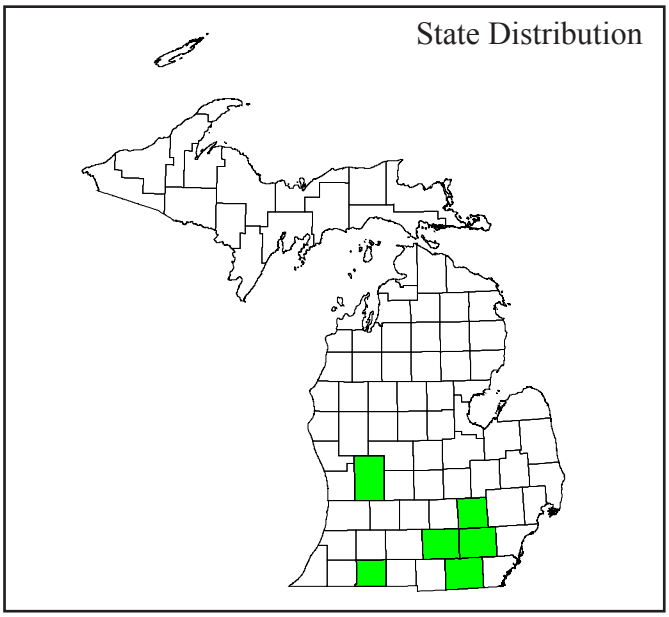
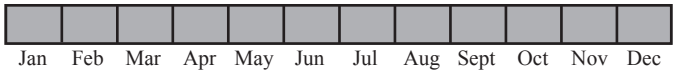
Celtis tenuifolia Nutt. dwarf hackberry



Best Survey Period



Status: State special concern

Global and state rank: G5/S3

Other common names: hackberry, sugarberry, upland hackberry, Georgia hackberry

Family: Ulmaceae (elm family)

Synonyms: *Celtis georgiana* Small; *C. occidentalis* Linnaeus var. *georgiana* (Small) Ahles; *C. pumila* Pursh var. *georgiana* (Small) Sargent; *C. tenuifolia* var. *georgiana* (Small) Fernald & B. G. Schubert; *C. tenuifolia* var. *soperi* B. Boivin (Flora of North America 1997).

Taxonomy: According to the Flora of North America (1997), the genus *Celtis* is more taxonomically complex than currently treated owing to a lack of clear distinctions among its species, and thus likely needs revision. Wagner (1974) found *C. tenuifolia* to be clearly distinct from *C. occidentalis* (common hackberry) in addressing older treatments that have placed these taxa as varieties of a single species. Wagner also evaluated the validity of several named varieties of *C. tenuifolia*, and while recognizing that taxonomic questions remain regarding the genus *Celtis*, he found no data in his studies to support maintaining the described varieties of both *C. tenuifolia* and *C. occidentalis*, with the possible exception of one variety of the latter.

Range: Dwarf hackberry occurs in eastern North America, the primary distribution being well south of the range limit of late Pleistocene glaciation. It ranges principally across the eastern United States from the lower Mississippi valley through the Atlantic Coastal Plain, with outlying or disjunct populations in the upper Midwest, the latter including Illinois, Indiana, Michigan, Ohio, and Ontario. Specifically, the species occurs from southern Ontario to Connecticut in the north, ranging south to northern Florida and west to the eastern edges of Kansas, Oklahoma, and Texas. The main areas of concentration include the Missouri-Arkansas region and the Mississippi-North Carolina region (COSEWIC 2003). The species is considered rare in Ontario, Illinois, Ohio, New Jersey, and North Carolina (NatureServe 2006).

State distribution: *Celtis tenuifolia* is restricted to southern Lower Michigan, with most of its nearly 40 occurrences documented in the southeast, where more than half of the localities are concentrated in Washtenaw County, with several occurrences in Jackson, Lenawee, and Livingston counties. A single locality is known for St. Joseph County, with an assumed occurrence in Kent

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County owing to the presence of an apparent hybrid between dwarf hackberry and the common hackberry, *Celtis occidentalis* (MNFI 2007), the locality based on the presumption that both parents are in proximity.
Recognition: Dwarf hackberry is a **many-branched shrub to small tree with multiple trunks** commonly ranging up to about 4 m in height, characterized by its **irregular to asymmetrical shape** and **dense, compact branching pattern, appearing very "twiggy" with numerous, small, spine-like fine branches**. The leaves are alternate, **ovate to deltoid** in shape, and **equal-sided to slightly asymmetrical at the base**, terminating in a tip that is bluntly triangular to sharp and acuminate (prolonged). The fruits, which are thin-fleshed drupes (stone-seeded) and approximately the size of a large pea, are roundish and **salmon-colored, remaining smooth-skinned** when dry and fully matured. According to Wagner (1974), the flavor of the flesh – albeit very thin and insubstantial – is reported as being **sweet and sugary.**

Dwarf hackberry fruits.

Although dwarf hackberry is somewhat similar to several shrubs and tree species it commonly occurs with (see discussion below), it is most likely to be confused with the more widespread common hackberry, *Celtis occidentalis*, a medium to large tree typically found in southern Michigan floodplain forests. Common hackberry is a lowland to mesic forest tree that may occur occasionally in upland habitats in association with dwarf hackberry, but can be distinguished in several ways. In addition to its markedly larger and more symmetrical growth habit, the leaves of *C. occidentalis* are lance-shaped, strongly lopsided or asymmetrical at the base, and end in a markedly prolonged (attenuate) and somewhat curved (falcate) tip. In contrast to the smooth fruits of dwarf hackberry, the slightly larger fruits of common hackberry are deeply puckered upon maturity, owing to the net-like (reticulate) pattern of the surface of the pit, and are olive-purple in color and tasteless to slightly bitter in flavor (Wagner 1974). Common hackberry can also be distinguished by its distinctive bark, which even in relatively young trees typically develops a pattern of small, corky "bumps" or protuberances which are not produced in dwarf hackberry.

With experience, growth habit alone can be used to reliably identify dwarf hackberry. During his extensive searches for this species in southern Michigan, Wagner (1974) and his research assistants found the noticeably dense and twisted aspect of the branching pattern and twigs to be diagnostic. This was found to be particularly useful during winter, when superficially similar species frequently encountered during his study (e.g. hazelnut, gray dogwood, Tatarian honeysuckle, shadbush, and especially open grown or sun-dwarfed forms of American elm) were far less likely to be confusing. Wagner, in fact, concluded that dwarf hackberry was best sought in the winter owing to its highly distinctive form.

Best survey time/phenology: Dwarf hackberry flushes and blooms about early to mid-May, and can be reliably identified following leaf flush by mid to late May. Owing to the number of characteristics that can be used to distinguish this species, including the presence of persistence fruits, identification (depending on experience) can virtually be conducted in all seasons, especially in winter as noted above.

Habitat: Dwarf hackberry is concentrated in the interlobate region of southeastern Lower Michigan, typically preferring open, early successional habitats,

and often persisting as sites close in and succeed into dry-mesic southern forest. Old fields and former orchards are common habitats, and also the tops and slopes of hills (Wagner 1974). Typical associates include such species as *Ulmus americana* (American elm), *Cornus foemina* (gray dogwood), *Viburnum rafinesquianum* (downy arrow-wood), *Corylus americana* (American hazelnut), *Amelanchier* spp. (shadbush), and not uncommonly widespread non-native species such as *Lonicera tatarica* (Tatarian honeysuckle) and *Morus alba* (white mulberry). Wagner's (1974) summary of the most consistent associates found in Michigan also included *Carya glabra* (pignut hickory), *Ceanothus americanus* (New Jersey tea), *Juniperus virginiana* (Eastern red cedar), *Quercus prinoides* (dwarf chinkapin oak), *Rhus aromatica* (fragrant sumac), and *Sassafras albidum* (sassafras).

Where documented as persisting in dry-mesic forest, dwarf hackberry occurs with such typical species as *Prunus serotina* (black cherry), *Carya ovata* (shagbark hickory), *Prunus virginiana* (chokecherry), *Quercus alba* (white oak), *Q. velutina* (black oak), and *Cornus florida* (flowering dogwood) and many other well known taxa of this forest type. For all of the Michigan sites studied by Wagner, soils were porous, well-drained, and sandy or gravelly, which is typical of upland interlobate areas. Soil pH was found to be consistently alkaline, with readings ranging from 7.5-8.5. It was noted that in the more acidic sands of adjacent areas, as typified by the presence of heath family (Ericaceae) species (e.g. *Vaccinium* spp., *Gaylussacia, Chimaphila*), dwarf hackberry dropped out, demonstrating that as is similar throughout its range, it is a largely a calciphile, preferring more alkaline (e.g limestone rich) substrates.

For the Great Lakes range of this species, Wagner summarized the three basic habitat types as: 1) open successional areas and young oak-hickory woodlands in glacial moraines, 2) near-shore, dry, calcareous sand dune deposits, and 3) habitats with limestone bedrock near the surface, such as alvars and similar types. In the Chicago region, dwarf hackberry is known only from the southern Lake Michigan dunes in Indiana, where it occurs in alkaline sands along the lakeshore with such associates as *Ceanothus americanus* (New Jersey tea), *Celastrus scandens* (American bittersweet), *Prunus virginiana* (chokecherry), *Ptelea trifoliata* (wafer-ash), *Pteridium aquilinum* (bracken fern), *Rhus aromatica* (fragrant sumac), and *Viburnum acerifolium* (maple-leaved viburnum) (Swink and Wilhelm 1994). Elsewhere, Baskin and Baskin (2000) and Kucera and Martin (1957) note the preference for limestone rich habitats in the central portion of the species' range.

Biology: Dwarf hackberry produces unisexual, self-compatible flowers that are wind-pollinated and occur on the same plant (i.e. plants are monoecious). The fruits are animal dispersed, principally via birds as the primary consumer, although small mammals have been implicated as well (Cypher and Cypher 1999). COSEWIC (2003) suggests that hybridization between *C. occidentalis* and *C. tenuifolia* is taking place, based on the observation of putative intermediate plants in some sites. Wagner (1974), however, observed and documented significant polymorphism in both of these species, and not uncommonly within individual plants, suggesting great caution about concluding that hybridization is occurring. More detailed studies, including both molecular analyses and morphological research, are likely required to determine if hybridization (and thus potentially gene flow or introgression) is occurring and to what degree.

There is little information available concerning the life history of this species. COSEWIC summarizes studies by Dunster (1992), who cored trees and found individuals between 40 and 64 years of age in two Ontario populations. Dunster also observed high levels of beetle infestation and an annual mortality level of 10% in a population near Point Pelee, where the survival rate of 1-3 year old seedlings was found to be very low. Wagner (1974) characterized the life history of dwarf hackberry as entailing a long-persistent shrub stage, from which individuals may or may not develop one or more dominant trunks to mature into a small tree. Although Wagner noted that plants in Michigan were typically about 4 m in height, the tallest plants observed in the Great Lakes were 8-10 m, and elsewhere within the range the species could attain a height of 20 m. Based on the coring of the largest diameter individual he observed (6.3 cm), Wagner calculated an age of 60-75 years.

According to COSEWIC (2003), dwarf hackberry was found to be the host for a beetle species not previously documented in Canada, as detailed by Bright et al. (1994). Wagner (1974) observed that caterpillars of

the skiff moth (*Prolimacoides scapha*) favored dwarf hackberry as a host. He also found all three butterfly species (*Asterocampa celtis*, *A. clyton*, and *Libytheana bachmannii*) whose caterpillars are known to feed on *C. occidentalis* and thus sought by collectors in floodplain forests, were unexpectedly associated with dwarf hackberry in upland habitats.

Conservation/management: Dwarf hackberry requires open, early successional habitats, and thus perhaps the principal threat is the loss of habitat through forest succession. Management that maintains open lands for grasslands and oak savanna habitats would greatly benefit this species and many others, and would be of particular value in the many state game areas and public recreation lands in southeastern Lower Michigan.

Comments: The overview of dwarf hackberry in the Great Lakes region by Wagner (1974) is an exemplary paper with comprehensive information on the taxonomy, morphology, ecology, and distribution of the *Celtis* complex, and should be consulted by those interested in more detailed information, in addition to the thorough status review for Ontario by COSEWIC (2003).

Research needs: Owing a paucity of information concerning this species, virtually any research directed toward life history, genetics (e.g. population structure), and ecology would provide valuable information for conservation and future management activities.

Related abstracts: Alleghany or sloe plum, Henslow's sparrow, Northern harrier

Selected references:

Baskin, J.M. and C.C. Baskin. 2000. Vegetation of limestone and dolomite glades in the Ozarks and Midwest regions of the United States. Ann. Missouri Bot. Gard. 87: 286-294.

Bright, D.E., R.E. Skidmore, and J.J. Dunster. 1994. Scolidae (Coleoptera) associated with dwarf hackberry, *Celtis tenuifolia* Nuttall, in Ontario, Canada. Coleopterists Bulletin 48: 93-94.

COSEWIC. 2003. COSEWIC assessment and update status report on the dwarf hackberry *Celtis tenuifolia* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 15 pp. (www.sararegistry.gc.ca/status/status_e.cfm)

Cypher, B.L. and E.A. Cypher. 1999. Germination rates of tree seeds ingested by coyotes and raccoons. Amer. Mid. Nat. 142: 71-76.

Dunster, K.J. 1992. The ecology of two northern marginal disjunct populations of *Celtis tenuifolia* Nutt. in Ontario, Canada. PhD Thesis, University of Toronto. 192 pp.

Flora of North America Editorial Committee. 1997. Flora of North America, North of Mexico. Volume 3: *Magnoliophyta: Magnoliidae and Hamamelidae*. Oxford Univ. Press. New York, NY. 590 pp.

Kucera, C.L. and S.C. Martin. 1957. Vegetation and soil relationships in the glade region of southwestern Missouri Ozarks. Ecology 38: 285-291.

Langlois, T.H. and M.H. Langlois. 1964. Notes on the life-history of the hackberry butterfly, *Asterocampa celtis* (Bdvl. & Lec.) on South Bass Island, Lake Erie. Ohio Jour. Sci. 64: 1-11.

NatureServe. 2006. NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: December 15, 2006).

Swink, F. and G. Wilhelm. 1994. Plants of the Chicago Region, 4th ed. Indiana Acad. Sci., Indianapolis. 921 pp.

Wagner, W.H., Jr. 1974. Dwarf hackberry (Ulmaceae: *Celtis tenuifolia*) in the Great Lakes Region. Mich. Bot. 13: 73-99.

White, P.S. 1983. Corner's rules in eastern deciduous trees: Allometry and its implications for the adaptive architecture of trees. Bull. Torrey Bot. Club 110: 203-212.

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