



Facts About Black Walnut

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Black walnut produces the most valuable wood of any tree species native to Indiana. Therefore, there is considerable interest in planting black walnut. A properly planned and managed black walnut planting can be a sound economic investment while also providing aesthetic and environmental benefits. There are several factors to consider, however, before making a decision to plant black walnut. This fact sheet is intended to present basic information about planting black walnut, and point out where additional information and assistance can be found.

Site Requirements

Planting on an appropriate site is the most important step in the successful establishment of black walnut. Failure to select a proper site will lead to poor tree performance, if not outright planting failure. Black walnut prefers moist, well-drained soils that are deep and fertile. Flooded or saturated soil conditions are not tolerated well, nor are dry south or southwest facing slopes, or ridgetops where soils are commonly thin.

Planting Stock Options

Various types of black walnut planting stock are available to select from. The choice of which planting stock to use should be based on careful consideration of the costs and benefits of each type relative to both short- and long-term objectives.

Since the late 1960s, scientists have been working on selection of genetically superior black walnut trees, as well as on techniques of tree grafting which allow reliable production of superior planting stock. This work has culminated in the development of several superior strains of walnut which have been selected for stem straightness and rapid growth. On good sites, with proper cultural treatments, these trees will typically perform better than common black walnut trees.

The primary benefit of the superior grafts is that, with proper management, they will produce a given sized tree in a shorter length of time. The trees will have favorable stem form and, therefore, high value. The primary drawback currently is the high cost per tree. In 1995, cost per tree is approximately \$25. The high cost is partially offset by planting fewer trees per acre; however, initial plantation establishment costs using superior grafts are substantially higher than costs using nursery produced seedlings.

Seedlings produced from nuts collected from superior black walnut trees provide another planting stock option. With this stock, the mother tree is known to contain superior characteristics,

but the quality and characteristics of the "father" tree are unknown. Preliminary tests have shown that the growth performance of these trees is intermediate between superior grafts and common nursery stock. These seedlings cost considerably less than grafted stock, but still much more than nursery stock.

Black walnut nursery stock is available from the Indiana Division of Forestry state nurseries, or from commercial nurseries in the region. Few of the seedlings are produced with nuts collected from trees screened for quality, so there is greater variability in the growth characteristics of nursery stock. With time, proper care, and selective thinning, however, these seedlings can produce high quality black walnut trees. Planting more seedlings than actually needed, and selecting the better trees to remain during a series of plantation "thinnings" can result in fast growing trees with good stem characteristics.

The main benefit of nursery stock is the low cost per seedling which, even at higher planting rates, results in lower plantation establishment costs. This benefit is partially offset, however, by the need for more intensive plantation management.

Tree Density

Another important decision is how many trees per acre should be planted and subsequently maintained. This decision represents a trade-off. Wide tree spacing promotes rapid tree growth, but typically increases the costs associated with cultural treatments such as pruning. Closer spacing can lower these costs, but does so at the expense of individual tree growth rates which leads to longer rotations. The correct planting density will depend on management objectives, stock type, and the management practices to be used. Given an objective of rapid production of high value trees, recommendations can be made for appropriate planting densities for different stock types.

When using genetically superior grafted stock, a reasonable recommendation is to plant about 140 trees per acre (TPA), which equates to a tree spacing of 15 feet by 20 feet. A series of thinnings will periodically reduce tree density, each time selecting the largest and best formed trees to remain. Superior seedling stock requires more that trees be planted to provide greater selection when thinning to favor the best trees. A reasonable planting density for superior seedling stock is 200 to 300 TPA (12-15 foot average spacing). Common nursery stock will require an even greater number of seedlings be planted to assure that enough trees of suitable quality will be included in the plantation. At least 400-450 TPA (about a 10 foot spacing) should be planted.

A reasonable mid-rotation target density for all stock types is 90-100 TPA when the average tree size reaches 10-12 inches in diameter (21-22 foot average spacing). The final number of trees per acre to manage for can vary. If the goal is to maximize individual tree growth and shorten the rotation as much as possible, then a reasonable target would be 25-35 TPA when average tree diameter has reached 18-20 inches (35-40 foot average spacing). A more conservative approach would be to manage for 50 to 75 TPA when average diameter is 18-20 inches (25-30 foot spacing). The

higher density will result in a longer rotation as the trees will take longer to reach the target size, but total stand volume will be greater and the slower tree growth may result in a higher quality veneer.

Plantation Care

There are two primary concerns for plantation care. One is controlling weeds which slow tree growth. The other is controlling stem form and quality.

Weeds compete with trees for moisture and nutrients, thus reducing tree growth rate. This competition is strongest when the trees are small, but continues to some extent over the life of the trees. It is imperative that weeds be controlled, particularly for the first several years when the trees are getting established.

A common misconception in hardwood management is that control of broadleaved weeds is adequate to ensure good tree growth. Studies have indicated, however, that control of sod forming grasses may be more critical than controlling broadleaved weeds.

Controlling stem form and quality is accomplished through the use of two tools—corrective pruning and lateral pruning. Corrective pruning is the removal of multiple leaders or forks in the stem so that the tree maintains a single, straight stem. This is often necessary because black walnut is prone to producing multiple stems following injury to the terminal bud. Corrective pruning is done relatively early in the life of the tree; generally up to a tree height of about 17 feet. Genetically superior stock has been selected for stem straightness, and therefore, requires less corrective pruning.

Lateral pruning is the removal of branches along the main stem. This allows the tree to produce wood without knots which is more valuable and, in the case of veneer, is required. Lateral pruning is started when trees reach 6-8 feet in height. A series of prunings gradually increases the length of clear stem on the tree. Each pruning should leave 40 to 50 percent of the tree height with a clear bole, but no more than 25 percent of the tree's crown should be removed in any one pruning. The lower 17-18 feet of the stem should be pruned. If possible, prune the lower 24-25 feet.

Rotation Length

How long it takes for black walnuts to mature depends greatly on the quality of the site, the type of growing stock, tree density, and the management practices employed. We can only estimate the approximate number of years required to grow trees to a given size under a given set of conditions.

High-quality planting stock growing on very good sites may achieve an average tree diameter (at 4½ feet above the ground) of 14-15 inches in 35-40 years. Reaching 18-20 inches, where higher veneer values are attained, will take longer, perhaps 45-55 years. Common nursery stock planted at 400-500 TPA, and thinned regularly to select the highest quality trees, will result in longer rotations than attained using superior stock. Planting on less desirable sites, or not using recommended intensive management practices, can increase significantly the time required to produce large diameter trees.

Additional Information Available

The following publications are available through the Agricultural Media Distribution Center at Purdue University, 301 South 2nd Street, Lafayette, IN 47905-1092.

- FNR-76 Corrective Pruning of Black Walnut for Timber Form (\$.50)
- FNR-105 Grafting Black Walnut \$.50)
- FNR-115 Characteristics of Purdue University's Patented Black Walnut Trees (\$.50)
- FNR-119 Black Walnut Plantation Management (\$1.50)
- FNR-134 Planting Hardwood Seedlings
- FNR-135 Weed Control for Tree and Shrub Seedlings
- FNR-148 Predicting Black Walnut Prices (\$1.00)
- FNR-149 Important Information About Planting Black Walnut in Indiana (\$.50)
- SB-562 Guide to Selecting Soils for Black Walnut Planting Sites in Indiana (\$5.00)
- HO-193 Black Walnut Toxicity

Additional information may be obtained from the Walnut Council, Inc., 260 South First Street, Suite 2, Zionsville, IN 46077-1602. A Walnut Council Hotline is also available to answer specific questions (618-453-2318).

You are strongly encouraged to seek the advice of a professional forester prior to investing in a black walnut planting. The Indiana Division of Forestry has district foresters located throughout the state which provide free advice to landowners on forestry matters. Private consulting foresters provide a full range of services including tree planting, weed control, and timber marketing. The Purdue University Cooperative Extension Service also provides technical advice related to black Walnut planting.

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