave one or two “nurse” branches uncoppiced, to feed the plant’s root system the following year. This is a good idea if you plan to mound layer the same plant for several years in a row, but if you only plan to do it for one year it is not necessary. Leaving a nurse branch will reduce the number of new shoots that emerge the following spring.

Try to cut the branches off as close to the ground as you can, and try to make the cuts clean. Otherwise the sharp stumps may be a hazard for your hands during the next step. Heavy duty pruning loppers work well for this job.

Step 2: Girdling and Applying Hormone



In early summer, when the stems are about pencil-thickness (1/8 to 1/4 inch thick), prepare them by girdling them and applying rooting hormones. The window for doing this may vary from season to season, but is generally from about the second week of June through the first week of July. Early in this time period, stems will form roots more easily, but they will be so tender that extra care is needed to work with them without breaking them. Thus we have found that mid to late June is better. In July, roots will not form as easily, but it is still worth trying.

If the new shoots are extremely thick and crowded, it would be good to first thin them out. Space them far enough apart that you can easily get your hands between them to apply the girdles.

Girdling is accomplished by wrapping a “twist-tie” wire around the base of each stem. The wire should be snug, but does not need to be tight, because as the stem grows through the season it will grow into the wire and girdle itself. If you tie the wire too tight you run the risk of breaking the stem.



Putting on wires



Painting on IBA

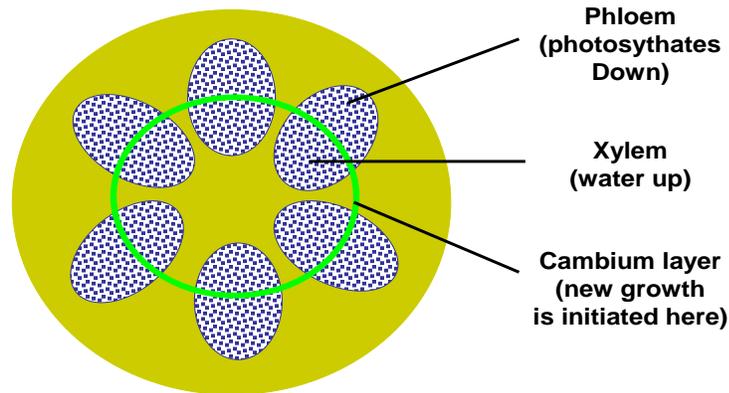
In general it is best to tie the wires as close to the ground as possible. However, sometimes when the soil is extremely clayey, or if landscape fabric has been used, and the new roots grow into it, it can be very difficult to dig the new plants out. Tying the wire higher on the stems may make the roots grow higher on the stems, keeping them out of the clay or fabric, though this requires that the sawdust be mounded higher. We recommend that the sawdust be at least six inches above the level of the wires to ensure that it stays moist at that level.

The next step is to apply rooting hormone to the stems. We have found that 2000 ppm (2000 mg per Liter) K-IBA in 50% ethanol (equal parts water and ethanol), painted onto stems in a 1 inch band just above the girdle is the best method. 8000 ppm Hormex® IBA in talc, mixed with a small amount of water to make a paste, also works. Concentrations higher than 2000 ppm in ethanol or 8000 ppm in talc resulted in excessively profuse but weak roots. It seems that absorption of the hormone is better with ethanol, so lower concentrations are needed with ethanol than with talc. We have not tried the other powder formulations available at garden centers, such as RootOne®, but we assume they could probably be applied as a paste as we did with Hormex. Spraying a water-soluble formulation (Hortex®) over the leaves was not as effective and stresses the plants. Vodka can be used instead of ethanol.

Why does girdling promote rooting? Girdling constricts the flow of photosynthates (sugar compounds produced in the leaves) down the stems to the roots, but does not constrict the flow of water from the roots to the leaves. That is because the phloem, the capillaries in which

photosynthates are transported downwards in plants, are located exterior to the xylem, which are the capillaries in which water is transported upwards in plants. Thus the girdle constricts the phloem but not the xylem, unless it is too tight, in which case the whole stem will be killed. When photosynthate, which is normally transported to the roots, to supply them with energy and the building blocks needed to grow, reaches the girdle and can't go any further, it is put to use producing new roots there, just above the girdle.

Cross-Section of a Stem



Another reason why girdling promotes rooting is that the natural plant hormone auxin, which promotes rooting, is normally produced in the terminal buds of stems and transported down stems to the roots. When its passage to the roots is impeded by the girdle it stimulates the stems to grow roots right there. Girdling may also injure the stem's cambium layer, which is where new growth is initiated from. Injury often stimulates plants to alter their growth, from, say, stem growth to root growth. We found that injuring hazelnut stems instead of girdling them was also an effective way to promote rooting, though not as effective as girdling.

Steps 3-5: Constructing the Mound

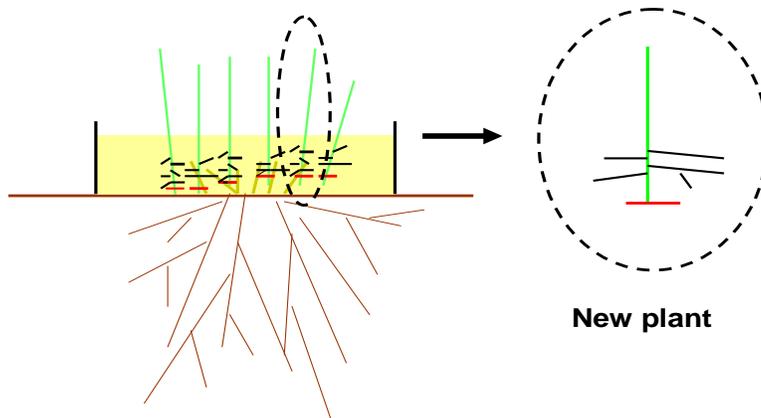
After all stems have been prepared, install a ring of tarpaper or some other material around the entire plant to keep the sawdust mounded up around the stems. We have found that 9 inch wide strips work well, though they may need to be higher if the girdles were placed high. The objective is for the sawdust to be at least six inches above the level of the girdle so that it does not dry out at the level at which rooting is to occur, because roots will not grow into a dry medium. The length of the strip will vary according to the size of the plant. We found that it is best to place it at least three inches outside of the outside-most stem because the sawdust adjacent to the tarpaper dries out faster. An ordinary stapler works for fastening the two ends of the tarpaper together. We would like to find an alternative to tarpaper, but so far have not thought of anything.

After the ring has been constructed, fill it with sawdust, covering the bases of the stems about six inches above the girdles. Other light weight materials besides sawdust, like peat moss, rice hulls, wheat chaff, or vermiculite may be used. The substance must be able to retain moisture without becoming waterlogged, because root growth requires both moisture and oxygen. Substances that are heavy, such as compost, soil, or sand, are likely to break stems and will make it difficult to dig the rooted stems out at the end of the season. Conversely, pure perlite is likely to dry out too much, though it might work in a mixture.



Finally, water the sawdust very well and make sure that it stays moist below the top inch for the duration of the season. We experimented with fertilizing the sawdust but found that it did more harm than good.

Step 6: Harvesting



Rooted layers may be harvested in either the fall or the spring, as long as the stems are dormant at the time of harvest. Gently pull the sawdust or other medium away from the stems with your hands, and carefully work the new roots free. By pulling gently upwards or sideways on the stems you may be able to snap them off where the girdle has weakened them. If not, carefully cut the stem below the mass of roots. Work quickly to avoid letting the roots dry out, placing the newly harvested rooted layers in a bucket of water or in a trash bag with moist peat moss as soon as possible. If roots from adjacent plants are entwined, simply harvest them as a mass and separate them later in a bucket of water.



Rooting occurs above the constriction.



The stem frequently breaks right at the constriction.

In the fall the leaves do not have to have completely fallen, but the abscission layer between the leaves and the stems needs to have formed. This usually occurs in mid-October in the Upper Midwest. It would be best to harvest them early enough to transplant them into their new location early enough that the roots can grow about a month before the soil freezes, though we have been successful with transplants in early November. In the Upper Midwest the window between when the stem goes dormant and the soil freezes may be very short. So it may be easier to wait until spring, though the window between when the soil is dry enough to plant and before bud break may also be short. Hazelnuts typically start to leaf out in mid-April in Minnesota, though we have successfully transplanted as late as mid-May.

Another approach is to harvest rooted layers in the fall and store them over the winter in a cooler or root cellar at about 34°F. Either pack their roots in moist peat moss, or store them bare-rooted if the humidity can be kept high enough to prevent their desiccation. This method should only be used by growers who have access to a greenhouse, because stems stored at 34°F will start to break dormancy long before it is warm enough to transplant them outdoors: in mid-March it is necessary to transplant them into pots in a greenhouse. These potted hazelnuts can be kept until it is convenient to plant them outdoors.