

- 5 Guayana Highland region of Venezuela, Brazil, and Guyana .....subsp. *appuniana*  
 - All other areas ..... 6  
 6 Central America (Mexico, Guatemala, Honduras, Nicaragua, Costa Rica, western Panama) ..... subsp. *edulis*  
 - South America in Andean regions from Venezuela to Bolivia, and just reaching eastern Panama..... 7  
 7 Flower pits distantly spaced; eastern Panama ..... subsp. *tacarcunensis*  
 - Flower pits rarely distantly spaced; South America in Andean regions from Venezuela to Bolivia ..... 8  
 8 Basal pinna 0.5(0.4–0.5) cm wide; apical pinna 1.7 cm wide; Carabobo state, Venezuela..... subsp. *venezuelana*  
 - Basal pinna 3.0(0.5–14.0) cm wide; apical pinna 10.6(2.0–30.0) cm wide; widespread ..... 9  
 9. Flower pits distantly spaced; eastern Andean slopes in southern Ecuador .....subsp. *skovii*  
 - Flower pits not distantly spaced; widespread .....subsp. *undata*

**67a. *Geonoma undata* subsp. *undata***

*Geonoma densa* Linden & Wendland (1856: 333). Type: COLOMBIA. Santander: Cachiri, no date, *N. Funck & L. Schlim* s.n. (holotype BR n.v., isotype K!), **synon. nov.**

*Geonoma margaritoides* Engel (1865: 682). Type: VENEZUELA. Táchira: La Grita, no date, *F. Engel* s.n. (holotype B, destroyed, isotype LE!).

*Geonoma barthia* Engel (1865: 688). Type: VENEZUELA. Mérida: no locality, no date, *F. Engel* s.n. (holotype B destroyed, isotype LE!).

*Geonoma iodolepis* Burret (1930a: 198). Type: COLOMBIA. Antioquia: Amalfi, 1800–2000 m, 14 May 1880, *W. Kalbreyer 1668* (holotype B, destroyed). Neotype (designated by Bernal *et al.* 1989): COLOMBIA. Valle del Cauca: La Cumbre, Western Cordillera, 1700–2100 m, 9 September 1922, *E. Killip & T. Hanzen 11137* (neotype NY!, isoneotype US!).

*Geonoma weberbaueri* Dammer ex Burret (1930a: 221). Type: PERU. Huánuco: SW of Manzón, no date, *A. Weberbauer 3552* (holotype B n.v., holotype image!), **synon. nov.**

*Geonoma megalospatha* Burret (1930a: 218). Type: PERU. Huánuco: Rio Pozuzo, 1909–1914, *A. Weberbauer 6800* (holotype B n.v., holotype image!, isotypes F!, GH!).

*Leaves* veins raised and rectangular in cross-section adaxially; basal pinna 3.0(0.5–14.0) cm wide; apical pinna 10.6(2.0–30.0) cm wide. *Inflorescences* prophyll margins with irregular, spine-like projections; flower pits usually spirally arranged, not distantly spaced.

**Distribution and habitat:**—From 10°56'N–17°48'S and 63°28'–80°42'W in Andean regions of South America from Venezuela to Bolivia at 1964(550–3370) m elevation in lowland or, more often, montane rainforest (Fig. 42).

There is considerable variation in this widespread subspecies and there are many local morphotypes. These are difficult to distinguish from one another and are variable within themselves.

In Venezuela, Colombia, Ecuador, Peru, and Bolivia there is a widespread morphotype (*margaritoides* morphotype). It has 25.4(6.4–54.0) cm long and 4.3(2.2–7.1) mm wide rachillae and 8.5(5.5–12.5) mm long and 6.3(4.2–8.9) mm wide fruits. This morphotype is relatively uniform throughout the northern part of its range, usually with elongate rachillae, often tricussately arranged flower pits, and small fruits (e.g., types of *G. margaritoides* and *G. barthia*). However, there are many exceptions, notably specimens with unusually short and thin, or unusually short and thick rachillae that occur in scattered localities.

There is geographical variation in this morphotype. Linear regression shows there are significant associations between elevation and one plant, two leaf, and five inflorescence variables. Squared multiple *R* for the regression of plant height on elevation is 0.07, basal pinna angle 0.19, apical pinna angle 0.11, prophyll length 0.35, interbract distance 0.22, number of rachillae 0.76, rachilla width 0.05, and fruit diameter 0.19. With increasing elevation, pinnae have narrower angles. prophylls and interbract distances are longer, rachillae wider, and fruits larger.

Some specimens from the Coastal Range in Venezuela (*undata* morphotype) occur at higher elevations and have greater interbract distances, longer peduncles, shorter rachillae, and longer and wider fruits. The type of *G. undata* has this kind of inflorescence.

Some specimens from Venezuela (Andes and Peninsula Paraguaná, Falcón) and Colombia are distinctive in their shorter, thinner rachillae (*densa* morphotype). The type of *G. densa* has this kind of rachillae.

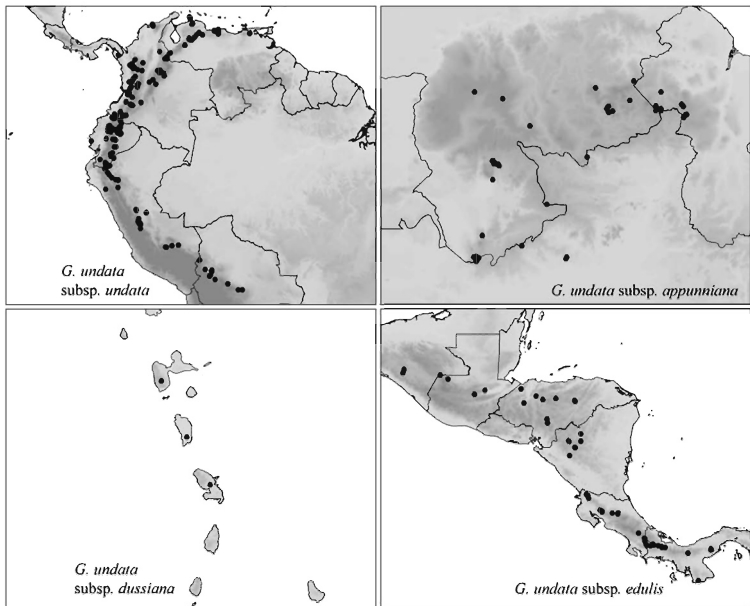


FIGURE 42. Distribution maps of *Geonoma undata* subsp. *undata*, *G. undata* subsp. *appunniiana*, *G. undata* subsp. *dussiana*, and *G. undata* subsp. *edulis*.

Some specimens lack distal lips of the flower pits (*megalospatha* morphotype). These are hypothesized to be hybrids between the *margaritoides* morphotype and *Geonoma trigona*. They share with *G. trigona* the absence of an upper lip, and occur in two areas where *G. trigona* occurs (Ecuador, Peru). It is predicted that *G. trigona* will be found in Bolivia at the third hybrid locality. The type of *G. megalospatha* has this kind of flower pits.

Specimens from the Western Cordillera of the Colombian Andes (*iodolepis* morphotype) have small leaves like those of *G. orbignyana* and inflorescences with short, thin rachillae 9.0(7.0–11.0) cm long and 2.6(2.1–3.5) mm wide. Fruits are 8.5 mm long and 6.3 mm wide. The type of *G. iodolepis* is of this morphotype.

In the Venezuelan, Colombian, Ecuadorian, and Peruvian Andes, and also the Sierra Nevada de Santa Marta in Colombia, there is an extremely variable morphotype (*weberbaueri* morphotype). Specimens have plicate leaves, short, thick rachillae 19.0(9.0–33.0) cm long and 5.7(3.0–9.4) mm wide, and 12.5(8.0–15.4) mm long and 8.7(5.0–12.0) mm wide fruits. Most specimens with fruits have large-sized fruits, but a few specimens (*Dodson 15213*, *Vásquez 26597*) have small, globose fruits. This morphotype differs from the *margaritoides* morphotype in 10 variables. See under *Geonoma orbignyana* subsp. *orbignyana* for potential hybrids with that subspecies.

There is geographical variation in this morphotype. Linear regression shows there are significant associations between elevation and three inflorescence variables. Squared multiple *R* for the regression of

prophyll length 0.39, interbract distance 0.26, and peduncle length 0.33. Prophylls, interbract distances, and peduncles increase in length with increasing elevation.

On eastern Andean slopes in Ecuador, particularly from Mera and Puyo, specimens (*mera-puyo* morphotype) have relatively slender inflorescences, 14.9(9.8–21.0) cm long and 2.1(1.5–2.5) mm wide rachillae, and 6.0(5.9–6.0) mm long and 4.6(4.1–5.0) mm wide fruits.

Also on eastern Andean slopes in Ecuador, there are specimens (*intermediate* morphotype) which appear intermediate between the *margaritoides* morphotype and *Geonoma orbignyana*. They have small leaves and inflorescences, like the latter, but the bracts of the inflorescence are like those of the former. They have 16.8(8.8–29.3) cm long and 3.8(3.1–5.0) mm wide rachillae and 8.2(7.6–8.8) mm long and 6.1(5.8–6.3) mm wide fruits.

One specimen (*sira* morphotype) from Peru (Huánuco) has small leaves like those of *Geonoma orbignyana*, slender rachillae 13.5 cm long and 1.9 mm wide, almost decussately arranged flower pits, and 8.9 mm long and 6.3 mm wide fruits.

#### 67b. *Geonoma undata* subsp. *appuniana* (Spruce) Henderson, comb. & stat. nov

Basionym: *Geonoma appuniana* Spruce (1871: 106). Type: GUYANA. Cuyuni-Mazaruni: Mount Roraima, 1864, C. Appun 1141 (holotype K!).

*Geonoma roraimae* Dammer (1915: 261). Type: GUYANA. Cuyuni-Mazaruni: Mount Roraima, 1800–2300 m, February 1910, E. Ule 8805 (holotype B, destroyed, isotypes K!, L!, US!).

*Leaves* veins raised and rectangular in cross-section adaxially; basal pinna 3.8(0.5–27.0) cm wide; apical pinna 6.4(1.5–15.0) cm wide. *Inflorescences* prophyll margins with irregular, spine-like projections; flower pits usually spirally arranged, not distantly spaced.

**Distribution and habitat:**—From 0°46'–6°04'N and 59°50'–66°04'W in the Guayana Highland region of Venezuela, Brazil, and Guyana at 1752(810–2700) m elevation in montane rainforest (Fig. 42).

There is geographic discontinuity and specimens occur on many, isolated mountains, but there are too few specimens from each mountain to test for differences amongst them.

There is geographical variation in this subspecies. Linear regression shows there are significant associations between elevation and three leaf and four inflorescence variables. Squared multiple *R* for the regression of rachis width on elevation is 0.40, basal pinna angle 0.29, apical pinna angle 0.58, prophyll length 0.23, rachilla width 0.23, fruit length 0.49, and fruit diameter 0.45. The rachis becomes thicker, pinna angles narrower, prophylls longer, rachillae thicker, and fruits longer and wider with increasing elevation.

#### 67c. *Geonoma undata* subsp. *dussiana* (Becc.) Henderson, comb. & stat. nov.

Basionym: *Geonoma dussiana* Beccari (1920: 436). Lectotype (designated by Read 1979): GUADELOUPE. Bois du Nez-Cassé, 28 February 1904, A. Duss 4198 (lectotype US!, duplicates F!, FI!, LE!, MO!, NY!).

*Geonoma hodgeorum* Bailey in Hodge (1942: 108). Type: DOMINICA. Morne Trois Pitons, 763–1400 m, 23 February 1940, W. Hodge 1430 (holotype BH!, isotype NY!).

*Leaves* veins raised and rectangular in cross-section adaxially; basal and apical pinna width no data. *Inflorescences* prophyll margins with irregular, spine-like projections; flower pits usually spirally arranged, not distantly spaced.

**Distribution and habitat:**—From 14°40'–16°05'N and 61°00'–61°40'W in Dominica, Guadeloupe and Martinique at medium elevations in lowland or montane rainforest (Fig. 42).

#### 67d. *Geonoma undata* subsp. *edulis* (Wendland ex Spruce) Henderson, comb. & stat. nov.

Basionym: *Geonoma edulis* Wendland ex Spruce (1871: 106). Type: COSTA RICA. Cartago: Turrialba, 1857, H. Wendland s.n. (holotype K!).

*Geonoma seleri* Burret (1930a: 211). Type: GUATEMALA. Huchuetenango: Yalambhoch, no date, E. Seler 2757 (holotype B, destroyed). Neotype (designated by de Nevers & Grayum 1998): GUATEMALA. Alta Vera Paz: between Sepacuite and Panzas, 24 June 1904, O. Cook & Doyle 327 (neotype US!).