

(2403) Proposal to conserve *Cuscuta campestris* against *C. gymnocarpa* (*Convolvulaceae*)

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- (2403) *Cuscuta campestris* Yuncker in Mem. Torrey Bot. Club 18: 138. 1932 [*Angiosp.: Convolvul.*], nom. cons. prop.
 Typus: U.S.A., Texas, *Lindheimer 126* (MO No. 2758345 [barcode MO-1889019!]; isotypi: K barcode K000195797!, MO No. 3264018 [barcode MO-1889018!]).
- (=) *Cuscuta gymnocarpa* Engelm. in Trans. Acad. Sci. St. Louis 1: 496. 1859, nom. rej. prop.
 Holotypus: James Island, Galapagos, [Oct 1835,] Darwin (K barcode K000196084!; isotypi: NY barcodes 00336714! & 00336715!).

We propose to conserve the more recent name *Cuscuta campestris* against *C. gymnocarpa*, which was made necessary by the finding that the taxa to which the names apply are conspecific (Costea & al. in Taxon 64: 1225–1242. 2015). The name “*C. arvensis* Beyr.” was largely used in the late 19th and early 20th century to refer indiscriminately to any of the members of a complex of North American taxa eventually treated by Engelmann (l.c. 1859: 494–495) as varieties of *C. arvensis*. The name was originally used by Beyrich on a herbarium label, and first validly published by Engelmann in Gray, Manual., ed. 2: 336. 1856. However, *C. arvensis* is an illegitimate name because Engelmann included as a synonym his earlier published *C. pentagona* (in Amer. J. Sci. Arts 43: 340. 1842). Yuncker’s (l.c. 1932) description of *C. campestris* was intended to disentangle taxonomically two of the members of this intricate group, and to bring to an end the misapplication of “*C. arvensis*” to one of its variants: *C. pentagona* var. *calycina* Engelm. (in Amer. J. Sci. Arts 45: 76. 1845 (“1843”)) (= *C. arvensis* var. *calycina* (Engelm.) Engelm., l.c. 1859: 495). As Yuncker (l.c. 1932) wrote: “the name *arvensis* was never applied by Beyrich to the variety *calycina*, and [...] a new name is required for this species” (*C. campestris*). Therefore, Yuncker described *C. campestris* (“n. nom.”), i.e., a new name for *C. arvensis* of some authors but not of Beyrich and corresponding to *C. pentagona* var. *calycina* (= *C. arvensis* var. *calycina*). Yuncker retained *C. pentagona* for Beyrich’s variant of *C. arvensis* (var. *pentagona* of Engelmann).

Cuscuta campestris and *C. pentagona* are indeed different species; the latter is restricted to the U.S.A. whereas the former has become one of the most common pest dodders worldwide (Yuncker, l.c. 1932; Dawson & al. in Rev. Weed Sci. 6: 265–317. 1994; Costea & al. in Sida 22: 151–175. 2006). A recent molecular study has shown that *C. campestris* is a hybrid species, and *C. pentagona* is one of the putative parents (Costea & al., l.c. 2015).

Yuncker (l.c. 1932) selected as a type of *C. campestris* “Texas (*Lindheimer 126*, a specimen in the herbarium of the Missouri Botanical Garden)”. However, two specimens of *Lindheimer 126* were present at MO in 1932: one from Bernhardt herbarium (MO barcode 1889018!) and one from Engelmann herbarium (MO barcode 1889019!). Thus, it can be considered that Yuncker designated a gathering as the type of *C. campestris*, and so the two specimens are syntypes (Art. 40.2). We here select MO barcode 1889019 as a lectotype for this species. Yuncker (in Illinois Biol. Monogr. 6: 142. 1921) also referred to *Lindheimer 126* as being the type of *C. pentagona* var. *calycina*, but in this case he clearly indicated that the specimen was from Engelmann’s herbarium (“*Lindheimer* [...] *126*, taken as the type in the Engelmann Herbarium”). This can only be MO 1889019 because the other specimen had not been available to Engelmann in 1845 when he described this varietal name (Bernhardt’s herbarium was purchased later, in 1857; Rudolph in Ann. Missouri Bot. Gard. 78: 1–18. 1991). Yuncker’s selection can be considered an effective lectotypification of *C. pentagona* var. *calycina*.

Engelmann (l.c. 1859) described *C. gymnocarpa* as a new species based on material collected in October 1835 by Charles R. Darwin from James (Santiago) Island, Galapagos. The several known herbarium specimens likely originated from one single gathering that was sent to J.S. Henslow. Similarly to other Darwin plant specimens (Porter in Taxon 31: 503–506. 1982), a part of this material was probably sent by Henslow to J.D. Hooker who used it to describe *C. sandwichiana* Choisy (“*sandvicensis*”) var. *mimosae* (in Trans. Linn. Soc. London 20: 205. 1847). A part of this material is also present in Bentham’s herbarium (K barcode K000196085!). When describing *C. gymnocarpa*,

Engelmann referred only to the Darwin specimen in Hooker's herbarium, therefore this specimen is the holotype. Although the label of the specimen in Hooker's herbarium is succinct, indicating only James Island and Darwin as a collector, both Engelmann and Hooker included in their descriptions the mention that *C. gymnocarpa* was growing in "immense abundance amongst (or "on") *Mimosa* bushes", information that is present only on the specimen that remained at Cambridge, which also bears the most complete label ["Galapagos; S. Amer: (James Island), Oct. 1835, *C. Darwin* 3816 immense quantity among mimosa bushes" (CGE barcode CGE00309!)]. This latter specimen was selected as a lectotype for *C. sandwichiana* var. *mimosae* by Porter (in Bot. J. Linn. Soc. 81: 114. 1980).

Yuncker (l.c. 1932: 142) provided a more detailed description for *C. gymnocarpa* than Engelmann and realized its morphological similarity to *C. campestris* because he felt compelled to provide some differential characteristics. Thus in his view, *C. gymnocarpa* differed from *C. campestris* "in having shorter, more upright corolla lobes, shorter filaments and more globose capsules and with the calyx lobes not overlapping". In addition to examining the type specimens, we undertook both molecular phylogenetic and morphometric studies, which have shown that *C. gymnocarpa* is conspecific with *C. campestris* (Costea & al., l.c. 2015). None of the characters suggested above by Yuncker provide a separation of *C. gymnocarpa* and *C. campestris*. A distinction of *C. gymnocarpa* is possible only within *C. campestris* using numerous quantitative characters in a morphometric analysis (Costea & al., l.c. 2015). Considering its biogeographic and systematic value as a case of incipient speciation in *Cuscuta*, we proposed preserving *C. gymnocarpa* as a variety of *C. campestris* despite their morphological and molecular similarity (Costea & al., l.c. 2015) using *C. sandwichiana* var. *mimosae* as basionym.

Thus *C. gymnocarpa* and *C. campestris* are synonyms, the former having priority over the latter. The name *C. campestris* has been extensively employed worldwide since 1932 because this species has a subcosmopolitan distribution (Yuncker, l.c. 1932; Dawson & al.,

l.c.; Costea & al., l.c. 2006). The binomial is employed by virtually all the continental and national floras, as well as by regional floras where the species is present. In addition, because this is perhaps the most common invasive agricultural pest of the genus (Dawson & al., l.c.; Costea & Tardif in Canad. J. Pl. Sci. 86: 293–316. 2006), the name *C. campestris* has also been used in the extensive agricultural and biological literature that explores a wide variety of non-taxonomic or floristic topics: prevention and control of infestation in numerous agronomic and horticultural crops, biology and ecology, host range and interactions, anatomy, physiology, evolution of photosynthetic apparatus, cell biology, etc. For example, a Google scholar (<http://scholar.google.ca/>) search of "*Cuscuta campestris*" revealed nearly 5000 published articles.

In contrast, the name *C. gymnocarpa* has been used only in accounts of the flora of the Galapagos Islands (e.g., Wiggins & Porter, Fl. Galapagos Isl.: 371. 1971). In previous phylogenetic and character evolution studies of *Cuscuta* (e.g., Welsh & al. in Pl. Syst. Evol. 285: 83–101. 2010; Wright & al. in Pl. Syst. Evol. 296: 51–76. 2011; García & al. in Amer. J. Bot. 101: 670–690. 2014), *C. gymnocarpa* has been considered a narrow endemic and its identity has not been linked with *C. campestris*.

In summary, *C. gymnocarpa* and *C. campestris* are synonyms, the former being rarely used. In order to preserve nomenclatural stability, in accordance with Art 14.1 & 14.2 of the ICN (McNeill & al. in Regnum Veg. 154. 2012), the conservation of *C. campestris* over *C. gymnocarpa* is here proposed. If the proposal is rejected, the name *C. gymnocarpa* would have to replace *C. campestris* used worldwide by botanists, plant biologists and agronomists, which would be extremely detrimental.

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