Planting Black Walnut in Kansas

Tree plantings can improve water and air quality, soil health, wildlife habitat, and aesthetics while providing sustainable products and income. Black walnut (*Juglans nigra*) is the most commercially valuable tree in Kansas. Its chocolate-colored wood is highly desired for fine furniture, veneer, interior finish, cabinets, and gun stocks. The wood is straight grained, strong, heavy, decay resistant, easily worked with tools, and shrinks and swells little after seasoning. Nuts are enjoyed by people and wildlife and the ground shells are used as abrasives.

Planting black walnut is a good long-term investment for landowners. In most cases, the cost of planting is borne by one generation and the income from sales received by the next; however, financial incentives may be available through government programs to help landowners with establishment costs. This publication outlines the elements necessary for successful establishment of black walnut.

Site Selection

Black walnut grows under a variety of site conditions; however, selecting a site where black walnut thrives is an important factor for success. Often, the best sites are found on well-drained loamy bottomlands not subject to prolonged flooding (three to four days of standing water). During the growing season, floods that submerge young crowns for extended periods of time usually kill the trees. Good sites may be found in draws and along the base of north- and east-facing slopes of less than 15%. Black walnut grows best when crowns are exposed to full sun in an environment protected from wind and extreme temperature variations.

Soils

Optimum growth occurs in loamy soils (both sand and silt) of medium texture that is at least 3 feet deep. Two of the best soil types for black walnut in Kansas are Verdigris and Kennebec.

Black walnut prefers fertile, moist, but well-drained, soils with high organic matter. Avoid soils with restrictive layers of coarse sand, gravel, rock, or heavy clay. Also avoid fragipans - layers of compacted soil associated with cultivation and the use of heavy equipment - that can hinder root development. Alternate streaks or blotches of yellowish brown, red, or gray may be an indicator of poor internal drainage.

Soil pH is important for regulating nutrient availability. Black walnut grows best in soils with a pH between 6.5 and 7.2. If the soil pH of the planting site falls outside this range, it should be corrected during site preparation.

Most Kansas soils suitable for black walnut have adequate fertility and do not require fertilization (Table 1). Fertilization is not recommended for trees less than three years old because weeds often benefit most from nutrient inputs. Fertilization may be considered for pole-sized trees (4 to 9 inches diameter at breast height) if soil tests indicate nutrient deficiencies. Interplanting with nitrogen-fixing plants could be an alternative to nitrogen fertilization.

Soil testing for pH and nutrient levels is recommended before planting since soil amendments are most practical during site preparation. Local K-State Research and Extension offices can provide soil tests for a small fee.

Soil maps and data for 95% of the nation's counties can be accessed through the Web Soil Survey; an online database operated by the USDA Natural Resources Conservation Service (NRCS), local conservation districts, NRCS offices, and K-State Research and Extension offices are also able to assist. Available soil data includes

Table 1. *Soil properties and nutrient recommendations for black walnut.*

pH: 6.5 to 7.2
Organic Matter: 2 to 3.5%
Nitrogen: 0.25 to 0.3%
Phosphate: 60 to 80 pounds per acre
Calcium: 3,000 to 4,000 pounds per acre
Potassium: 225 to 275 pounds per acre
Magnesium: 375 to 600 pounds per acre

type, description, and suitability for tree planting. Keep in mind that although a soil type may be listed as suitable for black walnut, individual sites can vary considerably. For this reason, it is good practice to assess soil characteristics firsthand with a probe or by digging a hole before a planting site is selected.

Site Preparation

Good site preparation saves a landowner time and money, and requires less weed control after planting. Site preparation involves removing competitive vegetation with mechanical or chemical methods. Site preparation also can require improving the physical and chemical condition of the soil. Methods and the degree of site preparation depend on the existing ground cover and erosion potential. General recommendations for preparing various planting sites are listed below. Seek professional advice from a forester for specific recommendations.

Cropland

Since cropland is cultivated, it may not require site preparation, which conserves soil moisture and limits the introduction of weed and grass seed. Whether or not to cultivate a cropland site should be decided on a case-by-case basis since in some situations soil may become compacted into a "plow pan" or "hard pan" from years of repeated cultivation and use of heavy equipment on the site. In those cases, plow or deep chisel in the fall and disc before planting in the spring; however, even with such treatments there is a possibility that the plow pan will return. If weeds and grass are present, a glyphosate herbicide may be applied in the spring before planting.

Abandoned Cropland

Undesirable woody vegetation should be cleared from the planting site. Chainsaws are most efficient when used to clear individual larger diameter woody plants. This method can be applied during the summer through the dormant season before planting. Refer to the *Forest Openings and Conversion* section for information on killing trees. Eastern red cedar should be cut below the lowest living foliage — do not treat with herbicide. Prolific sprouters such as Osage orange, honey locust, and black locust should be treated with a cut-stump herbicide application.

Brush clearing equipment such as a mower, skid steer, or tractor with a brush clearing attachment can be highly efficient for clearing dense brush. Cut the summer before planting then allow vegetation to resprout before spraying with herbicide in September. In the fall, the site can be mowed as close to the ground as possible.

Depending on soil conditions and planting methods, plowing to a 12- to 18-inch depth in the fall and disking before spring planting may be needed.

Noxious weeds and invasive species should be treated using approved methods.

Grassland and Pasture Sites

Planting trees in a native grassland may not be compatible with ecological or conservation goals. Contact the Kansas Department of Wildlife and Parks for assistance with prairie management.

Grass is capable of outcompeting tree seedlings and should be controlled to give seedlings the best chance of success. Grass can be controlled within the whole planting area, within 4-foot strips along tree rows, or within a 4- to 6-foot radius of each seedling. The mechanical method of grass control is mowing multiple times throughout the growing season. Chemical methods differ between warm-season (native) and cool-season grass such as brome or fescue.

Warm-season grass should be treated with herbicide in August in the boot-to-early seed head stage and cool-season grass in the fall when there is 6 to 12 inches of new growth. Burning or mowing in the spring can reduce residue and make fall treatments more effective. Cool-season grasses also may be treated in early summer if the grass is actively growing in the boot to early-seed-head stage. Apply annual spot treatments as necessary to prevent grass from competing with seedlings. After an herbicide treatment, the site may need to be cultivated following the instructions provided for abandoned cropland.

Forest Openings and Conversion

Black walnut requires full overhead sunlight for proper growth and development and does not tolerate much competition. For this reason it is important to ensure that openings are large enough to provide adequate light and prevent competition from surrounding trees. Circular clearings should be at least an acre in size (236 feet in diameter). If deer damage is a problem, then even larger areas should be planted and damage protection measures considered to ensure adequate seedling survival.

When creating new openings or expanding existing ones, all trees that shade the planting area should be killed by hand clearing or brush clearing equipment such as a skid steer or a tractor with a brush clearing attachment.

Hand-clearing methods include double girdle, single girdle with herbicide, hack-and-squirt, and cut-stump. If brush clearing equipment is used, hardwood stumps or

resprouts should be treated with an approved herbicide.

Eastern red cedar should be cut below the lowest living foliage — do not apply herbicide. Competing grasses and shrubs should be managed with methods outlined in the *Abandoned Cropland* section. Plant black walnuts into existing forest litter.

Under Plantings

Planting black walnuts in the shade of existing trees is recommended only if all competing trees are removed from the site within two years. Dense shrub growth, small trees, and stump sprouts must be controlled.

Selecting Seedlings and Nuts

Either seedlings or nuts may be planted. Black walnut seedlings and stratified nuts can be ordered from the Kansas Forest Service or county conservation district offices.

Know the source of the seedlings and nuts. Research on provenance performance suggests that seeds collected from trees within 100 miles north or south of the planting site have the greatest survival rate. Seeds collected from areas within 200 miles south of the planting site grow significantly taller. It is also recommended to limit the seed source to within 200 miles east and west of the planting site. Seed sources east of Missouri should not be considered for Kansas. Seedlings from other parts of the country are generally not adapted to the Kansas climate and growing conditions.

Spacing

Proper spacing depends on whether trees are being grown for nut production or for timber products. To produce a pure stand of black walnut at maturity, no fewer than 300 trees per acre (12 feet by 12 feet) should be planted. Spacings of this size allow for mortality and thinning of undesirable trees as the plantation matures. A 10-foot by 10-foot spacing provides 436 trees per acre. Spacings less than 10 feet by 10 feet may improve height growth and stem quality. This closer spacing also provides more trees to choose from when selecting crop trees, shortens the time it takes for canopy closure, and reduces the time span required for weed and grass control. The downside of higher density plantings is the greater need to thin out competing trees over time.

Trees should be planted at square spacings to facilitate maintenance, encourage canopy closure, and for distribution purposes when the thinning process begins.

When planting black walnut for nut production, recommended tree spacing is 30 feet by 30 feet, or 48 seedlings per acre. Although any walnut tree can be used as rootstock for grafting on quality nut producing cultivars, nuts from the cultivars 'Kwik-Krop', 'Sparrow', and 'Thomas' produce superior rootstock trees.

Ecological Considerations

Tree species with similar growth rates, such as red oak, can be planted with black walnut to increase diversity in the plantation. Stagger rows to make them appear less obvious and to improve screening for wildlife. Similarly, broadcast seeding walnuts results in a less orderly plantation than row plantings.

Native shrubs planted along borders of the plantation provide food, cover, and nesting habitat for wildlife. Once the trees are large enough to avoid competition, a native understory of grasses, forbs, and shrubs improves wildlife habitat and ecosystem function. See the publication *Forest Management for Wildlife,* MF2899 (*https://bookstore.ksre.ksu.edu/pubs/_MF2899.pdf*), for additional information on wildlife and ecological goals.

Planting Nuts

Establishing black walnut by seed is a good choice for large plantings and for people who want to plant in the fall. Nut plantings avoid transplant shock that can occur in seedlings. Knowledge of correct collection, handling, planting, and weed and grass control for the first three years is critical for success. Assume that purchased seed is neither stratified nor tested, and must be planted in the fall or stratified by cold storage for spring planting.

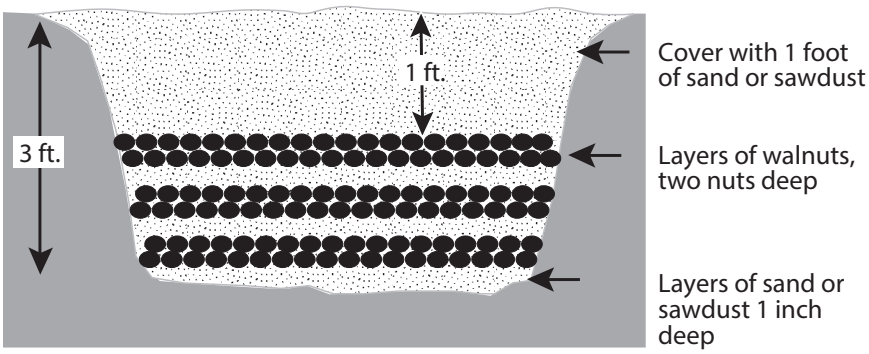
Black walnut tends to have a 60% to 70% germination rate and although the husk is messy, it prevents the seed from drying out. Large nut crops may occur every two to three years. Nuts can be collected locally beginning in late August when husks change color.

Seed viability percentage can be estimated before collecting a lot of nuts from a tree by cracking or cutting 10 seeds to determine freshness, color, moisture, and the presence of mold or insects. Collect seed from high-quality trees and if needed store it in piles less than 10 inches deep to avoid "heating up" and losing viability. Nut piles should be protected from squirrels.

Nuts should be planted in the fall with the husk on at a 2- to 3-inch depth. Recommended rates for planting seed in rows with a direct seeding machine or by hand are 1,500 to 3,000 seeds per acre. Recommended rates for broadcasting black walnut, which may be accomplished with a fertilizer spreader, are 3,000 to 4,800 seeds per acre.

Stratified nuts can be planted in the spring. Walnuts are stratified by

Figure 1. *A walnut stratifying pit.*



being subjected to 120 days of 33 to 40 degrees Fahrenheit temperatures (what they would normally endure if planted in the fall). Nuts may be stratified with hulls on, or hulls can be removed. If hulls are removed, floating nuts in a tub of water can test viability. Discard all nuts that float. Store viable seeds (those that sink) in a stratifying pit (Figure 1) or in a refrigerator at 41 degrees Fahrenheit. It may be necessary to cover stratifying pits with chicken wire to protect nuts from predators.

Planting Seedlings

Seedlings can be planted with a tree planting bar, shovel, power auger, or tree planting machine. Planting holes should be wide and deep enough to accommodate roots without doubling or twisting.

Black walnut seedlings often have a long, well-developed taproot and a large mass of fine feeder roots. If possible, avoid pruning roots. However, roots grow so quickly in nurseries that it may be necessary to lightly prune them with sharp pruning shears to fit seedlings into planting holes. Plant seedlings at or ½ inch below the depth they grew in the nursery, evident by a color change just above the swollen area on the taproot. Water trees immediately after planting and, if practical, every seven to 10 days during a prolonged drought for the first one to three years after establishment.

Two experienced tree planters can hand plant 1,000 to 1,500 trees in a day. For large plantings, a three-person machine planting crew can plant 4,000 to 6,000 seedlings in a day. Tree planting machines are available from the Kansas Forest Service and several county conservation districts and the Kansas Department of Wildlife and Parks.

Post-Planting Care

The area around young trees should be weeded as often as necessary to prevent competition, especially during the first three to five years. To obtain best growth, keep trees free of weeds and grasses.

Weeds can be controlled over the entire plantation area, in 4-foot strips along tree rows, or in a 4- to 6-foot radius around each tree. Cultivation, mowing, and the use of approved pre- and/or post-emergence herbicides are effective weed control options. In areas not subject to flooding, fabric or mulch can be used to control vegetation in the row. Planting a ground cover species also can be an effective method of weed control.

Tree plantings must be protected from fire, livestock, wildlife damage, and misuse of herbicides. Inspect your planting periodically for problems such as insects, disease, and wind or ice damage. Deer damage is a common problem and should be considered before planting.

This publication is made available in cooperation with the USDA Forest Service. The USDA is an equal opportunity provider, employer, and lender.

Elizabeth Jamison
Kansas Forest Service
2610 Claflin Road
Manhattan, Kansas 66502-2798
(785) 532-3300
www.kansasforests.org

Publications from Kansas State University are available at: *www.bookstore.ksre.ksu.edu*

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L731 July 2025

K-State Research and Extension is an equal opportunity provider and employer. Issued in furtherance of Cooperative Extension Work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of K-State Research and Extension, Kansas State University, County Extension Councils, Extension Districts.