



Common name: American chestnut

Legal status: State Endangered

Global and state rank: G3 (Vulnerable) / S1S2 (Imperiled or Critically Imperiled)

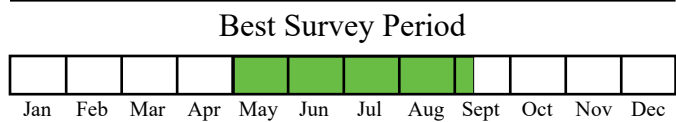
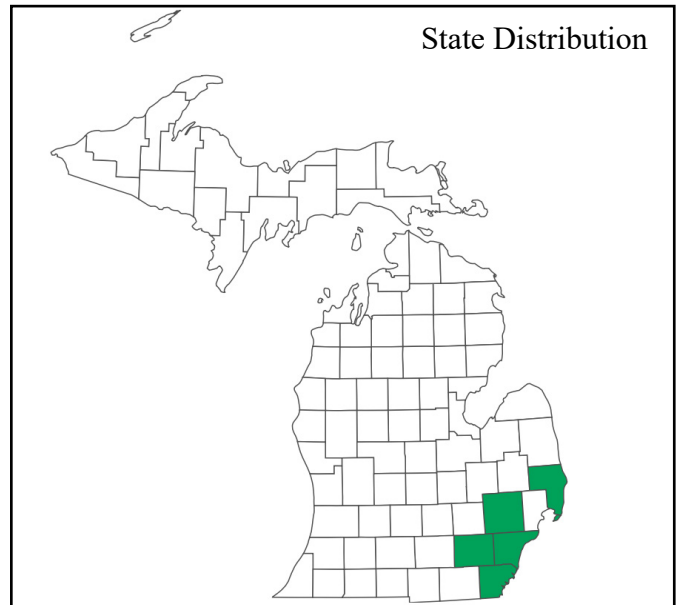
Other common names: Chestnut

Family: Fagaceae (beech family)

Synonyms: *Fagus castanea* var. *dentata* Marshall

Taxonomy: Depending on the classification that is followed, American chestnut (*Castanea dentata*) is one of two to four *Castanea* species in North America and eight to eleven globally (Nixon 1997, Weakley and Southeastern Flora Team 2026). Evolutionary relationships inferred from molecular phylogenetics show that North American species form a clade which is most closely related to European species, followed by Asian species. Therefore, it is hypothesized that this genus diversified as it migrated from East Asia across Europe to North America in the Eocene epoch over a period spanning roughly 54 million to 24 million years before present (Lang et al. 2007).

Total range: The historical native range of American chestnut extended from Michigan east to Maine south to the Florida panhandle west to Mississippi and north to Illinois. Today, it is considered extirpated from Florida and Illinois. It is ranked N3 (Na-



tionally Vulnerable) in the United States and N1N2 (Nationally Imperiled to Critically Imperiled) in Canada, where it is found only in the southwest of Ontario (Davis 2021, NatureServe 2026). The species has been planted in many locations beyond its native range including Iowa, Missouri, Wisconsin, California, and British Columbia (Freinkel 2009, NatureServe 2026).

State distribution: The native range of American chestnut in Michigan is restricted to the southeastern Lower Peninsula. It was historically abundant in Monroe and Wayne Counties and extended as far north as St. Clair County, which is the northwestern limit of its global native range (Barnes and Wagner 2004). Only eight element occurrences have been formally documented in the Michigan Natural Heritage Database, four in Oakland County and one each in Monroe, Wayne, Washtenaw, and St. Clair Counties. Most records have not been updated in more than 30 years. Nearly all documented populations are small and blighted or historical and lacking data. Some occurrences may even represent planted populations (MNFI 2026). The species has been planted in many locations beyond its native range throughout the Lower Peninsula and on Bea-



ver Island (Barnes and Wagner 2004, Reznicek et al. 2026).

Recognition: Historically, American chestnut was a large tree growing up to 30 m in height. Due to a devastating blight caused by a non-native fungus, this species is now largely confined to the understory, reaching heights of 5–15 m before succumbing to blight. Large trees can still be found occasionally, particularly planted or naturalized trees beyond the native range (Reznicek et al. 2026, Westbrook et al. 2026).

Bark grades from gray to dark brown, smooth when young and furrowed when old. The stout lustrous glabrous twigs vary from yellow-green to olive green to dark brown with age. Like many tree species, American chestnut lacks true terminal buds because the delicate tips of its twigs tend to abort or die back. In their place, the uppermost lateral buds take prominence. These false terminal buds are readily distinguished as they sit immediately above a leaf scar. Buds are glabrous, acute, ovate, brown, and 6 mm long. Leaves are simple and alternate. Petioles are generally 10–30 mm long. Blades are 9–30 cm long by 3–10 cm wide, oblong-lanceolate to obovate to oblanceolate in outline, cuneate at the base, acute to acuminate at the apex, sharply serrate on the margins, and glabrous to sparsely hairy on the veins beneath (Nixon 1997, Barnes and Wagner 2004, Reznicek et al. 2026).

Both staminate and pistillate flowers have sepals but lack petals. Staminate flowers have pistillodes in the center (reduced sterile pistils). All members of the Fagaceae have an involucre-like structure called a cupule subtending the nut. In chestnuts, the cupule is a spiny bur. In American chestnut, that bur encloses one to three nuts and splits open along four sutures at maturity. Nuts are 18–25 mm long by 18–25 mm wide with a beak up to 8 mm long excluding the style (Nixon 1997). Chestnuts are not to be confused with horse-chestnuts (*Aesculus*) in the family Hippocastanaceae, which also have brown nuts, yet the leaves are palmately compound, and the seeds are potentially



poisonous. The leaves of American chestnut resemble those of American beech (*Fagus grandifolia*), but American beech has distinctive buds that are cylindrical, sharply pointed, cigar-shaped, and long (1–2 cm) (Barnes and Wagner 2004).

American chestnut is most likely to be confused with other species and hybrids of *Castanea*. All species of the genus are probably interfertile (Nixon 1997). Both Chinese chestnut (*C. mollissima*) and European chestnut (*C. sativa*) are planted in Michigan. Chinese chestnut has pubescent buds, leaf undersides, and cupule spines, while in American chestnut these parts are glabrous to nearly glabrous. Unlike American chestnut, European chestnut has minute brown glands on the leaf undersides, especially near the petiole, and the leaves are somewhat pubescent beneath (Reznicek et al. 2026). Japanese chestnut (*C. crenata*) also could be planted in Michigan. Unlike American chestnut, the undersides of Japanese chestnut leaves have minute, glandular, peltate scales mixed with dense tomentum (Nixon 1997). Breeding programs have produced hybrids with varying degrees of American and Chinese chestnut DNA. Some hybrid lineages include DNA from American, Chinese, and Japanese chestnut, rendering identification even more difficult. A balance of physical traits should be considered in identification as well as environmental setting. Native American-chestnut can be expected from natural settings, while non-native American-chestnut, hybrids, and Asian species are more likely



along roadsides and at former homesteads.

Best survey time/phenology: American chestnut surveys should occur from the first week of May when leaves emerge through the first week of September prior to leaf senescence (MNFI 2026).

Habitat: Across its native range, American chestnut is associated with mesic to dry forests, particularly dry-mesic sites with oak (*Quercus* spp.) (Nixon 1997, Haines 2011, Weakley and Southeastern Flora Team 2026). There is relatively little data on habitat in Michigan. It is also not always clear when records are from native, naturalized, or planted populations, further confounding habitat descriptions. Native populations have been documented mostly from oak forests on sandy, lakeplain sites (MNFI 2026, Reznicek et al. 2026).

Associated species have rarely been documented in Michigan. The following have been explicitly listed as associated species at one occurrence: red maple (*Acer rubrum*), wild sarsaparilla (*Aralia nudicaulis*), sedge (*Carex pensylvanica*), witch hazel (*Hamamelis virginiana*), sour-gum (*Nyssa sylvatica*), Solomon-seal (*Polygonatum biflorum*), black cherry (*Prunus serotina*), black oak (*Quercus velutina*), sassafras (*Sassafras albidum*), and dry-land blueberry (*Vaccinium pallidum*) (MNFI 2026).

Biology: Chestnuts are monoecious, producing staminate and pistillate organs on the same plant, yet they are self-incompatible. Two types of catkins are produced: unisexual staminate catkins and bisexual catkins with staminate flowers positioned above the pistillate flowers (Larue et al. 2021). Although long believed to be wind-pollinated, recent research demonstrates that chestnut pollination is at least partially carried out by insects, with beetles, flies, and bees being the most common pollinators of European chestnut (Larue et al. 2021, Petit and Larue 2022). Jacobson and Pilkey (2024) also observed beetles, flies, and bees pollinating American chestnut, in orchard settings, mostly beetles of genus *Rhagonycha*, beetles of family Mordellidae, flies of family Syrphidae, the honeybee *Apis mellifera*, and



the bumblebee *Bombus impatiens*. Chestnuts are also an important host plant for Lepidoptera larvae in the United States (Narango et al. 2020).

Unlike most temperate nut-bearing trees, including oaks which are in the same family, chestnuts are non-masting, producing relatively uniform amounts of fruit each year (Stevens 2017). Historically, the fruit of American chestnut was likely dispersed by squirrels, chipmunks, woodland mice, blue jays, American crows, passenger pigeons, and humans (Davis 2021). American chestnut is a fast-growing, moderately shade-tolerant tree of medium longevity (Barnes and Wagner 2004). The oldest recorded age is 270 years (Eastern OLDLIST 2026).

Like all members of the Fagaceae, chestnuts form mutualistic relationships with ectomycorrhizal fungi. These relationships are positively associated with disease resistance, drought resistance, and nutrient absorption (Xiong et al. 2025). Ectomycorrhizal relationships of American chestnut have received considerable attention due to the tree's economic importance, yet most research has been conducted in planted stands or greenhouse conditions. A naturally occurring population of American chestnut was found to form ectomycorrhizal associations with six genera of basidiomycete fungi, particularly *Russula* and *Lactarius* (Stephenson et al. 2017).

American chestnut is affected by a number of pests and pathogens, most notably the non-native oomycete known as ink disease, root rot, or dieback



(*Phytophthora cinnamomi*) and the non-native fungus called chestnut blight (*Cryphonectria parasitica*, synonym *Endothia parasitica*) (Fernandes et al. 2022). Ink disease attacks the root collar, causing roots to rot and emit an ink-colored liquid, killing the entire tree. In the 19th century, ink disease devastated American chestnut over much of its range, particularly in lowlands where warm humid conditions favor the disease (Davis 2021). Ink disease has not yet been documented in Michigan, though its range will likely shift northward under climate change (Burgess 2017, Gustafson et al. 2022).

Chestnut blight was discovered in North America in 1904. This fungus girdles and kills aboveground portions of American chestnut. It is a prolific spore producer and disperses rapidly. Further, after decimating chestnut stands it can continue to survive on alternate hosts including oak and maple, while not killing them (Westbrook et al. 2026). By the 1940s, chestnut blight had spread throughout the native range of American chestnut. Few trees have any innate resistance, and the aboveground portions of virtually all trees were killed. Nevertheless, the species readily resprouts from the root collar at the base of stumps. Today, American chestnut exists mostly as a small understory tree in its native range, reaching heights of 5–15 m and rarely setting fruit before succumbing to blight (Nixon 1997).

Conservation/management: Because of ink disease and particularly chestnut blight, American chestnut is functionally extinct as a native tree in natural settings (Westbrook et al. 2026). Consequently, conservation may require radical measures and pragmatic concessions. Efforts to date have focused on biological controls, genetic modification, and traditional breeding programs. While some projects have aimed for blight resistance within genetically pure American chestnut, other efforts accept a degree of non-native DNA in the hopes of a blight-resistant phenotype that is otherwise aesthetically and functionally similar to the wild species.

Research into biological controls has focused upon



a naturally occurring virus which infects chestnut blight and diminishes the blight's effect (a phenomenon called hypovirulence). Although effective with blighted European chestnut, hypovirulence has been relatively ineffective within the native range of American chestnut in North America. Effects of the virus on blighted American chestnut were promising when first observed on the continent, beyond the tree's native range, in northwestern Lower Michigan and Wisconsin (Springer et al. 2013, Double et al. 2018), but efforts to spread hypovirulence to eastern North America have been unsuccessful (Milgroom and Cortesi 2004, Fernandez et al. 2022). This hurdle could potentially be overcome via genetic engineering of the virus (Stauder et al. 2019).

Research into genetic modification of chestnut has focused upon transferring a disease-resistance gene from wheat (*Triticum aestivum*) to chestnut (transgenics) and from blight-resistant chestnut species to blight-susceptible chestnut species (cisgenics)



(Fernandes et al. 2022, Westbrook et al. 2026). The gene from wheat has been successfully transferred, but the genetically modified trees have exhibited reduced growth and lack blight resistance. Further, genetic modification has not gained popular support or regulatory approval (Westbrook et al. 2026).

Traditional breeding programs have focused either upon artificial selection within American chestnut in an effort to improve innate resistance or upon backcrossing of American chestnut with blight-resistant Asian species. Within-species breeding has shown that innate resistance of large surviving American chestnut is heritable but modest, and additional wild sources are needed (Westbrook et al. 2026). Breeding American chestnut with Asian species has been more effective, yet 15–30% non-native DNA is needed for blight resistance (Westbrook et al. 2026).

American chestnut and hybrids are frequently planted in Michigan. These occurrences have aesthetic, cultural, and ecological value, yet they are not legally protected. Native populations are legally protected, but little can be done to protect them from blight. Nonetheless, extending the life of these trees could preserve their genetics for use in breeding programs. Inoculation with the hypovirus is to be considered, as is the use of a soil compress known as mud packing (Carlson 2019). Large surviving American chestnut can be reported to The American Chestnut Foundation (The American Chestnut Foundation n.d.).

Comments: American chestnut was formerly of immense economic importance in North America. Wood was used for lumber, furniture, interior trim, posts, poles, and fences. Bark was used for tanning leather (Barnes and Wagner 2004). Indigenous peoples used various parts of the plant to treat coughs, colds, rheumatism, heart trouble, chafed skin, and parasitic worms in dogs (Moerman 1987). The sweet edible nut was widely eaten in and exported from Appalachia (Freinkel 2009).



Research needs: A large community of scientists continues to research American chestnut, chestnut blight, hypovirus, and ink disease. Both within-species and interspecies breeding programs are promising. A fully native blight-resistant tree is most desirable, yet the hurdles are substantial. Additional large surviving American chestnut are needed for the within-species breeding program, as are growers and financial support (American Chestnut Cooperators' Foundation n.d.). Interspecies breeding programs are also essential, though research on hybrid invasibility and genetic swamping of native trees is needed. In addition to blight resistance, ink-disease resistance should continue to be valued in breeding programs.

Although relatively ineffective within the native range of American chestnut thus far, the hypovirus biocontrol might still prove effective. Research on increasing the virus' efficacy and overcoming vegetative incompatibility between the virus and chestnut blight may be fruitful. Michigan is one of the first places where hypovirus was discovered in North America and has been the site of long-term population monitoring, demographic modeling, and hypovirulence experimentation (Fulbright et al. 1983, Springer et al. 2013, Baines et al. 2014, Kolp et al. 2020). Continued long-term monitoring of hypovirulent stands in Michigan could inform biocontrol strategies in the native range.

Updates of existing element occurrences and sur-



veys for undocumented populations in other suitable habitat within southeast Michigan could assist with identifying germplasm for breeding programs. While chestnut blight is found throughout the native range of American chestnut, ink disease is present only in more southerly latitudes. Therefore, ideal restoration sites may be those where ink disease is absent and likely to remain absent even under climate change. Continued modeling of the projected future distribution of ink disease could help evaluate the suitability of Michigan as a potential restoration site.

Related abstracts: dry-mesic southern forest, pumpkin ash

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- Abstract citation:** Warner, Scott M. 2026. Species Abstract for *Castanea dentata* (American Chestnut). Michigan Natural Features Inventory, Lansing, Michigan, USA.



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Funding for abstract provided by Michigan Department of Transportation.

