

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

Park in Amazonian Ecuador, there are two forms of this morphotype. One has smaller leaves and branched inflorescences, the other larger leaves and unbranched inflorescences. The latter exactly resemble *trillii* in their leaves, except for the non-raised veins. There are no specimens of *trillii* from Yasuni, but it occurs just to the west of the Park. There may be introgression between *arundinacea* and *trillii* in this area. A specimen (Vásquez 7413) from Amazonian Peru has an exceptionally long rachilla.

On eastern Andean foothills and in the western Amazon region in Colombia, Ecuador, and Peru there is a morphotype (*elevata*) with small, undivided leaves with narrow basal angles and raised adaxial veins and unbranched inflorescences with persistent staminate flowers. Inflorescences are usually pendulous.

In the western Amazon region in Colombia, Peru, and Brazil there is a morphotype (*minor*) with small, undivided, rarely pinnate leaves and unbranched inflorescences with deciduous staminate flowers. Veins are difficult to score in this morphotype.

In the western Amazon region in Colombia, Ecuador, Peru, and Brazil there is a morphotype (*piscicauda*) with large, undivided leaves with narrow basal angles and raised adaxial veins. Inflorescences are unbranched and often pendulous, and have persistent staminate flowers. The types of *G. piscicauda* and *G. wittana* are of this morphotype.

On eastern Andean foothills in Ecuador at 1217(825–1600) m elevation there is a morphotype (*puyo*) with pinnate leaves and branched or unbranched inflorescences with deciduous staminate flowers. Veins are difficult to score in this morphotype, and there seem to be several local variants. Some specimens (*Balslev 6419*, *Cerón 6552*, *7454*, *Harling 3762*, *Øllgaard 98478*) have exceptionally long inflorescences.

A widespread morphotype (*pycnostachys*, Plates XX, XXI) occurs in the central and western Amazon region in Venezuela, Colombia, Ecuador, Peru, and Brazil. It has mostly undivided leaves with the veins not raised adaxially, and unbranched inflorescences with persistent staminate flowers. The type of *G. pycnostachys* is of this morphotype. Several specimens from the central Amazon region (*Campos 519*, *Cid 545*, *Henderson 662*, *1043*, *1066*, *Nee 42341*, *42897*) are more similar to subsp. *stricta* in their small leaves than they are to other, more westerly specimens of *pycnostachys*. However, small-leaved *pycnostachys* also occur sporadically in the western Amazon region. Specimens (*Díaz 7327*, *Kajekai 300*, *Rodríguez 261*, *568*, *Rojas 592*, *Vásquez 18741*, *20286*, *24195*, *24322*) from southeastern Ecuador and northwestern Peru (Amazonas) have exceptionally large leaves, thick rachillae, and large fruits. Specimens from eastern Andean slopes in Ecuador have pinnate leaves with few divisions. Some specimens (e.g., *Lewis 10332*, *Vásquez 14439*, and probably several others) appear to be hybrids between this and the *trillii* morphotype, and others appear to be hybrids between this and the *piscicauda* morphotype.

In the central and western Amazon region of Colombia, Ecuador, Peru, Bolivia, and Brazil, with outliers in the central Amazon of Brazil and in Bolivia, there is a morphotype (*trillii*) with pinnate leaves with raised adaxial veins and unbranched inflorescences with deciduous staminate flowers. The types of *Geonoma elegans* var. *amazonica*, *Geonoma trauniana*, *Geonoma dasystachys*, and *Geonoma bella* are of this morphotype. The two outlying specimens in Bolivia occur in the same area as outlying specimens of the *tapajotensis* morphotype of *G. macrostachys*. As in the *pycnostachys* morphotype, specimens from southeastern Ecuador and northwestern Peru (Amazonas) have exceptionally large inflorescences.

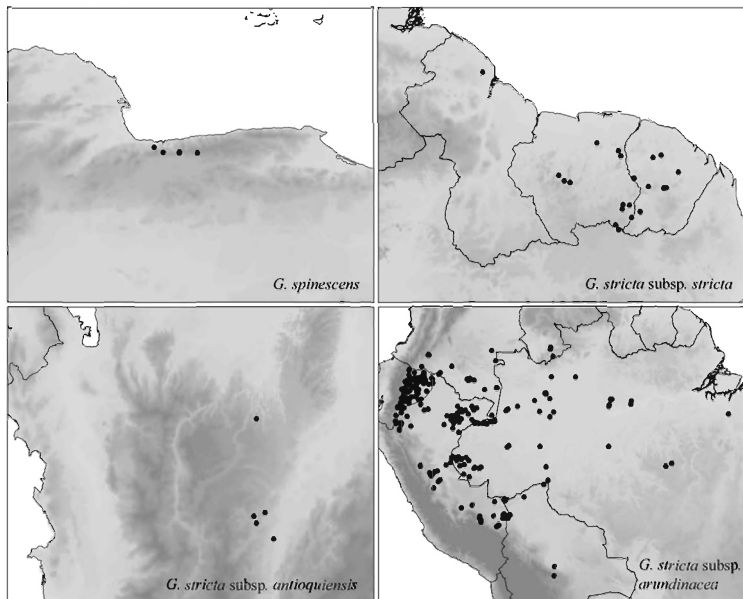
In the southwestern Amazon region in Peru and Brazil there is a morphotype (*uleana*) with undivided or pinnate leaves with non-raised adaxial veins and unbranched inflorescences with deciduous staminate flowers. It has longer peduncular bracts—3.5 (2.7–4.7) versus 0.5 (0.1–4.0) cm—than other morphotypes. The type of *G. uleana* is of this morphotype.

60d. *Geonoma stricta* subsp. *bracteata* Henderson, subsp. nov. (Appendix IV, Plate 61)

*A subspeciebus aliis foliis pinnatis venis haud prominentibus, rachillis tenuibus, atque inflorescentiis ramosis differt.*

Type: PERU. Huánuco: Prov. Pachitea, region of Pucallapa, western side of the Sira mountains, 9°28'S, 74°47'W, 800 m, 10 September 1988, H. Rainer P22–10988 (holotype NY!).

**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–