The Nurseryman's Role in the Culture of Black Walnut

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The well publicized premium prices being paid for walnut timber have resulted in an avalanche of requests for information on growing black walnut. Nursery production of walnut seedlings has increased severalfold the past few years and nurseries seldom have a surplus of walnut seedlings, indicating that landowners are genuinely interested in growing walnut. However, landowners are facing higher costs and taxes for land, higher costs of planting, and higher costs for the cultural practices needed for growing walnut. Unless good planting stock is used, many of the costs associated with these investments are increased, making it impractical for landowners to consider growing walnut as a business venture.

This paper summarizes some of the cultural practices required for growing black walnut, and shows how nurserymen and foresters can. cooperate to ensure that plantings get off to a good start by producing the best planting stock possible.

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Establishment of Successful Walnut Plantations:

It takes good land to grow high-quality walnut logs. The best sites contain deep, moist, well-drained, loam or silt-loam soil. Good internal drainage is important; there should be no evidence of mottling in the upper 30 inches of soil. Good walnut sites are generally located along stream bottoms, on lower north slopes, and in coves. Good agriculture land, whether upland or bottomland , is generally good walnut site because it has these characteristics. So, investment in land for growing walnut is generally high.

Some site preparation is generally required before planting. Abandoned fields along stream bottoms may support heavy growth of aster and giant ragweed, and volunteer elm, maple, and boxelder. Recently farmed areas may support dense sod growth. Most landowners, therefore, find it necessary to plow and disc the planting sites. It is preferable to do this the fall before planting because of uncertain weather conditions the following spring. It is difficult to plow and disc during a wet spring. Site preparation also facilitates chemical weed control needed in the early establishment of walnut plantations.

If we had a good rodent repellent, seed would probably be preferred over seedlings for establishment of walnut plantations. However, rodent pilferage, mainly by squirrels, is usually so complete that the difference in cost is not worth the risk. Research in developing effective rodent repellents has proved unsuccessful. Consequently, planting nursery-grown seedlings will continue to be the principal means for establishing walnut plantations.

Walnut seedlings should be planted at least 10 feet apart. Wider spacing may be even more desirable, because it's more favorable for rapid diameter growth. Walnut trees are most valuable when they reach veneer-log size, so the management objective is to get them to this size as soon as possible. Because of the cultural costs involved and the expected high value of the final product, we simply cannot plant excess seedlings at the expense of reduced growth with the hope of thinning later in the rotation. Wide spacing also is necessary to operate equipment used in weed control and other cultural practices throughout the rotation.

Weed control is an essential part of walnut culture. Weeds and grasses compete with planted walnuts for light, moisture, and nutrients.

Lack of early weed control has been a main cause of hardwood planting failure in the past. A minimum of two consecutive years of weed control around planted seedlings is needed to assure satisfactory establishment. Growth can be further stimulated by additional weed control.

Chemical weed control is easier arid more successful than mechanical cultivation and in the long run may cost less. Simazine and atrazine at the rate of 3 to 5 pounds/acre and dalapon at the rate of 10 to 15 pounds/acre are the recommended herbicides to control weeds and grasses around planted -seedlings. One application of simazine in early spring, followed by an application of dalapon after the grass grows up will keep the trees weed-free for an entire season. The herbicides can be sprayed in a 3-foot circle around planted seedlings or in a 3-foot strip down a row of seedlings being careful to keep the spray off of the walnut. A backpack sprayer with a mechanical agitator is the best tool for applying these chemical herbicides.

Corrective pruning is necessary at various times during the first 3 to 5 years after planting to "train" the walnut seedlings to grow single, straight stems. Any injury to the terminal bud or stem will stimulate lateral buds to sprout and cause forking. Likewise, a seedling planted on. an angle will send up new sprouts from the root collar. The longer trees of this type are left unattended, the more difficult it is to develop them into potentially merchantable logs. Corrective pruning should start the first year after planting and continue as long as necessary to attain a single, well formed bole of at least 16 feet long. Even after this intensive care, some trees may still be crooked or have multiple terminals. The best treatment for these trees is to coppice them at ground line, thin the resulting sprout clump to a single sprout, and then tend this sprout in the same manner as a new tree.

Pruning for clear length is also necessary and should begin when the trees are 4 to 8 years old. The danger in delaying clear-length pruning too long is that branches will be too large and leave large wounds when cut. These large wounds heal slowly and may serve as an entran.ce point for decay fungi. Pruning should be done before branches are larger than 1-1/2 inches in diameter. Only the lower branches should be removed; pruning should not exceed 50 percent of the tree height. Reducing live crown more than this may reduce diameter growth. The objective in clear-length pruning is to produce at least one 16-foot limb-free log.

Fertilization will undoubtedly become an integral part of walnut culture as soon as we get more information on rates of applications and types of fertilizers to apply. Even the fertile soils recommended for growing walnut may not supply all the nutrients needed for maximum walnut growth. Nutrient requirements are low during the first few years but increase when the stand begins to close and the roots occupy the soil more fully. Most walnut stands need not be fertilized until they are at least 10 years old. Fertilization at the time of planting frequently stimulates weed growth and makes weed control more difficult. Research is now underway on fertilizing black walnut.

Even with wide spacing, more trees are planted than. possibly can be grown to maturity. Thinning and release, therefore, will be an important part of walnut culture if we are to maintain a diameter growth rate approaching 1/2-inch per year and achieve veneer-log size in 40 to 50 years. Early thinn.ings are a cost item because walnut has no value until the trees reach sawtimber size. In one fairly typical walnut plantation where initial spacing was 12 by 15 feet , the first thinning was needed at 12 years. At least two more noncommercial thinnings and cleanings will be needed in this plantation. Saw logs can probably be removed when this stand is 25 years old and veneer logs may be available at 40 years. Other well managed walnut plantations should respond in a similar manner.

The Challenge to the Nurseryman:

Clearly, landowners cannot follow the plant-and-forget approach so commonly used in the past if they want fast-growing walnut plantations. Walnut plantations need to get a good start if we expect them to finish up well. This means starting with good planting stock, To produce good planting stock the nurseryman needs to consider three things: size and care of seedlings and seed source.

Size of Planting Stock:

Minimum acceptable planting stock grades for walnut seedlings have been developed by research over several years of testing seedlings at a number of nurseries. / We have found that walnut seedlings .should

1 / See previous paper on walnut stock grades by Robert D. Williams.

have a stem caliper of at least 8/32 of an inch measured 1 inch above the root collar, and be at least 15 inches tall. But more importantly, there should be good balance between tops and roots.

Smaller seedlings survive and grow poorly, and seem to be more susceptible to chemical injury. It is more difficult to keep herbicide sprays off the leaves of short seedlings than off tall seedlings. Small seedlings also lack the vigor to compete with weeds if weed control is not as successful as desired. Poor survival necessitates replanting with its added cost and inconvenience.

Even larger stock will probably be recommended in the next few years. Tests have demonstrated that supersize seedlings grow faster than normal-size seedlings. Height growth of 20 to 30 inches has been measured on these supersize seedlings the first year after planting. Black walnut seedlings should not be machine planted; therefore, there is no need to produce small stock on the premise that they are easier to plant. It is more difficult to plant larger seedlings, but many landowners are willing to do so to assure better survival and growth.

Care in Lifting, Packing, and Shipping:

Some of the mechanical lifters now being used were not designed for lifting tall hardwood seedlings such as black walnut. Many terminal buds are broken off during lifting and some stems are badly scarred. Similar injury frequently occurs during packing and shipping. When these seedlings are outplanted, the lateral buds will sprout and the tree may have multiple stems and be forked. Thus, the landowner is immediately faced with a job of corrective pruning. The added cost of early corrective pruning could be avoided if damaged seedlings were discarded.

Small fibrous roots of walnut seedlings are easily broken off during lifting, or may dry out and die during shipping. Since new roots on black walnut seedlings arise mainly on secondary and tertiary roots, the loss of the fibrous roots reduces new root growth and may result in poor growth of the planted seedlings. If a drought occurs in May or June after planting, seedlings that have few fibrous roots will be unable to withstand the moisture stress and may die. More care in recovering the fibrous root system during lifting and better packing and shipping will ensure a more active root system when the seedlings are finally in the ground.

Control of Seed Source:

We are certain that walnut seed is still being collected from large open-grown, wolf-type trees, simply because such trees are more likely to .produce lots of seed. With a general shortage of seed, nurserymen can probably do little to control the type of tree from which seed is collected for the next few years.

However, they can take immediate steps to maintain better records of where seed is collected, keep it segregated in the seedbeds, and make certain that the seedlings are shipped to a similar geographic area.. One way to control origin of seed is to set up seed-production areas . Natural. stands or plantations of known origin may be designated for this purpose. Once the areas are established, seed collection costs are generally lower.

In a State as long as Illinois, for example, seedlings grown from seed collected in the south should not be shipped to the extreme northern part of the State for outplanting. Such seedlings will break dormancy earlier in the spring and may be severely frost damaged. This may mean repeated dieback and more frequent corrective pruning. Likewise, seed from northern sources should not be shipped to the southern part of the state because of the possibility of slower growth. Our geneticists have found that there is a 10 percent reduction in early growth for every 100 miles seed is collected north of the planting site. 2/ Thus , seedlings from seed collected in northern Illinois but planted in southern Illinois may be as much as 35 percent shorter than seedlings from a southern Illinois seed source.

Summary:

Landowners are well aware of the value of black walnut and most are willing to carry out the intensive culture needed to establish successful walnut plantations. Planting stock represents only a small fraction of the total cost involved in growing walnut, and most landowners will be willing to pay a premium price for high-quality seedlings. Even if raising large, vigorous seedlings doubled the cost of planting stock, it would probably be well worth it in terms of

2 / Unpublished data obtained from Calvin Bey, Associate Geneticist, Forestry Sciences Laboratory, North Central Forest Experiment Station, U.S.D.A. , Forest Service, Carbondale, Illinois.

better plantations. There are several things that nurserymen could do now, including reducing seedbed density, using more care in lifting and handling seedlings, and maintaining closer control over seed source, to improve the quality of the planting stock.