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KEY TO THE DODDERS (*CUSCUTA*, CONVOLVULACEAE) OF ALABAMA AND ADJACENT STATES

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ABSTRACT

In North America, the genus *Cuscuta* (Convolvulaceae) is represented by fifty-five species, nine of which are in Alabama, with six additional taxa occurring in Mississippi, Tennessee, Georgia, and the Florida Panhandle. Keys, illustrations, photographs, and commentary are provided for all fifteen taxa. One species, *Cuscuta harperi*, is globally rare (G2G3) and reported from only ten Alabama and two Georgia counties worldwide. Two taxa in the region, *C. japonica* and *C. suaveolens*, are exotic to North America.

KEY WORDS: *Cuscuta*, dodders, Alabama

Dodders (*Cuscuta* spp.) are members of the Morning-glory family (Convolvulaceae), although some authors (e.g., Small 1933; Gandhi et al. 1987) have placed them in their own family (Cuscutaceae). Modern phylogenetic studies (Neyland 2001; Stefanović et al. 2002, 2003) indicate the genus is nested within a monophyletic Convolvulaceae and best treated as a member of this family. All *Cuscuta* species are leafless, annual parasitic herbs that essentially lack chlorophyll (Fig. 1). Their flowers are small (most less than 7 mm long) and usually have whitish corollas with waxy textures. They have slender, twining, often yellowish-orange stems that utilize haustoria (specialized "sucking roots") to penetrate and extract nutrients from their host (Dawson et al. 1994). Dodder seeds germinate in the soil, but their rudimentary roots (small swollen root-like structures) die in a matter of days as the new plants twine around their host (Sherman et al. 2008). Some of these obligate parasites are entirely weedy and cause serious damage to agricultural crops (Lanini & Kogan 2005).

Figure 1. *Cuscuta campestris* in Germany. Photo by Kristian Peters, 9 Sept 2007 (commons.wikimedia.org).

Carolus Linnaeus named the genus in 1753 in his monumental work *Species Plantarum*. According to Austin (1980), the word *Cuscuta* is thought to have been derived from "kushkut," the Arabic name for the plant, which translates as "a tangled wisp of hair." The common name of dodder has two possible origins. Shosteck (1974) proposed that it is derived from the German word *dotter*, meaning "yolk of an egg," possibly referring to orange-yellow color of the stems. Zimdahl (1989) believed the vine was named after the English derivation for dodder, which means to shake or tremble. When the vine first emerges from the soil it is weak and therefore trembles with any small breeze as it searches for its host. Other common names for this genus include: Love-Vine; Angel's-Hair; Tangle-Gut; Strangle-Vine; Devil's-Gut; and Witches'-Shoelaces (Gandhi et al. 1987).

Cuscuta have been notoriously difficult to identify because the primary characters used to distinguish species typically involve microscopic differences in the small flowers. Stefanović et al. (2007) stated that "parasitism is frequently associated with the extreme reduction or modification of vegetative structures," which makes identification difficult. Austin (1979) suggested that field botanists should make ample collections with mature flowers and fruit along with the host plant. He also stated that many "curators do not know how to mount or house them without eventual loss of many of the critical parts" (Austin 1979).

The keys that follow were constructed after examining numerous specimens from herbaria across the South (AMAL, BRIT, JSU, UNA, VDB). Many North American treatments of the genus were also utilized to assist in creating the keys. The most useful references were Truman G. Yuncker's two classic works on *Cuscuta* (1932, 1965). Other publications used as references include the following: Studies of the Florida Convolvulaceae – III. *Cuscuta* (Austin 1980); Guide to the Vascular Plants of the Florida Panhandle (Clewell 1985); Taxonomy of the *Cuscuta pentagona* complex (Convolvulaceae) in North America (Costea et al. 2006a); Taxonomy of the *Cuscuta gronovii* and *Cuscuta umbrosa* (Convolvulaceae) (Costea et al. 2006b); Taxonomy of the *Cuscuta indecora* (Convolvulaceae) complex in North America (Costea et al. 2006c); Shinners & Mahler's Flora of North Central Texas (Diggs et al. 1999); Cuscutaceae of Louisiana (Gandhi et al. 1987); Floristic Synthesis of North America (Kartesz 2013); Alabama Plant Atlas (Kral et al. 2013); The genus *Cuscuta* in Virginia (Musselman1986); Manual of the Vascular Flora of the Carolinas (Radford et al. 1968); Manual of the Southeastern Flora (Small 1933); Keys to the Flora of Arkansas (Smith 1994); Flora of Virginia (Weakley et al. 2012); Flora of the Southern and Mid-Atlantic States (Weakley 2013); Guide to the Vascular Plants of Florida (Wunderlin & Hansen 2003); and Steyermark's Flora of Missouri, Volume 2 (Yatskievych 2006).

KEY TO *CUSCUTA* OF ALABAMA AND ADJACENT STATES

1. Styles more or less united; capsule with circumscissile dehiscence near base (fruit splitting by a transverse circular line separating upper and lower sections); flowers 3–5 mm long and widely spaced in a spike-like inflorescence; fruit (capsule) large, about 5 mm long; plants known from Florida (and other states outside the study area); typically parasitic on woody plants ..... **15. Cuscuta japonica**

1. Styles free (separate and distinct from the base); capsule indehiscent (not splitting open to release seeds); flowers and fruits various; plants known from southeastern US and elsewhere in North America; parasitic on both herbaceous and woody plants.

   2. Flowers subtended by 1–10 bracts; sepals separate to base.

      3. Bracts lanceolate with reflexed or spreading tips (squarrose) and all about the same length; plant in dense, rope-like whorls or spirals, appearing as a dense coil of flowers with few string-like stems visible ..... **1. Cuscuta glomerata**

3. Bracts ovate or orbicular with erect, appressed tips and imbricate (layered like shingles on a roof); plant in compact or in loose paniculate clusters with string-like stems visibly clambering over host.

4. Flowers in sessile compact clusters, pedicels absent; bracts orbicular with rounded tips and tightly subtending flower; styles not exserted in flower and only 1.5–1.8 mm long in fruit; corolla lobes about 1.0 mm long ..... **2. Cuscuta compacta**

4. Flowers typically in loose panicles, pedicels 0.5–3.0 mm long; bract(s) ovate with bluntly pointed tip and loosely subtending flower; styles long-exserted, 2.5−3.5 mm long in flower and fruit; corolla lobes 1.8–2.0 mm long ..... **3. Cuscuta cuspidata**

2. Flowers not subtended by bracts (occasionally one bract may be found on the lower portion of pedicel); sepals more or less united basally (lobed 1/2 to 2/3 to base).

5. Surface of flowers densely granular (papillate); calyx lobes acute; corolla lobes sharply acute with tips curved inwards; flowers fleshy.

6. Flowers mostly 4-merous, corolla typically tubular; infrastaminal scales merely bifid with a few teeth on each segment and found well below filament bases; calyx often more than ½ as long as corolla (calyx lobes reaching the sinus of corolla lobes) ..... **4. Cuscuta coryli**

6. Flowers mostly 5-merous, corolla typically campanulate; infrastaminal scales profusely fringed and found at filament bases; calyx only ½ as long as the corolla (calyx lobes not reaching sinus of corolla lobes- only applies to var. *indecora*) ..... **5. Cuscuta indecora**

5. Surface of flowers not granular (but they may be reticulate or glandular); calyx and corolla lobes various; flowers usually membranous.

7. Capsule/ovary strongly beaked; flowers large, 4–6 mm long; plants of the Appalachian Mountains (especially the Blue Ridge) ..... **11. Cuscuta rostrata**

7. Capsule/ovary globose or ovate (blunt to pointed, but not beaked); flowers smaller, 1–4 mm long; plants of various physiographic provinces.

8. Flowers 0.9–1.4 mm long, mostly 4-merous; stems filiform (0.15–0.3 mm in diameter); plants occurring on granite or sandstone outcrops ..... **8. Cuscuta harperi**

8. Flowers 1.5–7.0 mm long, 4- or 5-merous; stems slender, medium or course (more than 0.35 mm in diameter); plants widespread in various habitats.

9. Flowers typically 4-merous, sessile to subsessile and in globular inflorescences; corolla lobes mostly erect.

10. Corolla lobes obtuse; capsule capped by withered corolla; styles mostly long, slender and the same width throughout their length, about 1.0–1.2 mm long; infrastaminal scales prominently fringed, not bifid ..... **6. Cuscuta cephalanthi**

10. Corolla lobes acute; capsule with withered corolla at base; styles mostly short, stout and flared at base, about 0.5–0.8 mm long; infrastaminal scales mostly bifid with a few fringes on each segment ..... **7. Cuscuta polygonorum**

9. Flowers typically 5-merous, sessile to pedicillate and in globular or loose inflorescences; corolla lobes erect or inflexed at tip (bent inward).

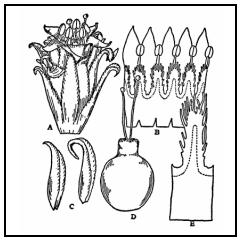
11. Calyx lobes acute; margins of calyx lobes more or less revolute, creating broadly rounded sinuses; corolla tubes distinctly longer than calyx; flowers 3–4 mm long, mostly longer than wide and often glandular; plants historic in Alabama and rare in US, typically parasitic on alfalfa (*Medicago sativa*) ..... **14. Cuscuta suaveolens**
11. Calyx lobes obtuse; margins of calyx lobes not as above; corolla tube about as long as calyx; flowers various; plants widespread in Alabama and US, parasitic on a variety of species.

    12. Corolla lobes acute with inflexed tips (on mature flowers); flowers and fruit not glandular; calyx surface usually distinctly reticulate.

        13. Calyx lobes strongly overlapping (imbricate) at base, forming 4 to 5 strong angles at the sinuses of mature flowers (sometimes obscured in fruit); corolla lobes lance-acuminate; mature flowers about 1.5–2 mm long ..... **9. Cuscuta pentagona**
        13. Calyx lobes not strongly overlapping at the base of mature flowers, therefore not distinctly 5-angled; corolla lobes deltoid-ovate; mature flowers about 2–3 mm long ..... **10. Cuscuta campestris**

    12. Corolla lobes mostly obtuse and straight at tip; flowers and fruits often appearing glandular; calyx surface usually not noticeably reticulate.

        14. Capsule globose-conic (flask-shaped); apex of capsule thick-collared (stylopodium present); flowers pedicillate; calyx lobes shorter than corolla tube or as long (in var. *latiflora*); corolla lobes more than 1 mm long; styles usually more than 1 mm long; throughout the Southeast (and elsewhere) ..... **12. Cuscuta gronovii**
        14. Capsule globose-depressed; apex of capsule lacking thickened ridge (stylopodium absent); flowers subsessile; calyx enclosing most of corolla tube; corolla lobes less than 1 mm long; styles less than 1 mm long; on the Coastal Plain of Gulf Coast states .... **13. Cuscuta obtusiflora**

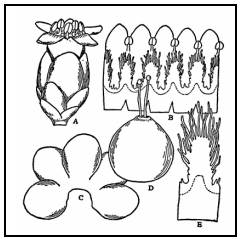


1. Cuscuta glomerata Choisy {clustered} — ROPE DODDER (Fig. 2). The epicenter of rope dodder's range includes the upper Midwest, but it is known in a few counties in Tennessee and Mississippi. It has not been documented for Alabama. Yuncker (1932) noted that "The yellow, rope-like masses of sessile, densely bracteated flowers tightly wound about the stems of its host make this one of the most easily recognized of the North American species." The only other *Cuscuta* it could likely be confused with in the Southeast is *C. compacta*, but *C. glomerata* differs by its loose lanceolate bracts with recurved tips. Illustration: *Cuscuta glomerata* (Yuncker 1932) A, flower; B, opened corolla; C, bracts; D, matured capsule; E, infrastaminal scale.

(A) Photo: Joel McNeal

(B) Photo: Joel McNeal

Figure 2. *Cuscuta glomerata* cultivated on *Coleus*, 11 June 2011. (A) Habit. (B) Flower with reflexed bracts.



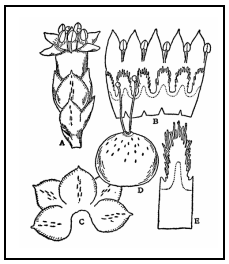
2. Cuscuta compacta Jussieu ex Choisy {compact} — COMPACT DODDER; COMPACT-FLOWER LOVE-VINE (Fig. 3). Alluvial woods, stream banks, pine savannahs, marshes, swamps, wet fields, and other low areas; common throughout Alabama; late July−November. The primary distribution of this *Cuscuta* is the southeastern USA, but it extends northward to Illinois and New England. It seems to prefer woody hosts but does parasitize herbaceous plants. This species has sessile clusters of flowers each subtended by tightly appressed, obtuse bracts. [*Cuscuta compacta* Jussieu *ex* Choisy var. *efimbriata* Yuncker] (Illustration: *Cuscuta compacta* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: Joel McNeal

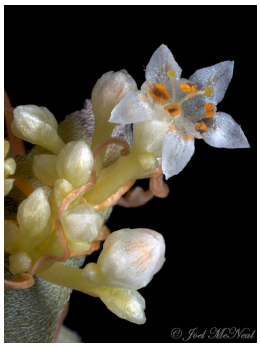
(B) Photo: Joel McNeal

Figure 3. *Cuscuta compacta*, cultivated on *Coleus*, 19 June 2000. (A) Habit. Note tight coils of flowers with visible string-like stems. (B) Inflorescence showing compact clusters of flowers with tubular corollas.

3. Cuscuta cuspidata Engelmann {with stiff points} — CUSP DODDER; ANGEL-HAIR (Fig. 4). This *Cuscuta* is mainly found in the central USA, east of the Rocky Mountains. It is not known from Alabama but has been reported for Tennessee and western Mississippi (Kartesz 2013). Cusp dodder seems to have a preference for host plants of the Compositae family (Asteraceae). It is a bracteate dodder, but unlike the others (in this treatment), it tends to have very few bracts and sometimes only one. It also differs by its loose flower clusters and long styles that are well-exserted above the corolla. Illustration: *Cuscuta cuspidata* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.



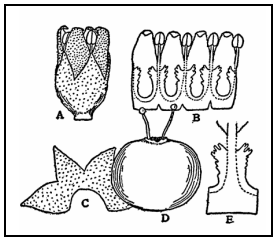
(A) Photo: Daniel L. Nickrent



(B) Photo: Joel McNeal

Figure 4. *Cuscuta cuspidata.* (A) Habit. Note loose panicles of flowers. On *Campsis radicans* in Garza County, Texas, 24 June 2001. (www.phytoimages.siu.edu). (B) Flowers. Cherry County, Nebraska, 19 July 2012.

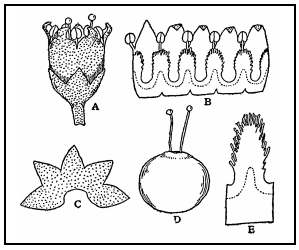
4. Cuscuta coryli Engelmann {of *Corylus*} — HAZEL DODDER (Fig. 5). Open woods and woodland borders; rare in northern Alabama (Cumberland Plateau); late June−November. The only valid specimens examined from Alabama were collected from Lawrence and Jackson counties. A specimen from the Blackbelt prairie region of the state (Greene County) was annotated by the author to *Cuscuta indecora*. Hazel dodder is found throughout the USA east of the Rocky Mountains but less commonly southward. This species occurs on a wide variety of woody and herbaceous hosts. It resembles *C. indecora* with its very granular flowers, but it is mostly 4-merous and has bifid infrastaminal scales that are much shorter than the corolla tube. [*Grammica coryli* (Engelmann) Hadac & Chrtek] Illustration: *Cuscuta coryli* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.



(A) Photo: Joel McNeal

(B) Photo: Joel McNeal

Figure 5. *Cuscuta coryli* in greenhouse on Coleus, 14 Aug 2007. (A) Inflorescence. (B) Close-up of flowers.

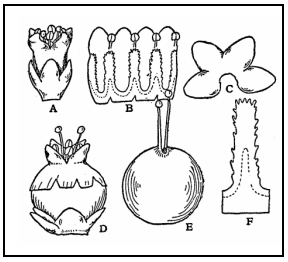


5. Cuscuta indecora Choisy {not ornamental} — LARGE-SEED DODDER; BIGSEED ALFALFA DODDER; PRETTY DODDER (Fig. 6). Pine savannahs, roadsides, open woods, bogs, salt marshes and open disturbed areas; frequent along the coast, but rare in north Alabama; July−October. Yuncker (1965) reported it being abundant along the coastal states from Florida to California and extending northward mainly through the central states. The flowers are said to have a faint sweet fragrance (Musselman 1986). This taxon is similar in appearance to *Cuscuta coryli*, but *C. indecora* flowers are campanulate, 5-merous, and have fringed infrastaminal scales that are about as long as the corolla tube. Both of these dodders have very granular flowers (appearing as numerous little bumps) with corolla lobes that are sharply acute and inflexed. These two characters make them very distinct from other southeastern *Cuscuta*. Costea et al. (2006c) recognized two other North American varieties, both having lanceolate calyx lobes that are usually longer than the corolla tube. The first, *C.indecora* var. *longisepala* Yuncker, is known only from Texas. It has acute calyx lobes and flowers in loose clusters. The second, *C. indecora* var. *attenuata* (Waterfall) Costea, is parasitic exclusively on *Iva annua* and is known from Kansas, Oklahoma, and Texas. It differs by its attenuate calyx lobes and its flowers in dense clusters. [*Cuscuta indecora* Choisy var. *neuropetala* (Engelmann) Hitchcock; *Grammica indecora* (Choisy) W.A. Weber] Illustration: *Cuscuta indecora* var. *indecora* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: Terry Gregston

(B) Photo: Joel McNeal

Figure 6. *Cuscuta indecora.* (A) Habit. Eddy County, New Mexico, 3 Nov 2011 (www.phytoimages.siu.edu). (B) Close-up of granular, 5-merous flowers. Plant cultivated in a greenhouse on *Coleus*, 24 Aug 2000.

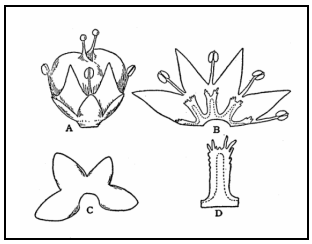


6. Cuscuta cephalanthi Engelmann {of *Cephalanthus*} — BUTTONBUSH DODDER (Fig. 7). Reported for Georgia and Tennessee but not known from Alabama (Kartesz 2013). This species is common in the upper Midwest of the USA, but its range extends west to California and eastward to New England. It seems to prefer woody hosts but can also be on a variety of herbaceous plants. Yuncker (1932) stated that "This species somewhat resembles the smaller forms of *C. gronovii*, but differs with its commonly 4-parted flowers, in dense, compact inflorescences, and with usually depressed capsules capped by the withered corollas." [*Grammica cephalanthi* (Engelmann) Hadac & Chrtek] Illustration: *Cuscuta cephalanthi* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, mature capsule crowned by withered corolla; E, mature capsule with corolla removed; F, infrastaminal scale.

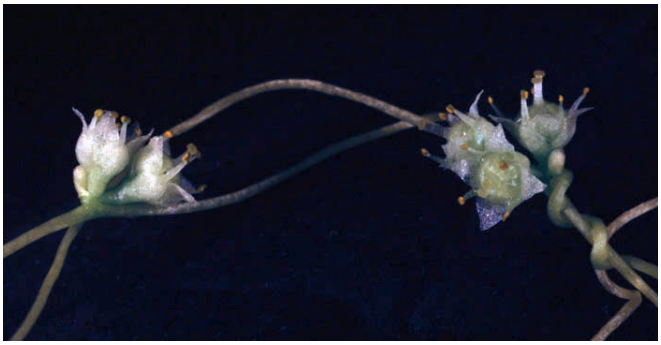
(A) Photo: Joel McNeal

(B) Photo: Joel McNeal

Figure 7. *Cuscuta cephalanthi*, cultivated on *Coleus* in the Pennsylvania State University greenhouse. (A) Habit. (B) Fruiting specimen with younger capsules capped by corollas.



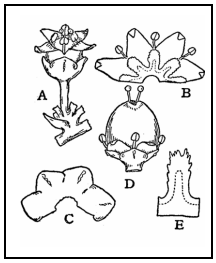
7. Cuscuta polygonorum Engelmann {of *Polygonum*} — SMARTWEED DODDER (Fig. 8). This species is reported from Davidson County Tennessee (Kartesz 2013). Its center of distribution includes the Midwestern USA (north to Ontario) and extends east to New England. Smartweed dodder's primary host is smartweed (*Polygonum/Persicaria*), but it can also be found on other herbaceous plants such as *Penthorum*, *Impatiens*, and *Lycopus*. Yuncker (1932) stated that "The 4-parted flowers with oblong, bifid scales, long stamens and large capsule with subulate styles readily distinguish this species." Illustration: *Cuscuta polygonorum* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, infrastaminal scale.



(A) Photo: Joel McNeal

(B) Herbarium specimen (CONN)

Figure 8. *Cuscuta polygonorum.* (A) 4-merous flowers. (B) Fruits. (http://bgbaseserver.eeb.uconn.edu/)



8. Cuscuta harperi Small {for Roland M. Harper, American botanist, 1878-1966} — HARPER'S DODDER (Fig. 9). Sandstone and granite outcrops; Cumberland Plateau, Valley & Ridge and Piedmont of Alabama; late July−November. The Alabama Natural Heritage Program (2012) ranks this species as a globally rare plant (G2G3), known only two USA states worldwide. In Alabama, Harper's dodder has been documented from 10 counties. In Georgia, it occurs in Heard County on granite outcrops of the Piedmont and Washington County on Altamaha Grit outcrops of the Coastal Plain (Chafin 2007). Its host plants include *Liatris microcephala, Bigelowia nuttallii, Hypericum gentianoides*, *Helianthus longifolius*, and *Croton willdenowii*. Yuncker (1932) noted that "It closely resembles some of the smaller specimens of *C. pentagona*, but differs generally in the smaller size of its flowers which are mostly 4-parted."

Cuscuta harperi has calyx lobes that overlap at the base to form angles like in *C. pentagona*. Illustration: *Cuscuta harperi* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: Wayne Barger

(B) Photo: Joel McNeal

Figure 9. *Cuscuta harperi* on sandstone outcrops in DeKalb County, Alabama. (A) Habit. Parasitizing *Liatris microcephala*, 20 Aug 2008. (B) Close-up of 4-merous flowers, 3 Sept 2007.

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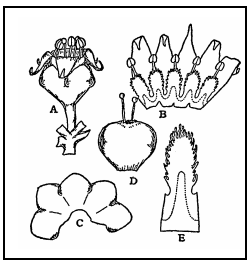
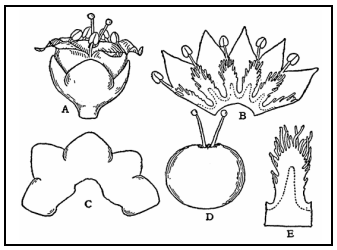
9. Cuscuta pentagona Engelmann {five-angled} — FIVE-ANGLED DODDER (Fig. 10). Roadsides, fields, and open disturbed places; common throughout Alabama; late May−November. This *Cuscuta* is parasitic on a wide variety of mostly herbaceous hosts and found throughout much of the USA and southern Canada but most abundant in the eastern USA. It is similar to *Cuscuta campestris*, but readily distinguished by its prominently angled calyces (formed by the overlapping bases of the calyx lobes). This taxon also resembles *C. harperi*, but *C. pentagona* has larger flowers and is typically 5-merous. [*Cuscuta arvensis* Beyrich ex Engelmann; *Grammica pentagona* (Engelmann) W.A. Weber] Illustration: *Cuscuta pentagona* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.



(A) Photo: Howard Horne

(B) Photo: Howard Horne

Figure 10. *Cuscuta pentagona* on Dauphin Island in Mobile County, Alabama, 2 Sept 2013. (A) Flowers and fruit. Note reticulated calyx surface. (B) Close-up of calyx showing overlapping base forming prominent angles.

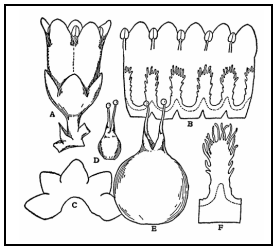


10. Cuscuta campestris Yuncker {of fields} — FIELD DODDER; PRAIRIE DODDER; GOLDEN DODDER (Fig. 1 & 11). Roadsides, fields, woodland borders and open disturbed areas; common throughout Alabama; late May−November. Commonly parasitic on non-woody legumes, especially *Lespedeza* (Fabaceae) but also found on a variety of other herbaceous hosts (rarely on woody plants). It is cosmopolitan and found throughout the range of the genus worldwide, probably because the association of its seeds with those of its cultivated leguminous hosts (Yuncker 1965). *Cuscuta campestris* is often confused and sometimes lumped with *C. pentagona*, but *C. campestris* has larger flowers and it lacks prominent angles at the base of calyx lobes. It has also been misidentified as *C. indecora* due to its reticulated calyx, which is sometimes mistakenly interpreted as granular in texture. [*Grammica campestris* (Yuncker) Hadac & Chrtek] Illustration: *Cuscuta campestris* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: Eric Soehren

(B) Photo: Eric Soehren

Figure 11. *Cuscuta campestris*. Lauderdale County, Alabama, 21 October 2010. (A) Habit. (B) Flowers & Fruit.

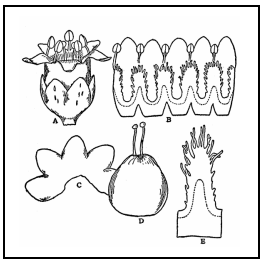


11. Cuscuta rostrata Shuttleworth {beaked} — APPALACHIAN DODDER; BEAKED DODDER (Fig. 12). This species occurs in high elevation hardwood forests and thickets of the Appalachian Mountains from West Virginia south to northeast Georgia. It is not found in Alabama. Appalachian dodder is one of the few species in the Southeast with very fragrant flowers (Musselman 1986). Its prominently beaked ovaries and capsules make it an easier *Cuscuta* to identify. However, some of the bracteate species have beaked ovaries and can be confused with it, but *C. rostrata* flowers do not have subtending bracts. [*Grammica rostrata* (Shuttleworth) Hadac & Chrtek] Illustration: *Cuscuta rostrata* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, ovary; E, matured capsule; F, infrastaminal scale.

(A) Photo: Jack Carman

(B) Photo: Joel McNeal

Figure 12. *Cuscuta rostrata.* (A) Habit. Unicoi County, Tennessee, 26 July 2011. (B) Fruit with distinctive beaks. Plant cultivated on *Coleus* in University of Pennsylvania greenhouse.

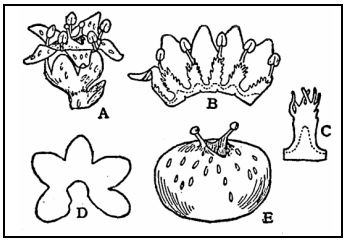


12. Cuscuta gronovii Willdenow ex J.A. Schultes {for Jan Fredrik Gronovius, Dutch botanist, 1690-1762} — SWAMP DODDER; COMMON DODDER; SCALDWEED; LARGE LOVE-VINE (Fig. 13). Stream banks, bogs, alluvial woods, marshes, swamps, wet fields, and other low disturbed areas; common throughout Alabama; late July−November. This dodder grows on a wide variety of woody and herbaceous hosts. It is the most common North American *Cuscuta* (Yuncker 1965). Its main distribution is central and eastern USA and Canada (Kartesz 2013). It can be identified by its obtuse corolla lobes and raised ridge on the apex of the capsule called a stylopodium. Because of its similar corolla, *Cuscuta rostrata*, can be mistaken for this species, but *C. rostrata* differs by its strongly beaked capsule. Some specimens have been misidentified as *C. compacta* because *C. gronovii* can also have compact flowers clusters, but it lacks bracts subtending the flowers. Two other varieties of *Cuscuta gronovii* are recognized by some authors (Costea et al. 2006b; Yuncker 1965). The first, *C. gronovii* var. *latiflora* Engelmann, has smaller flowers and a calyx that almost encloses the corolla tube. This variety has an overlapping range with var. *gronovii*. The second, *C. gronovii* var. *calyptrata* Engelmann, known only from Texas and Louisiana, has corolla tubes that are longer than var. *gronovii* and has a withered corolla that caps the maturing capsule (as in *C. cephalanthi*). [*Grammica gronovii* (Willdenow ex J.A. Schultes) Hadac & Chrtek] Illustration: *Cuscuta gronovii* var. *gronovii* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: Jack Carman

(B) Photo: Joel McNeal

Figure 13. *Cuscuta gronovii*. (A) Inflorescence. Rutherford County, Tennessee, 6 Sept 2004. (B) Typical fruits with stylopodium (thickened ridge a base of style). Along Spring Creek in Centre County, Pennsylvania.



13. Cuscuta obtusiflora Kunth var. **glandulosa** Engelmann {obtuse flower; glandular} — PERUVIAN DODDER; GLANDULAR DODDER (Fig. 14). Historically known from a collection made by Charles Mohr in a swampy thicket in Mobile County, Alabama, which was parasitic on *Rubus* (Mohr 1901). This specimen was not seen by this author and may be housed at herbarium US. According to Yuncker (1965), its primary host is *Polygonum* (*Persicaria*) and its main distribution is "West Indies, southeastern and Gulf states, and sparingly in Mexico." But this taxon also occurs in California, Oklahoma, and other states (Kartesz 2013). It is likely that more collections of this dodder will be made in Alabama, since it occurs in Florida, Mississippi, and adjacent Georgia (its type locality). Weakley (2013) states that it can be found "on herbs in calcareous glades," so these sites might be a good place to search for it, especially if smartweed (*Persicaria*) is present. Peruvian dodder can be confused with the more common *Cuscuta gronovii* because they both have obtuse corolla lobes, but *C. obtusiflora* lacks a stylopodium (thickened ridge

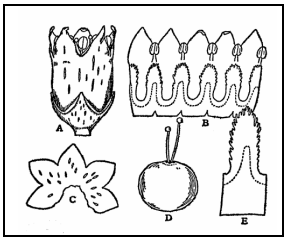
on top of its capsule) and its calyx lobes always reach the sinuses of the corolla lobes. Both species, however, can have glandular flowers and fruit. These visible translucent, yellowish glands are technically called "laticifers," which are glandular-appearing cells that contain latex (Costea et al. 2006a). The typical variety, *Cuscuta obtusiflora* var. *obtusiflora*, is native to South America and very similar to the more northern variety. In var. *glandulosa* the infrastaminal scales are as long as or longer than corolla tube and in var. *obtusiflora* they are shorter (Engelmann 1859). [*Cuscuta glandulosa* (Engelmann) Small] Illustration: *Cuscuta obtusiflora* var. *obtusiflora* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: Robert Corbett


(B) Photo: Hugh Wilson


(C) Photo: Hugh Wilson

Figure 14. *Cuscuta obtusifolia* var. *glandulosa*. (A) Flowers. Uvalde County, Texas. (B) Fruit. (C) Close-up of fruit revealing glandular surface. Brazos County, Texas. (http://botany.csdl.tamu.edu/FLORA/imaxxcus.htm)



14. Cuscuta suaveolens Seringe {sweet-scented} — FRINGED DODDER; LUCERNE DODDER; ALFALFA DODDER; FIMBRIATE DODDER (Fig. 15). The only documentation of this species in Alabama was made by Charles Mohr in 1889 from Montgomery County. Mohr (1901) wrote: "Observed for the first time July 10, 1889, in a patch of Lucerne [Alfalfa], growing luxuriantly, and proving most destructive to its host. In order to prevent the spread of this plant, on advice, the crop was plowed under before the seeds were matured." It is native to South America and has spread throughout the world as a contaminant of alfalfa (*Medicago sativa*). Fringed dodder is now found in scattered sites across the USA, most frequently in California (Kartesz 2013). Illustration: *Cuscuta suaveolens* (Yuncker 1932) A, flower; B, opened corolla; C, opened calyx; D, matured capsule; E, infrastaminal scale.

(A) Photo: J. Schimmitat

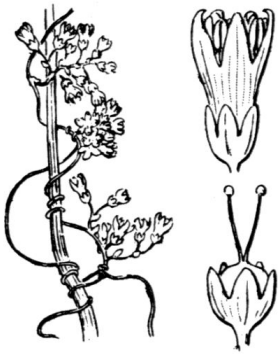
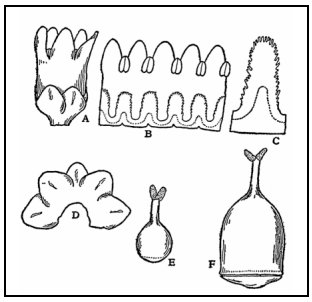

(B) Illustration: Hippolyte Jacques Coste

Figure 15. *Cuscuta suaveolens*. (A) Habit in Germany (http://www.floraweb.de/index.html). (B) Illustrated habit with close-up of flower and fruit. Hippolyte Coste - Flore descriptive et illustrée de la France, de la Corse et des contrées limitrophes, 1901-1906. (http://luirig.altervista.org/naturaitaliana)



15. Cuscuta japonica Choisy {of Japan} — JAPANESE DODDER (Fig. 16). According to the Center for Species and Ecosystem Health, Japanese dodder is an invasive exotic (www.invasive.org/). It is native to East Asia and is parasitic on woody plants. This species has been documented in Florida, Texas, California, and South Carolina (Kartesz 2013). It has also been reported from the Florida panhandle (Gadsden County) and is likely to eventually be found in Alabama. Look for this dodder on kudzu (*Pueraria*) and possibly other non-native woody plants such as privet (*Ligustrum*). It usually has coarse stems with widely spaced, subsessile flowers in a spikelike inflorescence and large circumscissile capsules with united styles. Illustration: *Cuscuta japonica* (Yuncker 1932) A, flower; B, opened corolla; C, infrastaminal scale; D, opened calyx; E, ovary; F, matured capsule.

(A) Photo: Aomorikuma

(B) Photo: Aomorikuma

Figure 16. *Cuscuta japonica* in Japan, 15 Aug 2009. (A) Habit. (B) Flowers. (commons.wikimedia.org/wiki)

Below is a key to other species found in Florida with circumscissile dehiscence (with capsules that separate at the base to release seeds).

a. Styles more or less united; stems mostly coarse; flowers 3–5 mm long and widely spaced in a spike-like inflorescence.

b. Calyx lobes minutely fringed (erose) and barely reaching middle of corolla tube; stigmas oval or conic; capsule about 5 mm long ..... **Cuscuta japonica**

b. Calyx lobes entire and covering most of corolla tube (but not capsule); stigmas flattened-depressed; capsule 5–7(–10) mm long ..... **Cuscuta exaltata** Engelmann [Tree Dodder; Fla. &Tex.]

a. Styles free (separate and distinct from the base); flowers smaller, 2–3 mm long and inflorescence in dense clusters.

c. Calyx lobes acute and equaling or longer than the tube; corolla lobes acute, reflexed and as long or longer than corolla tube; flowers with distinct petioles forming loose inflorescences in dense clusters; parasitic on herbaceous plants ..... **Cuscuta umbellata** Kunth [Flat-Globe Dodder; Fla. & sw USA]

c. Calyx lobes obtuse and much shorter than the tube; corolla lobes obtuse, erect or only slightly spreading and much shorter than corolla tube; flowers subsessile in compact clusters; parasitic on woody plants
..... **Cuscuta americana** Linnaeus [American Dodder; Fla. & tropical Americas]

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LITERATURE CITED

Alabama Natural Heritage Program (ANHP). 2012. Alabama Inventory List: the Rare, Threatened and Endangered Plants & Animals of Alabama. Privately printed by the Alabama Natural Heritage Program, 1090 South Donahue Drive, Auburn University 36849.

Austin, D.F. 1979. Comments on *Cuscuta* – for collectors and curators. Torreya 106: 227–228.

Austin, D.F. 1980. Studies of the Florida Convolvulaceae – III. Cuscuta. Florida Sci. 43: 294–302.

Chafin, L.G. 2007. Field Guide to the Rare Plants of Georgia. Univ. of Georgia Press, Athens.

Clewell, A.F. 1985. Guide to the Vascular Plants of the Florida Panhandle. Florida State Univ. Press, Tallahassee

Costea M., G.L. Nesom and S. Stefanović**.** 2006a. Taxonomy of the *Cuscuta pentagona* complex (Convolvulaceae) in North America. Sida 22: 151–175.

Costea M., G.L. Nesom, and S. Stefanović. 2006b. Taxonomy of the *Cuscuta gronovii* and *Cuscuta umbrosa* (Convolvulaceae). Sida 22: 197–207.

Costea M., G.L. Nesom, and S. Stefanović. 2006c. Taxonomy of the *Cuscuta indecora* (Convolvulaceae) complex in North America. Sida 22: 209–226.

Dawson, J., L.J. Musselman, I. Dorr, and P. Wolswinkel. 1994. Biology and control of *Cuscuta*. Rev. Weed Sci. 6: 265–317.

Diggs, G.M., B.L. Lipscomb, and R.J. O'Kennon. 1999. Shinners & Mahler's Flora of North Central Texas. Bot. Res. Inst. of Texas, Fort Worth.

Engelmann, G. 1859. *Cuscuta*: Systematic arrangement of the species of the genus *Cuscuta*, with critical remarks on old species and descriptions of new ones. Trans. Acad. Sci. St. Louis 1: 453–523.

Gandhi, K.N. and R.D. Thomas. 1987. Cuscutaceae of Louisiana. Sida 12: 361–379.

Lanini, T. and M. Kogan. 2005. Biology and management of *Cuscuta* in crops. Cien. Inv. Agr. 32: 165–179.

Mohr, C. 1901. Plant Life of Alabama. Contr. U.S. Natl. Herb. Vol. 6. United States Government Printing Office, Washington, D.C.

Musselman, L.J. 1986. The genus *Cuscuta* in Virginia. Castanea 51: 188–196.

Neyland, R. 2001. A phylogeny inferred from large ribosomal subunit (26S) rDNA sequences suggests that *Cuscuta* is a derived member of Convolvulaceae. Brittonia 53: 108–115.

Kartesz, J.T., The Biota of North America Program (BONAP). 2013. Taxonomic Data Center. (http://www.bonap.net/tdc). Chapel Hill, North Carolina [maps generated from Kartesz, J.T. 2013. Floristic Synthesis of North America, Version 1.0. Biota of North America Program (BONAP). (in press)]

Kral, R., A.R. Diamond Jr., S.L. Ginzbarg, C.J. Hansen, R.R. Haynes, B.R. Keener, M.G. Lelong, D.D. Spaulding, and M. Woods. 2013. Alabama Plant Atlas. Univ. of West Alabama, Livingston. <http://www.floraofalabama.org/>

Sherman, T.D., A.J. Bowling, T.W. Barger, and K.C. Vaughn. 2008. The vestigial root of dodder (C*uscuta pentagona*) seedlings. Int. J. Plant Sci. 169: 998–1012.

Shosteck, R. 1974. Flowers and Plants: An International Lexicon with Biographical Notes. Quadrangle/New York Times Book Co, New York.

Small, J.K. 1933. Manual of the Southeastern Flora. Univ. of North Carolina Press, Chapel Hill.

Smith, E.B. 1994. Keys to the Flora of Arkansas. Univ. of Arkansas Press, Fayetteville.

Stefanović, S.A., L Krueger, and R.G. Olmstead. 2002. Monophyly of the Convolvulaceae and circumscription of their major lineages based on DNA sequences of multiple chloroplast loci. Amer. J. Bot. 89: 1510–1522.

Stefanović, S., D.F. Austin, and R.G. Olmstead. 2003. Classification of Convolvulaceae: A phylogenetic approach. Syst. Bot. 28: 791–806.

Stefanović, S.A., M. Kuzmina, and M. Costea. 2007. Delimitation of major lineages within *Cuscuta* subgenus *Grammica* (Convolvulaceae) using plastid and nuclear DNA sequences. Amer. J. Bot. 94: 568–589.

Weakley, A.S., J.C. Ludwig, and J.F. Townsend. 2012. Flora of Virginia. Bot. Res. Inst. of Texas Press. Fort Worth.

Weakley, A.S. 2013. Flora of the Southern and Mid-Atlantic States (Working draft of 25 Feb). North Carolina Botanical Garden, Chapel Hill. <http://www.herbarium.unc.edu/flora.htm>

Wunderlin, RP. and B.F. Hansen. 2003. Guide to the Vascular Plants of Florida. Univ. Press of Florida, Gainesville.

Yatskievych, G. 2006. Steyermark's Flora of Missouri, Second Edition, Volume 2. Missouri Botanical Garden Press, St. Louis.

Yuncker, T.G. 1932. The genus *Cuscuta*. Mem. Torrey Bot. Club 18: 111–331.

Yuncker, T.G. 1965. *Cuscuta*. In W. R. Buck [ed.], North American Flora, series II, vol. 4, 1–51. New York Botanical Garden Press, Bronx.

Zimdahl, R.L. 1989. Weeds and Words: The Etymology of the Scientific Names of Weeds and Crops. Iowa State Univ. Press. Ames.