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Three New Taxa of *Chascolytrum* (Poaceae, Pooideae, Poeae) from South America

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ABSTRACT. Two new species and one new variety of *Chascolytrum* Desv. (Poaceae) are described and illustrated. *Chascolytrum latifolium* Essi, Souza-Chies & Longhi-Wagner and *C. juergensii* var. *angustilemma* Essi, Souza-Chies & Longhi-Wagner occur in the southern Brazilian highlands, while *C. altimontanum* Essi, Souza-Chies & Longhi-Wagner occurs in the Bolivian highlands. *Chascolytrum latifolium* is related to *C. subaristatum* (Lam.) Desv., but differs mainly by the wider leaf blades and by some characteristics of the palea. *Chascolytrum altimontanum* is related to *C. paleapiliferum* (Parodi) Matthei and *C. subaristatum*, the main differences being the presence of flattened trichomes at the lemma base and the shape of the spikelets. Specimens of all these new taxa were included in a parallel molecular analysis, with the results supporting the new taxa as genetically divergent from the closest morphologically related species. In addition, *Briza juergensii* Hack. is transferred to *Chascolytrum* for the new combination *C. juergensii* (Hack.) Essi, Souza-Chies & Longhi-Wagner.

RESUMO. Duas espécies novas e uma variedade de *Chascolytrum* são descritas e ilustradas nesse artigo. *Chascolytrum latifolium* Essi, Souza-Chies & Longhi-Wagner e *C. juergensii* var. *angustilemma* Essi, Souza-Chies & Longhi-Wagner ocorrem em campos de altitude do sul do Brasil, enquanto *C. altimontanum* Essi, Souza-Chies & Longhi-Wagner ocorre em regiões de altitude da Bolívia. *Chascolytrum latifolium* assemelha-se a *C. subaristatum* (Lam.) Desv., diferindo desse principalmente pelas lâminas foliares mais largas e por algumas características da pálea. *Chascolytrum altimontanum* assemelha-se a *C. paleapiliferum* (Parodi) Matthei e *C. subaristatum*, distinguindo-se destas principalmente pela presença de tricomas achatados na base do lema e pela forma das espiguetas. Exemplos de todos esses taxa foram incluídos em análise

molecular paralela, sendo que os resultados corroboram os novos taxa como geneticamente divergentes das espécies mais semelhantes morfologicamente. Além disso, *Briza juergensii* Hack. é transferida para *Chascolytrum* para a nova combinação *C. juergensii* (Hack.) Essi, Souza-Chies & Longhi-Wagner.

Key words: *Chascolytrum*, IUCN Red List, Poaceae, Poeae, Pooideae, South America.

According to Matthei (1975), *Chascolytrum* Desv. (Poaceae, Pooideae, Poeae) included six South American species related to the Eurasian genus *Briza* L. Before Matthei (1975), *Chascolytrum* was considered at the rank of genus (Desvaux, 1810) or section (e.g., Bentham & Hooker, 1883), or as a subgenus of *Briza* (e.g., Parodi, 1920), so that its taxonomic circumscription was controversial. A phylogenetic molecular analysis performed using three DNA regions (ITS, GBSSI, and *trnL-trnL-trnF*) has resulted in a broader circumscription for the genus *Chascolytrum* (Essi et al., 2008), with 22 species, including the three new taxa described here.

1. *Chascolytrum altimontanum* Essi, Souza-Chies & Longhi-Wagner, sp. nov. TYPE: Bolivia. Chuquisaca: Yamparaez, on the ascent, ca. 3 km E toward La Cienaga, 16 Mar. 1996, J. R. I. Wood 10841 (holotype, LPB; isotype, K). Figures 1, 4B.

Haec species lemmatibus gibbis conspicue alatis et paleis coriaceis elliptico-orbicularibus usque orbicularibus *Chascolytrō subaristato* (Lam.) Desv. et *C. paleapilifero* (Parodi) Matthei similis, etiam *C. subaristato* spiculis cylindricis et *C. paleapilifero* trichomatibus capitatis in dorso palearum similis, sed ab ambabus speciebus trichomatibus spathulatis copiosis in parte basali lemmatum, etiam a *C. paleapilifero* spiculis cylindricis differt.

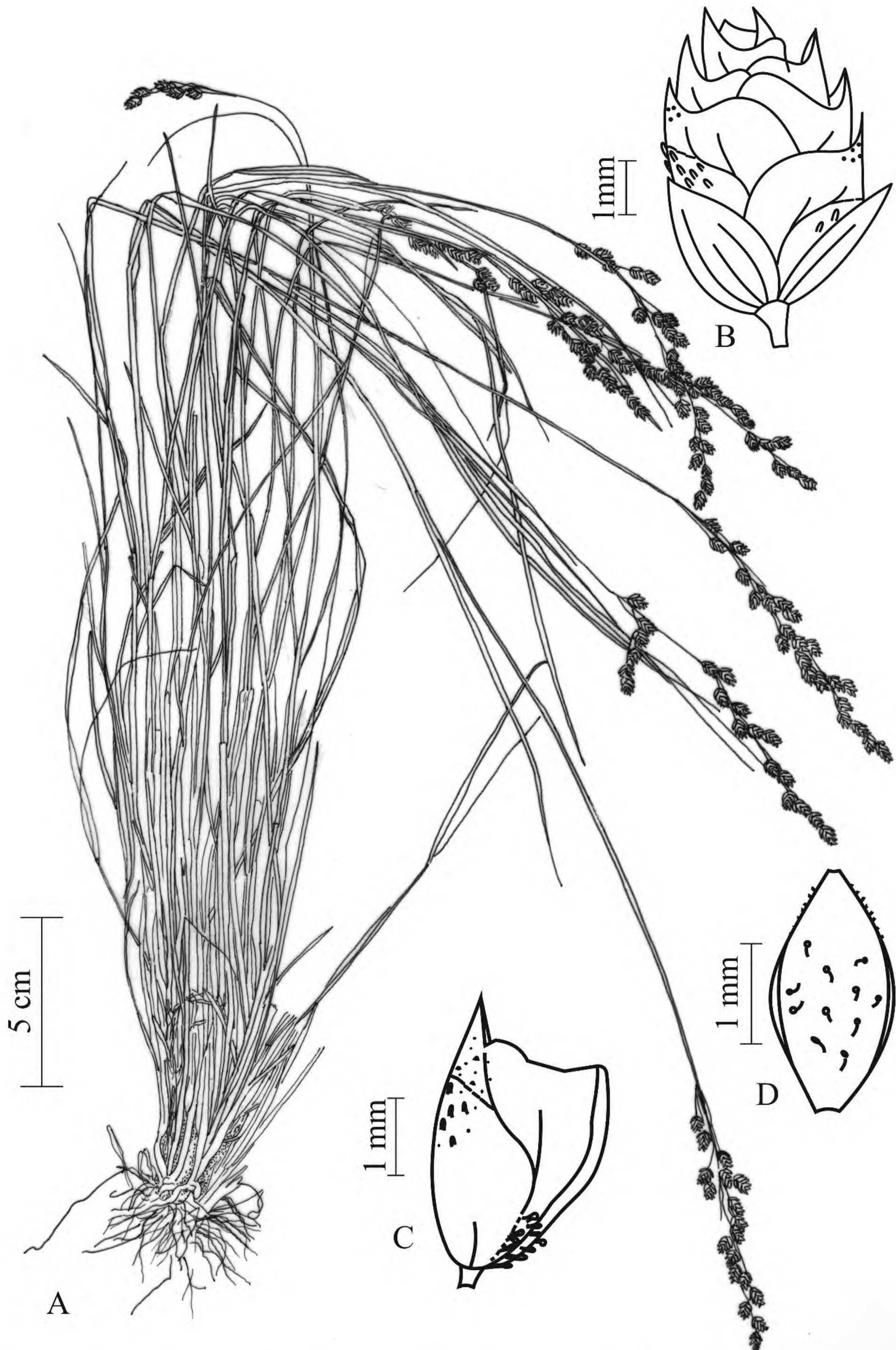


Figure 1. *Chascolytrum altimontanum* Essi, Souza-Chies & Longhi-Wagner. —A. Habit. —B. Spikelet. —C. Lemma, lateral view. —D. Palea, dorsal view. Drawn from the type Wood 10841 (LPB). Parts B–D drawn by L. Essi.

Plants 45–77 cm high; basal internodes of the culms not thickened; basal innovations extravaginal. Leaf sheaths glabrous, smooth, margins non-overlapping; leaf blades linear, 7–45 cm × 0.8–2.2 mm, flat

or convolute, glabrous; ligules 1.8–2.5 mm, acute. Panicle contracted, erect, 3–7 cm; pedicels smooth. Spikelets 5.5–6 × ca. 4 mm, 5- to 8-flowered, cylindrical, oblong; florets imbricate, obscuring the

rachilla; glumes herbaceous, convex, glabrous, smooth, acute or obtuse, subequal; lower glume 2.3–3 × 0.9–1.5 mm, 5-nerved; upper glume 2.3–3 × 1–1.5 mm, 5-nerved; lemmas chartaceous to coriaceous, dorsiventrally compressed, with a gibbous pale back, back strongly distinct from the broad margins, cordate to slightly attenuate at the base, 7-nerved, midvein non-salient on the back, glabrous or with sparse flattened trichomes on the back, truncate or acute at the apex, muticous or mucronate, margins with dense flattened trichomes at the base, inrolled or not at the base, without oil glands; lower lemma 2.5–3.8 × 1.2–2 mm; paleae elliptic-orbicular to orbicular, coriaceous, with capitate trichomes between the keels, occasionally deciduous at maturity, keels ciliolate at the upper half; lower palea 1.5–1.8 × 1–1.2 mm; lodicules flabelliform; stamens 1 or 2. Caryopsis suborbicular, planoconvex; hilum elliptic to linear-elliptic.

Distribution and habitat. *Chascolytrum altimontanum* occurs in the Bolivian highlands. This species is found on dry hill slopes, between 2200 and 3600 m.

IUCN Red List category. The total area of occurrence of *Chascolytrum altimontanum* is ca. 60,000 m², comprising the specimens found in ca. 11 locations. However, there is no precise information available for the size or fragmentation of the populations. Collection labels commonly indicate this grass as rare, but it is also necessary to evaluate the quality of the habitats. A factor that hinders the evaluation of the species status is the fact that *C. altimontanum* at first sight is similar to *C. subaristatum* (Lam.) Desv., which is a common grass broadly distributed across South America and extending to Guatemala and Mexico. Thus, the size of the populations may be overestimated. Because population size and extent have not been established or monitored for this species in any part of its range, it must be classified as Data Deficient (DD) according to IUCN Red List criteria (IUCN, 2001).

Notes. Many herbarium specimens of *Chascolytrum altimontanum* have been identified either as *C. subaristatum* or *C. paleapiliferum* (Parodi) Matthei. Indeed, *C. altimontanum* is morphologically related to both species, with the three species sharing similar palea and lemma shapes, and coriaceous palea. Because the new species presents capitate hairs between the palea keels, some individuals were misidentified as *C. paleapiliferum*. However, the new species differs by the shape of the spikelets and by the presence of dense, flattened trichomes at the lemma base. The geographic distribution is also distinctive: *C. altimontanum* is restricted to the Bolivian

highlands while *C. paleapiliferum* is mainly restricted to the Argentinian highlands. The presence of dense flattened trichomes at the lemma base is also a remarkable difference between *C. altimontanum* and *C. subaristatum*. The latter species is widely distributed in South America, extending to Mexico, in a broader range of habitats. A collection of this new species (Wood 10768, LPB) was included in molecular analyses, which supports *C. altimontanum* as genetically distant from both *C. paleapiliferum* and *C. subaristatum* (Essi et al., 2008).

Paratypes. BOLIVIA. **Chuquisaca:** on E side of Cerro Chataquila near Punilla (Sucre-Ravelo), 9 Apr. 1995, *J. R. I. Wood* 9665 (LPB); Tomina, Lampacillas, ca. 30 km S of Padilla toward Monteagudo, 31 Dec. 1994, *J. R. I. Wood* 9068 (K, LPB); Oropeza, ca. 2 km beyond Sucre airport toward Ravelo, 25 Feb. 1996, *J. R. I. Wood* 10768 (K, LPB); Vamporz, Sucre, SE of the town, 17 Apr. 1994, *J. R. I. Wood* 8314 (K). **Cochabamba:** Mizque a 10 km S of Totora toward Aiquile, 19 Dec. 1995, *J. R. I. Wood* 9461 (K); Tapacarí, entre Parotani y Challa, 21 Feb. 1979, *Ceballos, Charpin, Casas & Bermejo* BO-445 (G); Tiraque, on pass just W of Sacabambilla on old Cochabamba–Santa Cruz rd., 2 Feb. 1996, *J. R. I. Wood* 10486 (LPB); Prov. Chapare, Parque Tunari, bosque de *Polylepsis*, 23 Feb. 1991, *J. Hensen* 998 (LPB); 51 km W of Cochabamba, 3100 m, 25 Mar. 1981, *S. Renvoize & T. Cope* 4082 (K). **Santa Cruz:** Caballero, at summit of rd. on Loma Grande, ca. 6–8 km W of Comarapa on rd. to Siberia, 13 Mar. 2002, *J. R. I. Wood* 17802 (K); Vallegrande, ca. 16 km from Vallegrande on rd. to Masucuri, 11 Feb. 1996, *J. R. I. Wood* 10601 (LPB); Voladerogebirge, 29 Jan. 1928, *C. Troll* 1101 (B, M).

2. *Chascolytrum latifolium* Essi, Souza-Chies & Longhi-Wagner, sp. nov. TYPE: Brazil. Santa Catarina: Urubici, Faz. Arno Philippi, 7 Dec. 2006, *H. M. Longhi-Wagner, A. Zanin & L. Souza* 10228 (holotype, ICN; isotypes, FLOR, K, MO). Figures 2, 4A.

Haec species spiculis cylindricis et lemmatibus aristulatis late alatis *C. subaristato* (Lam.) Desv. similis, sed ab eo lamina foliari generaliter latiore et paleis elliptico-lanceolatis membranaceis trichomatibus longis secus costas ornatis (nec elliptico-orbicularibus usque orbicularibus, coriaceis) praecipue differt.

Plants 27–87 cm high; basal internodes of the culms not thickened; basal innovations extravaginal. Leaf sheaths glabrous, margins non-overlapping; leaf blades linear-lanceolate, 7.5–40 cm × (4–)7–12 mm, flat, glabrous; ligules 1.5–4 mm, truncate. Panicle open, pendulous, 9–15 cm; pedicels scabrous. Spikelets 5–6 × (1.5–)4–5.1 mm, 4- to 8-flowered, subcylindrical, oblong; florets imbricate, obscuring the rachilla; glumes herbaceous, convex to naviculate, glabrous, smooth, subequal; lower glume 3.2–3.9 × 0.6–1.5 mm, 3-nerved; upper glume 3.2–4 × 1.1–1.5 mm, 3- to 5-nerved; lemmas herbaceous, slightly laterally com-

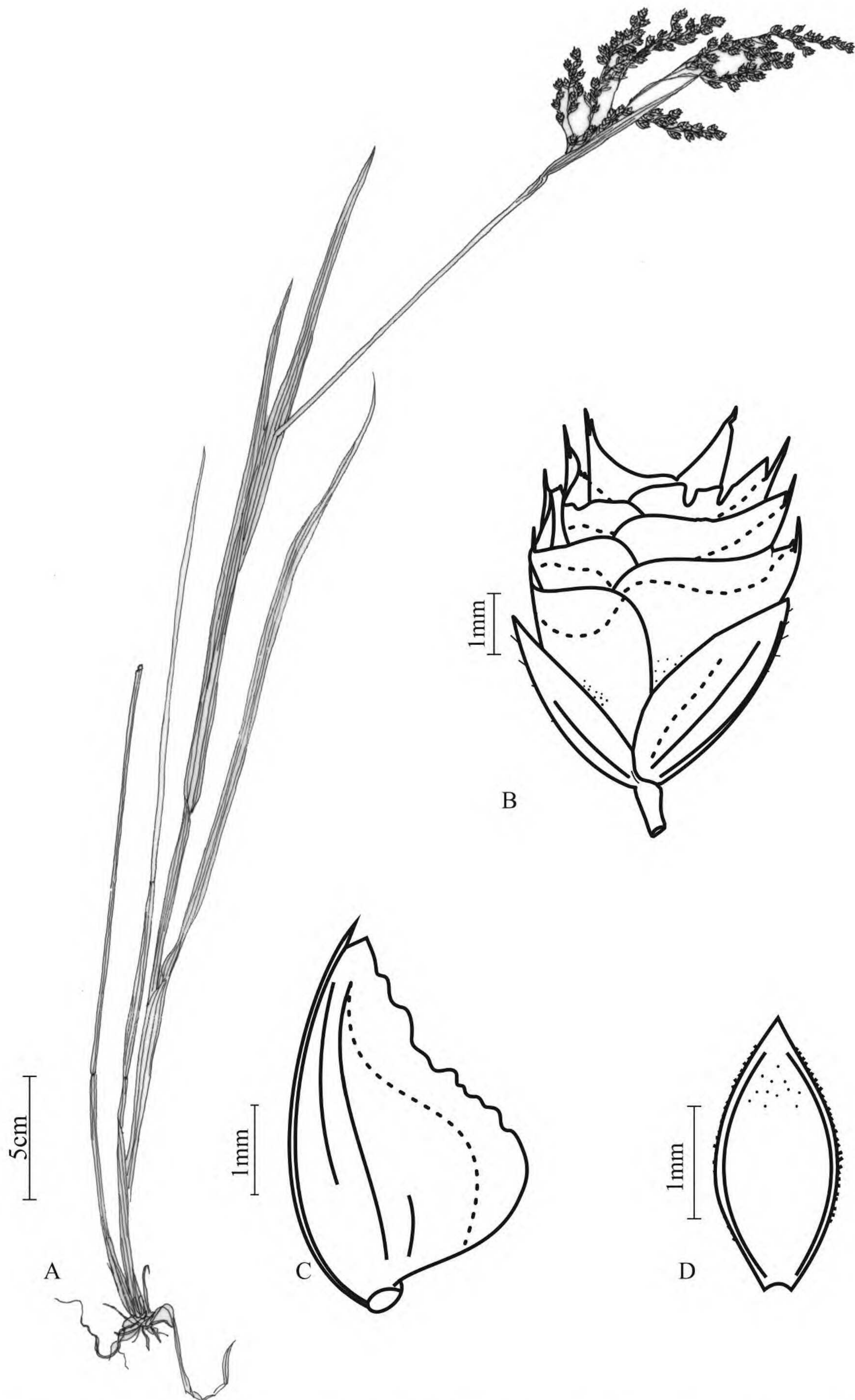


Figure 2. *Chascolytrum latifolium* Essi, Souza-Chies & Longhi-Wagner. —A. Habit. —B. Spikelet. —C. Lemma, lateral view. —D. Palea, dorsal view. Drawn from the type Longhi-Wagner, Zanin & Souza 10228 (ICN). Parts B–D drawn by L. Essi.

pressed, without a gibbous back, with broad margins not distinct from the back, slightly attenuate at the base, 7-nerved, midvein non-salient on the back, glabrous, acute, truncate, or bidentate at the apex,

mucronate, margins glabrous, smooth or scaberulose at the apex, not inrolled at the base, without oil glands; lower lemma 3.9–4 × 1.4–2.5 mm; paleae elliptic-lanceolate, membranous, glabrous and smooth between

the keels, keels ciliate; lower palea $2.8\text{--}3.2 \times 1.1\text{--}1.7$ mm; lodicules linear; stamen 1. Caryopsis suborbicular, planoconvex; hilum elliptic.

Distribution and habitat. *Chascolytrum latifolium* occurs in southern Brazil. This species is found in wet soils with species of *Sphagnum* L. in high-altitude grasslands, mainly in southeastern Santa Catarina, at altitudes of 1400–1580 m, and also in northeastern Rio Grande do Sul, at ca. 800 m.

IUCN Red List category. *Chascolytrum latifolium* is considered Near Threatened (NT) according to IUCN Red List criteria (IUCN, 2001), but approaches the criteria B1ab(iii) and B2ab(iii) for the category of Vulnerable (VU). The extent of occurrence of this species is ca. 27,000 km², but it occurs only at high altitudes in five areas, and the area of occupancy is estimated to be much smaller due to population fragmentation. In the area called Campo dos Padres, in Santa Catarina State, this species is more common and the populations have more individuals. However, collections in other locations are rare and the populations are smaller. Of concern is the reduction of the preserved habitats where this species occurs, but one positive action is already in progress: the area where this species is more abundant is being proposed as a national preservation area named Parque Nacional do Campo dos Padres, which will help in its preservation.

Notes. This new species seems to be a morphological link between the genera *Chascolytrum* and *Poidium* Nees, as accepted by Matthei (1975). *Chascolytrum latifolium* presents wide lemmas, as in typical *Chascolytrum*, but the paleae are elliptic-lanceolate and membranous, as seen in *Poidium*. The delicate consistency of the lemma is also remarkable. The wide, flat, shiny green leaf blades and the pendulous, dense inflorescences of this new species are easy to recognize in the field. A collection of this new species (Essi, Guglieri & Hefler 201, ICN) was included in a phylogenetic molecular analysis (Essi et al., 2008) and was found to be closer to *C. juergensii* (Hack.) Essi, Souza-Chies & Longhi-Wagner (= *Poidium juergensii* (Hack.) Matthei, sensu Matthei, 1975) than to *C. subaristatum* (sensu Matthei, 1975).

Paratypes. BRAZIL. **Rio Grande do Sul:** São José dos Ausentes, Monte Negro, 2 Dec. 2003, L. Essi, A. Guglieri & S. Hefler 159 (ICN). **Santa Catarina:** Bom Retiro, Campo dos Padres, 16 Dec. 1948, R. Reitz 2389 (HBR), 18 Dec. 1948, R. Reitz 2553 (HBR, S), 23 Jan. 1957, L. B. Smith & R. Reitz 10311 (HBR, RB); Bom Retiro, Campo dos Padres, betw. Faz. Campo dos Padres & Faz. Santo Antônio, 21 Nov. 1956, B. Smith & R. M. Klein 7804 (HBR, NY); São Joaquim [Urubici] Morro da Igreja, Faz. Morrinhos, Campestre do

Malacara, 22 Jan. 1960, J. Mattos 7448 (BLA); São Joaquim, Campestre do Malacara, Faz. de Morrinhos, 22 Jan. 1960, J. Mattos 8462 (HAS); Parque Nac. São Joaquim, 2001, H. M. Longhi-Wagner & Garcia 7377 (ICN); Urubici, Faz. Arno Philippi, 7 Dec. 2006, H. M. Longhi-Wagner, A. Zanin & L. Souza 10229, 10230 (ICN); Urubici, Morro da Igreja, em frente à Cavalgada, próx. do quartel, 4 Dec. 2003, L. Essi, A. Guglieri & S. Hefler 201 (ICN).

The following key distinguishes the newly described species of *Chascolytrum* from morphologically related species:

KEY TO DESCRIBED SPECIES AND MORPHOLOGICALLY RELATED SPECIES OF *CHASCOLYTRUM* IN SOUTH AMERICA

- 1a. Paleae membranous, ciliate on the keels; lemmas herbaceous; leaf blades $7.5\text{--}40$ cm \times (4–)7–12 mm *C. latifolium*
- 1b. Paleae coriaceous, glabrous or ciliolate on the keels; lemmas chartaceous to coriaceous; leaf blades $6\text{--}50$ cm \times 0.8–6.5 mm.
 - 2a. Paleae glabrous between the keels, rarely pilose, trichomes noncapitate; lemma margins glabrous *C. subaristatum*
 - 2b. Paleae with capitate trichomes between the keels, occasionally deciduous at maturity; lemmas with or without flattened trichomes on margins at the base.
 - 3a. Margins of the lemma with dense flattened trichomes at the base; lower lemma 2.5–3.8 mm long; spikelets cylindrical *C. altimontanum*
 - 3b. Margins of the lemma glabrous (rarely 2 to 4 capitate trichomes around the callus); lower lemma 4.5–5 mm long; spikelets subcylindrical to laterally compressed *C. paleapiliferum*

Chascolytrum juergensii belongs to a group of species with a very controversial circumscription at the genus level, referred to by Matthei (1975) as the *Briza* complex. Based on morphology only, there was no consensus about the best circumscription for the genera belonging to this group (e.g., *Poidium*, *Briza*, and *Chascolytrum*), and thus a molecular phylogenetic analysis was performed (Essi et al., 2008). Considering the results of this analysis, a new circumscription was proposed for the complex, maintaining the Eurasian species in the genus *Briza*, but including all the South American species studied into a single genus, *Chascolytrum*, so that this genus is considered now in a broader circumscription (*Chascolytrum* s.l.). New combinations are therefore required for *Chascolytrum* s.l. (Essi et al., submitted), including the new combination made here.

3. *Chascolytrum juergensii* (Hack.) Essi, Souza-Chies & Longhi-Wagner, comb. nov. Basionym: *Briza juergensii* Hack., Verh. K.K. Zool.-Bot. Ges. Wien 65: 76–77. 1915. *Poidium juergensii*

(Hack.) Matthei, Willdenowia 8: 114. 1975. TYPE: Brazil. Rio Grande do Sul: Pinheiral, Mpio. Rio Pardo, 70 m, 1909, *C. Jürgens* (holotype, W).

3a. *Chascolytrum juergensii* var. *juergensii*.

3b. *Chascolytrum juergensii* var. *angustilemma* Essi, Souza-Chies & Longhi-Wagner, var. nov. TYPE: Brazil. Rio Grande do Sul: Cambará do Sul, perto do Fortaleza, 29°04'54.6"S, 050°00'14.4"W, 1 Dec. 2003, *L. Essi, A. Guglieri & S. Hefler 122* (holotype, ICN; isotypes, K, MO). Figure 3.

A varietate typica lemmatibus angustioribus non gibbosis lateraliter distincte alatis differt.

Plants 28–70 cm high; basal internodes of the culms not thickened; basal innovations extravaginal. Leaf sheaths glabrous, margins non-overlapping; leaf blades linear-lanceolate, 7–23 cm × 2–7 mm, flat, glabrous; ligules 1–2.5 mm, obtuse to truncate. Panicle open, erect or pendulous, 4.5–15 cm; pedicels smooth. Spikelets 5.2–6 × 2–3.2 mm, 4- to 6-flowered, laterally compressed, elliptic-lanceolate; florets imbricate, obscuring the rachilla, or loosely imbricate, rachilla apparent; glumes herbaceous, naviculate, glabrous, smooth, subequal; lower glume 2.8–3 × 0.5–0.9 mm, 3-nerved; upper glume 3–3.3 × 0.7–1 mm, 3- to 5-nerved; lemmas chartaceous or coriaceous, laterally compressed, pale, without a gibbous back, margins narrow, not distinct from the back, rounded to slightly attenuate at the base, 5-nerved, midvein non-salient on the back, lemmas pilose, acute at the apex, muticous, margins glabrous or sparsely pilose, inrolled or not at the base, without oil glands; lower lemma 3.1–3.9 × 1–1.2 mm; paleae lanceolate, membranous, pilose between the keels, keels ciliate; lower paleae 2–2.5 × 0.7–1 mm; lodicules linear-lanceolate; stamens 1 to 3. Caryopsis elliptic, concavo-convex; hilum elliptic.

Distribution and habitat. *Chascolytrum juergensii* var. *angustilemma* occurs in Brazil, mainly in Rio Grande do Sul and Santa Catarina, the southernmost states in Brazil. There are only two records of variety *angustilemma* for other states (one record from Minas Gerais and another from São Paulo), and its distribution is concentrated in Rio Grande do Sul, while the typical variety is distributed more broadly in other southern states of Brazil and in Colombia. Variety *angustilemma* is found in high-altitude wet grasslands surrounded by *Araucaria angustifolia* (Bertol.) Kuntze (Araucariaceae) forests; variety *juergensii* is also found in wet soils, but in open grasslands.

IUCN Red List category. *Chascolytrum juergensii* var. *angustilemma* is assessed here as Near Threatened (NT) according to IUCN Red List criteria (2001), but approaches criterion B2ab(iii) for the category Vulnerable (VU). The extent of the taxon's occurrence is ca. 550,000 km², but the population is severely fragmented. There are about 11 locations where this variety was found, with most populations concentrated in Rio Grande do Sul State. This Red List assessment is principally due to the reduction of habitat because the areas containing *Araucaria angustifolia* (an endangered tree species, det. Farjon [IUCN, 2009]), where the new variety usually occurs, are being progressively fragmented. It is also important to point out that the grasslands in northeastern Rio Grande do Sul State are being reduced due to forestation with species of *Pinus* L., a new commercial activity of high ecological impact in this ecosystem.

Notes. Matthei (1975) mentioned that the Colombian specimens of *Chascolytrum juergensii* present slightly narrower lemmas than the Brazilian material. However, *C. juergensii* var. *angustilemma* lemmas are even narrower than the Colombian material. Longhi-Wagner (1987: 37) previously emphasized this difference, provisionally naming this new taxon as "*Briza* aff. *juergensii*." The distribution of the new variety, as currently known, is restricted and generally associated with populations of *Araucaria angustifolia*. Plants are shorter than those of *C. juergensii* var. *juergensii*, ranging to 28–70 cm in height, with more delicate culms, while the typical variety usually presents 65–150 cm in height.

A collection of this new variety (*Longhi-Wagner 8759*, ICN) was included in a molecular phylogenetic analysis (Essi et al., 2008) and was found to be distinct from the typical variety.

Paratypes. BRAZIL. **Minas Gerais:** Camanducaia, Monte Verde, 22 Jan. 2002, *H. M. Longhi-Wagner 8009* (ICN). **Rio Grande do Sul:** Bom Jesus, sede, 300 m após entroncamento prope Vacaria, 29 Nov. 1975, *Sampaio, H. M. Longhi & H. Winge 102* (ICN); Bom Jesus, Aparados da Serra, Dec. 1954, *Barreto s.n.* (BLA); Cambará do Sul, Itaimbezinho, 4 Jan. 1974, *M. C. M. Hickenbick 92* (ICN), 28 Nov. 1975, *M. T. S. Sampaio, H. M. Longhi & H. Winge 58, 59, 61, 62* (ICN), 7 Jan. 1977, *M. T. S. Sampaio, H. Winge & L. Arzivenco 406, 411* (ICN), 15 Jan. 1979, *C. T. Lemos & M. T. S. Sampaio 33, 36* (ICN), 1 Dec. 1981, *H. M. Longhi-Wagner et al. 957, 959, 960* (ICN); Cambará do Sul, Itaimbezinho, Bela Vista, 1 Dec. 1981, *H. M. Longhi-Wagner et al. 949* (ICN), *A. M. Sacchet 28* (ICN); Cambará do Sul, Fortaleza dos Aparados, 28 Nov. 1975, *H. M. Longhi, M. T. S. Sampaio & H. Winge 315, 325, 328* (ICN); Cambará do Sul, Parque Nac. da Serra Geral, 29°03'43.9"S, 049°57'23.7"W, 1 Dec. 2003, *L. Essi, A. Guglieri & S. Hefler 135, 136, 139* (ICN); Cambará do Sul, a caminho do Parque, 17 Nov. 2004, *L. Essi 295* (ICN); São Francisco de Paula, Itaimbezinho, 20 Feb. 1953, *B. Rambo 54022* (B), *B.*

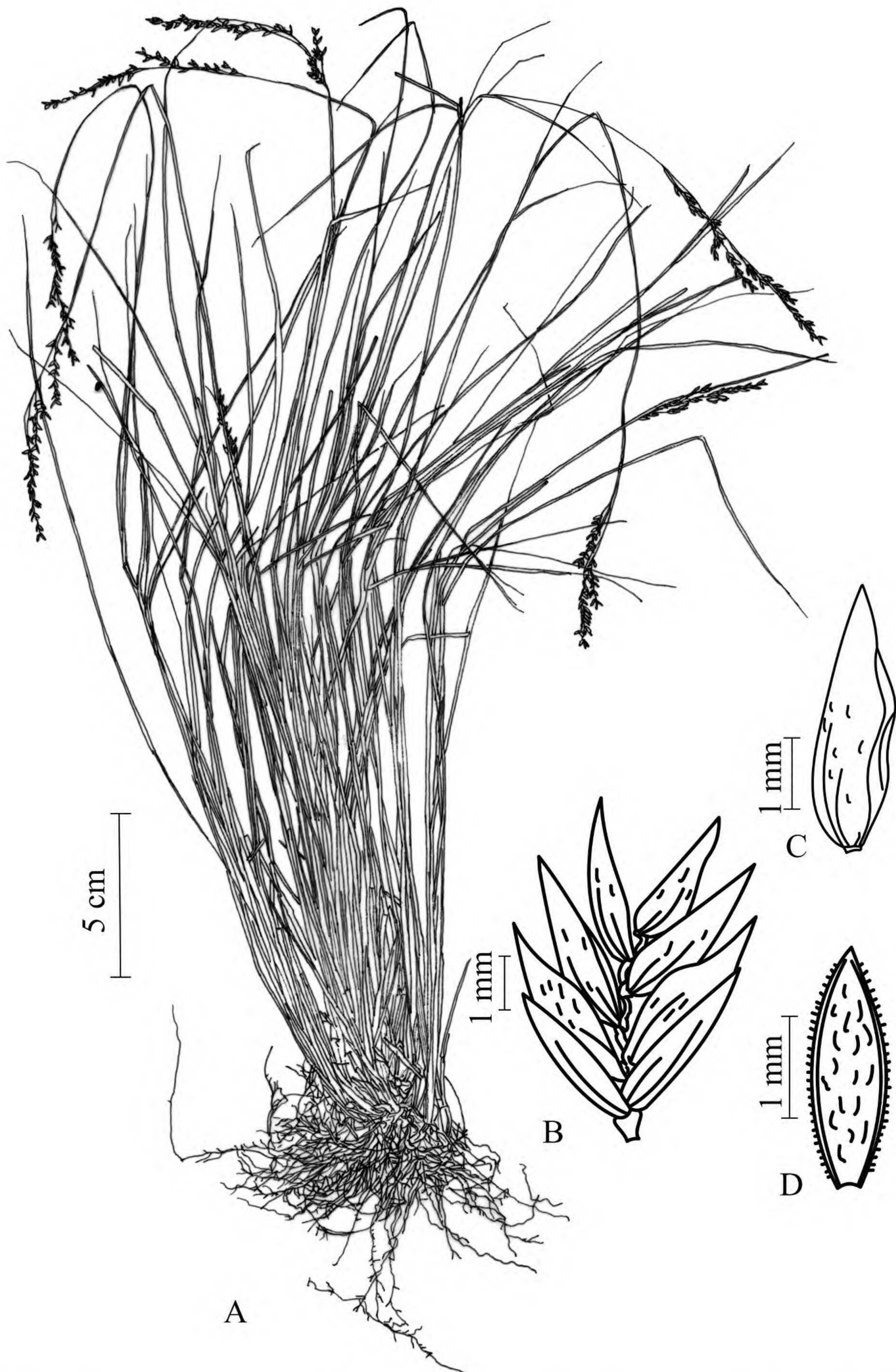


Figure 3. *Chascolytrum juergensii* var. *angustilemma* Essi, Souza-Chies & Longhi-Wagner. —A. Habit. —B. Spikelet. —C. Lemma, lateral view. —D. Palea, dorsal view. Drawn from the type Essi, Guglieri & Hefler 122 (ICN). Parts B–D drawn by L. Essi.

Rambo s.n. (PACA); São José dos Ausentes, Monte Negro, 28°37'00.6"S, 049°47'42.1"W, 2 Dec. 2003, L. Essi, A. Guglieri & S. Hefler 152 (ICN). **Santa Catarina:** Água Doce, 6 Nov. 1971, L. B. Smith, R. M. Klein & G. Hatschbach 15700

(HBR); Bom Jardim, Curral Falso, 19 Nov. 1959, R. Reitz & R. M. Klein 8405 (HBR); Bom Jardim, Serra do Oratório, 9 Dec. 1958, R. Reitz & R. M. Klein 7642 (HB, HBR, L); Caçador, 2 Dec. 1964, L. B. Smith & R. M. Klein 13367