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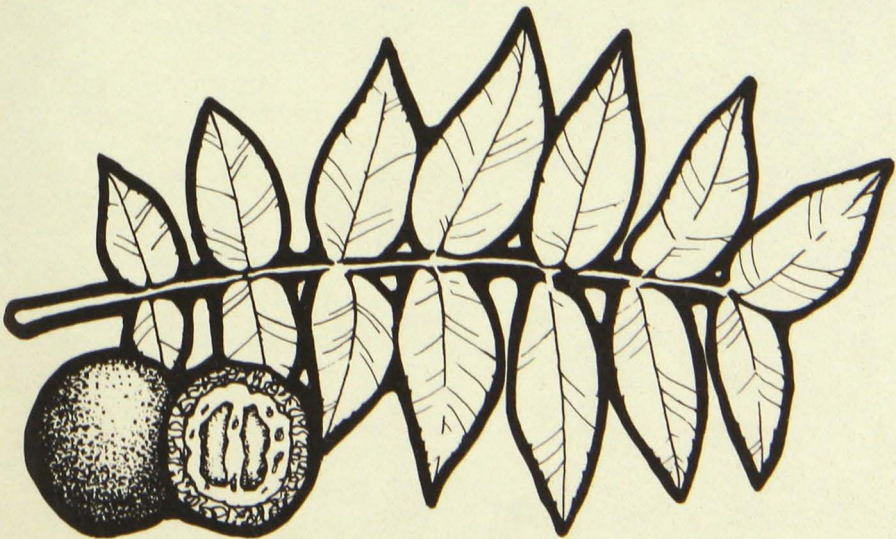
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Growing Black Walnut in Minnesota

By Philip Splett, William Miles, and Marvin Smith



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Figure. 1. This walnut tree may be worth as much as \$500 to a buyer. This publication tells how Minnesotans can raise, care for, and harvest black walnut trees.



**By Philip Splett, William Miles,
and Marvin Smith***

Black walnut (*Juglans nigra* L.) is Minnesota's most valuable tree. Since colonial days, walnut lumber has been in great demand for furniture, gun stocks, and cabinets. Black walnut veneer is one of the most expensive materials for interior finishes and furniture tops. The beautiful, fine-figured wood is stable after seasoning, has fine machining properties, and features uniform texture and strength. It is naturally durable.

The fruits—the walnuts, themselves—are highly prized as food seasoning and for candy products. Walnuts are excellent wildlife food, preferred by squirrels and eaten by woodpeckers and white-tailed deer. Black walnut trees are also used for landscaping.

The nation's supply of black walnut is decreasing because of the increasing demand for walnut veneer and saw logs. Because of the warmth and beauty of the lumber, the demand will continue indefinitely.

Black walnut trees do not occur in large stands, and nowhere in Minnesota do they grow in abundance. Chance occurrence and slow growth of the wildling trees cannot meet future demands. More high-quality walnut trees must be produced. These trees will provide a high economic return to woodland owners who invest in black walnut planting, culture, and harvesting.

*Former assistant extension forester and extension foresters, respectively.

IDENTIFYING BLACK WALNUT

The black walnut (*Juglans nigra*) has dark gray or black-furrowed bark. The wood is dark brown. The twigs are stout and light brown to orange brown and have a buff-colored, chambered pith. The terminal (end) buds are short, blunt, and are covered with a few hairy scales. The leaves are alternate, pinnately compound, and have 9 to 23 leaflets which are mostly lanceolate, pointed, and saw-toothed. The petioles (leaf stems) are stout and are usually

pubescent (hairy). The flowers appear in late May and Early June.

The fruits are rounded nuts with fleshy husks and hard shells which mature and fall from the trees in autumn.

Walnut or butternut?

The butternut (*Juglans cinerea*) is sometimes confused with black walnut. Distinguishing characteristics of butternut are: (1) a chocolate-brown, chambered pith; (2) light gray bark with wide, flat ridges divided by shallow fissures; and (3) an egg-shaped, edible nut.

Figure 2. Twig sections differentiate between butternut (left, having a chocolate-covered pith) and black walnut (right, having a buff-colored pith).

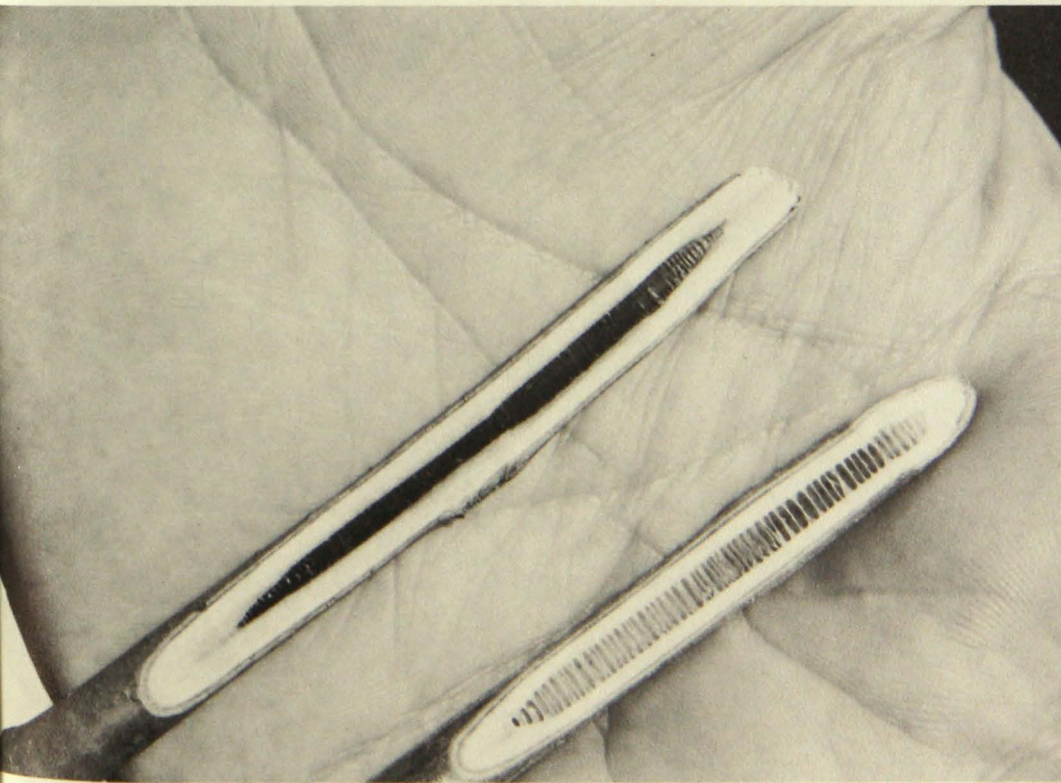
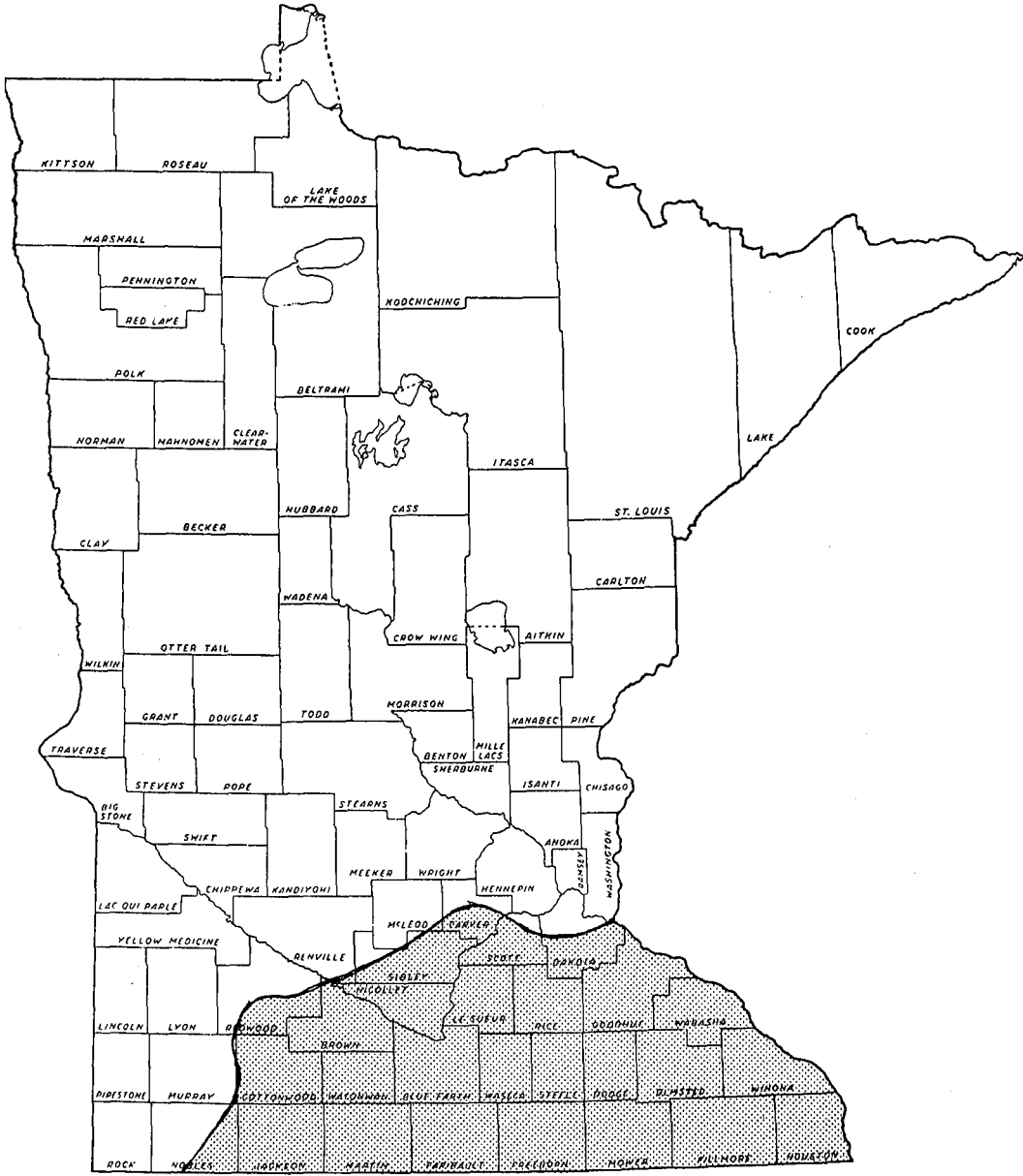


Figure 3. Growing range of black walnut in Minnesota.



RANGE

The map shows the principal range of black walnut trees in Minnesota. The south-central and south-eastern areas of the state are primarily where the trees grow. Scattered trees can be found thriving outside of this range, however. In fact, some success has been noted in plantings outside the range, but adverse climatic and topographic factors may reduce the potential of these plantings.

SITE SELECTION

Black walnut grows best in soil that is rich, moist, and deep, but well-drained. Walnut grows well on limestone soils and deep loam or loess. Agricultural land with rich,

black topsoil—such as that used for growing corn—usually provides a good planting site. In smooth and gently rolling landscapes, soil characteristics such as texture and internal drainage are the most important factors. Avoid planting in clay soils, poorly drained bottomlands, or south-facing and west-facing slopes and ridgetops.

Trees on poor sites will often be of a lower quality—usually shorter, crooked, and excessively limby—and will produce low-quality wood.

Trees already present in an area can indicate its appropriateness for black walnut. Red oak, basswood, white ash, sugar maple, slippery elm, and black walnut, itself, indicate that the site will grow walnut.

Figure 4. This black walnut plantation is on a good site. Trees are planted 11 x 11-feet apart for easy and clean mechanical cultivation. (Photo courtesy of Robert Burke.)





Figure 5. Black walnut values include shade, aesthetics, and home production of nuts, as exemplified by this 70-year-old tree.

PLANTING PREPARATION

Black walnut plantings can be established by either planting seedlings or by directly seeding the nuts. The seedling method has been more successful, primarily because rodents pilfer the planted nuts.

Seedlings can be purchased in quantity from the Minnesota Department of Natural Resources, Division of Forestry, St. Paul 55155. These seedlings are sold to Minnesota landowners for reforestation of woodlots, windbreaks, and shelterbelts, and for erosion control, soil and water conservation, and permanent food and cover for wildlife. The trees may not be planted for ornamental purposes or be resold or given away. Orders for these seedlings are accepted from Sept. 1 through March 15.

For survival and growth, seedlings should have a stem diameter of $\frac{1}{4}$ inch at 1 inch above the root collar. Tops should be 10-14 inches long. Only the best stock should be planted.

Seedlings should be planted after the ground thaws—in April or early May. Most sites require some preparation before planting. Fall plowing or disking before planting works well in accessible areas.

When planting seedlings in forest openings, competing brush and weeds should be cleared from adjacent areas. Trees shading the seedlings should be removed or killed by girdling.

Walnut trees provide shade and beauty as well as food for wildlife. For these reasons, they are sometimes planted along fence rows, at the edges of groves, and in yards.

PLANTING TECHNIQUES

Seedlings

Walnut seedlings are shipped from the nursery in a tight bundle. They can be stored in a cool place in this bundle for several days. The trees can also be stored in a "heeling-in bed" for several weeks (See *Planting Trees in Minnesota*). However once the bundle has been opened, the roots must be kept cool and moist.

Seedlings should be planted so that the root collars are placed slightly deeper into the soil than they were in the nursery. Seedlings should be planted in an upright position, and the moist top soil should be pressed firmly around the roots. Never plant damaged or diseased stock!

Walnut seedlings have large roots; therefore, the holes need to be wide enough and deep enough to avoid doubling or twisting these roots.

Spacing requirements vary, depending on the reasons for planting black walnut. For veneer and sawlogs, spacing should be somewhat closer together (12 x 12 feet), depending on the intended amount of pruning. For nut trees, spacing can be wider (16 x 16 feet) since large, open-grown, full-crowned trees are desirable.

In plantations, walnut seedlings should be planted at least 10 feet apart. Several thinnings will produce small saw logs (resulting in about 18 x 18 feet spacing) and finally will produce veneer logs (resulting in about a 26 x 26 feet spacing).

Don't plant black walnut too close to conifers, such as red pine, or next to agricultural crops, such as tomatoes and alfalfa. Black walnut roots, leaves, and seed husks contain juglone, which is toxic to many plants. However, actual contact with walnut roots is apparently necessary before adjacent plants are affected by this chemical.

Seeds

Black walnut seeds are easier and less expensive to plant than are seedlings; however, seeding has disadvantages. Nuts must be protected from rodents, such as squirrels who search for the planted nuts.

Nuts may be planted in either the fall or spring. For fall planting, it is not necessary to remove the husks. Spring planting is usually better because of immediate growth and less feeding by rodents. During the winter, nuts for spring planting should be stratified between layers of sand. This can be done outdoors as shown in figure 6. A wire covering may be necessary to protect nuts from squirrels.

Figure 6. Walnuts stratified between layers of sand.

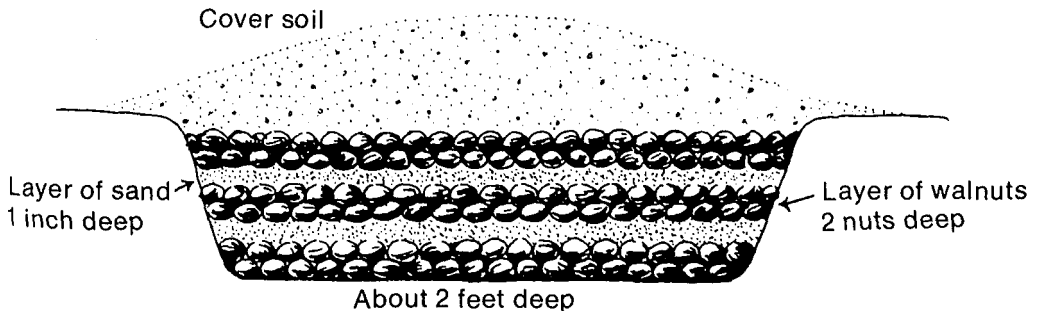


Figure 7. Wire cone seed protector.

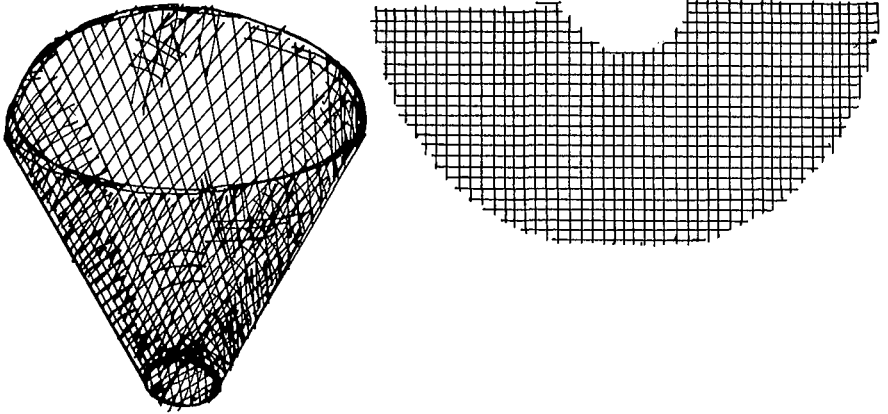
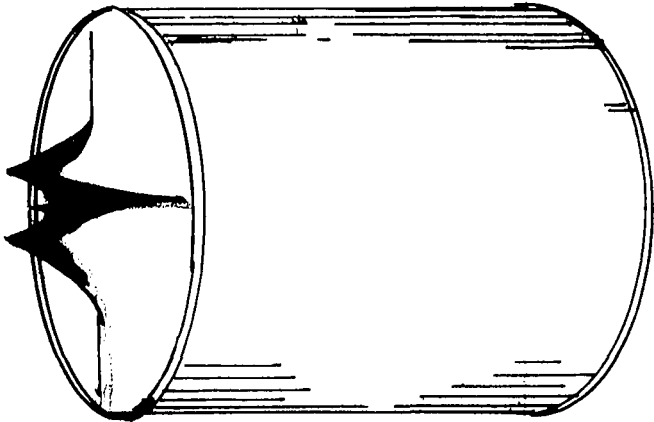


Figure 8 (below). Tin can seed protector.



No rodent repellent exists for treating walnut seeds, so planted seeds must be protected mechanically.

A wire screen protector can be made by shaping a semicircular piece of hardware cloth into a cone fastened together by wires. Each cone should be held firmly in place by a wire rod or by partially burying it (figure 7).

No. 2 cans—such as soup cans—also work well. First, burn the cans so they will oxidize readily and disintegrate within a few years. Remove one end of each can and cut an X into the other end. Pry up the

ends to make a 1-inch opening (figure 8). Grasping the can with the open end up, place about 2 inches of soil into the can and drop in a nut. Then fill the can with soil. Quickly turn the can over so the open end is on the bottom, and place it into the hole. The hole should be deep enough so approximately 1 inch of soil covers the can.

Intensive weed control in direct-seeded plantations increases early survival and growth. It also reduces rodent populations by destroying weeds that provide them with food and cover.



Figure 9. Both photos show 4-year-old black walnut seedlings. The photo on the left shows trees having received mechanical cultivation each year; the photo on the right shows trees having received no weed control.

HERBICIDE WEED CONTROL

Young walnut seedlings require freedom from competitive weeds and grasses. Competition for moisture, light, and nutrients is severe because of the nature of the more fertile soil found on typical walnut sites.

Mechanical cultivation, mowing, and scalping around individual trees provide effective weed control. However, today's chemical herbicides give effective control at a lower cost, especially on plantations.

Two chemicals showing positive results are Simazine and Atrazine. These pre-emergence herbicides give best results when applied in early spring (March-April) before weeds emerge. The area to be treated should be disked to clear it of vegetation. The chemicals are activated by moisture. An extended dry period reduces or delays their effectiveness.

On medium-textured soils, the rate for both chemicals is approximately 4 pounds per acre. (Follow

the directions on the labels carefully before applying.) Treating strips or spots (at least 4 feet wide) is a common and effective application method.

Some weed species are especially difficult to control with pre-emergent herbicides. Post-emergent herbicides may be needed to control these species. Consult your county extension agent about appropriate chemicals to use. Remember, read all labels and apply only the correct rates.

PRUNING

Walnut seedlings may require several types of pruning. The first and most common method is "clean stem pruning." Lower branches of the seedlings are removed after the trees are about 15 years old. (These branches are removed during the dormant season). Do not remove more than one-third of the live crown at one time, and do not permit the branches to get bigger than 1 inch in diameter before

pruning. When the trees are approximately 50 feet tall, at least 17 feet of the bole should be free from branches and sprouts. The clearer the bole, the greater the value of the tree.

The second method is "corrective pruning"—training 1- and 2-year-old seedlings. Forks may develop, terminal buds may become damaged, and seedlings may die back. In all instances, prune so only one main stem grows. (See "How to 'Train' Black Walnut Seedlings," North Central Forest Experiment Station Brochure, 1969.)

A combination method of corrective pruning and taping—as shown in the illustrations—works well. The dominant lateral is taped to another lateral in an upright position, forcing the dominant lateral to become the terminal shoot.

THINNING

Thinning is the removal of entire trees. It may benefit both plantation



Figure 10 (above). Pruning branches to 17 feet high produces high-quality butt logs free from defects. **Figure 11 (below).** The photo to the left shows a black walnut tree before pruning and taping. The photo on the right shows the same tree with its dominant lateral branch taped upright to produce a central stem.



and natural stands. Thinning in plantations is done to achieve maximum growth rates. The best growth response is made by dominant and co-dominant trees. (The crowns of these trees are higher and fuller than are the crowns of other trees.)

Walnut trees growing naturally in a forest may benefit most from a release thinning. Competing species which may overshadow the walnut trees are cut or girdled. The girdled portions and stumps of the cut trees should be sprayed with an herbicide to prevent sprouting and suckering.

FERTILIZATION

Generally, walnut is planted on sites sufficiently rich in nutrients to make fertilization unnecessary. Little growth response will be obtained from fertilization unless there is a definite deficiency of some element. When the trees are about 8 feet tall, a soil sample can determine nutrient deficiency.

Soil analysis and fertilizer advice can be obtained from the Soil Conservation Service, district or consulting foresters, or your county extension agent.

INSECT AND PATHOLOGICAL DISEASES

Insect pests

The primary insect pests of black walnut trees are the walnut lace bug, curculio, walnut caterpillar, and fall webworm. In some localities, extensive damage may be caused by other leaf-feeding caterpillars, aphids, and twig girdlers. Your county extension agent or district forester can recommend control measures for these.

Walnut lace bug:

Description: The walnut lace bug is a somewhat fragile, fly-like insect. It is $\frac{1}{4}$ inch long and has lacelike wings.

Damage: Lace bugs attack the underside of walnut leaflets, sucking out the juices. These leaves turn a yellow or gray color; sometimes they fall prematurely. The nuts are poorly filled, and the tree is weakened.

Control: Spray the foliage with Malathion when the nuts are marble-sized.

Curculio:

Description: The curculio is approximately $\frac{1}{4}$ inch long, has a long, curved snout and prominent humps and ridges on its wing covers.

Damage: The damage becomes noticeable in June when adults feed on the newly formed nuts and foliage. The females puncture the young nuts, depositing eggs within the fruits. This causes the nuts to fall early.

Control: Apply insecticide spray (i.e., methoxychlor) to the foliage when the stigmas of the female flowers are withering.

Walnut caterpillar:

Description: The full-sized larva (caterpillar) is 2 inches long, black, and has white hairs. Minnesota has a single generation in late summer.

Damage: When feeding in large masses, these caterpillars can completely defoliate black walnut trees.

Control: Apply insecticide spray (methoxychlor) to foliage as soon as the caterpillars appear.

Fall webworm:

Description: The fall webworm is the larva of a common white moth. The larva (caterpillar) is usually 1 inch long, has black and orange spots, and is hairy. Its presence can be identified by the distinctive gray webs that enclose branch tips and leaves.

Damage: Webworms can defoliate black walnut trees.

Control: Apply insecticide spray (methoxychlor) to foliage when webworms first appear.

CAUTION: Insecticides are dangerous, and extreme care should be used in handling them. Always follow the manufacturer's directions on the label.

Pathological diseases

Walnut anthracnose:

Description: Walnut anthracnose (leaf blotch) occurs on black walnut throughout its range. The

fungus-caused disease may first appear in late May or early June; it can occur any time thereafter until leaf fall. The severity of the disease increases greatly during wet weather. On some trees, this may cause almost total leaf fall before late July or August.

Tiny dark brown or black spots—usually circular in shape—first appear on infected leaves. These spots gradually enlarge and become more numerous, some forming larger dead areas bordered by yellowish leaf tissue.

Infected nuts show sunken dead spots somewhat smaller than those appearing on the leaves. Often, infected nuts will drop from the tree prematurely, or else the meat of the nut will become dark and shriveled.

Control: On growing walnut trees in forest conditions, no practical control of anthracnose is available.

Figure 12. These leaflets show walnut anthracnose (leaf blotch). This fungus disease becomes much more severe during wet weather. Among the damage it causes is premature dropping of nuts.



For shade trees and nut-producing trees, raking and burning leaves on the ground sometimes gives at least partial control. Where practical, spraying with a protective fungicide—such as zineb or maneb—gives good control during wet seasons. The initial spraying should be done in the spring when the leaves are about one-half their mature size. This first spraying will protect the trees from primary infection. Two additional sprayings are recommended at about 2-week intervals. A third application may be desirable during a wet season.

PRODUCTS Timber

Black walnut has become an increasingly valuable timber species. The demand for valuable veneer logs and other high-priced products has increased to the extent that walnut trees are hunted for and sold individually.

Figure 13. This high-value veneer-grade butt log is from a black walnut tree harvested in southeastern Minnesota.

Walnut timber is used for furniture, gunstocks, millwork, musical instruments, and other fine wood products. Walnut veneer (usually on plywood) is commonly used for wall paneling, radio cabinets, television sets, tables, bedroom furniture, sewing machine cabinets, and other diverse products.

Log prices range from \$50 to \$550 per 1,000 board feet, depending on the quality, the market, and the sales location. The price *trend* has been steadily upward.

MARKETING BLACK WALNUT TIMBER

The walnut owner wants to sell his timber at the best price; therefore, he needs to know how to appraise, scale, and market his logs.

The owner should inspect his trees carefully, determining which ones he wants to sell. These he should mark with paint. No cutting should be done until a market is found.

Walnut timber may be sold either as standing trees or as logs. High-



quality trees should be sold on the stump (uncut) on a high bid basis. Regardless of how the timber is sold, prepare a written contract outlining the sales terms.

Purchasers will often have their own loggers do the cutting, thus insuring their specifications are met.

Some buyers accept logs as small as 12 inches in diameter, but it usually is not advisable to cut trees this small. State foresters and consultant foresters can help owners select trees that should be removed. They will also provide information on markets. For additional information on marketing and for a list of buyers, contact the Extension Forester, University of Minnesota, St. Paul 55108.

NUTS

The nuts of black walnut are an important food crop and are also used for seed.

Walnuts are second only to pecans in demand and production. When mechanical hullers and cracking machines were introduced in 1957, walnut gathering and selling increased measurably. The market for nuts varies dramatically. Some years, it may not exist.

A native black walnut tree will bear nuts 8 to 12 years after planting. Maximum production occurs at 30 to 35 years of age. Native wild trees produce about one-fourth of a bushel of nuts per tree, whereas some improved varieties produce up to 2 bushels of nuts per tree.

The first nuts to fall in early autumn are usually defective and should be discarded. The ideal time to gather nuts is just after the first light frost. Then, the hulls should be fairly soft and should be yellow.

Hull the nuts the day they are gathered to keep the kernels from darkening and to preserve their fla-

vor. Lighter-colored kernels have a better marketability and superior flavor.

Before cracking nuts by hand, soak them overnight in warm water. The kernels will then be plump and can be extracted in larger pieces.

Management practices differ for maximum production of walnuts rather than for timber production. A grown tree which is more open and has a spreading crown and shorter bole yields more walnuts than does a straight, clear-boled, tall walnut tree having a narrower, less dense crown.

Black walnut shells

For years, the shells from black walnuts were simply discarded because they were considered to be of no value. However through research, the use of black walnut shells is now an important part of the industry. Black walnut shells were first used commercially for charcoal. This charcoal was of very high quality and was used in gas masks during World War I. They are used as: a filler in dynamite; a binder in glue; and additive in texture paint; a non-slip agent in automobile tires; and a filtering agent for industrial smokestacks.

CONCLUSION

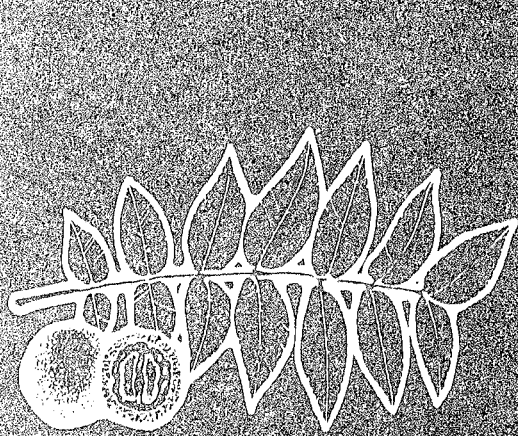
If you're looking for the "money tree" of the future and if your land has the proper soil, climate, and topography, consider *Juglans nigra*—BLACK WALNUT. It may take 60 years to realize maximum return—so your money tree will be harvested by your children or grandchildren. But what an investment! In the meantime, you can enjoy its nuts, its beauty, and its contribution to wildlife.

Figure 14. This is an ideal tree to have in the yard. The high-value black walnut has an excellent shape; its full crown provides both shade and maximum nut production.



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