

LOCAL NAMES

English (walnut,American walnut,eastern black walnut,black walnut); French (noyer noir); German (schwarze Walnuß); Portuguese (nogueira-preta); Spanish (nogal negro,nogal Americano)

BOTANIC DESCRIPTION

Black walnut is a deciduous tree that grows to a height of 46 m but ordinarily grows to around 25 m and up to 102 cm dbh. Black walnut develops a long, smooth trunk and a small rounded crown. In the open, the trunk forks low with a few ascending and spreading coarse branches. The root system usually consists of a deep taproot and several wide-spreading lateral roots.

Leaves alternate, pinnately compound, 30-70 cm long, up to 23 leaflets, leaflets are up to 13 cm long, serrated, dark green with a yellow fall colour in autumn and emits a pleasant sweet though resinous smell when crushed or bruised.

Flowers monoecious, male flowers catkins, small scaley, cone-like buds; female flowers up to 8-flowered spikes.

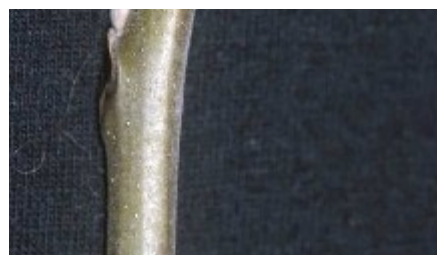
Fruit a drupe-like nut surrounded by a fleshy, indehiscent exocarp. The nut has a rough, furrowed, hard shell that protects the edible seed. Fruits produced in clusters of 2-3 and borne on the terminals of the current season's growth. The seed is sweet, oily and high in protein.

The bitter tasting bark on young trees is dark and scaly becoming darker with rounded intersecting ridges on maturity.

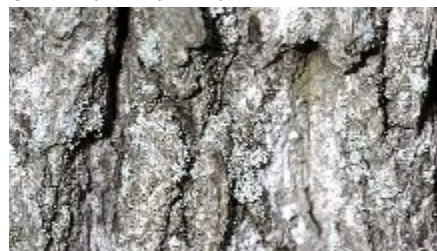
BIOLOGY

Flowers begin to appear mid-April in the south and progressively later until early June in the northern part of the natural range. Flowering and leafing out occur at approximately the same time and always before the late spring frosts. The fruit ripens in September or October of the same year, dropping shortly after the leaves fall.

Good seed crops are produced irregularly, like twice in 5 years. Open-grown trees may produce some seed when only 4 - 6 years old, the minimum seed-bearing age for commercial quantities of seed is about 12 years, but large seed crops do not occur until the trees are 20 - 30 years old. Best seed production begins when the trees are about 30 years old and continues for another 100 years.



(Robert H. Mohlenbrock. USDA NRCS. 1995. Northeast wetland flora: Field office guide to plant species)



Bark (Robert H. Mohlenbrock. USDA NRCS. 1995. Northeast wetland flora: Field office guide to plant species)



Seeds????????? (Steve Hurst. Provided by ARS Systematic Botany and Mycology Laboratory. Stillwater)

ECOLOGY

Black walnut grows naturally in areas with cool temperate, moist to wet subtropical moist forest life zones, intolerant of shade and grows best in well-drained bottoms. In mixed forest stands it must be dominant or codominant to survive. Throughout its range, walnut generally reaches its greatest size and value along streams and on the lower portion of north- or east-facing slopes. Common tree associates include American elm (*Ulmus americana*), hackberry (*Celtis laevigata*), green ash (*Fraxinus pennsylvanica*), box elder (*Acer negundo*), and butternut (*Juglans cinerea*).

It is found in many of the climax associations but because of its intolerance is not classified as a climax tree in the strict sense. Generally, maintains itself in most stands as scattered single trees occupying openings in the canopy.

BIOPHYSICAL LIMITS

Altitude: up to 1219 m

Temperature: average summer temperature of 16.5°C, annual average temperature 7 - 19°C

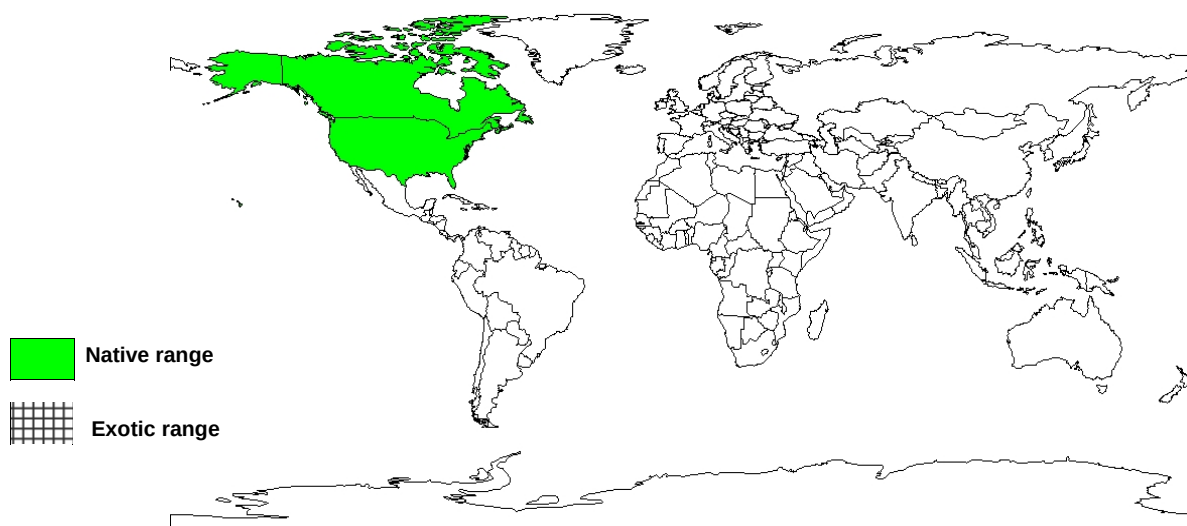
Rainfall: annual precipitation from 300 - 1300 mm with an average of 889 mm. It is drought tolerant and is moderately tolerant of flooding.

Soil type: grows best on deep loams, well-drained neutral or slightly acid soils (pH from 4.9-8.2) that are moist and fertile. It is common on limestone soils and fertile alluvial deposits. Good agricultural soils are generally favorable sites with reliable indicators for suitable land being a good stand of white oak (*Quercus alba*) and tulip popular (*Liriodendron tulipifera*), or where corn grows well.

DOCUMENTED SPECIES DISTRIBUTION

Native: Canada, US

Exotic:



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS

Food: The nuts of black walnut are used as food by humans and are harvested commercially. The nuts are eaten plain or with honey and also used to flavor cakes, candy, and ice cream. An edible oil is obtained from the seed. It has a sweet taste but tends to go rancid quickly. Used as a seasoning in bread, squash and other foods. The tree yields a sweet sap that can be drunk or concentrated into syrup or sugar. It is tapped in spring.

Timber: Black walnut wood is heavy, strong, and highly resistant to shock. It ranks with the most durable U.S. and European hardwoods, including cedars (*Thuja* spp.), chestnuts (*Castanea* spp.), and black locust (*Robinia pseudoacacia*). It can be satisfactorily kiln dried and holds its shape well after seasoning. Black walnut is normally straight grained, is worked easily with hand tools, and has excellent machining properties. When finished, the wood takes on a smooth velvety surface and a handsome grain pattern. The best known use of black walnut is for its lumber and veneer. The wood is used for fine furniture of all kinds, interior paneling, specialty products, and gunstocks.

Medicine: The bark and leaves are considered alterative, astringent, detergent, laxative, and purgative. They are used for eczema, herpes, indolent ulcers, scrofula. The unripe fruit is sudorific and vermifugal, and used for ague and quinsy, and is rubbed onto cracked palms and ringworm. Oil from the ripe seeds is used externally for gangrene, leprosy, and wounds. Burnt kernels, taken in red wine, are said to prevent falling hair, making it fair. Green husks are used to ease the pain of toothache. Indians used the root bark as vermifuge. The juglone found in roots and/or leaves of the plant has antihemorrhagic activity.

Dye: black dye can be extracted from the roots yet green fruit husks boiled provide a yellow dye.

Other uses: Ground shells provide special products. During World War II, airplane pistons were cleaned with a "nut shell" blaster and in the auto industry; to deburr precision gears. Ground shell products are also used to clean jet engines, as additives to drilling mud for oil drilling operations, as filler in dynamite, as a nonslip agent in automobile tires, as an air-pressured propellant to strip paints, as a filter agent for scrubbers in smokestacks, and as a flourlike carrying agent in various insecticides.

Macerated in warm water, the husks and/or leaves, are said to destroy insects and worms, without destroying the grass. Insects are said to avoid the walnut, hence often used as a poor man's insect repellent. Rubbed on cattle and horses faces, walnut leaves are said to repel flies. The husks can be made into a high quality charcoal.

It can be used as an alternative ingredient of 'QR' herbal compost activator. This is a dried and powdered mixture of several herbs that can be added to a compost heap in order to speed up bacterial activity and thus shorten the time needed to make the compost.

Woody shells on fruits are used to make jewelry. The husks are rich in tannin.

SERVICES

Ornamental: Black walnut is cultivated as an ornamental in eastern United States; as lawn trees, in parks and wide open spaces but the fruits can be messy.

Browse or forage: Although not considered a choice browse, black walnut leaves are palatable to white-tailed deer. The nuts of black walnut furnish food for many rodents and make up about 10 percent of the diet of eastern United States fox squirrels. The nuts are also eaten by a variety of birds.

Site rehabilitation: Black walnut has been successfully planted on surface mined areas in the eastern United States to assist in site rehabilitation.

TREE MANAGEMENT

Because of its large taproot, walnut seedlings survive well. Weed control during the first 2 - 3 years and pruning to established trees greatly increase growth and quality in only a few years.

Pruning lateral branches helps to produce knot-free wood under open growing conditions. To minimize damage and promote rapid healing, branches should be pruned before they are 5 cm dbh.

No more than 25 percent of the live crown should be released in a single year, and at least 50 percent of the total tree height should be maintained in live crown.

Black alder (*Alnus glutinosa*) and Russian olive (*Elaeagnus angustifolia*) interplanted with black walnut increases black walnut's yield because of their ability to increase available nitrogen in the soil.

An antagonism (allelopathy) between black walnut and many other plants growing within its root zone has been recognized and attributed to juglone, a toxic substance found in the leaves, bark, nut husks, and roots of black walnut trees. Many garden vegetables and several conifers are susceptible to juglone hence should not be inter-planted with black walnut.

NPK fertilizer should be applied to each tree when buds begin to swell in early spring at the rate of 230-450 g/yr. It should not be applied in the first year, because of danger of injuring roots. In strongly acid soils, lime should be applied to change pH. Excessive application of lime makes zinc in soil unavailable to tree.

Most production of black walnuts is from wild trees growing on non-crop land, and these represent the main commercial source of kernels for today's market. Nuts should be harvested as soon as they fall, in order to get light-colored kernels with mild flavor. Leaving them on ground causes some discoloration of kernel.

GERMPLASM MANAGEMENT

The storage behaviour of *Juglans nigra* seeds is described as orthodox and can maintain viability for 4-5 years in hermetic storage at <15% mc and 3-4°C. Cold stratification for 90 - 120 days is required for optimum seed germination but the necessity and duration of stratification may vary by seed source.

PESTS AND DISEASES

Defoliators: the walnut caterpillar (*Datana integerrima*) and the fall webworm (*Hyphantria cunea*) commonly defoliate black walnut from midsummer through to September.

Borers: the ambrosia beetle (*Xylosandrus germanus*), which may introduce a *Fusarium* fungus into the tree, causing dieback and resprouting from the base of the tree; the flatheaded apple tree borer (*Chrysobothris femorata*), which feeds in the phloem and outer sapwood area as larvae and on the foliage as adults; the walnut curculio (*Conotrachelus retentus*), which damages developing nuts when the larvae bore into them and cause great losses during the so-called "June drop" of walnuts; and the walnut shoot moth (*Acrobasis demotella*), which damages the terminal buds in early spring when the larvae bore into the still unexpanded bud, causing multiple forks and crooks in the main stem. The pecan leaf casebearer (*Acrobasis juglandis*) is closely related to the walnut shoot moth but is a much less damaging.

Suckers: the aphids or plant lice (*Monellia* spp. and *Monelliopsis* spp.), which suck the juices from leaves and often deposit a sticky substance called "honey-dew" on the leaf surface that may turn black and prevent photosynthesis; and the walnut lace bug (*Corythucha juglandis*), which causes damage when the adults and nymphs suck the sap from the lower surfaces of walnut leaflets.

Animal damage: seedlings propagated under nursery conditions are susceptible to rodent predation. Deer browse on buds and rub antlers against young trees. Mice and rabbits gnaw on the stems of young trees during the winter, and squirrels dig up and eat direct-seeded nuts and feed on green and mature nuts still on the trees. Perching birds break the terminal or new branches from the tree, and the yellow-bellied sapsucker drills holes through the bark during late winter or early spring. Some trees may be nearly girdled with peck holes.

Diseases: Two serious root rot diseases found in nursery seedling are caused by the fungi *Phytophthora citricola* and *Cylindrocladium* spp. A mold on stored seed and seedlings is associated with *Penicillia* and other normally saprophytic fungi. Walnut anthracnose, caused by the fungus *Gnomonia leptostyla*, is a leaf spot disease that begins during wet spring weather. The fungus *Cristulariella pyramidalis* is also responsible for premature defoliation by causing leaf spots. A newly discovered, serious leaf spot disease is caused by the fungus *Mycosphaerella juglandis*. Stem diseases caused by fungi are the *Fusarium* cankers caused by several species of *Fusarium* and the perennial target canker (*Nectria galligena*) commonly known as *Nectria* canker.

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