Propagating Eastern Black Walnut

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GROWER RECOMMENDATIONS

Use the best possible planting stock to establish a new black walnut orchard. Start with a vigorous rootstock grown from a known seed source. Chose black walnut cultivars with proven records of nut production for grafting onto your rootstock trees. Graft only well-established trees during the spring flush of growth. Select your propagation method based on the size of your stock tree. Use the 3-flap graft on small trees and the bark graft on larger trees. Support young grafts with a stake to prevent wind damage. Train the new graft to a central leader tree by trimming all growth to a single central leader.

INTRODUCTION

Black walnut trees will reach their full nut bearing potential only if careful consideration is given to the rootstock and cultivars used to establish the orchard. To ensure top quality orchard trees, many growers choose to grow their own rootstock trees and graft those trees with superior nut cultivars. In this chapter, black walnut propagation, from germinating seeds to grafting large trees will be discussed.

SEED PROPAGATION

Black walnut trees are easily grown from properly stratified nuts. Collect nuts for planting during the fall harvest season. Hull and wash the nuts as soon as you collect them. During the washing process, discard all nuts that float to the top (these floaters are poorly filled and won't germinate well). Even though many seed sources can be used, 'Kwik-Krop', 'Sparrow', and 'Thomas' nuts have proven to produce excellent rootstock trees. Stratify the nuts in moist sand by placing them in layers about 3 inches deep and holding them in a refrigerator (33 to 40° F) for 120 days. Be sure the nuts are kept moist throughout the stratification process to ensure uniform germination after planting. Three methods can be used for growing seedlings for later use in establishing a black walnut orchard:

1. Growing trees in place
2. Establishing a nursery
3. Growing trees in containers

GROWING TREES IN PLACE

Prepare a fine seedbed in the areas you intend to plant black walnut seed. During early spring,plant 3 to 5 stratified nuts, 2 to 3 inches deep, at each tree location. Be certain to mark the area where nuts are planted and to keep the area weed-free. During the first year, select the strongest-growing tree and remove the others by cutting them off below the root collar. Fertilize the seedlings in mid-

July with 1/4-cup of a slow release fertilizer per tree location. Water trees when conditions become dry.

ESTABLISHING TREES IN A NURSERY

Choose a deep, sandy loam soil for a black walnut nursery to facilitate digging and transplanting. Prepare a fine seed bed for the nursery area in early spring. Plant stratified seed 2 to 3 inches deep, 2 feet apart, in rows 4 feet apart. Keep the nursery weed-free and well watered. Sidedress the nursery rows with a slow release fertilizer in mid July. Nursery-grown trees should be dug for transplanting in March of the following year. When digging one-year-old seedlings, be sure to dig at least 16 to 18 inches deep and preserve as many fibrous roots as possible.

GROWING TREES IN CONTAINERS

There are several sizes and shapes of containers that can be used for growing black walnut seedlings. Choose a container with an open bottom. When placed on a screen wire bench, walnut roots will grow to the bottom of the pot and then become "air-pruned". The air-pruning process prevents root circling--a common problem in container grown trees.

Use a potting soil mixture that allows free movement of water through the pot. Mix in a slow release fertilizer that can provide both macro- and micronutrients for 7-9 months. Plant a single, stratified nut in each pot. Black walnut seedlings grown in containers need daily waterings and the careful attention demanded by all containerized nursery plants.

Container grown stock can be transplanted into the field in the early fall. The fall planting season starts 3-4 weeks before the first killing frost in the fall and continues until mid-November. Containerized stock can also be planted during the traditional spring planting season. However, if you are holding container trees over the winter, you must protect the trees from freezing during the winter. After trees become dormant in the fall, lay the pots down on the ground and cover the trees with an insulating cover.

GRAFTING TREES

The only way a walnut grower can ensure that each tree in his orchard produces quality nuts is to graft superior cultivars onto his rootstock trees. Trees grown from seed will, in most cases, bear nuts that are inferior to the nut planted. The seed grown tree exhibits characteristics from both male and female parents. Since walnut trees are wind pollinated, the source of male pollen is usually unknown. The pollen that fertilized the flower and resulted in the nut you plant may have come from a small, hard-shelled "wild" tree. As a consequence a seedling tree often produces nuts that are intermediate between that small, hard nut and the big nut that was planted.

Grafting is an age old horticultural technique that can be defined as attaching a twig from one tree to the stem of another in such a way that the twig continues to grow and become a permanent part of the tree. All of the branches that grow from that twig will have the identical characteristics of the tree from which the twig was taken. Grafting is one method nut growers can use to propagate trees that bear large, easily cracked nuts. Grafting a twig (the scionwood) from a tree that produces high

quality nuts onto a seedling tree (the stock) is the only way to assure that your tree will produce desirable nuts.

COLLECTING SCIONWOOD.

The first step in the grafting process is to obtain scionwood from trees of known performance. There are hundreds of cultivars of black walnut that have been selected by nut growers over the last 100 years but only a few are frequently recommended for commercial nut production (see chapter on cultivar selection). Scionwood should be collected during the late dormant season. Cut scionwood from the previous season's new growth making sure there is an ample supply of large plump buds on the twig. Store scionwood in plastic bags under refrigeration (35° F) until the spring grafting season. Make sure the scionwood does not dry out during storage by wrapping the wood with moistened paper towels. Check stored scions frequently and rewet the paper towel if it become dry.

TOOLS FOR GRAFTING TREES

Before the grafting season begins you should collect all the tools and equipment you will need to graft walnut trees. The necessary supplies are listed below:

* Sharp grafting knife (sheep's foot blade)
* Pair of pruning shears (with by-pass blades)
* Pruning saw (turbo style)
* Light duty staple gun (Arrow model JT 21)
* Tack hammer
* 4-mil plastic grafting tape
* Plastic sandwich bags
* Aluminum foil
* Bottle of white glue
* 5/16" staples for staple gun
* 5/8" brad nails

With this equipment you will be prepared to graft trees from 1/2" to 4" in diameter.

SEASON FOR GRAFTING

During the spring flush of growth, rapid wood and bark growth allows the bark to be easily removed from the wood. We use this natural phenomenon to our advantage during the grafting process. But because the bark of the stock tree must 'slip', grafting season is largely confined to a six-week period during the spring. Graft small trees as soon as the emerging buds are one inch long. Start grafting larger trees when the leaves begin to unfurl. You can continue to graft until the leaves of the stock trees are completely expanded. During certain periods of the grafting season you will note excessive sap flow when black walnut stock trees are cut. This 'bleeding' will inhibit callous formation and cause graft failure. To avoid 'bleeding' problems, cut stock trees off just above the location you intend to graft. Wait a couple of days, and then make a fresh cut one-inch below your previous cut before grafting.

When you are ready to start grafting, take your scionwood out to the field in a small cooler. Ice down your scionwood to keep it fresh. Avoid leaving bags of scionwood out in the sun, where the wood can become very hot.

THE THREE-FLAP GRAFT

The three-flap graft is best method for propagating walnut cultivars onto stock trees three to six feet in height. The three-flap graft works best when both scion and stock are approximately the same diameter. Take a piece of scionwood out of your cooler and hold it up to the stock tree and choose the proper height for grafting (Fig. 1). Cut off the top of the stock tree at that point with hand shears. As a general rule, the scionwood should be large enough to allow you to cut off at least 1/3 of the stock tree.

After choosing the site for grafting, set your scion back in the cooler and prepare the stock. Begin preparing the stock by making three vertical incisions, three inches long, through the bark at the top of the stock. Space these evenly around the diameter of the stock. If a bud and leaf scar are present, rub off the bud and make the first vertical cut directly through the bud (Fig. 2). To facilitate tying the graft union during a later step, tie an 18-inch piece of plastic grafting tape on the stock just below the three vertical cuts.

Now turn your attention to preparing the scion. First, trim 1/2 inch off the bottom of the scion to fresh, green wood. With a sharp grafting knife, make a shallow cut through the bark and into the wood approximately 2 inches long at the bottom end of the scion (Fig. 3). This cut should expose a long "U" shaped area of cambial tissue with woody tissue inside the "U" (Fig. 4). Repeat this step two more times so that the scion has three evenly spaced cuts around its diameter. Leaving a strip of bark between each cut ensures maximum cambial exposure (Fig. 5).

Sometimes, a bud and leaf scar are found in a position where cuts are to be made. If so, make the first shallow cut so that it removes the bud. Before moving back to working on the stock, hold the cut end of the scion in your mouth (away from tongue and teeth) to keep the scion from drying and to free your hands.

Using the tip of your knife, separate the bark from the wood at the top of the stock. With your fingertips, carefully peel the bark away from the wood in three flaps, each 2.5 to 3 inches long. Use shears, blade side down, to hold the three flaps down while clipping out the wood on the inside of the flaps (Fig. 6). Avoid excessive fingering of the flaps--oily fingers can impair graft callus formation.

Next attach scion to stock. Place the scion inside the three flaps, lining up each cut surface with a flap. Hold the three flaps up over the cut surfaces with one hand and begin wrapping the graft union with grafting tape (already in place) (Fig. 7). Wrap the graft spirally up the stem, making certain the flaps and scion do not twist (Fig. 8). Tie the tape above the three flaps. Push straight down on the scion to ensure that the scion is firmly seated against the wood of the stock.

Protect the graft from sunburn by wrapping it with a small piece of aluminum foil (Fig. 9). Foil also acts as a splint, protecting the graft from wing injury. Next, tear the corner out of a plastic sandwich bag and place the bag over the graft (Fig. 10). Tie the bag above and below the graft union with

grafting tape. The plastic bag helps prevent moisture loss and speeds graft callusing. Cover the cut surface at the top of the scion with a drop of white glue (Fig. 11), which prevents moisture loss from the scion.

Three to four weeks after grafting, scion buds should start to break (Fig. 12). After the scion has made three to five inches of new growth, carefully remove the plastic bag, aluminum foil, and grafting tape to prevent graft girdling. A strong graft should have callous tissue growing between each flap.

Wrap up the graft again in reverse order, first with the plastic bag, then aluminum foil, and finally grafting tape. This wrapping will not girdle the graft but provides wind protection. Force scion growth by pruning back growth below the graft and by fertilizing with nitrogen.

THE BARK GRAFT

The bark graft is an effective way to propagate walnut cultivars onto trees one to four inches in diameter. Select a point on the stock above the first whorl of branches and at a comfortable working height (Fig. 13). Retain lower branches to help maintain tree vigor until the new graft becomes established. Leaves on these branches will also shade the trunk to prevent sunscalding. Remove the top of the stock tree with your turbo saw. Check for excessive sap flow, and be prepared to graft another day if necessary.

Inspect the cut surface of the stock. You'll notice that the stem is not perfectly round. Choose the flat side of the tree to make your graft. At this point, remove some of the rough bark with your knife. Pare down the bark until it becomes about 1/8 in. thick in an area 1.5 in. wide and 3 in. long. Reducing bark thickness will make the bark more pliable and more able to conform to the scion. Use your grafting knife to make a 2.5-inch long vertical slit through the bark (Fig. 14). The stock is now ready to accept the scionwood.

Scionwood approximately 3/8 in. in diameter works best for the bark grafting. Trim 1/2 inch off the bottom of the scion with your pruning shears to expose fresh, green wood. If a bud is found near the base of the scion, your first cut should remove the bud (Fig. 15). Draw your knife through the scion starting about 2.5 inches from the base. Carve the scion down through the pith to less than half its original thickness using several passes of your knife (Fig. 16). This deep cut should be parallel to the scion and feature a right angle shoulder. Be certain that two buds remain above the cut.

Turning the scionwood piece over, make a shallow cut into the wood of the backside your first cut (this cut is similar to preparing a scion for three-flap grafting). This cut is not made parallel to the deep cut but angled to one side (Fig. 17). When finished, you should have a thin piece of bark adjacent to the deep cut on one side and a much thicker strip on the other. The cut on the backside of the scion should start just below the shoulder of the deep cut and should give the scionwood a wedge shape when completed (Fig. 18). A third cut is made perpendicular to the deep cut along the thick bark strip edge. This cut should be made just deep enough to expose the cambium. Be certain to leave a strip of bark between the backside cut and the perpendicular cut. At this point your scionwood should have a triangular shape (Fig. 19). Complete scionwood preparation by making a

chisel point on the end of the bud stick (Fig. 20). This final cut should be made on backside of the scion.

Use your grafting knife to gently pull the stock's bark away from the wood on the right side of the bark slit (Fig. 21). Insert the scion between the bark and the wood of the stock (Fig. 22). Tap the scion down into the stock until the shoulder of the deep cut fits snugly against the upper side of the stock (Fig. 23). The deep cut should be facing the wood, while the shallow cut should be covered by the raised bark flap and perpendicular cut should fit snugly against the bark slit. Secure the graft union with staples (Fig. 24) or brad nails (Fig. 25). It is important to nail down the bark firmly against the scion and to be sure that all air pockets are removed. Use as many staples as needed but be careful not to split the bark.

Like the three-flap graft, cover the graft union with aluminum foil. Place the foil over the cut surface of the stock and around the base of the scion. Next, cut the corner out of a sandwich bag and place over the scion. Tie the plastic bag with grafting tape to the base of the scion and bellow the aluminum foil on the stock (Fig. 26). Place a drop of white glue on the cut surface at the top of the scion to prevent moisture loss.

When you see about six inches of new growth from the scion, attach a piece of lath wood (1/2 x 1 inch) to the tree to prevent the wind from blowing out the graft. Nail the lath to the stock and tie the new shoot to the lath with twine or plastic grafting tape. The young graft will need support until new wood grows over the cut surface on the stock (two or more years).

GRAFT AFTER CARE

One year after grafting, prune the growth on the graft to a central leader. If more than one bud grows from the bud stick, leave only the growth coming from the strongest bud to form the new top of the tree. During this same time, prune off about one third of the lower limbs to force more of the trees energy to the graft. In subsequent years, continue pruning the top of the tree to a central leader and remove limbs below the graft.