

## Two new species of *Lessingianthus* (Vernonieae, Asteraceae) from the Brazilian highlands

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Two additional species of *Lessingianthus*, *L. bakerianus* and *L. lanuginosus*, from the campo cerrado vegetation of central Brazil, are described and illustrated. The first species is characterized by the presence of capitula arranged in groups, nine to 12 florets per head, leaves sessile, oblong to ovate leaf blades with the lower surface densely lanate, sparsely villous on the main veins. It has certain resemblance to *L. syncephalus* (Sch. Bip. ex Baker) H. Rob. and *L. brevipetiolatus* (Sch. Bip. ex Baker) H. Rob., which present petiolate leaves and leaf blades lanceolate, cuneate or attenuate at the base. *L. lanuginosus* is superficially similar to *L. buddleiifolius* (Mart. ex DC.) H. Rob., but differs in having smooth stems, woolly indumentum, smaller heads and the largest leaves disposed at the middle of the stem. © 2006 The Linnean Society of London, *Botanical Journal of the Linnean Society*, 2006, 150, 487–493.

ADDITIONAL KEYWORDS: Brazil – cerrado – pollen morphology – taxonomic position.

### INTRODUCTION

The tribe Vernonieae Cass. (Asteraceae) comprises approximately 89 genera and 1700 species concentrated around two major cores of diversification, the central region of Africa and southern Brazil. The members of the tribe occur in all types of habitat and they are widely variable in habit, ranging from small scapose herbs to large trees (Bremer, 1994).

Because of this variation, there have been certain problems in the circumscription of the different genera of Vernonieae (Cabrera, 1944; Keeley, 1978; Jones, 1979, 1981; Keeley & Turner, 1990). In the last classification of the tribe, Robinson (1999) segregated almost all of the species of *Vernonia* Schreb. sect. *Lepidaploa* (Cass.) DC. to new genera, restricting the genus exclusively to North America. As presently delimited, the largest genera of Vernonieae in the New World are *Lepidaploa* (Cass.) Cass., with approximately 140 species, and *Lessingianthus* H. Rob. with 110 taxa.

The genus *Lessingianthus* was established to segregate the species previously included by Baker (1873) into sect. *Lepidaploa* subsect. *Macrocephalae* Benth.

of the genus *Vernonia*. It contains perennial herbs or shrubs with xylopodia, having medium- or large-sized heads and seriate-cymose inflorescences (Robinson, 1999). One of the most distinctive characteristics of the genus is provided by the pollen grains, which have been designed as type 'B' by Keeley & Jones (1979). Another particular feature of *Lessingianthus* is the chromosome number, as it constitutes the single group of the *Lepidaploa* complex with basic number  $x = 16$  (Dematteis, 2002). From the cytological viewpoint, *Lessingianthus* is also characterized by the greatest number of polyploid species and the highest ploidy levels within the Vernonieae (Dematteis & Fernández, 2000).

*Lessingianthus* is widely distributed in Brazil, Paraguay, Uruguay, Bolivia and Argentina (Robinson, 1988), but it is basically concentrated in south-eastern Brazil, where more than half of the species of the genus occur. In the present paper, two additional species that occur in cerrado vegetation from the Brazilian highlands are described.

### MATERIAL AND METHODS

Pollen samples were obtained by removing one or two florets from herbarium specimens of the species. The pollen grains were acetolyzed according to the proce-

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ture suggested by Erdtman (1966). For light microscopy, the pollen samples were mounted in glycerine jelly on glass slides and then examined with a Zeiss Axioplan microscope. Permanent slides were deposited at the Palynological Laboratory of the Universidade Nacional del Nordeste (PAL-CTES).

For scanning electron microscopy, acetolyzed pollen grains were washed in 96%, and then 100% ethanol. Grains were sputter-coated with gold-palladium and observed using a JEOL 5800 LV scanning electron microscope. The terminology of Erdtman (1966), Punt *et al.* (1994) and Keeley & Jones (1979) was used to describe pollen structure. Leaves were examined after critical-point drying and sputter-coating with gold-palladium.

## DESCRIPTIONS

### *LESSINGIANTHUS BAKERIANUS* DEMATTEIS, SP. NOV.

(FIG. 1)

*Vernonia glomerata* Baker ex Warm., Vidensk. Meddel. Dansk Naturhist. Foren. Kjøbenhavn 1890: 185. 1890, nomen nudum [non *Vernonia glomerata* Sch. Bip., Bot. Zeit. 3: 155. 1845].

*Lessingianthus glomeratus* (Baker ex Warm.) H. Rob., Proc. Biol. Soc. Wash. 101(4): 943. 1988, nomen nudum.

**Diagnosis:** Frutex erectus 50–80 cm altus, caulibus striatis, superne ramosis, dense villosis. Folia sessilia, coriacea, alterna vel superne subopposita, oblonga vel ovata, denticulata, ad apicem rotundata et obtusa, basi cordata, 5–7 cm longa, 3–4 cm lata, supra sparse lanata, subtus dense lanata, in nervis majoribus villosa. Inflorescentiae cymosae, ramis 3–4, erectis, 20–30 cm longis. Capitula sessilia, 2–4 aggregata vel solitaria, cylindrica vel turbinata, 9–11 mm alta, 3–5 mm lata. Phyllaria ovato-lanceolata vel lanceolata, leniter lanata.

**Typus:** Brazil. Minas Gerais: Lagoa Santa, in campis graminosis prope Lapa, 28.iii.1864, *Warming* 2867 (holotypus C).

**Description:** Erect SHRUB 50–80 cm high. STEMS striate, branched only at upper part, densely villous, hairs often retrorse, antrorse at the nodes. LEAVES sessile, coriaceous, alternate at the base of the stems and almost subopposite upwards. Leaf blades oblong to ovate, denticulate, subrevolute at the margins, rounded and obtuse at the apex, basally cordate, 5–7 cm long, 3–4 cm wide, upper surface sparsely lanate, lower surface densely lanate, villous on the major veins, with acroscopic hairs. INFLORESCENCE terminal,

cymose, branches 3–4, erect, 20–30 cm long, bearing 6–10 groups of sessile heads. Capitula disposed in groups of 1–4 at a node subtended by leafy bracts. Lower inflorescence bracts ovate, densely woolly, longer than heads, upper leafy bracts gradually shorter. Involucre cylindrical to turbinate, 9–11 mm tall, 3–5 mm diameter. Phyllaries 4–5 seriate, appressed, purple towards the apex, glabrous to sparsely lanate on the margin, outer phyllaries ovate-lanceolate, 3–5 mm long, inner ones lanceolate, 8–10 mm long. Florets purple, 9–12(–13). COROLLAS glabrous, 10–12 mm long, lobes lanceolate, 4.8–5.3 mm long. ANTHERS basally sagittate, 4–4.5 mm long, apical appendage nonglandular, ovate, c. 0.4 mm long. STYLE 12–13 mm long, densely pilose, branches linear, 3.3–3.5 mm long. CYPSELAS ribbed, densely sericeous-pubescent. PAPPUS white, biseriate, outer scales fimbriate, linear, 1.2–1.5 mm long, inner bristles 7–8 mm long.

**Distribution and habitat:** Endemic to the Lagoa Santa area in the Brazilian state of Minas Gerais, where it occurs in campo cerrado.

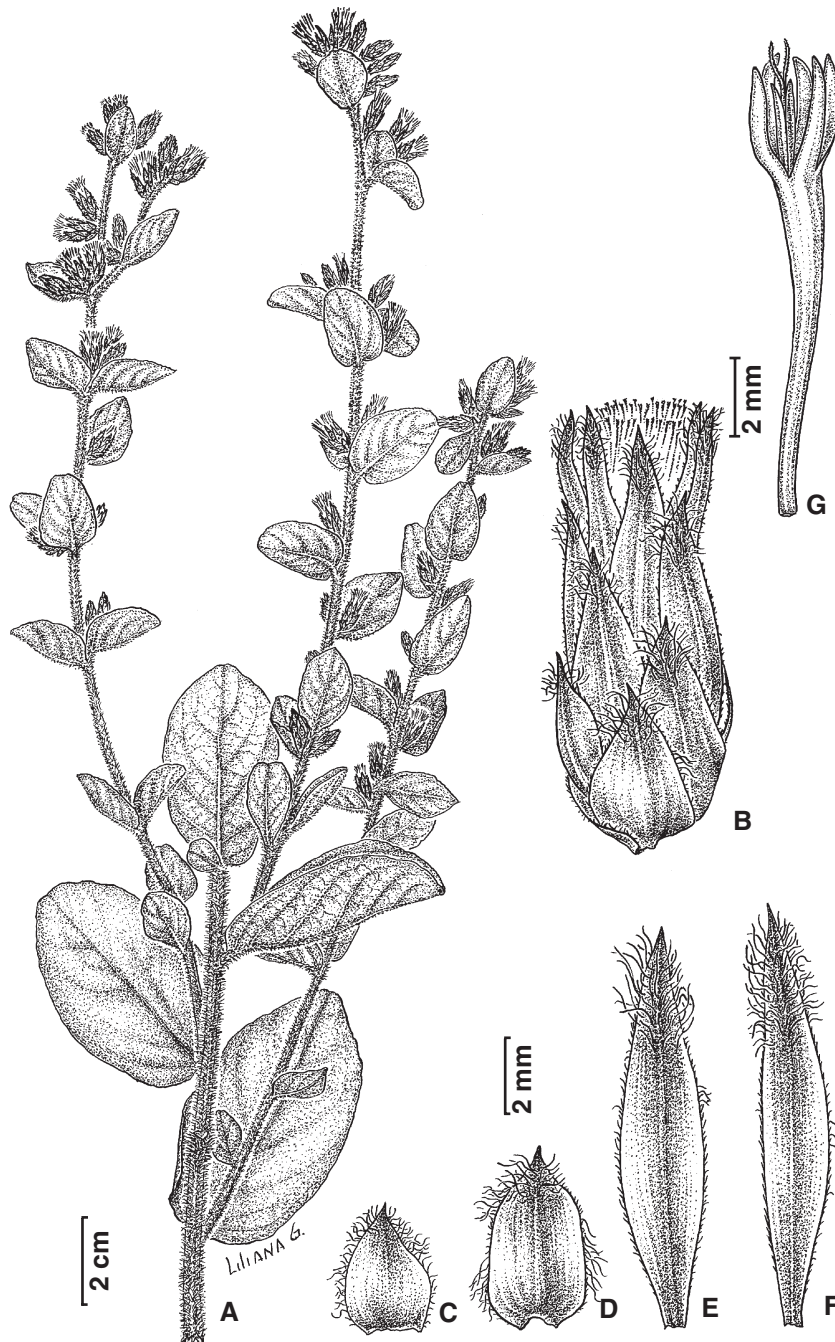
**Additional specimen examined:** BRAZIL. Minas Gerais: Lagoa Santa. *Warming* 2684 (C).

This taxon was initially determined as a new species by J. G. Baker in herbarium specimens deposited at C, but it remained unknown until Eugene Warming (1890) published the *Symbolae ad Floram Braziliae Centralis*. In this article, the author listed all the species of Asteraceae from the Lagoa Santa area, including *Vernonia glomerata*. However, the new species was published only as a name, without a valid description according to the International Code of Nomenclature (Greuter *et al.*, 2000).

The name *Vernonia glomerata* Baker ex Warm. was later recorded in Supplement I of *Index Kewensis*, which included taxa published between 1886 and 1895 (Durand & Jackson, 1901–06). The species has also been known through a photograph of the specimen *Warming* 2684 distributed by the Field Museum. Recently, Robinson (1988) transferred this taxon to its new genus, *Lessingianthus*, but did not provide a valid description of the species.

A detailed examination of the remaining members of the genus showed that Warming's specimens represent a hitherto undescribed species. The new species is named in honour of John Gilbert Baker, who was the author of the Asteraceae family in *Flora Brasiliensis*.

The new species can easily be separated from other taxa of the genus by the presence of capitula arranged in groups at each node. This character seems to be frequent in several genera of the *Lepidaploa* complex, such as *Stenocephalum* Sch. Bip. and certain species



**Figure 1.** *Lessingianthus bakerianus*. A, habit (flowering branch). B, involucre. C, outer phyllary. D, E, middle phyllaries. F, inner phyllary. G, corolla showing anthers and style. Warming 2687 (holotypus C).

of *Chrysolaena* H. Rob. and *Vernonanthura*. However, in *Lessingianthus* it occurs only in *L. syncephalus* (Sch. Bip. ex Baker) H. Rob. and *L. brevipetiolatus* (Sch. Bip. ex Baker) H. Rob.; these species have petiolate leaves and leaf blades lanceolate, cuneate or attenuate at the base, whereas *L. bakerianus* has sessile cordate leaves. Some specimens of

*L. varroniifolius* (Mart. ex DC.) H. Rob. also show the basal heads of the inflorescence disposed in groups, but the terminal capitula are almost always solitary. Among these species, *L. bakerianus* is also distinguished by the involucre shape, number of florets per head, leaf size, leaf base and type of pubescence (Table 1).

**Table 1.** Morphological comparison of *Lessingianthus bakerianus* and related species

Character	<i>L. bakerianus</i>	<i>L. brevipetiolatus</i>	<i>L. syncephalus</i>	<i>L. varroniifolius</i>
Leaves	Sessile	Petiolate	Petiolate	Subsessile
Leaf size (cm)	5–7 × 3–4	7–10 × 2.5–3.5	10–15 × 3.7–4.5	7–10 × 3–5
Leaf shape	Ovate to oblong	Lanceolate	Lanceolate	Oblong
Blade base	Cordate	Attenuate	Cuneate	Rounded
Blade apex	Rounded and obtuse	Acute	Acute	Subacute
Indumentum	Lanate	Lanate and glandular hairy	Puberulent	Tomentose
Head number at nodes	1–4	1 or rarely 2	2–3	1–2
Involucre shape	Cylindrical	Narrowly campanulate	Campanulate	Campanulate
Floret number	9–12(–13)	20–25	15–18	20–24
Corolla lobes	Glabrous	Pilose	Glabrous	Glabrous

**LESSINGIANTHUS LANUGINOSUS** DEMATTEIS  
**SP. NOV.** (FIGS 2–4).

*Diagnosis:* Frutex erectus 40–70 cm altus, caulibus rotundatis, albo-tomentosis, usque ad inflorescentiam ramosis, internodiis aequidistantibus 2.2–3.8 cm longis. Folia alterna, discoloria, coriacea, sessilia vel subsessilia, lanceolata vel oblonga, 8–12 cm longa, 2–3 cm lata, denticulata, apice obtusa, basi rotundata vel subcordata, supra hispida, rugosa, subtus dense lanata. Inflorescentiae cymosae, ramis 10–15 cm longis, 3–8-cephalis. Capitula sessilia, solitaria, 10–12 mm alta, 9–11 mm lata. Phyllaria imbricata, subrotundata vel anguste elliptica, pubescentia. Corolla 9–10.5 mm longa, lobis lanceolatis, 3–3.4 mm longis. Achenia costata, 3.5–4 mm longa.

*Typus:* Brazil. Goiás: Rod. BR-040, 15–20 km L de Cristalina, xilopodifera ate 50 cm de altura, capitulos lilás, campo cerrado, 25.i.1988, *Hatschbach & Cordeiro* 51859 (holotypus MBM; isotypi BR, C, CTES, S).

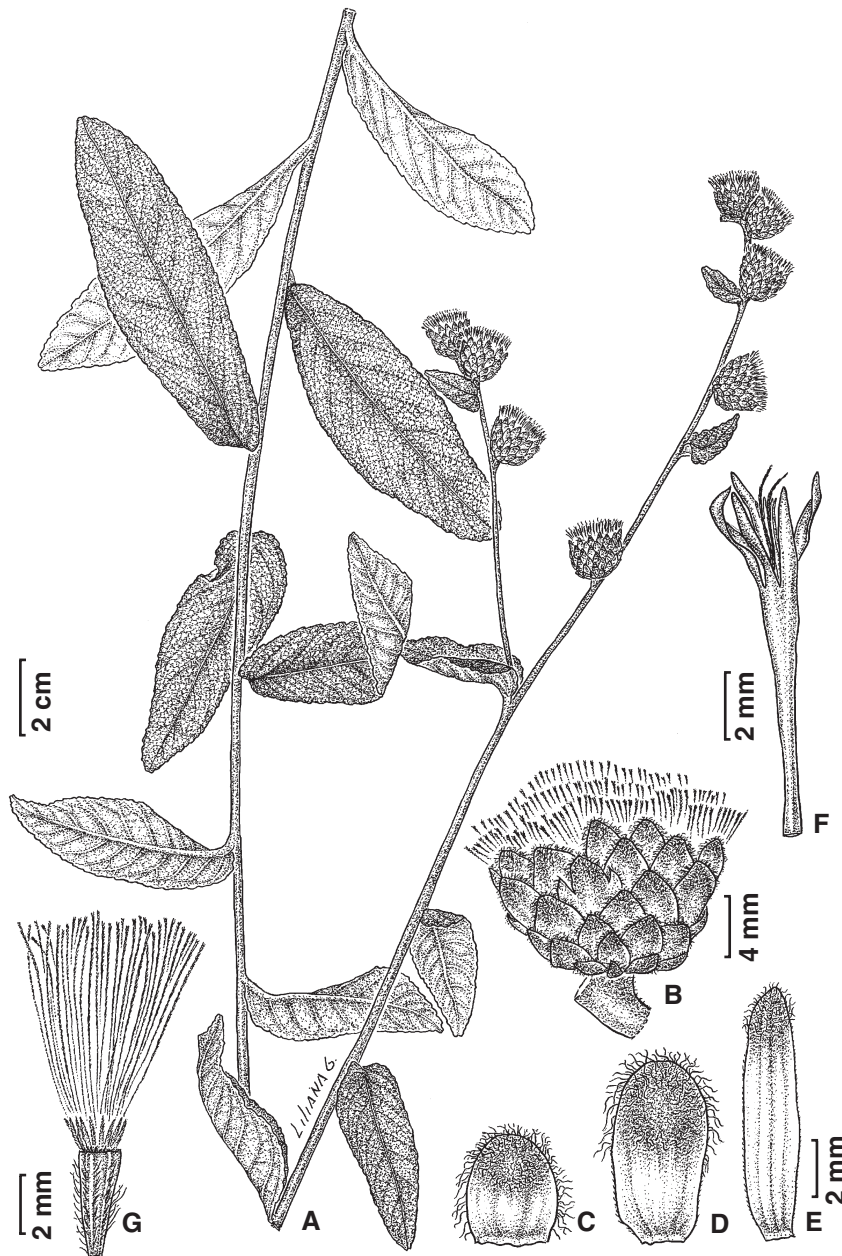
*Description:* Erect SHRUB, 40–70 cm high, with xylopodia. STEMS smooth, branched only at the inflorescences, 3–4 mm in diameter at base, densely grey to white-tomentose; internodes 2.2–3.8 cm long. LEAVES alternate, discolorous, coriaceous, sessile to subsessile, the largest ones in the middle of the stem gradually decreasing in size towards the base and the apex. Leaf blades lanceolate to oblong, 8–12 cm long, 2–3 cm wide, denticulate, obtuse at the apex, basally rounded to subcordate, hispid and rugose above, densely lanate beneath, penninervate, secondary veins arcuate, 12–15 pairs, prominent beneath. INFLORESCENCE seriate-cymose, branches 10–15 cm long, bearing 3–8 heads. Capitula solitary, sessile, axillary. Bracts of the inflorescence greatly reduced upwards, always shorter than the involucre. Involucre widely campanulate to hemispheric, 10–12 mm high, 9–11 mm diameter. Phyllaries coriaceous, densely imbricate, 5–6 seriate,

purple to brownish, subcircular to narrowly elliptic, rounded and sparsely pubescent at the apex, margins sparsely lanate. Florets violet, 35–45. COROLLA pilose to glabrous, 9–10.5 mm long, lobes lanceolate, 3–3.4 mm long. ANTHERS 4–4.2 mm long, sagittate at the base, apical appendages ovate. STYLE 10–12 mm long, branches linear, 2.9–3.1 mm long. CYPSELAS cylindrical to obconical, ribbed, sericeous-pubescent, 3.5–4 mm long. PAPPUS white, biseriate, outer scales lanceolate, fimbriate, 1–1.2 mm long, inner bristles 7–8 mm long. POLLEN GRAINS radially symmetrical, spheroidal, 53–59 µm diameter, tricolporate, echinolate, germinal furrows very long, converging at poles, lacunae 10–13 µm diameter, disposed in a regular pattern, polar lacuna absent, spines generally prominent, 2.5–3.9 long, acute at the apex (type B).

*Distribution and habitat:* Restricted to campo cerrado vegetation of Distrito Federal, Goiás and Minas Gerais, Brazil.

*Additional specimens examined:* BRAZIL. Distrito Federal: Brazilia, Parque Nacional, 22.i.1978, *Krapovickas, Cristóbal & Arbo* 33175 (CTES, K, SI). Goiás: SE end of Chapada da Contagem, 14 km N of Brazilia, 20.xii.1979, *Smith & Eiten* 864 (C); Mun. Pirenópolis, Serra dos Pirineus, Fazenda Solar dos Pirineus, 12.ii.2000, *Hatschbach, Ribas & Willberg* 70059 (CTES, MBM); Mun. Pirenópolis, Serra dos Pirineus, Fazenda Solar dos Pirineus, 16.ii.2000, *Hatschbach, Ribas & Willberg* 70250 (C, CTES, MBM). Minas Gerais: Barbacena. *Pohl* 3769 (P, W).

This species has often been misidentified as *L. pulverulentus* (Baker) H. Rob. and *L. ligulifolius* (Mart. ex DC.) H. Rob. However, specimens have most commonly been determined as *L. buddleiifolius* (Mart. ex DC.) H. Rob., to which *L. lanuginosus* seems to be more closely related. The general appearance of the new species certainly resembles *L. buddleiifolius*, but



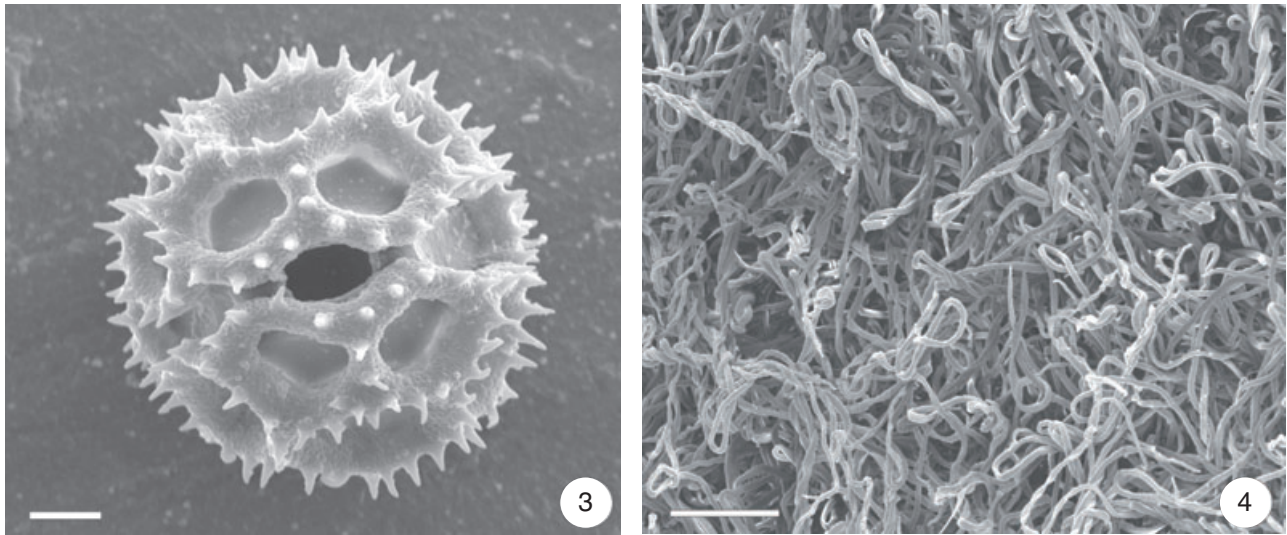
**Figure 2.** *Lessingianthus lanuginosus*. A, habit. B, involucre. C, outer phyllary. D, middle phyllary. E, inner phyllary. F, corolla showing anthers and style. G, cypsela with pappus. Hatschbach & Cordeiro 51859 (isotypus CTES).

it differs in plant height, head size and disposition of the leaves, among other features. *L. buddleiifolius* is commonly a robust shrub with larger heads than *L. lanuginosus*, and also has larger leaves at the stem base than the latter species. The main differences among *L. lanuginosus* and the remaining species are summarized in Table 2.

The specimen Pohl 3769 (P) was determined by Schultz Bipontinus as *Vernonia asteriflora* Mart. ex DC. [= *Lessingianthus asteriflorus* (Mart. ex DC.) H.

Rob.]. However, the new species is not closely related to *L. asteriflorus*, differing considerably in many morphological features. Although the shape and pubescence of the leaves are similar, both species have quite different inflorescence patterns, involucre morphology and texture of the phyllaries.

The new species occurs in campo cerrado and is mostly distributed in central Brazil. The cerrado vegetation is found in the Brazilian highlands, in the states of Goiás, Mato Grosso, Mato Grosso do Sul,



**Figures 3, 4.** Scanning electron photomicrographs of *Lessingianthus lanuginosus*. Fig. 3. Pollen grain in polar view. Scale bar = 10  $\mu\text{m}$ . Fig. 4. Lower surface of the leaves showing woolly hairs. Scale bar = 100  $\mu\text{m}$ . *Hatschbach & Cordeiro* 51859 (isotypus CTES).

**Table 2.** Diagnostic morphological characters of *Lessingianthus lanuginosus* and closely related taxa

Character	<i>L. buddleiifolius</i>	<i>L. lanuginosus</i>	<i>L. ligulifolius</i>	<i>L. pulverulentus</i>
Plant height (cm)	70–150	40–70	70–100	100–150
Stem shape	Ribbed	Smooth	Striated	Ribbed
Position of largest leaves	Stem base	Middle part of the stem	Lower one-third of stem	Stem base
Leaf size (cm)	15–23 $\times$ 4–6	8–12 $\times$ 2–3	6–11 $\times$ 0.5–2	7–9 $\times$ 3–4.5
Indumentum	Tomentose	Lanate	Tomentose	Tomentose
Blade shape	Lanceolate to elliptic-lanceolate	Lanceolate to oblong	Lanceolate to oblanceolate	Ovate
Blade base	Largely attenuate	Rounded to subcordate	Cuneate	Cordate
Leaf margin	Entire to serrate	Denticulate	Entire to denticulate	Entire
Head size (mm)	15–17	10–12	10–14	12–15
Phyllaries	Glabrous	Pubescent	Glabrous	Glabrous

Minas Gerais, Tocantins, Maranhão and Piauí (Ratter, Ribeiro & Bridgewater, 1992). Thus, additional collections of the new species may well be found in some other states.

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