Calliandra dolichopoda and *C. cualensis* (Leguminosae, Mimosoideae), two new species from Mexico

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Abstract. Calliandra dolichopoda and **C. cualensis**, two species endemic to Guerrero and Jalisco, Mexico, respectively, are described and illustrated. Both species appear to be closely related to *C. hirsuta.*

Key Words: *Calliandra*, Guerrero, Jalisco, Leguminosae, Mexico, Mimosoideae.

Resumen. Se describen e ilustran **Calliandra dolichopoda** y **C. cualensis**, dos especies endémicas de Guerrero y Jalisco, México, respectivamente. Ambas especies parecen estar relacionadas con *C. hirsuta*.

Calliandra Benth. (Leguminosae, Mimosoideae, tribe Ingeae) is a genus of shrubs, trees, and rarely perennial herbs restricted to tropical and subtropical regions in the American continent. According to its present circumscription (Barneby, 1998), it includes some 130 species about 30 of which occur in Mexico. Two major centers of species distribution have been identified, one in eastern Brazil, primarily in the state of Bahia, and the other in southern and western Mexico. In the course of my previous and current taxonomic work on this genus (Macqueen & Hernández, 1997; Hernández, 2001, 2007), herbarium material of two undescribed species from Guerrero and Jalisco was discovered. These are herein described as new species.

Calliandra dolichopoda H. M. Hernández, **sp. nov**. Type: Mexico. Guerrero: Mpio. Chilpancingo, 5.2 [km] al W del Ocotito, camino a Jaleaca, 735 m, 10 Nov 1982, *R. Torres et al. 1843* (holotype: MEXU; isotypes: IEB, MEXU, MO, NY). (Fig. 1)

Frutex inermis, stipulis ad 11(–15) mm longis, dense sericeis. Pinnae (3–)4–7(–8)-jugatae, petiolis 0.4–0.8 cm longis, rhachidi (1.3–)2.3–4.6(–6) cm longa, tomentosa, rhachillis 6–9(–12.5) cm longis; foliola in paribus 26–38 (–50) disposita, infra sericea. Inflorescentiae umbellatae, floribus 14–26. Flores omnino sericei, pedicellis (2.5–)3–7 mm longis, calyce campanulato, corolla tubulari-campanulata.

Shrubs unarmed, up to 1.2(–1.5) m tall, erect; branchlets terete, elongate, straight, the younger parts densely tomentose, with white, soft, usually interspersed trichomes, becoming glabrate on the older parts; stipules to 11(–15) mm long, triangular or triangular-lanceolate, usually slightly curved, subcoriaceous, the younger ones densely sericeous, with the vesture obscuring the surface, the older ones losing trichome density, persistent. Leaves bipinnate; pinnae (3–)4–7(–8)-jugate; petioles 0.4–0.8 cm long, eglandular, tomentose; rachis (1.3–)2.3–4.6(–6) cm long, tomentose; rachillae 6–9(–12.5) cm long, tomentose; leaflets 26–38(–50) pairs, (4–)5–9×(1.5–)2–3 mm when fully developed, narrowly-oblong to lanceolate, sometimes falcate, subcoriaceous, the adaxial faces glabrous and lustrous dark-brown or dark-green, the abaxial faces sericeous and pale-green, the bases usually obliquely-truncate, the margins ciliate, the apices acuminate or acute. Inflorescences umbellate, with 14–26 flowers; peduncles solitary or fasciculate, axillary, (4.6–)5.4–

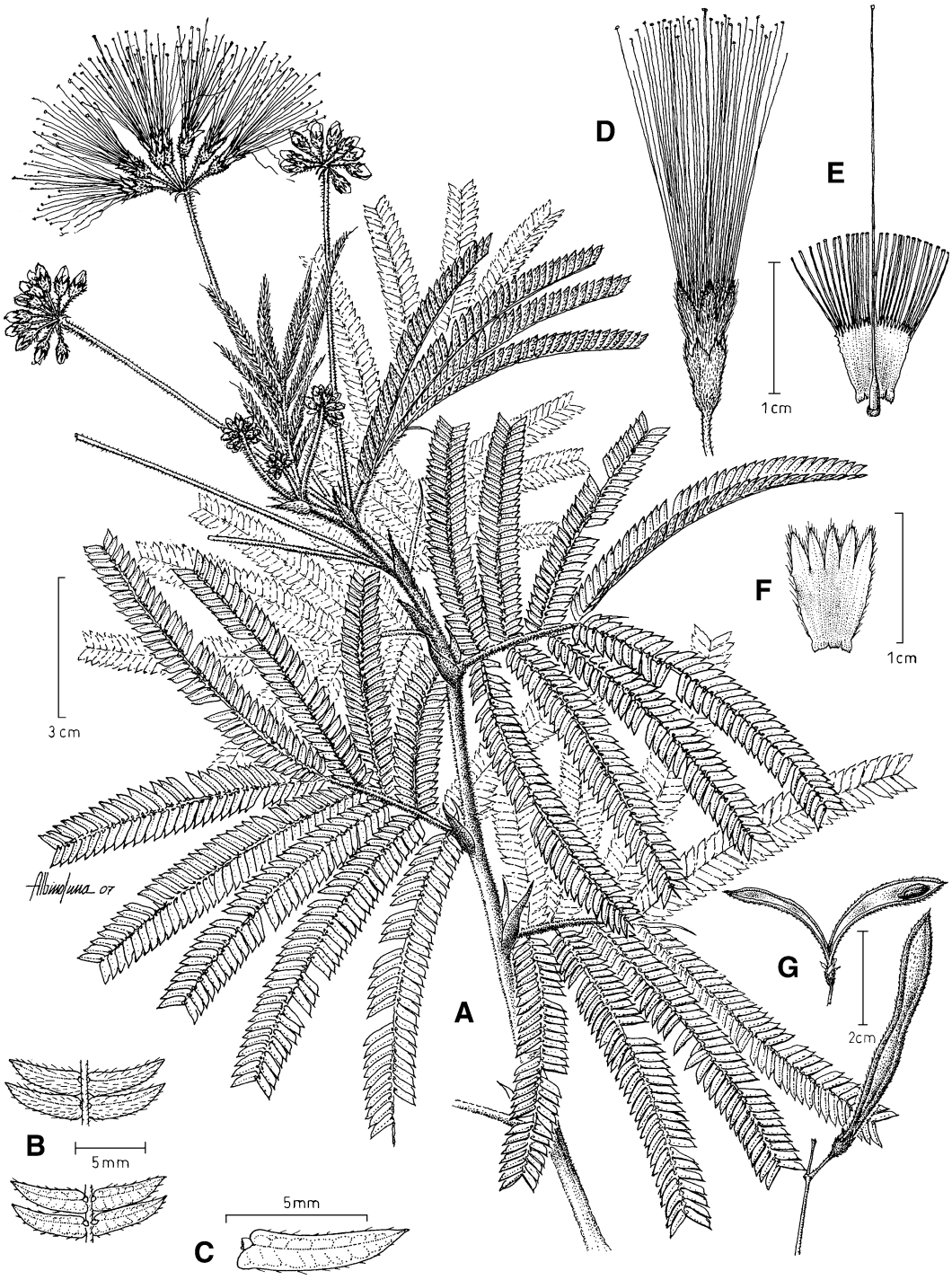

Fig. 1. *Calliandra dolichopoda*. **A.** Branchlet with inflorescences. **B.** Leaflets, abaxial (above) and adaxial (below) surfaces. **C.** Detail of leaflet. **D.** Flower at anthesis. **E.** Dissected flower showing the staminal tube and pistil. **F.** Internal surface of corolla. **G.** Pods (A–F based on *Torres et al. 1843*, MEXU; G based on *Hernández & Tenorio 867*, MEXU).

8.2 cm long. Flowers homomorphic, sericeous throughout, with soft, long, appressed, white or light-yellow trichomes; pedicels (2.5–)3–7 mm long; calyx (2–)3–5 mm long, campanulate, the teeth deltate to triangular, sometimes parted toward the base, membranous; corolla 6–10 mm long, tubular-campanulate, membranous; filaments 3–4 cm long at anthesis, red, with the staminal tube included; polyads 8-grained, bisymmetric, with a mucilaginous structure on the basal cell. Pods ascending, to 8.7 cm long, 0.7 cm wide, linear or linear-oblanceolate, acute at the apex, rostrate, rigidly coriaceous, densely tomentose to velutinous, with white, soft, long, interspersed trichomes. Seeds ca. 7 mm long, ca. 3 mm wide, narrowly elliptic, dark-brown, with 90% pleurogram.

Distribution and habitat.—This species appears to be restricted to south-central Guerrero, Mexico, in the municipalities of Chilpancingo, Mochitlán, and Acapulco, at altitudes ranging from 640 to 1000 m. It grows in open, usually disturbed areas, derived from pine (*Pinus oocarpa*), pine-oak, and oak forests (Fig. 2).

Phenology.—Found in flower in June, July, August, October, November and January, and in fruit in January.

Etymology.—The specific epithet refers to the long-pedicellate flowers of this species.

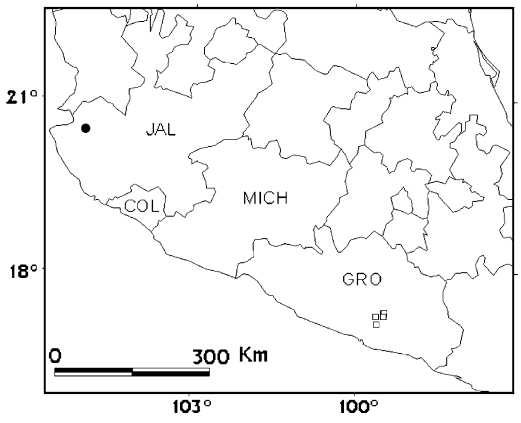

Fig. 2. Geographic distribution of *Calliandra dolichopoda* (*squares*) and *C. cualensis* (*solid dot*).

Additional specimens examined. MEXICO. Guerrero: Mpio. Acapulco, Acapulco, 1882, *Hancock s. n*. (K, mixed coll.); La Venta, falda oeste del cerro El Peregrino, 17°07′10″ N, 99°36′40″ W, 800 m, 19 Aug 1968, *Kruse 1918* (MEXU). Mpio. Chilpancingo, Cruz de Ocotempa, 5.2 km al W del Ocotito por carretera a Jaleaca, 640 m, 23 Jan 1985, *Hernández & Tenorio 867* (MEXU, MO); 5.2 km al W del Ocotito, camino a Jaleaca, 735 m, 10 Nov 1982, *Torres et al. 1816* (MEXU, MO). Mpio. Mochitlán, 2 mi SE of Agua de Obispo, 3100 ft, 14 Jun 1954, *Floyed et al. 105* (MICH, TEX); Agua de Obispo, al S de Chilpancingo, *Germán & Téllez 874* (MEXU); same locality, 1000 m, 11 Jan 1960, *Kruse 149* (MEXU); same locality, 19 Oct 1977, *Ladd et al. 185* (MEXU, MO); cerro El Fresno, 17°15′20″ N, 99°29′00″ W, 19 Jul 1968, *Kruse 1856* (MEXU).

Calliandra cualensis H. M. Hernández, **sp. nov**. Type: Mexico. Jalisco: Mpio. El Tuito, El Cuale, 28 Nov 1979, *A. Solís Magallanes 2151* (holotype: MEXU; isotypes: MO, NY). (Fig. 3)

Frutex inermis, stipulis ad 6 mm longis, dense sericeis. Pinnae (3–)4–8(–9)-jugatae, petiolis 0.1–0.4 cm longis, rhachidi (0.7–)1.5–4.2 cm longa, rhachillis (0.9–)1.4–5.2 cm longis; foliola in paribus 13–38 disposita, infra sericea. Inflorescentiae umbellatae, floribus 6–9. Flores omnino sericei, pedicellis 3–5 mm longis, calyce campanulato, corolla campanulata.

Shrubs unarmed, up to 1 m tall, erect; branchlets terete, elongate, straight, densely tomentose, with yellow, soft, usually interspersed trichomes; stipules to 6 mm long, triangular-lanceolate, rarely narrowly triangular-lanceolate, usually slightly curved, subcoriaceous, densely sericeous, with the vesture obscuring the surface, persistent. Leaves bipinnate; pinnae (3–)4–8(–9)-jugate; petioles 0.1–0.4 cm long, tomentose, eglandular; rachis (0.7–)1.5–4.2 cm long, tomentose; rachillae (0.9–)1.4–5.2 cm long, tomentose; leaflets 13–38 pairs, 3–5 × 0.6–1.3 mm when fully developed, lanceolate to widely lanceolate, subcoriaceous, the adaxial faces glabrous to sparingly sericeous, lustrous, dark-brown, the abaxial faces sericeous and pale-green, the bases usually obliquely-truncate, the margins ciliate, the apices acute. Inflorescences umbellate, with 6–9 flowers; peduncles solitary or fasciculate, axillary, 2.7–5.6 cm long. Flowers homomorphic, sericeous throughout, with soft, long, appressed, white or light-yellow trichomes; pedicels 3–5 mm long; calyx 2–3 mm long, campanulate, the

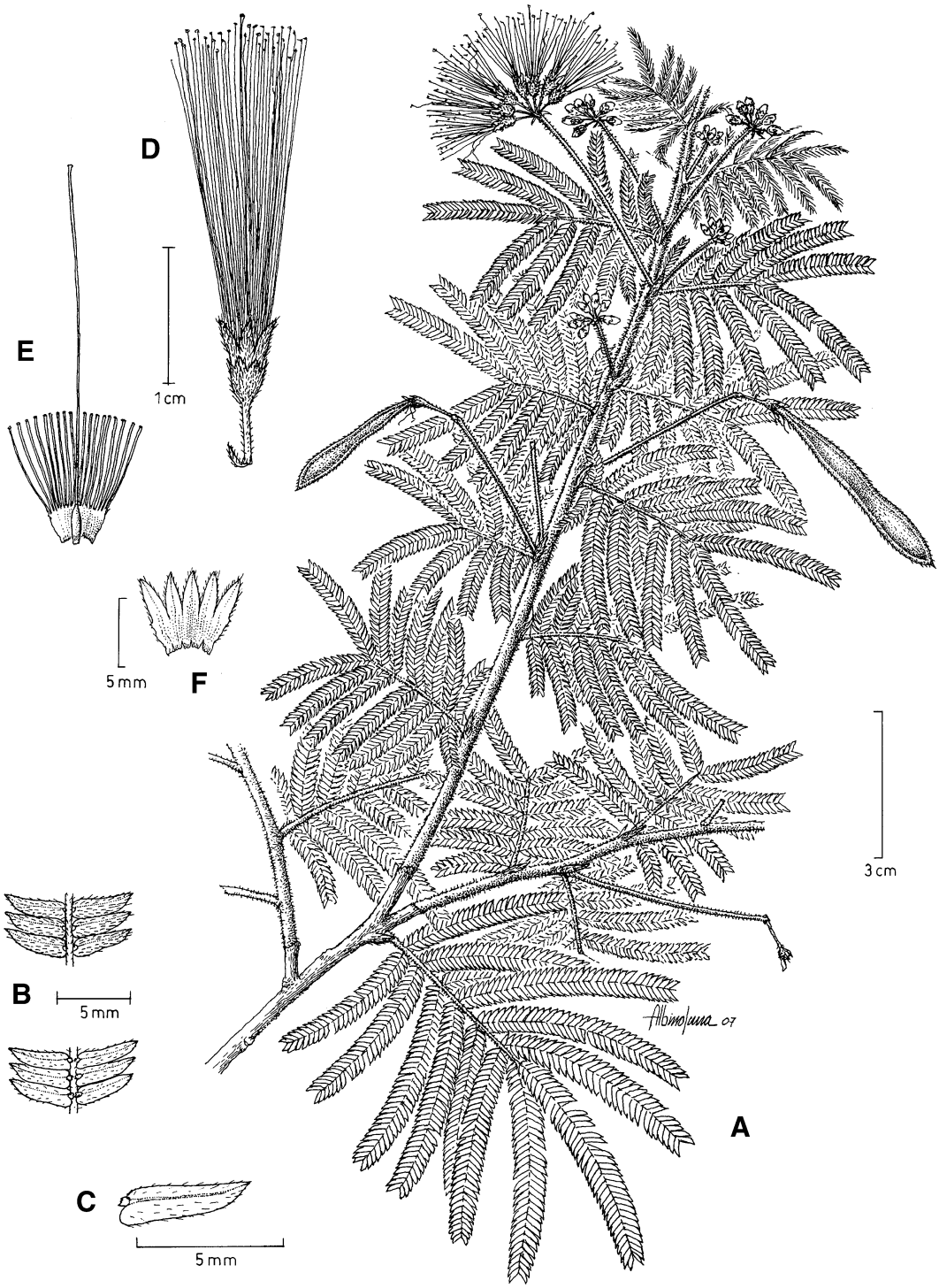

Fig. 3. *Calliandra cualensis*. **A.** Branchlet with inflorescences and fruits. **B.** Leaflets, abaxial (above) and adaxial (below) surfaces. **C.** Detail of leaflet. **D.** Flower at anthesis. **E.** Dissected flower showing the staminal tube and pistil. **F.** Internal surface of corolla (based on *Solís Magallanes 2151*, NY).

teeth deltate to triangular, membranous; corolla 4.5–6 mm long, campanulate, membranous; filaments ca. 2 cm long at anthesis, red, with the staminal tube included; polyads 8-grained, bisymmetric, with a mucilaginous structure on the basal cell. Pods ascending to descending, to 6.6×0.8 cm, linear-oblanceolate, acute at the apex, rostrate, rigidly coriaceous, densely tomentose to velutinous, with white, soft, long, interspersed trichomes. Seeds ca. 6×4 mm, widely elliptic, dark-brown, with 90% pleurogram.

Distribution and habitat.—Apparently restricted to a small area covered by pine forests near the coast of Jalisco, in the municipalities of El Tuito and Talpa de Allende, at an altitude of approximately 1875 m (Fig. 2).

Phenology.—Found in flower and fruit in November.

Etymology.—The specific epithet refers to El Cuale, currently the only known locality of the species.

Additional specimens examined. MEXICO. JALISCO: Mpio. El Tuito, ladera sur, ca. 2.5 km al W de Corazón del Cuale, 20°27′ N, 105°01′ W, 9 Nov 1978, *Solís Magallanes & Basurto 1244* (MEXU). Mpio. Talpa de Allende, La Mina, Sierra del Cuale, 1875 m, 8 Nov 1978, *Solis Magallanes 1220* (MO).

Conservation status

The lack of information on the population size and densities of *Calliandra dolichopoda* and *C. cualensis* precludes accurate assessment of their conservation status. *Calliandra dolichopoda* is known to occur in five discrete populations, resulting in an estimated area of occupancy of 35.1 km^2, whereas *C. cualensis* has been found in only one small population of about 2 km^2 (see Hernández & Navarro, 2007). Based on the IUCN (2001) criteria, *C. dolichopoda* and *C. cualensis* can be provisionally assigned a status of Endangered [EN B2ab(i,ii,iii)] and Critically Endangered [CR B2ab(ii,iii)], respectively.

Discussion

Calliandra dolichopoda and *C. cualensis* clearly belong to series *Nitidae* in the classification of Bentham (1844, 1875). This series was included by Barneby (1998), together with members of series *Macrophyllae* Benth. and some additional species, in his section *Androcallis*. Species in series *Nitidae* are characterized by having lateral, axillary inflorescences, never organized in terminal efoliate pseudoracemes, and pinnae with small, usually numerous leaflets.

The species of *Calliandra* that most closely resembles *C. dolichopoda* and *C. cualensis* is *C. sesquipedalis* McVaugh. This species can be distinguished from the other two by being sparingly pubescent to glabrous throughout, and by its smaller stipules and few-flowered umbels. In turn, the three species can be easily separated from the remaining Mexican and Mesoamerican members of *Calliandra* series *Nitidae* by their characteristic long-pedicellate flowers borne in umbellate inflorescences. With the exception of *C. dolichopoda, C. cualensis*, and *C. sesquipedalis,* all Mexican species of this series have sessile flowers organized in compact, capituliform inflorescences. Very occasionally, however, individuals of *C. hirsuta* (G. Don) Benth. and *C. humilis* Benth. have sub-sessile flowers bearing exceedingly short pedicels. The flowers of *C. hirsuta*, for example, are typically sessile, but occasionally short-pedicellate ones are visible; in these exceptional cases, pedicels usually are shorter than 1 mm, and rarely exceed 1.5 mm (see descriptions in McVaugh, 1987 and Barneby, 1998).

If the general vegetative and reproductive morphological characters of *Calliandra dolichopoda, C. cualensis,* and *C. sesquipedalis* are considered, it becomes apparent that they are closely related to, and probably derived from, *C. hirsuta*, a relatively common species found in several disjunct mountain areas across a large portion of the Pacific slope of Mexico, from Nayarit to Chiapas. As discussed by McVaugh (1987) and Barneby (1998), *C. hirsuta* is highly variable morphologically, in particular regarding vesture, and the general characteristics of the leaves and flowers. This species is usually recognized by its low shrubby habit, and by its pilose, sessile or subsessile flowers organized in capituliform inflorescences; however, the characteristics of the flower indumentum, as well as the configuration of the leaves

(indumentum, number of pairs of pinnae, length of the rachillae, leaflet dimensions, etc.) are extremely variable in this species. *Calliandra dolichopoda* can be readily distinguished from *C hirsuta* and all of the synonyms mentioned by McVaugh (1987) and Barneby (1998) by its long-pedicellate flowers and umbellate inflorescences, and by usually having larger stipules and leaf parts. In the same way, *C. cualensis* can be distinguished from this species by its pedicellate and campanulate flowers, and its umbellate inflorescences; however, its leaves are similar to those in some forms of *C. hirsuta*. *Calliandra dolichopoda, C. cualensis,* and *C. sesquipedalis*, together with *C. hirsuta* and some species recognized by Britton and Rose (1928) in their group *Pubiflorae* (e.g., *C. californica* Benth. and *C. peninsularis* Rose) constitute a taxonomic complex that merits a thorough systematic investigation.

Finally, it should be emphasized that it is very likely that *Calliandra dolichopoda* and *C. cualensis* are closely related to each other, as suggested by their common morphological traits, most importantly the long-pedicellate flowers organized in umbellate inflorescences, the long, sericeous stipules, and the general aspect of the leaves and pods. However, they can be easily distinguished from each other by the larger stipules, longer rachillae, more numerous pairs of larger leaflets, more densely-flowered umbels, usually longer peduncles, and the larger flowers with tubular-campanulate corollas of *C. dolichopoda.* Ecologically, both species appear to be convergent in that they inhabit a similar habitat in pine and oak forests. Pine and oak forests are the most common vegetation types in mountain regions throughout Mexico, usually developing in this country at altitudes ranging from 1500 to 3000 m (Rzedowski, 1978). However, in some areas of the Pacific slope, in western and southern Mexico, patches of pine forest dominated by *Pinus oocarpa* Schiede ex Schltdl. penetrate areas close to the coast, where warmer, more tropical climates prevail.

The following is a key for the identification of *C. dolichopoda*, *C. cualensis*, and closely related species.

1. Inflorescences capituliform, compact, obconic; flowers sessile or subsessile, the pedicels 0–0.5(–1.2) mm long……*C. hirsuta*
1. Inflorescences \umbellate; flowers pedicellate, the pedicels 2–7 mm long.
   2. Flowers sparingly strigose, almost glabrous; stipules to 3.5 mm long, glabrous; inflorescences three- to six-flowered; pods sparsely pubescent……*C. sesquipedalis*
   2. Flowers sericeous; stipules to 11(–15) mm long, densely sericeous; inflorescences 6–26-flowered; pods densely tomentose to velutinous.
      3. Stipules to 11(–15) mm long; rachillae 6–9(–12.5) cm long in well developed leaves; leaflets 26–38 (–50) pairs per pinnae, 4–9 mm long; inflorescences 14–26-flowered; corollas 6–10 mm long, tubular-campanulate……*C. dolichopoda*
      3. Stipules to 6 mm long; rachillae (0.9-)1.4–5.2 cm long in well developed leaves; leaflets 13–38 pairs per pinnae, 3–5 mm long; inflorescences 6–9-flowered; corollas 4.5–6 mm long, campanulate……*C. cualensis*

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