United States Department of Agriculture

Natural Resources Conservation Service | Plant Guide

BLACK LOCUST

Robinia pseudoacacia L.

Plant Symbol = ROPS

Figure 1: Black locust in flower (M. van der Grinten, Big Flats, NY Plant Materials Center).

Alternative Names
Common Names: yellow locust, white locust, common locust, false acacia

Scientific Names: Robinia pseudoacacia L. f. *inermis* (Mirb.) Rehder, *Robinia pseudoacacia* L. var. *pyramidalis* Pepin, *Robinia pseudoacacia* L. var. *rectissima* (L.) Raber

Description
General: Black locust is a hardwood tree that fixes nitrogen (Dirr, 2009). It grows quickly (2 -3 feet annually) when it is young, and lives for about 50-75 years (Hightshoe, 1988). The deeply furrowed bark is dark reddish-brown to black (Dirr, 2009; Hightshoe, 1988). Pairs of ¼ to ½ inch long thorns grow along the zig zag twigs (Hightshoe, 1988). Pinnately compound leaves are 6 to 14 inches long with 7 to 19 leaflets (Dirr, 2009). The dull green oval leaflets are 1 to 2 inches long (Dirr, 2009). Flowers are white (Figure 1) and extremely fragrant, blooming in late April to mid-June (Dirr, 2009). Seed pods are flat, brown to black, and are 2 to 4 inches long (Dirr, 2009; Hightshoe, 1988). There are three other *Robinia* locust species occurring in North America: bristly locust (*R. hispida* L.), clammy locust (*R. viscosa* Vent.) and New Mexico locust (*R. neomexicana* A. Gray), each with 2 or more varieties (Kartesz, 2015).

Distribution: Black locust's native range is not accurately known. Huntley (1990) described the range as following the Appalachian Mountains from Pennsylvania to Alabama with secondary populations in the Ozark Mountains (Figure 2). However, the tree is planted widely and has become naturalized across the world (GBIF, 2023). For a current distribution map, please consult the Plant Profile page for this species on the PLANTS Website.

Figure 2. Black locust's native range (Huntley, 1990).

Habitat: Black locust does not tolerate shady locations (Allard, 1943) and does not grow well on poorly drained or compacted soils (Auten, 1945; Vítková et al., 2015). Vítková et al. (2015) reports that black locust grows in soils with pH 3.2 to pH 8.2 while Kurtz & Hansen (2017) conclude it grows on disturbed sites. It is tolerant to salt, drought, heat, and sulfur dioxide pollution, however, black locust is sensitive to ozone pollution (Hightshoe, 1988).

Uses
Erosion Control: Black locust is used for erosion control in the United States, Europe, and Asia on critical and highly disturbed areas (mine spoils, road cuts) due to its easy establishment, fast growth, and soil building abilities (Huntley, 1990).

Wildlife: The seeds are a minor food source for several birds including ring-necked pheasant (*Phasianus colchicus*; Swank, 1944), ruffed grouse (*Bonasa umbellus*; Nelson et al. 1938), northern bobwhite quail (*Colinus virginianus*; Colavecchio & Williams, 2010), mountain quail (*Oreortyx pictus*; Johnsgard, 2017), chukar (*Alectoris chukar*; Johnsgard 2017), and California quail (*Callipepla californica*; Johnsgard, 2017). Medzihorský et al.'s (2022) literature review documented 454 herbivorous arthropod species feeding on black locust worldwide. Stubbs et al. (1992) reported several species of native bees visiting black locust flowers: two-spotted bumblebee (*Bombus bimaculatus*), yellow-banded bumblebee (*Bombus terricola*) and half-black bumble bee (*Bombus vagans*). Giovanetti (2019) also reported honeybees (*Apis mellifera*) visiting black locust flowers.

Silvopasture: Black locusts leaf out in the late spring and cast a mild shade that allows growth of grasses below them (Gabriel, 2018a). In Hungary, researchers report that black locust foliage can prolong grazing seasons in silvopasture systems (Halasz et al., 2010).

Forage: Black locust is used for livestock forage in South Korea and China (Keresztesi, 1988). The tops and leaves of 1-2 ft tall black locust seedlings contain high amounts of crude protein (22 to 24%; Baertsche et al., 1986), as does meal prepared from leaves alone (13.2%-20%; Horton & Christensen, 1981). Black locust also has compounds that are toxic when eaten in large quantities (Papachristou & Platis, 2011). Goats appear to be less susceptible to the toxins, and it is unclear whether black locust is toxic to cattle or sheep (Burner et al., 2008). The seeds and bark are the most toxic and ingesting them can be fatal to horses (Vanschandevijl et al., 2010). Most ruminants (except horses) naturally limit intake of black locust (Gabriel, 2018b).

Figure 3. Black locust posts make for long lived and durable fencing, especially useful in organic gardens/pastures (Heckman, 2015).

Post, Pole Production: Black locust wood is strong, hard, and extremely durable. Some black locust trees produce relatively straight, un-forked trunks, making them good for post and pole production (Briggs, 1987). On sites with ideal growing conditions, it takes 10 – 20 years to produce post-sized trees (Heckman, 2015; Huntley, 1990). Posts will typically last 30 – 50 years or more in the ground (Heckman, 2015). Black locust wood is used for fencing (Figure 3), trellises for wine grapes and hops (Heckman, 2015), mine timbers, railroad ties (Stone, 2009), and decking (Brischke, 2017). The National Organic Program (2000) prohibits organic farms from using pressure treated lumber fencing and black locust posts provides an alternative to using treated lumber.

Ornamental Tree/Urban: Several black locust varieties will survive in urban habitats and produce attractive leaves and flowers (Vítková et al., 2017). However, Dirr (1988) does not recommend it for the home landscape due to the thorns and brittle branches that can fall easily. Additionally, black locust suckers readily and root sprouts can penetrate patios (Dirr, 1998; Bir, 1992).

Firewood/Biomass/Other Uses: Black locust firewood splits well, burns slowly and very hot (Gabriel 2018b). It is among the hottest burning woods with heat production comparable to hickory (*Carya species*) and white oak (*Quercus alba*) (Huhnke & Craighead, n.d.). In Germany, where locust borers are absent, black locust short rotation coppice plantations (cutting trees to ground level, stimulating growth, and providing firewood) produce between 2.5 to 34 tons of dry woody biomass/acre/year while sequestering 7.2 tons of carbon/acre/year (Carl et al., 2017). Straker et al. (2015) consider black locust to have strong bioenergy potential in the U.S. Locust borer (*Megacyllene robinae*) and heart rot fungi (*Phellinus rimosus* or *Vanderbylia robiniophilia*) may make growing black locust for large scale timber production challenging in the U.S. (Huntley, 1990; DeGomez & Wagner, 2001). In addition, black locust wood is used for shipbuilding, veneer, furniture, boxes, handcrafts, particleboard, and wood chips (reviewed by Nicolescu et al. 2019). In several European countries, black locust honey is an important product (Vítková et al., 2017).

Ethnobotany

People of the Cherokee Nation use black locust to make bows (Vick, 2011), and the Wailaki people of Mendocino, California fed black locust seeds to chickens (Chestnut, 1902). Ajaib et al. (2014) reports that in Pakistan the flowers are eaten to treat eye ailments and the bark is used to make paper. In Siberia, the flowers are used in tea to treat colds and stomach problems, and to strengthen immune systems (Jarić et al., 2015). In Bosnia and Herzegovina, traditional healers used the flowers as an expectorant and for insomnia and restlessness (Šarić-Kundalić et al. 2011).

Status

Threatened or Endangered: Black locust is not a threatened or endangered species.

Weedy or Invasive: Although black locust is native to parts of the US, it is a listed noxious weed in MA, ME, MN, and WI; a regulated plant in MA and NY; and is a listed invasive plant in CA, CT, MA, MI, NJ, OR, and WI (Center for Invasive Species and Ecosystem Health, 2018). It has also become weedy or invasive in Europe (Vítková et al., 2017). Please consult with your local NRCS Field Office, Cooperative Extension Service office, State Department of Natural Resource, State Department of Agriculture, or the PLANTS Web site (http://plants.usda.gov/) for information on black locust's current status (e.g., threatened or endangered species, state noxious status, and wetland indicator values).

Planting Guidelines
Black locust is hardy to -37° F, and requires 16 to 65 inches of annual precipitation, a minimum of 140 frost free days and at least 36 inches rooting depth for establishment (Kurtz & Hansen, 2017). Straker et al. (2015) recommend clearing weeds before planting black locust by applying preemergence herbicides, since some weeds reduce black locust growth (Larson & Schwartz, 1980). Clark & Hutchinson (1989) also suggest that black locust plantations do better with some weed control, but also point out that black locust can establish on unprepared sites. In natural situations, black locust is an early successional tree, establishing in canopy gaps and growing best in full sun (Boring & Swank, 1984; DeGomez & Wagner, 2001). Authors have reported broadcast seeding black locust at a wide range of rates: 0.022 lb/acre for a multispecies bottomland restoration in Mississippi (Twedt, 2006) to 1 to 3 lb/acre on Appalachian mine reclamation projects (Ashby et al., 1985). On average, there are about 25,500 seeds per pound (Vítková et al., 2017). Nicolescu et al. (2013) suggest sowing seeds (after scarifying them) in late spring to avoid frosts. To reduce the risk of borer damage, black locust plantings should usually be less than twenty percent (Briggs, 1987) or twenty-five percent (Limstrom, 1960) of all trees planted in one contiguous area.

Planting spacing – Rédei et al. (2013) found that 5-year-old trees were the healthiest and fastest growing at 5.2 feet apart (or 2529 trees/acre). In Bulgarian plantations sampled by Stankova et al. (2022), trees were commonly 5.2 -6.6 feet apart. For mine restorations, Linstrom (1960) recommended 6 x 6 feet or 7 x 7 feet spacing for hardwoods including black locust. For silvopasture, row spacing varies from 30 to 40 feet apart depending on terrain (Demchik & Feldhake, 2014). Silvopasture tree rows roughly oriented in a north to south direction allow shade to move across the paddock during the day (Demchik & Feldhake, 2014).

Management
Since black locust is a nitrogen fixing species, it has lower soil nitrogen requirements than non-nitrogen fixing species (DeGomez & Wagner, 2001). Annual nitrogen fixation rates vary from 26 lb/acre for a 4-year-old mixed species hardwood forest (Boring & Swank, 1984*)* to 101 lb/acre for an urban forest in Seoul, Korea (Noh et al., 2010). Trees do benefit from phosphorus applications (DeGomez & Wagner, 2001). Phosphorus fertilizer applied at the rate of 99 lb/acre increased growth of black locust? on acidic surface mine soils when used alone or with 50 lb/acre nitrogen applications (Plass, 1972).

Deer browse the shoots and buds of black locust (Rédei et al. 2011), so in areas with high deer pressure, growers might consider using tree tubes or other protection. For sawlog production Keresztesi (1983) recommends pruning the trees 4 times: first when they are ~10-12 feet tall, again when they are ~15-18 feet tall, a third time when the trees are 8-12 years old, and a fourth time when they are 15-19 years old. Dirr (2009) recommends avoiding pruning branches in the spring as wounds will "bleed" sap.

Pests and Potential Problems
Two insects that inflict most damage on black locusts are locust leaf miner (*Odontota dorsalis*) and black locust borer (*Megacyllene robiniae*; Gabriel, 2018b). Other potential issues are powdery mildew, canker, weevils, scales, whiteflies (Missouri Botanical Garden, n.d.), aphids, leaf miners, *Macrosaccus robiniella* (a moth), *Obolodiplosis robinia* (a gall midge), *Phylosticta robinae* (a leaf spot fungus; Wilkaniec et al. 2021), heart rot fungi (*Phellinus rimosus* or *Vanderbylia robiniophila*; Hightshoe, 1988; Huntley, 1990), and witches' broom (caused by the virus *Chlorogenus robiniae*; Huntley, 1990).

Leaf miner beetles overwinter in bark and leaf litter, and lay eggs in the spring on black locust leaves (Baker, 2023). When the larvae emerge, they eat the inner layers of locust leaves, defoliating the trees and reducing their growth (Zheng et al. 2003). Leaf miners may kill trees by midsummer if the trees are experiencing other stressors (Baker, 2023). Locust borer eggs and young larvae overwinter in the bark of locust trees (Harman & Harman, 1990). As the weather warms, locust borer larvae carve tunnels through the trunk and branches resulting in weaker trees and frequent wind/ice breakage (Dellinger & Day, 2015). Adult borers resemble wasps and can be found from early September until frost and feed on goldenrod pollen (Johnson & Lyon, 1991). Borers prefer locust trees that are at least 2.5 inches and less than 7 inches in diameter at breast height (DBH) (McCann & Harman, 1990). When tree trunks reach 6 inches DBH, few trees are killed outright (Johnson & Lyon, 1991). Black locust borer attack frequency is lowest in mixed forest (closed canopy) stands (McCann & Harman, 1990), compared with forests dominated by black locust clones. Planting black locust on good quality soils with other hardwoods and/or conifers may discourage locust borer infestation (Briggs, 1987; McCann & Harman, 1990). Fast growing trees have the best borer resistance (Dirr, 2009).

Environmental Concerns
Many U.S. states have listed black locust as an invasive species (see **Status** section) as have governments in many parts of the world including Europe, Asia, and Oceania (Li et al., 2014). Black locust produces allelopathic chemicals (Medina-Villar et al., 2017). Depending on the forest type, this may (Trentanovi et al., 2013; Benespieri et al., 2012) or may not (Deneau, 2013; Carter et al., 2017) have negative effects on plant diversity within black locust stands.

Control
Cutting: Cutting alone is ineffective at controlling black locust due to prolific root suckering (Zimmerman, 1984).

Herbicide: Chemical control has variable success because killed plants can resprout several years after treatment (Missouri Department of Conservation, 2023). Gouin (1979) found that glyphosate sprayed in a Christmas tree plantation (in September, Garrett Co., Maryland) at the rate of 10 oz/acre to 32 oz/acre completely killed black locust by the following year. In Melichar et al.'s (1986) study of sites in 6 northeastern states, herbicide sprays manually applied to the basal 12-15 inches of dormant trees (triclopyr alone (4lbs/gal) or trichlopyr (2lbs/gal) with picloram (1lb/gal)) resulted in 100% defoliation the next season, although resprouts were visible two years later in all treatments. Cut stumps and tree base applications (2% triclopyr, 20% glyphosate) are generally effective for controlling small trees (DBH of 6 inches or less). Applying the herbicides mid-July until December minimizes root suckering (Missouri Department of Conservation, 2023).

Mature Tree Control: Bulldozing mature black locust stands may be practical in some instances; removing as much root material as possible will limit subsequent root sprouting (Missouri Department of Conservation, 2023). Root sprouts and seedlings may appear after several years, so it is important for land managers to monitor for them after the initial treatment (Missouri Department of Conservation, 2023). Black locust is not controlled by fire and its spread is encouraged by burning (De Marco et al., 2023; Stone, 2009)

Please contact your local agricultural extension specialist or county weed specialist to learn what works best in your area and how to use it safely. Always read label and safety instructions for each control method. Trade names and control measures appear in this document only to provide specific information. USDA NRCS does not guarantee or warranty the products and control methods named; other products may be equally effective.

Seeds and Plant Production
Seed Propagation: Black locust seeds typically ripen from September – October and disperse from September – April (Young & Young 1992). Seeds exhibit high dormancy due to an impermeable seed coat and require light for germination (Stone, 2009). Dormancy can be broken when seed passes through animals' digestive systems (Swank, 1944). Scarifying the seed mechanically prior to soaking it in water overnight will also increase germination. Other methods of scarification include chemical treatments or wet heat (hot water, 212° F for 1 minute; Wilson 1944). Sufficiently scarified seed will imbibe water. Seeds can be stored for 10 or more years at 32°- 40° F (0 to 5° C) or 3 to 4 years when stored in a cool dry place (Olson, 1974).

Vegetative Propagation: Superior black locust individuals or cultivars can be propagated vegetatively as dormant root cuttings, ¼ inch (0.64 cm) to 1 inch (2.54 cm) in diameter, of the previous year's growth (Swingle, 1937). Budding, softwood cuttings, or tissue culture are other vegetative propagation methods (Davis & Keathley, 1992; Dirr, 2009).

Cultivars, Improved, and Selected Materials
Black locusts are not/somewhat/readily [select one choice] available from commercial sources (Table 1). Black locust conservation plant releases are collectively referred to as the Steiner Group and were released in 1987 by the USDA-NRCS Norman A. Berg National Plant Materials Center, Beltsville, Maryland, U.S. Forest Service, West Virginia Department of Agriculture and Forestry, and the USDA Agricultural Research Service (Briggs, 1987). Select cultivars based on the local climate, resistance to local pests, and intended use. Consult with your local land grant university, local extension, or local USDA NRCS office for recommendations on adapted cultivars for use in your area**.**

Table 1: Black locust cultivars and attributes separated into conservation releases and ornamental varieties.

Conservation Releases	Attributes
'Algonquin'*	Vigor, good borer resistance
'Allegheny'*	Vigor, straight trunks
'Appalachia'*	Vigor and form
Ornamental Varieties	**Attributes**
'Aurea'	Yellow new leaves
'Bessoninan'	Thornless, central leader
'Dean Rossman'	Persistent yellow leaves, thornless
'Decaisneana'	Pinkish flowers
'Frisia'	Yellow leaves
'Inermis'	Thornless
'Purple Robe'	Rose pink flowers, new bronze leaves, borer issues
'Pyramidalis'	Upright form
'Semperflorens'	Flowers throughout summer
'Tortulosa'	Small tree with contorted branches

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