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*A New Species of Agrostis* (Poaceae, Pooidae, Poeae, Agrostidinae) from the Andean Páramos of Colombia and Ecuador

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**ABSTRACT.** *Agrostis laegaardii* A. M. Molina & Rúgolo (Poaceae), a new species restricted to the high páramos from Colombia and Ecuador, is described and illustrated. It is morphologically most similar to *A. brevculmis* Hitchc. but differs in spikelet length, pedicel apex, glume texture, relative distance between upper glume and floret, lemma and palea length, and the presence of an awn on the lemma. Micromorphology of the spikelet is discussed, and a Trichodium net is reported on the epidermis of the lemma. A distribution map and a key to the Colombian and Ecuadorean species of *Agrostis* L. with contracted inflorescences are provided.

**Key words:** Agrostidinae, *Agrostis*, high páramos, Trichodium net.

The grass subtribe Agrostidinae Fr. (Poaceae, Poeae) is composed of 409 species distributed in 11 genera (Soreng et al., 2017). One of these genera is *Agrostis* L., which comprises about 224 species (Soreng et al., 2017) and has a wide geographical distribution in temperate and cold regions of both hemispheres and in mountains of tropical and subtropical regions. In America, two important centers of species diversification are present, one in the Andean Patagonian region of Argentina and Chile, where many native species occur, some of them endemic (Rúgolo de Agrasar & De Paula, 1978; Nicora & Rúgolo de Agrasar, 1987; Rúgolo de Agrasar & Molina, 1990, 1992, 1993, 1998), and the other in the southwestern United States and Mexico (Molina & Rúgolo de Agrasar, unpubl. data). In Ecuador, there are several contributions on *Agrostis* (Sodiro, 1889, 1930; Hitchcock, 1927; Espinosa, 1949; Acosta Solís, 1969; Jørgensen & Ulloa Ulloa, 1994), and 11 species have been cataloged in Jørgensen and León-Yánez (1999). Recent studies of Colombian grasses (García-Ulloa et al., 2005) included four new records in *Agrostis*. Later, Giraldo-Cañas (2011) prepared an inventory of the Colombian species of Poaceae and reported 14 species of *Agrostis*.

The present work is part of a taxonomic revision of *Agrostis* for the Neotropical regions of America (Molina & Rúgolo de Agrasar, unpubl. data). *Agrostis laegaardii* A. M. Molina & Rúgolo, a new species from the páramos of Colombia and Ecuador, is here described and illustrated and its known geographic distribution is provided. Details of the spikelet, as well as the epidermis of the lemma, are analyzed and SEM photomicrographs are included. A key to differentiate *A. laegaardii* from morphologically similar taxa in this region is provided.

In *Agrostis*, the morphology of the inflorescence is useful for the identification of species (Rúgolo de Agrasar & Molina, 1992, 1998). Two different types of inflorescences are recognized: contracted inflorescences with more or less appressed branches and lax inflorescences with divergent branches at maturity that do not exceed the total length of the inflorescence. The inflorescences of *A. laegaardii* belong to the first type, as do those of several other taxa of *Agrostis* in Ecuador (i.e., *A. boyacensis* Swallen & García-Barr., *A. brevculmis* Hitchc., *A. foliata* Hook. f., *A. meyenii* Trin., *A. tolucensis* Kunth var. *tolucensis*, and *A. tolucensis* var. *andicola* (Pilg.) Rúgolo & A. M. Molina) and Colombia (*A. stolonifera* L. var. *paleustris* (Huds.) Farw.). The morphologically most similar species to *A. laegaardii* is *A. brevculmis*, which is widely distributed in South America.
American, where it occurs in high mountains from Colombia to Chile and Argentina (Rúgolo de Agrasar & Molina, 1992, 1993, 1998). These two species differ from the others in Colombia and Ecuador in being caespitose plants with short rhizomes, forming basal cushions, and having convolute, chartaceous leaf blades with navicular apices and glumes with shiny prickle hairs along the keel.

**Materials and Methods**

Macromorphological, micromorphological, and anatomical studies were carried out using specimens from AAU, BAB, QCA, QCNE, SI, and US (Thiers, 2019), according to traditional taxonomic methods. A list of selected material examined is presented (Appendix 1).

For micromorphological studies the spikelets were selected from herbarium specimens, cleaned with xylene, and coated with a gold-palladium (40%/60%) alloy using a sputter coater (Thermo Fisher Scientific, West Sussex, U.K.). The micromorphology of the spikelets was analyzed with a Philips XL 30 (Philips, Eindhoven, the Netherlands) Scanning Electron Microscope (SEM) at the Museo Bernardino Rivadavia (Buenos Aires, Argentina). Observations were made of the abaxial epidermis of the lemmas (middle zone) of spikelets attached in the middle zone of the inflorescence branches.

The texture of the glumes was compared with their anatomy at the middle zone in transverse section, according to traditional techniques (D’Ambrogio de Argüeso, 1986). The anatomical description of the glumes in cross section follows the terminology proposed by Ellis (1976).

**Taxonomic Treatment**

*Agrostis laegaardii* A. M. Molina & Rúgolo, sp. nov.

**Type:** Ecuador. Pichincha-Napo: on N-side of Volcán Antisana app. 12 km along dirt rd. from Hacienda Antisana, 78°10′W 00°27′S, 4600–4650 m, in old moraines, soil partly unconsolidated due to solifluction, 15 May 1992, S. Laegaard 102881 (holotype, AAU!; isotypes, BAB!, QCA!, QCNE), Figure 1.

**Diagnosis.** *Agrostis laegaardii* A. M. Molina & Rúgolo is distinguished from *A. brevicalmus* Hitchc. by having spikelets (1.7–3.3 mm long (vs. 1.6–2.5 mm long), pedicels slightly dilated toward the apex, cupuliform (vs. apex not dilated, truncate); glumes membranous (vs. chartaceous), lower glume narrowly ellipsoid (vs. navicular); distance between upper glume and floret (0.5–0.7–1 mm (vs. 0.3–0.5 mm); lemma (1.4–1.7–2 mm long, awned, dorsal awn (1.6–2.5–3 mm long, apex shortly 4-awned, 0.5–0.6 mm long (vs. lemma 1.2–1.4 mm long, awnless or mucronulate, apex 4-mucronate), and palea 0.4–0.5 mm long (vs. 0.2–0.3 mm long).

Perennial herbs 6–18 cm tall, caespitose, forming hemispherical cushions; rhizomes 0.5–1 mm diam., internodes ca. 5 mm. Innovations intravaginal and extravaginal. Culms erect, simple, shining, smooth. Leaves up to half as long as culms; sheath smooth, paperyaceous, striate, longer than internodes, those of flowering shoots broader than their leaf blades, glabrous; ligule 1–2 mm, membranous, truncate, decurrent with sheath, apex obtuse, abaxially glabrous or minutely scabrous; blade 1.5–5 cm × 1–2 mm, convolute, rigid, straight or recurved, abaxially shining, glabrous; adaxial surface and margins scabrous; apex obtusely navicular. Inflorescence 2–5 cm × 3–6 mm, exerted at maturity; lateral branches alternate, appressed, minutely scabrous or glabrous; pedicels of spikelets 1.5–4 mm, slightly dilated toward apex, cupuliform, glabrous or minutely scabrous. Spikelets (1.7–3.3 mm, yellowish with purple tint. Glumes persistent on inflorescence, membranous, narrowly ellipsoid, subequal, 1-nerved, keeled (V-shaped in cross-section), apex acute, adaxial surface minutely scabrous on the upper half; lower glume with abundant shiny prickle hairs along keel; upper glume with abundant shiny prickle hairs along upper 2/3–3/4 of keel. Stipe between upper glume and floret-callus (0.5–0.7–1 mm, rachilla extension above floret absent. Callus rounded, with 2 lateral tufts of short hairs 0.1–0.2 mm. Lemma (1.4–1.7–2 mm, 5-nerved, membranous, scabrous, apex with 4 minute awns, middle nerve prolonged in a dorsal awn (1.6–2.3–3 mm, straight or flexuous, minutely scabrous, inserted in middle to upper third of lemma, exerted from glumes; abaxial epidermis with Triechodium net. Palea 0.4–0.5 mm, hyaline, nerves not evident. Lodicules 2, 0.3–0.6 mm, lanceolate, unlobed, hyaline. Stamens 3; anthers 0.7–1 mm, purple at maturity. Ovary glabrous. Immature caryopsis brownish, longitudinally grooved; hilum punctiform; endosperm dry.

**Phenology.** Flowering occurs from February to May.

**Etymology.** *Agrostis laegaardii* is dedicated to Simon Laegaard, botanist and specialist in Poaceae and native flora of Ecuador, who collected the type and much of the known material.

**Geographic distribution and habitat.** *Agrostis laegaardii* is found in the high páramos of Colombia and Ecuador, forming dense tufts. In Ecuador the species was collected in the provinces of Pichincha, Napo, Pastaza, Cotopaxi, Tungurahua, and Chimborazo (Fig. 2), inhabiting a pajonal moorland according to the classification of moors proposed by Hofstede et al. (2002). In Colombia, *A. laegaardii* was collected near the Nevado del Ruiz, an active stratovolcano (Mejia et al., 2012). All these collections belong to the Andean...
Figure 1. *Agrostis laegaardii* A. M. Molina & Rúgolo. —A. Habit. —B. Ligule, ventral view. —C. Apex of the leaf. —D. Lateral view of spikelet. —E. Floret, dorsal view. —F. Floret, ventral view. —G. Stamen. —H. Callus, lodicules, and palea in ventral view. —I. Caryopsis, dorsal view. —J. Caryopsis, ventral view. All based on Laegaard 102881 (QCNE).
páramos, which represent a biogeographical region of great biological diversity (Llambi & Cuesta, 2014). These ecosystems have endemic species, provide fundamental environmental services, and are spaces of cultural importance for various traditional and local populations (Llambi & Cuesta, 2014). Human activities (raising livestock and crops) have transformed the páramos and caused impacts on the environment (Llambi & Cuesta, 2014). According to our records, more than 20 years have elapsed since the last collection of *A. laegaardii*. Therefore, field trips are necessary to target areas for conservation and sustainable management.

**Notes.** In addition to the characters mentioned above, *Agrostis laegaardii* and *A. breviculmis* also differ in the anatomy of the glumes in cross section. In *A. laegaardii*, the glumes have a standard V shape (i.e., between 45° and 90° to each other; Ellis, 1976) and at the margins they have only one cell layer of thickness (abaxial epidermis), whereas in *A. breviculmis* the glumes have a narrow V shape (that is, less than 45° between them; Ellis, 1976) and at the margins they are two cell layers thick (adaxial and abaxial epidermis).

The structure of the lemma epidermis in *Agrostis* has been studied by Björkman (1960), Rajbhandari (1985), Romero García et al. (1988), and Rúgolo de Agrasar and Molina (1992, 1998). Björkman (1960) analyzed and described transverse thickening bars on the outer tangential cell walls of the abaxial lemma epidermis and called them “Trichodium net.” The presence of Trichodium net may be related to the palea development and texture. In *Agrostis*, species with a reduced palea exhibit Trichodium net, while it is absent in those species in which the palea reaches half the length of the floret (Björkman, 1960; Rajbhandari, 1985; Romero García et al., 1988; Rúgolo de Agrasar & Molina, 1992, 1998). For this reason, Björkman (1960) considered that the occurrence or absence of a Trichodium net was the most useful character in the subgeneric classification of *Agrostis*. *Agrostis laegaardii* exhibits a reduced palea and its lemma epidermis has a well-developed Trichodium net (Fig. 3). According to the classification proposed by Widén (1971), *A. laegaardii* exhibits a Trichodium net type I. This network is fully developed with thickened transverse ribbons almost as wide as, or wider than, the non-thickened parts of the outer epidermis cell wall.

**Paratypes.** **COLOMBIA.** *Caldas–Tolima:* Páramo del Ruiz, 3700–4200 m, 26 Dec. 1936, Chardon 5021 (US). **ECUADOR.** *Chimborazo:* upper WSW slopes of Volcán Chimborazo, 500 m S of (below) the Whymper refuge, 4750 m, 28°50’W, 01°28’S, 7 Feb. 1988, Molau & Eriksen 2985 (AAU, QCNE); Volcán Chimborazo, above the lower
Figure 3. *Agrostis laegaardii* A. M. Molina & Rúgolo. SEM microphotographs. —A. Lateral view of spikelet. —B. Upper part of the spikelet, dorsal view of the lower glume. —C. Base of the floret, callus, and callus hairs. —D. Lateral view of the palea. —E. Dorsal view of lemma apex, in the foreground part of the dorsal lemma awn. —F. Lemma epidermis. Bars: A = 5 mm; B, D = 500 μm; C = 50 μm; E = 200 μm; F = 20 μm. A–D from Laegaard 102977 (QCNE); E, F from Molau & Eriksen 2985 (QCNE). Abbreviations: a, anther; aw, awn; ca, callus; ch, callus hairs; f, floret; le, lemma; lg, lower glume; p, pedicel; pa, palea; pr, prickle; tn, Trichodium net; ug, upper glume.
Refugio (4840 m), 5070 m, 78°50′W, 01°29′S, 11 May 1992, Lægaard 102822 (QCNE); campsite above Río Alao, 3350–3550 m, 20 May 1990, Peterson et al. 9195 (US); betw. Urbina & Mt. Chimborazo, 3600–4500 m, 4 Oct. 1923, Hitchcock 21978 (US). Nabo: Laguna San Marcos, NE of Volcán Cayambe, extensive flat plain S of the lake, 3370 m, 77°55′W, 00°07′S, 8 July 1980, Lægaard 34011 (SI); Lægaard 34061 (SI); NW slope of Antisana, Lago Mauca-Machay, 4350 m, 78°10′W, 00°27′S, 2 Nov. 1979, Lægaard 20730 (SI); Volcán Antisana, 4600 m, 00°30′W, 78°10′S, 22 July 1997, Lægaard 2745 (AAU); W side of Mt. Cayambe, 4050–4350 m, 22–23 July 1943, Little & Paredes 6851 (US). Nabo–Pastaza: aldeedores de Llanganates, entre Anchilivi y Río Burro Potrero, al este de Río Pámpano, 3500–3620 m, 30 Aug. 1939, Barclay & Jujiobiosi 9172 (US).

**Pichincha**: Pió-Pintag, in valley 2 1/2 hour horse ride above Inga Monserrat, 3625–3725 m, 78°17′W, 00°19′S, 11 Apr. 1992, Lægaard 102236 (AAU).

**Pichincha–Cotopaxi**: Volcán Cotopaxi, NE slope at rd. to El Refugio, 4600–4800 m, 78°25′W, 00°38′S, 2 Oct. 1976, Ollgaard & Balslev 9977 (AAU). **Pichincha–Napo**: on N side of Volcán Antisana, ca. 12 km along dirt rd. from Hacienda Antisana, 4410–4830 m, 78°27′W, 00°27′S, 15 May 1992, Lægaard 102877 (QCNE); same loc., on old moraine, 4700 m, 15 May 1992, Lægaard 102890 (AAU).

**Tungurahua**: Cordillera de Llanganates, Páramo de Jamallino, 4000–4250 m, 78°22′W, 01°10′S, Nov. 1984, Lægaard 53315 (AAU); Mt. Catilhuairazo, 4400 m, 22 Sep. 1939, Asplund 8467 (US).

**Key to *Agrostis* species of Colombia and Ecuador Having a Contracted Inflorescence at Maturity with More or Less Appressed Branches**

1. Plants stoloniferous, 30–100 cm high; palea 0.7–1.1 mm ......... A. stolonifera L. var palustris (Huds.) Farw.
1’. Plants rhizomatous, 3–30(–51) cm high; palea 0.1–0.7 mm.

2. Leaf blades convolute, rather rigid, 0.5–2 mm wide; plants caespitose, with thick short rhizomes, internodes 1–2 mm.

3. Spikelets (1.7–2–3.3 mm; pedicels slightly dilated toward apex, cupuliform; glumes membranous, standard V shape in transverse section; lower glume narrowly ellipsoid; distance between upper glume and floret (0.5–0–7–1 mm; lemma (1.6–2–3–3 mm long, apex shortly 4-awned, 0.5–0.6 mm long; palea 0.4–0.5 mm .... A. laegaardi M. A. Molina & Rúgolo

3’. Spikelets 1.6–2–2.5 mm; pedicel not dilated at apex, truncate; glumes chartaceous, narrowly V-shaped in transverse section; lower glume navicular; distance between upper glume and floret 0.3–0.5 mm; lemma 1.2–1.4 mm, apex 4-mucronate, awnless or mucronulate; palea 0.2–0.3 mm ....... A. breviculmis Hitchc.

2’. Leaf blades conduplicate or flat, rather soft, 1–6 mm wide; plants with thin, well-developed rhizomes, sometimes creeping, internodes 7–9 mm.

4. Floret awnless, mucronate or rarely with a subapical short awn ca. 1.2 mm long; leaf blades 1.5–2 mm wide.

5. Lemma 1.7–2.6 mm; glumes subequal, both scabrous along upper third of keel; pedicels smooth, exceptionally minutely scabrous ........ A. meyenii Trin.
5’. Lemma 1.4–1.5 mm; glumes unequal, lower glume longer than upper one, lower glume scabrous along entire length of keel, upper glume smooth or scabrous in upper third on surface; pedicels scabrous .... A. boyacensis Swallen & García-Barr.

4’. Floret awned, the awn 2–6 mm, geniculate and twisted, exserted from glumes; leaf blades 1–6 mm wide.

6. Spikelets 3.5–4 mm; floret 1/2 the length of the spikelet; inflorescence 1–2.5 cm wide, with lateral branches up to 7 cm long; leaf blades 2–6 mm wide ........... A. foliata Hook. f.
6’. Spikelets (2–)2.5–3–4.5 mm; floret ca. 2/3 the length of the spikelet; inflorescence 0.5–1.5 cm wide, with lateral branches 0.5–1.5 cm long; leaf blades 1–4(–5) mm wide.
6”. Awn inserted at the lower 1/3 of the back of the lemma .......... A. tolucensis Kunth var. tolucensis
6’’. Awn inserted in the upper or middle 1/3 of the back of the lemma ........ A. tolucensis var. andicola (Pilg.) Rúgolo & A. M. Molina

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**Literature Cited**

Acosta Solís, M. 1969. Glumíferas del Ecuador. Catálogo Fitogeográfico de las Gramíneas, Cyperáceas y Juncáceas. 1a Contribución del Instituto Ecuatoriano de Ciencias Naturales al Programa Internacional de Biología, Quito.

Björkman, S. O. 1960. Studies in *Agrostis* and related genera. Symb. Bot. Upsal. 17: 1–112.

D’Ambrogio de Argüeso, A. 1936. Manual de Técnicas en Histología Vegetal. Hemisferio Sur, Buenos Aires.

Ellis, R. P. 1976. A procedure for standardizing comparative leaf anatomy in the Poaceae. I. The leaf-blade as viewed in transverse section. Bothalia 12: 65–109.

Espinoza, R. 1949. Estudios Botánicos en el Sur del Ecuador. Vol. 2, Editorial Universitaria, Loja.

García-Ulloa, J. A., C. Lastra, C. Salas & M. Medina Merchán. 2005. Estudios en gramíneas (Poaceae) de Colombia: Veinte novedades corológicas. Caldasia 27: 131–145.

Giraldo-Cañas, D. 2011. Catálogo de la familia Poaceae en Colombia. Darwiniana 49: 139–247.

Hitchcock, A. S. 1927. The grasses of Ecuador, Peru, and Bolivia. Contr. U.S. Natl. Herb. 24: 291–556.

Hofsteder, R., R. Coppus, P. Mena Vásquez, P. Segarra, J. Wolf & J. Sevink. 2002. El estado de conservación de los páramos de pajacone en el Ecuador. Ecotropicos 15: 3–18.

Jørgensen, P. M. & C. Ulloa Ulloa. 1994. Seed plants of the high Andes of Ecuador - A checklist. Poaceae. AAU Rep. 34: 1–443.

Jørgensen, P. M. & S. León-Yánez. 1999. Catálogo de las Plantas Vascularis de Ecuador. Monogr. Syst. Bot. Missouri Bot. Gard. 75: 1–43.

Jørgensen, P. M. & F. Cuesta, L. D. & F. Cuesta. 2014. La diversidad de los páramos andinos en el espacio y en el tiempo. Pp. 7–40 in F. Cuesta, J. Sevink, L. D. Llambí, R. de Bièvre & J. Posner (editors),
Avances en la investigación para la Conservación en los Páramos Andinos. CONDESAN, Quito.
Mejía, E. L., F. Velanda, C. A. Zuluaga, J. A. López & T. Cramer. 2012. Análisis estructural al noreste del volcán Nevado del Ruiz, Colombia - aporte a la exploración geotérmica. Bol. Geol. (Bucaramanga) 34: 27–41.
Nicoa, E. & Z. E. Rúgolo de Agraasar. 1987. Los Géneros de Gramíneas de América Austral. Hemisferio Sur, Buenos Aires. 
Rahjhandari, K. R. 1985. The genus Agrostis in Nepal. J. Jap. Bot. 60: 65–78.
Romero García, A. T., G. B. López & C. M. Morales Torres. 1985. Revisión del género Agrostis (Poaceae) en la península Ibérica. Ruizia 7: 1–164.
Rúgolo de Agraasar, Z. E. & M. E. De Paula. 1978. Avena canadensis L. (Gramineae). Gayana, Bot. 47: 3–16.
Rúgolo de Agraasar, Z. E. & M. A. Molina. 2003. Sinopsis del género Agrostis (Gramineae: Agrostideae) de la Argentina. Parodiana 7: 179–255.
Romero García, A. T., Z. E. A. M. Molina. 1990. Las especies del género Agrostis (Gramineae: Agrostideae) de Bolivia. Parodiana 8: 129–151.
Rúgolo de Agraasar, Z. E. & A. M. Molina. 1992. Las especies del género Agrostis (Gramineae: Agrostideae) de Bolivia. Gayana, Bot. 47: 91–156.
Sodiro, P. L. 1939. Gramíneas eucarionticas de la provincia de Quito. Anales Univ. Centr. Ecuador 3: 474–484.
Sodiro, P. L. 1930. Sertula Flora de Ecuador. Series 4. Gramíneas Eucarionticas, Vol. 2. L. Mille (editor). Revista del Colegio Nat. Vicente Rocafuerte 11: 55–96.
Soreng, R. J., P. M. Peterson, K. Romaschenko, G. Davidse, J. K. Teisher, L. G. Clark, P. Barberá, et al. 2017. A worldwide phylogenetic classification of the Poaceae (Gramineae) II: An update and a comparison of two 2015 classifications. J. Syst. Evol. 55: 259–290.
Thiers, B. 2019 [continuously updated]. Index Herbariorum: A global directory of public herbaria and associated staff. sweetgum.nybg.org/science/ih/.
Widén, K. G. 1971. The genus Agrostis L. in Eastern Fennoscandia. Taxonomy and distribution. Fl. Fennica 290.
Appendix 1. Selected material examined.
Agrostis boyacensis Swallen & García-Barr. COLOMBIA. Boyaca: Nevado del Gocuy, Alto Valle de Las Lagunillas, 4000–4300 m, 12 Sep. 1938, Cuatrecasas & García Buiraga 1459 (US).
Agrostis breviculmis Hitchc. COLOMBIA. Amazonas: Nueva Granada, 17°33’–18°08’N, 79°46’–79°59’W (MA), Cordillarunetec Chisacá-Sumapaz, Reserva de Bosque Andino, subida de Chisacá, 3200 m, 13 Sep. 1994, Fernández Alonso et al. 11628 (MA).
Santander: E de Bucaramanga, 2700 m, 18 Dec. 1948, Arquel Molina y Barkley 18 S389 (LIL); Páramo de Santurtún, near Vetas, 3950–4160 m, 17 Jan. 1927, Killip & Smith 17573 (P). 
ECUADOR. Azuay: Parque Nacional Cajas, NW of Cuenca, 3700 m, 21 Apr. 1990, Peterson et al. 8855 (QCNE); Cuenca, Páramo grassland, 21 Sep. 1987, Ramsay & Merrow-Smith 651 (QCNE).
Bolivar: Rd. Ambato–Guaranda, 12 km W of intersection betw. old & new rd., 4150 m, 1 Aug. 1985, Laeuger 58415 (QCNE). 
Carchi: Volcán Chiles, 9 km of Tufíno, páramo espeletias, 10 Mar. 1929, Laeuger 101676 (QCNE). 
Chimborazo: Cotacachi, 4100 m, 9 Nov. 1946, Auber de la Raye s.n. (P); Páramos de Pichincha, Oct. 1956, Remy s.n. (P); Pichincha, 4500 m, 13 Jul. 1915, Mexia 7498 (BAA); Tungurahua-Maldonado rd., 4 km W of Tufíno, Montebello Redondo area, 3475 m, 12 Apr. 1978, Isern 132 b (NY).
Guayas: Guayaquil, 17°40’N, 5°45’W, 2 km NW of La Casa Mosquirre, 10 Mar. 1929, Killip & Smith 17565 (P).
Los Ríos: Cayambe, 4100 m, 30 Jul. 1915, Killip & Smith 17566 (P).
Napo: Cotacachi, 5 km of Pichincha, 4500 m, 5 May 1940, Cuatrecasas 14731 (P).
Pichincha: Volcán Antisana, betw. Campamento IMAP y Núcleo Lauro, 4100 m, 17 Aug. 1923, Killip & Smith 17567 (P). 
Quevedo: Volcán Antisana, 37°06’N, 78°10’W, 3950 m, 17 Jul. 1939, Killip & Smith 17568 (P).
Provincia de Guayas, subiendo a la sierra, 2 km de algunas ruinas Incaicas, 4 km NE of Quito, 4100 m, 17 Jul. 1953, Killip & Smith 17569 (P).
Tungurahua: Volcán Antisana, 37°06’N, 78°10’W, 3950 m, 17 Jul. 1939, Killip & Smith 17570 (P). 
Carchi: Volcán Chiles, 9 km of Tufíno, páramo espeletias, 10 Mar. 1929, Laeuger 101676 (QCNE). 
Chimborazo: Cotacachi, 4100 m, 9 Nov. 1946, Auber de la Raye s.n. (P); Páramos de Pichincha, Oct. 1956, Remy s.n. (P); Pichincha, 4500 m, 13 Jul. 1915, Mexia 7498 (BAA); Tungurahua-Maldonado rd., 4 km W of Tufíno, Montebello Redondo area, 3475 m, 12 Apr. 1978, Isern 5710 (P).
Chimborazo: El Altar, N side of the volcano, Canningo peak, Silencar 88–3 (NY).
Cotopaxi: Parque Nacional Cotopaxi, Rio Pita, bosque subpluvial sub-alpino, 4000 m, 14 Dec. 1990, Ceron 12595 (QCNE).
Roma: Rd. Pifo–Papallacta, N of antennas at Paso de la Virgen, superpáramo, 4250–4400 m, 13 Mar. 1985, Laeuger 52960 (QCNE).
Pichincha: Dec. 1864, Isern 132 b (MA); Laguna de Hoyas, Páramo de Guamaní, 9 Mar. 1987, Ramsay 226 (QCNE); along rd. to Refugio, Cayambe volcano, 4000–4500 m, 1 Mar. 1928, Laeuger 70455 (QCNE); Km. 40 tte. Quito–Papallacta, cordillera oriental, 4000 m, 1 May 1947, Aubert de la Rue s.n. (P); Páramos de Pichincha, Oct. 1956, Remy s.n. (P); Pichincha, 4500 m, 9 Nov. 1946, Auber de la Rue s.n. (P); Monte Pichincha, Sep. 1887, Sodiro s.n. (W); Monte Pichincha near Quito, 4100–4500 m, 17 Aug. 1923, Hitchcock 21053 (BA); Crescit in arenis vulci. Intis Pichincha, 4500 m, July 1918, Mille s.n. (BAB). 
Pichincha–Napo: Volcán Antisana, betw. Campamento IMAP & Laguna Micaica, moist & dry grass-páramo, swamps around the lake, 7 Mar. 1992, Laeuger 101590 (QCNE); Jan. 1865, Isern 145 (MA). 
Tungurahua: N slopes of Volcán Tungurahua, Ramsay et al. 254 (QCNE); along trail Mesa Tlabor to Limpiopuengu 5 of Laguna Pisayambo, superpáramo without traces of fires, 14 Jan. 1999, Laeuger 19457, 19480 (QCNE); Cordillera de Llanganates, páramo de Jaramillo, 2–4 Nov. 1984, Laeuger 53229 (QCNE); ca. 5 km SE of Laguna Pisayambo, Las Tolas, 3900–4000 m, 13 Jun. 1999, Laeuger 19428 (QCNE).
Cantón Patate, Parque Nacional Llanganates, faldas del cerro Pan de Azúcar, Páramo
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de Soguillas–Cerro Pan de Azúcar, 13 Oct. 1998, Vargas et al. 2817 (QCNE); volcano, humid area above tree limit, 18–19 Nov. 1983, Körning & Thomsen 47336 (QCNE).

Agrostis tolucensis Kunth var. tolucensis. ECUADOR. Azuay: Mt. Azuay, Spruce 6097 (BAA, K, US). Bolivar: ca. Km. 20 Guaranda–Riobamba, 3300–3400 m, 10 July 1990, Laegaard 71726 (QCNE). Loja: Old Campamento y Fierro Urco, 8 Sep. 1998, Laegaard 19112 (QCNE). Pichincha: 5 June 1931, Benoist 4401, 4402 (P).

Agrostis tolucensis Kunth var. andicola (Pilg.) Rúgolo & A. M. Molina. ECUADOR. Azuay: Páramos de Soldadas-Angas, 14 Feb. 1988, Laegaard 70114 (QCNE). Bolivar: 45.7 km SW of Ambato on Hwy. to Guaranda, 3 May 1990, Peterson 8977 (QCNE); Cruces de Los Arenalas, 78°54' W, 01°25' S, 4160–4200 m, 1 Mar. 1992, Laegaard 101494 (BAB, QCNE). Cañar: Panamerican Hwy., entre Cañar y Biblian, 29 Aug. 1984, Laegaard 52758 (QCNE).

Chimborazo: In pascuis Monte Chimborazo, Sodiro s.n. (P); betw. Urbina & Mt. Chimborazo, 3600–4500 m, 4 Oct. 1923, Hitchcock 21999 (F, US); crescit in páramos Chimborazo, 1890, Sodiro 11/6 (Q); Cruce de Los Arenalas–Chimborazo Km 5, dune-sand, 11 May 1992, Laegaard 102782 (QCNE); Collanes Valley, Páramo de los Altaires, 3 Sep. 1987, Ramsey & Merrow-Smith 334 (QCNE); camino de Riobamba a Pallatanga, Oct. 1978, Roig s.n. (MERL); Parque Nacional Sangay, near Campanilla, 78°29' W, 1°35'S, 3300–3500 m, 24 Mar. 1984, Laegaard 51876 A (QCNE). Cotopaxi: Illiniza N & Illiniza S, 4750 m, 2 May 1990, Peterson 89668 (QCNE); Parque Nacional Cotopaxi, 25 Feb. 1992, Laegaard 101445 (QCNE).

Imbabura: Lago San Marcos, Cayambe, 25 Nov. 1961, Cazalet & Pennington 5328 (B); SW slopes of the Volcano Cotacachi, 9 Nov. 1983, Boysen et al. 45647 (QCNE). Loja: along rd. to Fierro Urcu, ca. 10 km from main rd. Loja–Saraguro, 8 June 1998, Laegaard 18860 (QCNE). Napo: Cordillera de los Llanganates, Laguna Encantada, Lakeshore, 78°12' W, 01°11' S, 3400 m, 17 Mar. 1983, Holm-Nielsen 41977, 41991 (SI). Napo-Pastaza: NE of Cayambe Mtn., 12 Dec. 1961, Cazalet & Pennington 5579 (B). Pichincha: crescit in silv. occidentale prope Pichincha, Aug. 1889, Sodiro s.n. (Q); Laguna Negra de Mojanda, 29 Feb. 1997, Laegaard 101485 (QCNE); ca. Cotocollao, Aug. 1886, Sodiro s.n. (BAB, Q); ca. de Quito, Mar. 1886, Sodiro 232 (Q, W). Tungurahua: Cantón Patate, Parque Nacional Llanganates, 14 Oct. 1998, Vargas et al. 2881 (QCNE); Km. 33.4, Zumbagua–Latacunga, 78°45' W, 00°55' S, 3885 m, 26 July 2001, Laegaard et al. 21468 (SI).