

Plant Diversity Website

***Cuscuta coryli* Engelm.**

Common Names: Hazel dodder (3).

Etymology: With Arabic origins, *Kushkut*, means dodder plant or parasitic plant; in New Latin, *Cuscuta* directly translates as dodder. *Corylus* converts to hazel in Greek. The species epithet, *coryli*, refers to the tendency to parasitize *Corylus* (1,2).

Botanical synonyms (4):

Cuscuta compacta var. *crenulata* (Engelm.) Choisy

Cuscuta crenulata Engelm.

Cuscuta inflexa Engelm.

Epithymum coryli (Engelm.) Nieuwl. & Lunell

Grammica coryli

Family: Convolvulaceae, the morning glory family

Quick Notable Features:

- Reduced stem and leaf structure
- Thread-like stem is 0.4-0.6mm in diameter
- Tiny flowers, ~1.5-2.5mm, with translucent yellowish-white petals, growing in cymose-paniculate clusters or compact glomerulate bunches
- Corolla lobes are inflexed
- Most often present in hazel (*Corylus*) fields



Plant Height: The height of *Cuscuta coryli* is dependent on the host; H.L. Dean measured the length of a single dodder plant at nearly half a mile (14).

Subspecies/varieties recognized (4): *Cuscuta coryli* var. *coryli* and *Cuscuta coryli* var. *stylosa* Engelm.

Most Likely Confused with: Any other species of *Cuscuta*—in Michigan these might be: *C. cephalanthi*, *C. epilinum*, *C. epithymum*, *C. glomerata*, *C. indecora*, *C. pentagona* or *C. polygonorum*.

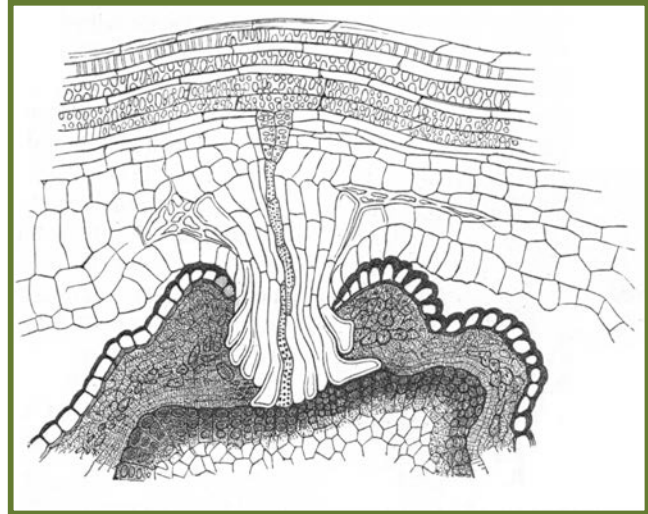
Habitat Preference: In Michigan, *C. coryli* parasitizes *Amphicarpaea*, *Aster*, *Bidens*, *Ceanothus*, *Corylus*, *Euthamia*, *Mentha*, *Monarda*, *Solidago*, *Stachys* and *Symphoricarpos* (6). It has also been noted in sandy areas along pond perimeters and low, dry surfaces (17).

Geographic Distribution in Michigan: *C. coryli* is found in eight counties in Michigan's Lower Peninsula: Cass, Kalamazoo, Monroe, Wayne, Oakland, St. Clair, Midland and Bay (6).

Known Elevational Distribution: The altitudinal limit of *C. coryli* is not mentioned in the literature, however congener *C. indecora* is found between from sea level to 1,500m and congener *C. cephalanthi* is found between 0 and 3,000m in California (8,9).

Complete Geographic Distribution: *C. coryli* is native to the continental U.S. and Canada (4). It is found throughout the United States, excluding the west (Washington, Oregon, California, Nevada, Utah, Wyoming and Colorado), southeast (Louisiana, Georgia, Florida) and the extreme northeast (Vermont, New Hampshire, Maine). It is present in the Canadian provinces of Saskatchewan, Manitoba and Ontario.

Parasitism: Parasitism is a type of symbiotic relationship in which one organism obtains nutrients directly from a host organism. This has a detrimental effect on the host, but benefits the parasite. Although parasitic plants are commonly known to lack chlorophyll, some species have green organs, making them partially photoautotrophic. The physical link between the parasite and the host is called a “haustorium,” and often occurs through xylem-to-xylem attachment. The host can vary, ranging from the mycorrhizae of trees, to grasses and hardwood trees. The parasite often maintains open or partially open stomata, allowing transpiration to aid in extracting nutrients from the host (7).



Vegetative Plant Description: As *Cuscuta spp.* germinate, they develop a short anchorage root, while a stem forms and nutates (rotates) in search of a host. When an attachment with a host has been created, the anchorage root dies (21). Additional means of finding a host have been suggested in literature, such as positive photoautotrophy or growth toward a source of moisture or specific chemicals (5). In *C. coryli*, the stem and leaf structure are simple; the stems are thread-like, yellow-green-cream, 0.4-0.6mm in diameter (3), and form a fairly dense mass over the host. Any leaf rudiments are alternate. The haustoria of dodders can leave girdle-like swellings on the host, referred to as hypertrophies (5).

Climbing Mechanism: In the genus *Cuscuta*, two types of coiling methods are found: loosely twining with few haustoria, and tightly twining with many haustoria—both show upward growth only; it is suggested that the former is used while the plant is in search of a host and the latter is used once contact with a host has been made (5). Typically, *Cuscuta spp.* makes no more than three turns around the same branch. (21). The literature states that the genus generally twines dextrally (5).

Flower Description: The flower is tiny, ~1.5-2.5mm (6,10,15,16), with translucent yellowish-white petals growing in cymose-paniculate clusters or compact glomerulate bunches (12). Some to all of the flowers are pedicellate (15,18). The lobes of the perianth are papillate (6,16). The connate calyx is 4-parted, acute and triangular-ovate; the lobes are approximately equal to or longer than the corolla tube (3,16). The corolla tube is cylindrical-campanulate; the lobes are 4-parted, occasionally 5 (12), oblong to triangular-ovate erect and have acute, incurved tips (16,18,26).



The two free, styles are subulate, thickened at the base, shorter than the ovary: ~1 mm in length, with globose-capitate stigmas (10,12). The 2-locular ovary is subglobose with 4 ovules. The stamens are about equal in length to the corolla lobes; anthers are ovoid-oblong (3). The presence of infra-staminal scales is important to note; they are rudimentary, bifid, toothed, and shorter than the corolla tube (3,17,26). In all Convolvulaceae, the ovary is superior (23).

Flowering Time: In Ohio and the Northeast, the species flowers between July and September (12,18). In *Flora of the Great Plains*, the flowering period is listed as August-September (3).

Pollinator: Yuncker observed visits by wasps and other species of the order Hymenoptera to *Cuscuta* (10). Specific pollination information on *C. coryli* was not found.

Fruit Type and Description: The fruit is a capsule, initially globose, but later developing as depressed-globose, 2-3mm at its widest point, with a thickened ridge at the apex (between the style bases); the withered corolla can persist around the fruit or can fall off entirely (3,6,10,16).

Seed Description: In the genus *Cuscuta*, the defining characteristic of the mature embryo is the absence of cotyledons. This may be attributable to the fact that the first job of the young stem is to search for a host, not to photosynthesize. Each ovary bears four ovules, but one or more may abort, which causes variation in seed size and shape; a dodder seed may have zero, one, or two flat surfaces (5). In *C. coryli*, the seed is compressed-globose, 1.5mm in length and exhibits a scurfy texture (3,10).

Dispersal Syndrome: *C. coryli* is often seen growing on bushy hosts (19), most often hazel (*Corylus*), so the presence of the host is a factor in its dispersal. In unspecified members of the genus *Cuscuta* both germination in the capsule and seeds falling to the ground were observed, leaving water dispersal or other means a possibility for dispersal. Additionally, *Cuscuta* spp. seeds may be able to pass through the intestinal tract of a sheep intact, remaining viable. Although this method of dispersal is unlikely, it extends the potential dispersal mechanisms to include zoochory (5).

Distinguished by: Close similarities between the vegetative parts of species of dodders leave one to rely on inflorescence, floral, and fruit characteristics to distinguish among the species (5). *C. coryli* is most closely related to *C. cephalanthi*, *C. indecora* (22) and *C. polygonorum*. *C. cephalanthi* can be distinguished because it lacks a papillate perianth; *C. polygonorum* is characterized by its short style (6). *C. indecora* is most easily confused with *C. coryli* because it also has incurved corolla lobes, but *C. coryli* can be distinguished by its usually 4-parted perianth and rudimentary infra-staminal scales (20). "Use botanical illustrations in *Dicotyledons of Ohio* to note morphological distinctions".

Other members of the family in Michigan (number species): In Michigan, Convolvulaceae is a small family, comprised of four genera: *Calystegia* (3), *Convolvulus* (1), *Ipomoea* (4), and *Cuscuta* with 10 species: *C. campestris* Yuncker, *C. cephalanthi* Engelm., *C. epilinum* Weihe, *C. epithymum* (L.) L., *C. glomerata* Choisy, *C. gronovii* Schultes, *C. indecora* Choisy, *C. pentagona* Engelm. and *C. polygonorum* Engelm. (6).

Ethnobotanical Uses: While no specific information has been located on the use of this species of *Cuscuta*, the following information that is not attributed to any one species has been found:

"An Indian proverb states that the person finding the root of dodder will have access to all the riches of the earth" (5). This statement pertains to the wide use of *Cuscuta* spp. for medicinal purposes

across Asia, from herbal mixtures to treat ovarian cancer and postmenopausal osteoporosis to antifungal and insecticidal applications (13). From another perspective, “The dodder’s rapid development and its stranglehold on and damage to the host have earned it a place in the superstition of many Western countries. The German “Teufelswurm” and Dutch “Duivelsnaaigaren” are vernacular names of this sort,” highlights *Cuscuta*’s standing as a noxious weed in many places (5).

Phylogenetic Information: Convolvulaceae is among five other families of the order Solanales (Montiniaceae, Sphenocleaceae, Hydroleaceae, and Solanaceae), which encompasses 165 genera and 4,080 species. The distribution of Convolvulaceae is extensive worldwide, excluding areas of extreme temperatures—the Sahara and Gobi Deserts, and areas of high latitude (Canada, Greenland, Russia, Antarctica, as well as the southern tip of South America). Convolvulaceae has been noted as the only asterid family whose seeds exhibit physical dormancy (5). *Cuscuta spp.*, belonging to the subfamily Cuscutioideae, is the only genus within the family that is parasitic. Its placement in Convolvulaceae is openly debated, but is supported by similar flower morphology (5, 10, 11) as well as the twining habit.

Interesting Quotation or Other Interesting Factoid not inserted above: *Cuscuta coryli* was originally published by George Engelmann in 1842 (24). When he discovered that *C. coryli* is not host-specific to *Corylus*, he stated in a subsequent article that he wished he could change the name to *C. crenulata* (25). This name was never published as a new name (avowed substitute, nomen novum), therefore *C. crenulata* is illegitimate (nomen superfluum). Nancy Hensold of the Field Museum kindly helped the author interpret this information. The original description of *C. coryli* is tremendous; do take a look at it online via the Biodiversity Heritage Library.

Literature and websites used:

- (1) Brown, R.W. 1956. *Composition of Scientific Words*. Washington, D.C., USA: Smithsonian Institution Press.
- (2) Stearn, W.T. 1972. *Stearn’s Dictionary of Plant Names for Gardeners*. New York, NY, USA: Sterling Publishing Co. Inc.
- (3) McGregor, R.L. 1986. *Flora of the Great Plains*. Lawrence, Kansas, USA: The University Press of Kansas.
- (4) Tropicos. Last modified: 2012. <http://www.tropicos.org/Name/8500669?tab=synonyms>
- (5) Kuijt, J. 1969. *The Biology of Parasitic Flowering Plants*. Los Angeles, CA, USA: University of California Press.
- (6) Voss, E.G. 2004. *Michigan Flora Part III: Dicots Concluded*. Ann Arbor, Michigan, USA: Cranbrook Institute of Science.
- (7) Clark, W.D., R. Moore, & K.R. Stern 1995. *Botany*. Dubuque, Iowa, USA: Wm. C. Brown Publishers.
- (8) Calflora. Last modified: 2012. http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2536
- (9) Calflora. Last modified: 2012. http://www.calflora.org/cgi-bin/species_query.cgi?where-calrecnum=2533
- (10) Yuncker, T.G. 1920. Revision of the North American and West Indian Species of *Cuscuta*. *Illinois Botanical Monographs*. 6(2&3):1-141.
- (11) Olmstead, R.G., & S. Stefanović 2004. Testing the phylogenetic position of a parasitic plant (*Cuscuta*, Convolvulaceae, Asteridae): Bayesian inference and the parametric bootstrap on data drawn from three genomes. *Systematic Biology* 53(3): 384-399.
- (12) Cooperrider, T.S. 1995. *The Dicotyledons of Ohio: Linaceae through Campanulaceae*. Columbus, Ohio, USA: Ohio State University Press.
- (13) Costea, M. & T.J. François 2005. The biology of Canadian weeds. 133. *Cuscuta campestris*

- Yuncker, *C. gronovii* Willd. ex Schult., *C. umbrosa* Beyr. ex Hook., *C. epithymum* (L.) L. and *C. epilinum* Weihe. *Canadian Journal of Plant Science*. 298.
- (14) Dean, H.L. 1942. Total length of stem developed from a single seedling of *Cuscuta*. *Proc. Iowa Acad. Sci.* 49: 127–128.
- (15) Gleason, H.A. & A. Cronquist 1991. *Manual of Vascular Plants of the Northeastern United States and Adjacent Canada*. Bronx, New York, USA: New York Botanical Garden Press.
- (16) Radford, A.E., H.E. Ahles, & C.R. Bell 1968. *Manual of the Vascular Flora of the Carolinas*. Chapel Hill, North Carolina, USA: The University of North Carolina Press.
- (17) Fernald, M.L. 1950. *Gray's Manual of Botany*, 8th ed. New York, USA: American Book Company.
- (18) Magee, D.W. & H.E. Ahles 1999. *Flora of the Northeast: A Manual of the Vascular Flora of New England and Adjacent New York*. Amherst, Massachusetts, USA: University of Massachusetts Press.
- (19) Yuncker, T.G. 1923. The genus *Cuscuta* in Michigan. *Pap. Michigan Acad.* 1:185-189.
- (20) Stevens, O.A. 1912. Notes on the distribution and growth of North Dakota Cuscutae. *American Journal of Botany* 3(4): 185-188.
- (21) Menninger, E.A. 1970. *Flowering Vines of the World*. New York, New York, USA: Hearthside Press Incorporated.
- (22) Costea, M., G.L. Nesom, & S. Stefanović 2006. Taxonomy of the *Cuscuta indecora* (Convolvulaceae) complex in North America. *Sida* 22(1) 209-225.
- (23) Zomlefer, W.B. 1994. *Guide to Flowering Plant Families*. Chapel Hill, North Carolina, USA: The University of North Carolina.
- (24) Engelmann, G. 1842. Monography of the North American Cuscutineae. *The American Journal of Science* 43: 337-338.
- (25) Engelmann, G. 1843. North American Cuscutineae. *The London Journal of Botany* 2: 197.
- (26) Britton, N.L. & H.A. Brown 1970. *An Illustrated Flora of the Northern United States and Canada: Volume III*. New York, NY: Dover Publications, Inc.

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1 and 3) Both images of the flowers, close and inflorescence are courtesy of Joel McNeal

2) Drawing of haustoria: Haustorium von *Cuscuta epilinum* an *Linum usitatissimum* from Julius Sachs: *Vorlesungen über Pflanzenphysiologie*, zweite Auflage, Leipzig (1887), downloaded from http://commons.wikimedia.org/wiki/File:Haustorium_Cuscuta_epilinum.jpg

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