Two new records of Lactuca L. (Cichorieae, Asteraceae) in South America

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ABSTRACT: (Two new records of Lactuca L. (Cichorieae, Asteraceae) in South America). Lactuca indica and Lactuca canadensis have been recorded for the first time in the Americas and in South America, respectively. Lactuca indica is native to Eastern Asia, and L. canadensis to North America. In Brazil, L. indica is used as a substitute for lettuce in some communities. The leaf shape in the Brazilian plants of the two species is less variable than in Asiatic or North American populations. This could possibly be a result of a single introduction to Brazil of each species. Both species are weeds, occurring in disturbed habitats in south and south-eastern Brazil. The two species are described, illustrated and their affinities are discussed. An identification key is provided to the six species of Lactuca (all introduced) in South America.

Keywords: Compositae, edible plant, lettuce, neotropics, Brazil.

INTRODUCTION

Lactuca sativa L. is one of the most important edible plants and a major vegetative food commodity in the sunflower family (Simpson 2009). In 2012 it had a worldwide production of approximately 24,000,000 tons (FAO 2015). Members of Lactuca L. are also medicinally important, with some species used in the treatment of asthma, bronchitis, insomnia and cough (Bano & Qaiser 2011).

Lactuca is the most widely distributed genus in the tribe Cichorieae, natively occurring in Africa, Asia, Europe and North America (Kilian et al. 2009). However, in other countries it occurs as introduced, it has been introduced due to its economic importance, or naturally as a weed (Hurrel & Deluchi 2013). In North America almost one-third to a half of Lactuca diversity is represented by introduced species (Dille 1974, Strother 2006). So far, only four introduced species of Lactuca have been recorded in South America: Lactuca sativa, L. saligna L., L. serriola L. and L. virosa L. (Cabrera 1971, 1974, Ariza-Espinar & Urtubey 1998, Robinson et al. 1999, Hurrel & Deluchi 2013, Kilian et al. 2015).

Lactuca comprises 50–70 species (Lack 2007), depending on the adopted circumscription (Kilian et al. 2009).

Numerous contradictory classifications of the genus have been proposed, but none of them have been based on a worldwide treatment. The first phylogenetic analysis of Lactuca and related genera was conducted by Koopman et al. (1998) using one nuclear marker (ITS-1). The genus was shown to be monophyletic and the authors identified three gene pools in Lactuca, named L. sativa primary gene pool, L. saligna-L. serriola secondary gene pool, and L. tatarica-L. viminea tertiary gene pool. More recently, a densely sampled molecular phylogenetic analysis helped to clarify relationships among Asian species of Lactuca (Wang et al. 2013).

During fieldwork, two species of lettuce recognized as different entities were found that did not match any previously known species of Lactuca from Brazil or other countries in South America. They were later identified as L. canadensis and L. indica, respectively.

MATERIAL & METHODS

This study was based on material studied in the field and subsequently deposited in the following herbaria: B, PMSP, S, SPSF, and UEC (Thiers 2015). Morphological characters were studied with an Olympus SZX16 stereo microscope.

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RESULTS AND DISCUSSION


Synonymy: Strother (2006)

Herb, annual, 1–1.8 m high, with taproot. Stem unbranched, glabrous, striate, greenish with purplish spots. Latex pale yellow or pale orange. Leaves spirally alternate, sessile, not clasping; basal leaves, blade 8–18(20) × 2–8 cm, pinnately lobed, pinnatifid, 2–4 pairs of lateral lobes, all lobes acute, thin, margin entire, apex acute, cladodromous, venation prominent abaxially, impressed adaxially, both surfaces glabrous; apical leaves, blade 5–8 × 1–3 cm, entire, lanceolate to narrowly lanceolate, thin, apex acuminate, margin smooth, eucamptodromous, venation prominent abaxially, impressed adaxially, both

New records of *Lactuca*


of Eucalyptus L’Hér. and Pinus L. plantations and near roads. Flowering and fruiting in November and February.

Vernacular in Brazil: Almeirão-serralha.

Uses in Brazil: unknown.


Distribution: Lactuca canadensis is found in the Brazilian states of Rio de Janeiro, São Paulo, and Paraná (Fig. 3). The oldest collection from Brazil known to us dates back from 1999. This is the first report of the species in South America. This species occurs as native in Canada, the United States, Mexico (Strother 2006), Haiti and Dominican Republic (Liogier 1996, Acevedo-Rodriguez & Strong 2012).

Ecology and Phenology: In Brazil, Lactuca canadensis is a common weed that grows in disturbed, humid environments, forest edges (border), the understorey surfaces glabrous. Secondary inflorescences cylindrically to rarely conical paniculiform with numerous capitula, branches with bracts linear-lanceolate; peduncle 2–8(18) mm long; involucre narrowly cylindrical, 9–12 mm long; involucral bracts 5–6 series, ovate, lanceolate, narrowly lanceolate, 3–6 × 1.4–1.6 mm, green, acuminate apex, purplish, margin very narrow whitish hyaline, glabrous. Flowers 18–21, bisexual, corolla ligulate, 8–10 mm long, 5-toothed, yellow in both surfaces, tube distally sparsely pubescent externally; yellow anthers, basally caudate; style branches barbellate on shaft and branches, apex glabrous, yellow. Cypselae rostrate, 6–7 mm, dark brown, beak ca. 2 mm long, body dorsiventrally compressed, lateral ribs winged, wings scabrous, with one facial rib on either side. Pappus simple, white, 5–6 mm long, persistent, bristles smooth.

Morphology and Taxonomy: Lactuca canadensis is known to be polymorphic, with multiple leaf shapes in its native distribution areas, and even somehow presenting an unclearly distinction from its closest relatives, probably due to introgression (Radloff 1961). However, the Brazilian specimens are remarkably uniform, perhaps indicating a single introduction event. Whereas the Brazilian plants have leaves not clasping the stem (Fig. 1A),
basal leaves with pinnatifid (Fig. 1B) and apical leaves entire, lanceolate and, narrowly lanceolate blade (Fig. 1B), North and Central American plants are more variable, with leaves that clasp or not the stem, basal leaves with pinnatifid, ovate or only toothed blades, and apical leaves with entire, linear, lanceolate, ovate, obovate, or pinnatifid blades.

*Lactuca canadensis* is superficially similar to *L. serriola*, which also occurs in Brazil (Schneider 2015), because of its habit as an unbranched herb, with basal leaves having sinuate margins, but they differ by not having auriculate leaf base (vs. auriculate), leaves and stems unarmed (Fig. 1A–B) (vs. leaf margins, principal veins, and stems prickly), and compressed cypsela with lateral wings (Fig. 1F) (vs. ellipsoid cypsela without lateral wings). *Lactuca canadensis* resembles *L. saligna* by its basal pinnatifid leaves (Fig. 1B), apical linear-lanceolate leaves (Fig. 1B) and yellow corollas (Fig. 2A–C). However, the former differs from the latter by being taller – 1–1.8 m high (vs. 0.2–0.8 m) – with capitula in large cylindrical panicleform secondary inflorescences (Fig. 1A, 2A) (vs. spiciform to racemiform), yellow anthers without longitudinal purplish lines (vs. yellow anthers with longitudinal purplish lines), larger leaves 8–18(20) × 2–8 cm (vs. 3–8 × 1–2.5 cm), peduncle 2–8(18) mm (Fig. 1C) (vs. sessile to subsessile capitula) and compressed cypsela with lateral wings (Fig. 1F) (vs. ellipsoid cypsela without lateral wings). Additionally, *L. canadensis* is also morphologically similar to *L. indica* due to the dorsiventrally compressed fruits, with scabrous winged margins (Fig. 1F). It differs by the pinnately lobed to pinnatifid basal leaves (Fig. 1B) (vs. elliptic, narrowly elliptic, to oblong-elliptic (Fig. 4A, 4C)); cladromodromous venation (vs. brochidodromous); pale yellow to pale orange latex (Fig. 2C) (vs. whitish); yellow corolla (Fig. 2B–C) (vs. pale yellow adaxially and purplish abaxially (Fig. 2D–F)), yellow anthers (vs. yellow with longitudinal purplish lines), yellow-style branches (vs. purplish); and cypsela with 0.5–1 mm long beak (Fig. 1F) (vs. 2 mm beak (Fig. 4G).


*Synonymy*: Shi & Kilian (2011)

Herb, annual, 1–2 m high, with taproot. Stem unbranched, glabrous, striate (costate), greenish with purplish spots. Latex whitish. Leaves spirally alternate, sessile; blade 9–25(33) × 1.1–4.3(5.2) cm, elliptic, narrowly elliptic, oblong-elliptic, thin, sessile base, not clasping, apex acuminate to attenuate, margin entire or dentate, weak brochidodromous, pale yellow principal vein, venation prominent abaxially, impressed adaxially, both surfaces glabrous. Secondary inflorescences conically to widely cylindrically panicleform to corymbiform, bracts on branches linear-lanceolate to linear; peduncle 0.2–1(1.7) cm long; involucre narrowly cylindrical, 7–13(17) mm long; involucral bracts in 4–5 series, widely ovate, ovate, lanceolate, or narrowly lanceolate, 2–9 × 2–4 mm, green, apex acute, green, margin narrow whitish hyaline, glabrous. Flowers 20–30, bisexual, 9–13 mm long, corolla ligulate, 5-toothed, pale yellow adaxially, purplish abaxially, tube distally sparsely pubescent externally; yellow anthers with longitudinal purplish lines, basally caudate; style branches barbellate on shaft and branches, apex glabrous, purplish. Cypselae shortly rostrate, 4–5 mm long, dark brown-black, beak 0.5–1 mm long, body dorsiventrally compressed, lateral ribs winged, wings scabrous, with one facial rib on either side. Pappus simple, white, 5–6 mm long, persistent, bristles smooth.

*Distribution*: *Lactuca indica* is known from São Paulo and may occur in Mato Grosso do Sul (M. Egea pers. comm.) (Fig. 3). The oldest collection seen from Brazil dates back from 2003. This is the first report of the species for Brazil, and also seems to be the first for the American continents. The species occurs as native in Bhutan, China, India, Indonesia, Japan, Korea, Philippines, Eastern Russia, Thailand, Vietnam (Shi & Kilian 2011), and has been introduced to South-East Africa (Kilian et al. 2015).

**Ecology and Phenology**: In Brazil, *L. indica* is a rather uncommon weed. It grows in disturbed, humid environments, forest edges, and near farmhouses. In its native distribution area in East Asia, it was probably originally a member of mountainous tall forb communities but spread to a variety of open habitats, and also occurs as a weed. In China, it is one of the most common species of *Lactuca*, occupying a large range of different habitats (Shi & Kilian 2011). Flowering and fruiting in January to February.

**Vernacular in Brazil**: Almeirão, almeirão-do-mato-grosso, almeirão-do-mato, almeirão-selvagem, and alfaiçe-selvagem, radicho-do-mato.

**Uses in Brazil**: This species is used as a folk substitute for lettuce in salads in south-western São Paulo. It grows naturally without sowing.


**Morphology and Taxonomy**: *Lactuca indica* has an extremely variable leaf shape, base, and margins, but the plants collected in Brazil are not as variable as the Asian plants. Brazilian plants always have entire leaves (Fig. 4C), the leaf base is sessile (Fig. 4A), attenuate, and does not clasp the stem. In contrast, Asian plants have entire, sinuate, or pinnatifid leaves, leaf base is sessile, cordate, or auriculate-sagittate, scarcely clasps the stem (Kirkpicznikov 1964, Shi & Kilian 2011).

Considering the South American species of the genus, *L. indica* is superficially similar to *L. sativa*, which also possesses entire leaves, but the former differs from the
latter by having a non-clasping leaf base (vs. clasping auriculate leaf base), linear bracts in branches of the secondary inflorescence (vs. very widely ovate bracts), pale yellow corollas with purplish tinged abaxial surface (vs. entirely yellow), yellow anthers with longitudinal purplish lines (Fig. 2E–F) (vs. yellow anthers without longitudinal purplish lines), purplish style branches (vs. yellow) and compressed cypselae with two lateral wings (Fig. 4G) (vs. ellipsoid cypselae without lateral wings). *Lactuca indica* is morphologically similar to *L. canaden-sis*, their morphological differences are mentioned in the morphology and taxonomy section of the latter species.

Key to South American \textit{Lactuca} L.

1. Lower portion of stem, leaf mid-vein abaxially and margin prickly.
2. Stem leaves in sunshine usually held in vertical plane; cypselae greyish brown, body 3–4 mm long (introduced in Argentina, southern Brazil, Paraguay and Uruguay) .................................................... \textit{L. serriola}
3. Leaf base acutely auriculate to sagittate, semi-amplexicaul or, if indistinctly to distinctly clasping stem; upper branches with straight lanceolate, lanceolate, sagittate bracts (introduced in Argentina, Brazil, and Uruguay).
4. Leaf base sagittate, clasping stem; upper branches with ± sagittately clasping bracts; stem whitish; cypselae body more than twice as long as wide, lateral ribs broadened, not wing-like, and beak distinctly longer than body (introduced in Argentina and Uruguay) .................................................... \textit{L. saligna}
5. Leaves usually entire; fresh flowers with pale yellow adaxially and tinged purplish abaxially corollas; anthers yellow with longitudinal purplish lines; cypselae 4–5 mm long, beak 0.5–1 mm long (introduced in Brazil) .................................................... \textit{L. indica}
6. Leaves usually pinnately lobed; fresh flowers and anthers bright yellow; cypselae 6–7 mm long, beak c. 2 mm long (introduced in Brazil) .................................................... \textit{L. canadensis}

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\section*{References}