

Ucayali with pinnate leaves and erect inflorescences. ANOVA shows that for pair wise comparison probabilities, 13 variables (stem diameter, internode length, petiole length, rachis length, rachis width, number of pinnae, basal pinna width, basal pinna angle, apical pinna width, peduncle length, peduncle width, rachilla length, rachilla width) differ significantly ($P < 0.05$) between one pair of subgroups, and one (prophyll length) differs amongst all three subgroups. Based on these results, these three subgroups are recognized as subspecies (subsp. *bracteata*, *divaricata*, *pendula*).

The remaining specimens from the central and western Amazon region and eastern Andean slopes in Ecuador cannot be divided into consistent groups based on traits or geography. Adaxial veins are difficult to score in several cases; inflorescences are seldom branched, but both branched and unbranched ones can occur on the same plant; and staminate flower persistence is also difficult to score. For these reasons, these specimens are recognized as one subspecies (subsp. *arundinacea*).

In the Guianas and adjacent Brazil (Amapá) there are two subgroups of specimens, one with pinnate leaves and raised adaxial veins and the other with undivided (rarely pinnate) leaves and non-raised adaxial veins. There are only four specimens of the subgroup with pinnate leaves and raised adaxial veins, too few to test for differences. However, this subgroup is geographically isolated from the other, and the two are recognized as subspecies (subsp. *stricta*, *pliniana*).

Key to the subspecies of *Geonoma stricta*

- 1 Pacific coast of Colombia (Chocó) and Central Cordillera in Colombia (Antioquia)..... 2
- All other areas..... 3
- 2 Pacific coast of Colombia (Chocó)..... subsp. *quibdoensis*
- Central Cordillera in Colombia (Antioquia)..... subsp. *antioquiensis*
- 3 Eastern Andean slopes and central and western Amazon region..... 4
- Northeastern Amazon region of the Guianas and Brazil (Amapá)..... 8
- 4 Inflorescences unbranched or branched; central and western Amazon region, or eastern Andean slopes in Ecuador.....
- subsp. *arundinacea*
- Inflorescences branched; eastern Andean slopes in northern (Amazonas, Loreto) and central (Huánuco, Pasco, Ucayali) Peru..... 5
- 5 Leaves mostly undivided; inflorescences pendulous; Amazonas..... subsp. *pendula*
- Leaves pinnate; inflorescences erect; Amazonas, Huánuco, Loreto, Pasco, Ucayali..... 6
- 6 Veins raised and rectangular in cross-section adaxially; Huánuco, Pasco..... *submontana*
- Veins not raised or slightly raised and triangular in cross-section adaxially; Amazonas, Huánuco, Loreto, Pasco, Ucayali..... 7
- 7 Amazonas, Loreto..... subsp. *divaricata*
- Huánuco, Pasco, Ucayali..... subsp. *bracteata*
- 8 Veins raised and rectangular in cross-section adaxially; leaves pinnate..... subsp. *pliniana*
- Veins not raised or slightly raised and triangular in cross-section adaxially; leaves undivided (rarely pinnate).....
- subsp. *stricta*

60a. *Geonoma stricta* subsp. *stricta*

Geonoma maguirei Bailey (1948: 102). Type: SURINAME. Coppename River headwaters, 24 July 1944, *B. Maguire* 24166 (holotype NY!).

Leaves undivided, rarely pinnate; veins not raised or slightly raised and triangular in cross-section adaxially; pinnae 1(1–3) per side of rachis. *Inflorescences* unbranched, rarely branched; staminate flowers deciduous after anthesis, rarely persistent.

Distribution and habitat:—From 2°20'–7°10'N and 52°50'–58°50'W in the northeastern Amazon region of Suriname and French Guiana, with an outlying specimen in Guyana, at 373(100–800) m elevation in lowland rainforest (Fig. 38).

Two specimens from French Guiana (*de Granville* 4803, *Le Prieur* s. n.) are unusual in having branched inflorescences with 2–3, stouter rachillae, and one has a pinnate leaf (the only one in this subspecies). They

are recognized as the *neglecta* morphotype. One of these specimens (*Le Prieur s. n.*) has "*Geonoma neglecta*" written, in Trail's hand-writing, on the label. This specimen was illustrated by Wessels Boer (1968, plate V) and determined by him as *G. bartlettii*. However, the type of that name was destroyed and it is treated here as an excluded name. Two specimens from Suriname (*Sastre 1567. Wessels Boer 1558*), with larger leaves and inflorescences with persistent staminate flowers appear more like those of the *pyncostachys* morphotype of subsp. *arundinacea*. These are recognized as the *large* morphotype.

60b. *Geonoma stricta* subsp. *antioquiensis* Henderson, subsp. nov. (Appendix IV, Plate 60)

A subspeciebus extraamazonicis aliis bractea pedunculare altior supra prophyllis inserta differt.

Type: COLOMBIA. Antioquia: Mun. San Luis, autopista Medellín-Bogotá, sector Río Samaná-Río Claro, hacia Aquitania, entrando por vereda Altavista, a 5 km de la autopista, 700–800 m, 27 September 1986, A. Cogollo & R. Torres 2397 (holotype COL!).

Leaves undivided; veins not raised or slightly raised and triangular in cross-section adaxially; pinnae 1 per side of rachis. Inflorescences unbranched; staminate flowers deciduous after anthesis.

Distribution and habitat:—From 5°42'–7°05'N and 74°44'–74°58'W in the Central Cordillera in Colombia (Antioquia) at 852(700–1075) m elevation in lowland rainforest (Fig. 38).

60c. *Geonoma stricta* subsp. *arundinacea* (Martius) Henderson, comb. & stat. nov.

Basionym: *Geonoma arundinacea* Martius (1823: 17). Lectotype (selected by Wessels Boer 1968): BRAZIL. Amazonas: "Rio Negro", no date, *C. Martius s.n.* (lectotype M!).

Geonoma pyncostachys Martius (1823: 16). Type: BRAZIL. Amazonas: Rio Japurá, no date, *C. Martius s.n.* (holotype M!).

Geonoma stricta var. *trailii* (Burret) Henderson (1995: 288). *Geonoma trailii* Burret (1930a: 178). *Geonoma elegans* Martius var. *amazonica* Trail (1876: 324). Type: BRAZIL. Amazonas: Rio Purus, Barreiras de Mancira, 29 September 1874, *J. Trail 1032/CXXXIII* (holotype K!).

Geonoma piscicauda Dammer (1907: 123). *Geonoma stricta* var. *piscicauda* (Spruce) Henderson (1995: 287). Type: BRAZIL. Acre: Rio Juruá, Juruá-mirim, May 1901, *E. Ule 5520* (holotype B, destroyed, isotypes F!, K!, MG!).

Geonoma wittiana Dammer (1907: 124). Type: BRAZIL. Acre: Rio Juruá, Juruá-mirim, September 1901, *E. Ule 5884* (holotype B, destroyed, isotype MG!).

Geonoma uleana Dammer (1907: 122). Type: BRAZIL. Acre: Rio Juruá, Cachoeira, May 1901, *E. Ule 5521* (holotype B, destroyed, isotype MG!).

Geonoma trauntana Dammer (1907: 124). Type: BRAZIL. Acre or Amazonas: Rio Juruá, Fortaleza, October 1901, *E. Ule 5946* (holotype B, destroyed, isotype MG!).

Geonoma dasystachys Burret (1930a: 251). Type: BRAZIL. Amazonas: Rio Negro, Jaupasse assu, 5 July 1874, *J. Trail 981/XC* (holotype K!).

Geonoma bella Burret (1935b: 304). Type: BRAZIL. Amazonas: Mun. Tefé, Paranagua, 22 May 1933, *B. Krukoff 4543* (holotype B, destroyed, isotypes F!, M!, MO!, NY!, US!).

Leaves undivided or pinnate; veins raised and rectangular in cross-section adaxially, or not raised or slightly raised and triangular in cross-section adaxially; pinnae 2(1–12) per side of rachis. Inflorescences unbranched or branched; staminate flowers deciduous or persistent after anthesis.

Distribution and habitat:—From 2°30'N–17°50'S and 49°32'–78°42'W in the western Amazon region of Venezuela, Colombia, Ecuador, Peru, and Brazil and eastern Andean slopes in Ecuador, at 416(75–1850) m elevation in lowland or montane rainforest (Fig. 38).

This is a widespread and extremely variable subspecies which can be divided into various morphotypes, mostly based on leaf size and shape.

In the western Amazon basin of Colombia, Ecuador, Peru, and Brazil there is a morphotype (*arundinacea*) with undivided or pinnate leaves with non-raised adaxial veins and unbranched or branched inflorescences with deciduous staminate flowers. In some cases specimens approach those of the *trailii* morphotype and are only distinguished by their non-raised adaxial veins. For example, in Yasuni National

Subspecific variation:— No trait varies within this species. According to Stauffer (1997) the leaves are rarely irregularly pinnate with multi-veined pinnae. This species is scored as having the flower pits spirally arranged, but some specimens, especially those from Carabobo, have almost distichously arranged flower pits.

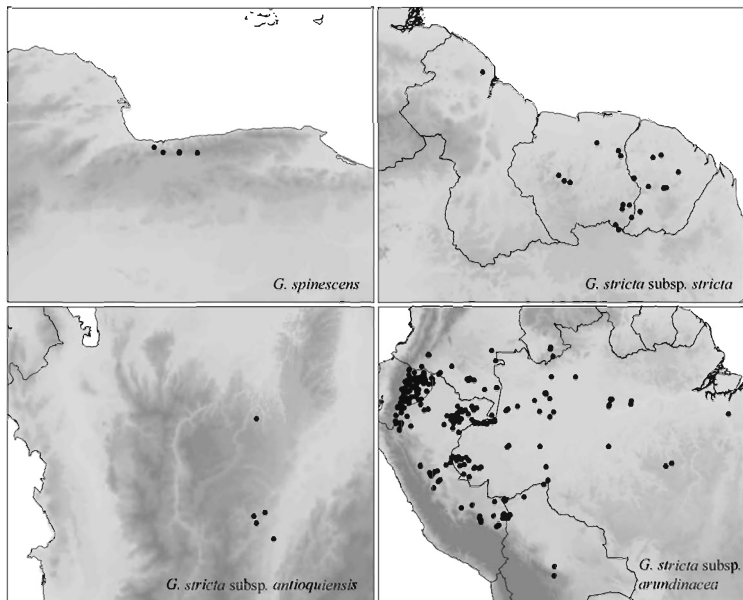


FIGURE 38. Distribution maps of *Geonoma spinescens*, *G. stricta* subsp. *stricta*, *G. stricta* subsp. *antioquiensis*, and *G. stricta* subsp. *arundinacea*.

60. *Geonoma stricta* (Poiteau) Kunth (1841: 232). *Gynestum strictum* Poiteau (1822: 391). Type: FRENCH GUIANA. Without locality, no date, A. Poiteau s.n. (holotype P!).

Plants 1.8(0.4–4.0) m tall; stems 1.4(0.2–5.0) m tall, 0.7(0.3–1.6) cm in diameter, solitary or clustered, not cane-like or cane-like; internodes 3.0(0.4–8.4) cm long, yellowish and smooth. *Leaves* 8(4–17) per stem, undivided or irregularly pinnate, not plicate, bases of blades running diagonally into the rachis; sheaths 8.9(1.0–22.0) cm long; petioles 12.9(1.0–58.0) cm long, drying green or yellowish; rachis 29.6(10.1–75.8) cm long, 2.6(0.9–6.0) mm in diameter; veins raised and rectangular in cross-section adaxially or not raised or slightly raised and triangular in cross-section adaxially; pinnae 2(1–12) per side of rachis; basal pinna 20.4(8.0–38.0) cm long, 3.4(0.6–11.4) cm wide, forming an angle of 40(9–112)° with the rachis; apical pinna 12.6(3.2–38.5) cm long, 10.3(1.5–23.5) cm wide, forming an angle of 34(14–50)° with the rachis. *Inflorescences* unbranched or branched 1 order; prophylls and peduncular bracts not ribbed with elongate, unbranched fibers, flattened, deciduous or persistent; prophylls 6.8(0.7–21.3) cm long, not short and asymmetrically apiculate, the surfaces not ridged, without unequally wide ridges; peduncular bracts 0.6(0.1–