

# How to Layer chestnuts.



Cloning your best trees is possible through stool bed layering or what we simply call “layering”. Cloning your best chestnut trees allows you to make identical copies of a tree that you know is a superior tree. Clones of a superior tree you can plant on final spacing to increase productivity or expand your orchard and share or trade the best genetics with other growers. In only a few easy steps we can do this by encouraging sucker (a.k.a. shoot) growth, then encouraging root growth on the suckers and then dig them up before they start to grow again in the following spring. Of course, there are more details we need to know to be successful, but it isn’t difficult to do. Cloning a known tree via layering is lower cost than most seedlings without the unknown production, disease resistance and double planting needed for seedlings.

Often in small to large orchards by year 8 or 9 productive and blight resistant trees stand out and some trees have been found to be unproductive or blight susceptible. In years 8 or 9 the trees can be encouraged to produce suckers by pruning the tree back and by year 8 or 9 trees will need good pruning if they haven’t been pruned for good form previously. The unproductive trees can be removed and replaced by clones that appear to be worthy productive trees that are blight resistant.

There are four main steps to cloning your best trees.

## 1. Winter pruning or coppice

You want the roots to have excess energy so they will send up new suckers for you to clone. Now that we know we really like a tree and want to copy it, we want to encourage sucker growth. If your tree doesn’t produce suckers at the base of the tree it usually means the tree is getting mature and the base is shaded enough that sucker growth is hindered. To encourage sucker growth you will need to prune the tree back by 30% to 50% during dormancy. If the tree is deformed from a storm or has other serious life-threatening issues you may want to coppice (otherwise known as cutting down the tree). Heavily pruned and coppiced chestnut trees almost always produce many suckers the following spring. There are many references for pruning you can find one reference is here: [Tips On Chestnut Tree Pruning - Learn About Trimming A Chestnut Tree | Gardening Know How.](#)



Figure 1 Mulched chestnut tree in preparation of stool bed layering

Dormancy is when the tree has stopped growing and has its leaves turn brown growing during the late fall and winter months after a hard frost. Pruning back the tree during this time period allows the wounds to dry and not be bothered by pests. Trees that are coppiced may grow upwards of 50 suckers (a.k.a. shoots) as the roots must send their energy upwards. If one or two suckers are not layered those shoots can be 12 feet tall by the end of year two. Those fast-growing shoots in year two may need staking to not be damaged by windstorms as we have witnessed. Trees that were heavily pruned and sent up many suckers the year after heavily pruning or coppicing will produce suckers for a few years. If the grower doesn’t want any more

clones, then the suckers should be cut off to allow the root energy to go to the main tree or the selected sucker to replace the coppiced trees.

## 2. Spring mulching

**What you need:** Mulch, tarpaper or similar, two or three stakes per tree that are 16" long.

Most orchards mulch their trees anyway in the spring, except this year you will mulch six to eight inches deep in a circle that is 12 to 16 inches outside the bark of the tree before buds break if possible. For example, if your tree has a diameter of 6 inches then you will form a circle a minimum of 30 inches ( 6" + 12" + 12") in diameter. You will then need to hold the mulch in place using tarpaper or plastic. To hold the tarpaper or plastic in place you will need a minimum of two stakes pounded into the ground and staple the tarpaper/plastic to the stakes. The suckers will sprout through the mulch and develop stems in the mulch that allow us to have easy access, to apply hormone and then have easy access to dig up the roots. Check the depth of the mulch monthly to maintain a minimum of six inches of mulch.

Chestnut trees like acid soil below 6.5 pH. The mulch should not be limed and allow for easy removal during subsequent hormone application. The purpose of the mulch is to etiolate the stems for six inches above the native soil line. Etiolation is where the stems are yellow due to lack of sun light and enable better root formation with rooting hormone. Mulch needs to be held in place as a couple of good rainstorms will spread out the mulch. The mulch also enables easy removal of the roots so long as the nylon zip tie is placed an inch or two above the native soil line. The soft loose mulch allows for easy access to the stem below the nylon zip tie to be cut with a hand pruner. The mulch also allows for easier separation of the roots between the suckers and minimizing any root damage.

## 3. Summer hormone application

**What you need:** 75 lb. strength nylon zip ties, Petroleum Jelly (a.k.a Vaseline), IBA-K hormone.

**Timing of when to put hormone on the suckers is very important.** It is best to check when is the average first frost in your area and then go back 60 days. For example, in Cortland, New York the average first day of frost is October 1<sup>st</sup>. Therefore, you want to start layering August 1<sup>st</sup> through August 14<sup>th</sup>. This time period will allow six weeks to eight weeks for roots to form. Too early the suckers are growing too fast and will only choke and die. Too late in the year and the roots won't form in time. If you have coppiced your tree, leave one or two suckers alone to grow to replace the original tree. You will be applying a hormone known as salt of Indole-3- butyric acid (IBA-K) to the base of the stems with a small brush. Before applying to the base of the tree you will need to order the IBA-K from your local hydroponics store or on-line retailer like Amazon or eBay. Purchase heavy duty nylon zip ties with a minimum strength of 50 lbs. at your local hardware store or online retailer. Do not use lighter weight nylon zip ties or they will probably break due to stem growth, wasting your time. Strip off the bottom third of leaves from each stem. This will allow you to see the stems and apply the hormone.

Growers wishing to clone their chestnuts may want to use wire instead of nylon zip ties but need to be careful not to crush the stem but still have the wire snug enough to encourage root development. The nylon zip tie constricts the flow of nutrients(via the phloem) back to the root system and this energy is redirected to grow roots with the aid of the IBA-K rooting hormone. Nylon zip ties allow for easy good constriction without crushing the stem and not blocking the flow of water, of the inner stem, to the leaves via the xylem.

**How to prepare the hormone and petroleum jelly.** The typical Petroleum jelly you buy at your local drug store or your “dollar “or “value” store is 262 ml (7.5 oz.) of Petroleum jelly. To have 4000ppm of solution of IBA-K in 262 grams (7.5 oz) of petroleum jelly you will need 0.848 grams of IBA-K. If you have very accurate scale to measure fractions of a gram, you are good to go. Otherwise, a close approximation is measure out 1/8 teaspoon and also a ¼ teaspoon of IBA-K into 2 tablespoons of room temperature water and stir until dissolved. Then mix solution into 262 gram (7.5 oz.) jar of Petroleum jelly until smooth. Careful not to splash hormones while mixing. It is highly advised to warm up the Vaseline to a liquid prior to mixing. How to melt petroleum jelly into a liquid according to Bing is to, “Fill a small container with petroleum jelly, then empty the petroleum jelly into a microwavable bowl. Microwave at 30 second increments until just melted. Alternatively, you could melt the petroleum jelly over low heat in a double boiler.” In previous studies 2000ppm of IBA didn’t generate roots, while 5000ppm of IBA can kill suckers, so measuring properly is very important.



Figure 2 IBA-K hormone measurement for 7.5 ounce of Petroleum jelly.

It took three years to find the window of opportunity to best layer the suckers and have rooted suckers. The first year of the study most suckers choked and died because they were layered too early. If the suckers are layered too early the fast-growing shoots choke both the phloem and xylem so no nutrients down to the roots or water can flow up to the leaves. Layered too late and the roots don’t have time to form and few if any roots will form. Technical references found easily rooted chestnut selections only need a month while more reticent selections need two

months to form roots. Encourage the grower to start layering chestnuts a full two months before the first average frost date for the grower’s farm location. For further details and references please see the SARE report: [Clonal Production of Hybrid Chestnuts via Stool Bed Layering to Improve Overall Orchard Quality - SARE Grant Management System](#)

Prior to putting on hormone, pull away mulch from suckers and expose the lightly colored stems. Hopefully the lightly colored part of the stem is four to six inches long and is the part of the stem that is hidden in the mulch. An inch or two from the very bottom of the exposed stem place a nylon zip tie snugly to the base without crushing or breaking the stem. Too loose and the stem won’t form roots. Lightly scrape the stem about ½ inch above the nylon zip tie for two inches in length, and scrape again on opposite sides of the stem. Liberally apply the IBA-K Vaseline mixture with a small brush the hormone mixture ½ inch above the scrape, all around the stem and down to the zip tie. Replace restraining tarpaper or plastic and refill mulch to the original levels as shown in Figure 1.



Figure 3 Nylon zip ties, stem scrapping in preparation for 4000ppm IBA-K hormone to be applied to stem. Note leaves on the ground from stripping the bottom third of the suckers leaves.

#### 4. Fall/spring dig up rooted clones.

After the leaves have turned brown and are falling off in the fall and before the buds swell in the spring, you will dig up the suckers. You will need to gently pull back the mulch with your hands gingerly to not break the tender roots. Once you see roots, work your way under the roots to the nylon zip tie. Cut the sucker below the nylon zip tie and gently lift the cloned tree from the rest of the suckers. Sometimes you have to cut a few suckers and pull them out at the same time as the roots are so intertwined you cannot pull them apart separately without damaging the roots. If you do pull up a few trees at once you can sometimes shake the soil/mulch off and then separate the roots. If you cannot separate them after shaking off the soil/mulch, then dip the roots into a bucket of water and they will separate much easier for replanting.

#### Aftercare

Although not part of the actual cloning, there may be some efforts of protecting the less than ideally rooted trees you may not be used to dealing with. Heavily rooted trees can be planted out in their forever home directly and care as normal for any tree you plant. If the new clone has less than six main roots with secondary roots then we suggest temporarily planting in mulch or potting them while keeping them well watered and protected from wind and too much direct sun. Also pruning back the stem to only a few buds helps match the roots to the stem, as should be done for the second from the left of clone in Figure 4. One way to protect is to put on a tree tube that is the same height at the stem, with two or three stakes for a couple of weeks, while the buds elongate and slowly open the tube over a few more weeks to be more exposed to the wind and sun.

The second from the left side of the rooted chestnuts in Figure 4 are weak compared to the root system of the suckers on either side. The weak root system needs to have the stem be pruned to match the root system. Therefore, the buds should be counted up from the root system. The top of the stem should be cut off after the third or fourth bud from the bottom of the sucker.



Figure 4 Well rooted stems on three of the five suckers, with one without roots and one poorly rooted that will need extra care.

**Disclaimer:** Follow manufacturer directions fully for all products purchased. We are not responsible for any injury or death of tree or any damage to person or property. Always wear proper personnel protection equipment that includes but not limited to eye protection, gloves and air filtration.

"This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under subaward number FNE22-033. "Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture."

