Spiny Bromeliaceae of BELIZE

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Of the approximately 70 species of Bromeliaceae in Belize, 15 have spiny leaf margins. They belong to seven genera: *Aechmea, Ananas, Androlepis, Billbergia, Bromelia, Hechtia,* and *Pitcairnia*. The pineapple, *Ananas comosus*, is not considered to be native, but is found widely cultivated in Belize and throughout the tropics.

Two of the genera (*Hechtia, Pitcairnia*) have capsular, dry fruits that split open in three parts to reveal appendaged seeds. Appendages are wings or fine "hair-like" growths that aid dispersal by wind and gravity. All other spiny species have colored fleshy berries that are dispersed by birds and possibly some by bats. Then there is the pineapple, with its distinctive aggregate form which is due to individual fruits coalescing, and ripening to aromatic delight.

As for armature, spiny Bromeliaceae run the range from aggressively armed leaf margins with curved, stout spines in *Bromelia* that can easily tear through mammalian flesh, to *Pitcairnia* spines that are slight and usually found only at one end of the leaf or the other. The latter tend to be terrestrial or lithophytic (on rocks), but some are regularly epiphytic. Inflorescence shape varies, from being borne among the leaves and lacking a scape (*Bromelia karatas*) or with large, stalked inflorescences (*Aechmea bracteata*). As with non-spiny Bromeliaceae, spiny bromeliads are often adapted for hummingbird pollination, with brightly-colored bracts and flowers; a few have white or yellow flowers that may also be insect-pollinated (*Androlepis, Hechtia*).

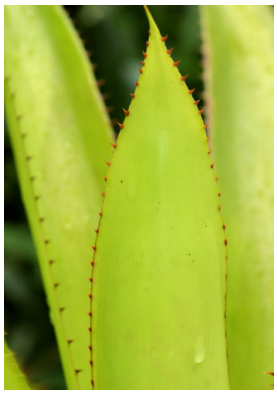
Spiny Bromeliaceae can have tanks formed by overlapping leaves that hold water in their centers (*Aechmea, Androlepis, Billbergia*), which creates critical habitat for fauna and a nutrient-rich soup for the plant. Or, they may lack tanks (*Ananas, Bromelia, Hechtia, Pitcairnia*) and capture water and nutrients through their functional roots. Spiny bromeliads are found throughout Belize, but reach their peak of species diversity in drier, lower areas of the country. All of the species produce one or more "pups" or "offsets" and continue growing after the mother plant flowers and dies, thus forming colonies. In the case of *Aechmea magdalenae* and species of *Bro-melia*, the colonies can be many meters wide and number into the hundreds of individuals.

Spiny bromeliads are the largest in terms of overall size of the family known in Belize, and reach 2–3 m tall and wide. The long, fibrous leaves of some species have been used to make rope (*Aechmea* spp., *Bromelia* spp.), the fruits of some are known to be sweet and used to make beverages (*Ananas comosus, Aechmea bracteata, Bromelia karatas*), and the leaves of *Bromelia* spp. have been used as a home remedy to treat a number of maladies, including as a vermifuge.

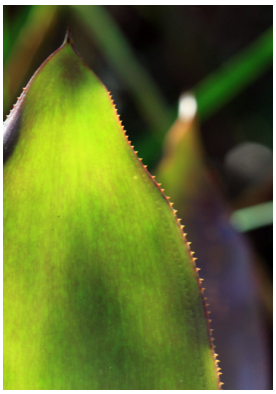
District Abbreviations: Belize **(B)**, Cayo **(Ca)**, Corozal **(Co)**, Orange Walk **(OW)**, Stann Creek **(SC)**, Toledo **(T)**. **Elevations are for Belize only.**

- **This guide is arranged by *degree* of armature, or "spininess." The levels correlate to spine rigidity and angle, sharpness, length, and abundance.**
- **There are four basic levels:**

Level 1. Large, stout, often curved spines with high potential to immobilize movement, and cause pain/blood loss. Sometimes used as "living fences" (EB)



Level 2. Smaller than level 1, with stout, erect, sharp spines or teeth with potential to cause pain along with minor to severe blood loss (BH)



Level 3. Short, regularly-spaced fine spines with potential to cause pain and minor blood loss if mishandled (EB)

Level 4. Small spines on only a few parts of the leaf, either tip or base; low potential for pain and blood loss if carefully handled (EB)

Aechmea magdalenae

- Terrestrial in humid forests in shade, from **Ca, SC, T;** 70–210 m elev.
- This plant can form large, impenetrable colonies via vegetative propagation. The long, narrow leaves silvery below, bright red flower clusters, and yellow petals are unmistakable.

Level 1 spines do not yield to mammalian flesh; leaf blades are broad, and with a deep channel (EB)

The flower cluster is shorter than the 2–3-meter-long leaves; young leaf bases often light pink (EB)

Flower bracts turn from red to green, and mature fruits turn yellow (EB)

Flower bracts are red and have small spines along their margins; petals are yellow (EB)

Bromelia karatas

- Terrestrial in dry forests of central to northern Belize in **B, Ca, Co, OW;** 10–420 m elev.
- Inflorescence bracts colored, scape lacking
- Leaves silvery below; spine direction can change on either side of the leaf, or from top to bottom.

Level 1 spines, with finer, sharper tip than above; leaf base has abundant coppery trichomes (MP)

Plants are large; flower cluster is just above ground level; leaves 2–3 m long (MP)

Fruits turn from green to bright pink at maturity, and are succulent with numerous seeds inside (MP)

Flowers are lavender; inner leaves are pink; abundant coppery trichomes are present (BM)

Bromelia pinguin

- Terrestrial on rocky slopes in semi-deciduous forests in **Ca, Co, OW, SC, T;** 10–420 m elev.
- Habit and spine-level similar to above, but colorful inflorescence elevated and with evident branches.
- Leaves silvery below.

Level 1 spines, similar to above, change direction toward leaf base; lower surface is gray (EB)

Bright red "flag leaves" can rise a few meters high to attract pollinators to the lower level flowers (EB)

Fruits turn yellow at maturity, and are sharply acidic to the taste (EB)

Inflorescence with distinct scape and branches, densely white-scaly, the petals are purple to lavender (EB)

Aechmea bracteata

- Epiphyte in many forest types of Belize and known from **all Districts;** 5–880 m elev.
- A common and attractive bromeliad in Belize, distinguished by the urn-shaped rosette, strong and erect marginal teeth, and bright red bracts that are pendent.

Level 1 spines. They are significant and dangerous, but are not curved and do not hook flesh (BH)

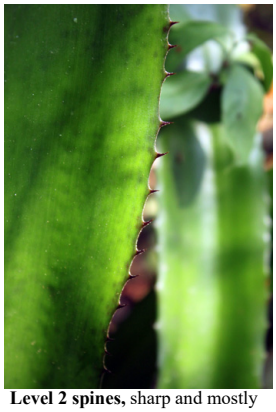
The "urn-shape" growth is characeristic; leaves are broad and strap-shaped (BH)

Primary bracts hang down and maintain a bright color; branches are perpendicular to the axis (EB)

Mature fruits turn black; inflorescence branches usually remain vibrant with red color (EB)

Aechmea bromeliifolia

- Terrestrial or epiphyte. Rare in Belize, known from low elevations in **B, OW;** about 120 m elev.
- Possibly confused with *Androlepis skinneri*, but with a dense, white-cottony flower cluster, bright red bracts, and yellow flowers turning black and arranged in spirals.



Level 2 spines, sharp and mostly straight. Note mottled and spotted leaves with transmitted light (EB)

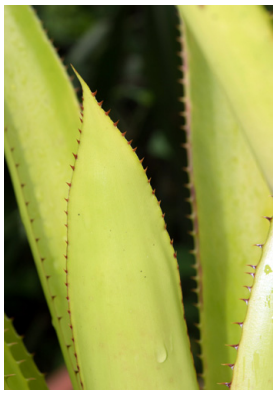
The leaves are often markedly silvery or gray on the lower surface and curved at the apex (MP)

Scape bracts pale to bright red (photo from French Guiana; BH)

Congested, dense flower spike; petals turn from yellow to black, while spike remains whitish (PN)

Aechmea tillandsioides

- Epiphyte found in humid to drier forests in **Ca, OW, SC, T;** 40–420 m elev.
- Not only with significant spiny teeth and colorful bracts but almost always growing in hanging epiphyte gardens harboring aggressive ant colonies.



Level 2 spines, sharp, straight, and dark, markedly contrasting with the leaf color, which is bright green on both surfaces (EB)

Growth habit like *A. bracteata,* but spines are fine and sharp, and inflorescences with stout, short branches (BH)

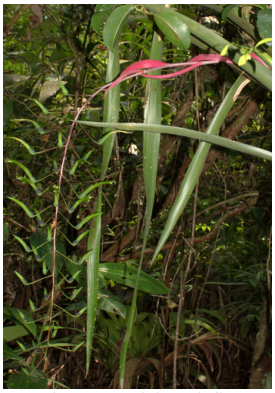
Inflorescence branches flattened, simple or compound; scape and primary bracts bright red with small teeth, flowers yellow (BH)

Inflorescence bracts range from pale orange to deep orange or reddish; fruits are bright blue at maturity (EK)

Billbergia viridiflora

- Found in a wide range of habitats, as an epiphyte, on rocks, or in deep leaf litter in **B, Ca, SC, T;** 5–710 m elev.
- Distinctive with its narrow, tubular leaf rosette, unbranched inflorescence, angled, long flower stalks, pink bracts.

Level 2 spines, on slender, elongate leaves that form a tube at the base. (EB)



Growing as an epiphyte; inflorescence pendent or arching with strongly diverging flowers (EB)

The green flowers arise at a strong angle from the rachis; the ovary is darker than the calyx/corolla (EB)

The scape bracts are pink and have small teeth; the fruits are orange at maturity (EB)

Hechtia guatemalensis

- Terrestrial genus rare in Belize, discovered in 2017 by Caves Branch BG in the Macal River basin on rocky outcrops. **Ca;** about 400 m elev.
- Plants have whitish flowers that are either male or female; colorful bracts lacking.

Level 2 spines, pointing forward on thick, fleshy leaves with irregular spotting (Mexico; JPP)

The inflorescence is elongated well above the leaves, and lacks colored bracts; found growing on rock outcrop in bright light (Belize; MP)

Flowers are either male or female, small, white, and pollinated by insects (Honduras; KS)

Spiny Bromeliaceae of BELIZE

Ananas comosus

- The pineapple is a terrestrial plant native to the West Indies, and cultivated around the world, and in **all Districts**; elev. range unknown in Belize.
- Easy to identify by its aggregate, fragrant fruit, long spiny leaves, and delicious taste.

Level 3 spines are short, sharp, abundant, and found from base to apex; blades gray below (EB)

Plants are always terrestrial, and found only in cultivated situations, never in the wild (EB)

The distinctive "coma" or leafy crown is unmistakable, and the fruits usually ripen pale yellow (EB)

The flowers are purple/lavender; the fruit as we know it is actually formed by multiple, tightly packed fruitlets (EB)

Aechm. lueddemaniana

- Rare epiphyte in Belize, only known from the higher mountains of **SC, T;** 620–1000 m elev.
- Leaves are similar to *Androlepis skinneri*, with mottled appearance, but flowers brightly colored and inflorescence more highly branched.

Level 3 spines, short, sharp spines throughout the leaf length; leaf blades are mottled as in *Androlepis skinneri, b*elow (BH)

The inflorescence is heavily covered with white-gray trichomes, and has short lateral branches (PN)

Corollas are distinctly pink-violet in color; this species is infrequently seen and photographed (PN)

Androlepis skinneri

- Epiphyte, terrestrial, or lithophyte found in many forest types in **Ca, SC, T;** 10–750 m elev.
- Leaves can be colorful with orange, red, and pinkish hues, the inflorescence with shades of white and pale yellow, bracts may be light pink.

Level 3 spines, short, sharp, and abundant, from base to tip; blades irregularly spotted. (EB)

Flower cluster narrow, long, the lower portion branching; bracts pinkish; shade leaves green (EB)

Becoming massive epiphytes, plants receiving strong sunlight take on vibrant leaf colors (EB)

Flowers are yellow and with small spines, they can be male or female; inset, fruits are white (EB)

More *A. skinneri*

- A few more images of the the largest, most prominent spiny bromeliad in southern Belize.
- The tanks can hold many liters of water and provide abundant habitat for animals.
- Flowers are visited by many types of animals.

Androlepis skinneri in full sun along the Temash River, Sarstoon-Temash National Park (BH)

Shade form of *A. skinneri*, with long, slender green leaves that reach more than 2 m (BH)

Though lacking brightly colored bracts, the nectar-rich flowers attract hummingbirds (EB)

Pitcairnia heterophylla

- Rare in Belize, collected once in the Bladen Nature Reserve as an epiphyte (also grows on rock outcrops) **T;** 300–500 m elev.
- Inner leaves long and narrow, soft, deciduous; outer leaves sharply spiny.
- Inflorescence sessile with red flowers.

Level 4 spines, are *not* found on the leafy blade, but on the tough, outer, and reduced leaves, see image to right (WR)

Level 4 spines, are found only on the outer, reduced leaves; the grassy inner leaves lack spines and are deciduous (WR)

The soft leaves are linear, light green; they have a light covering of grayish trichomes (PN)

Bracts and flowers are typically salmon red to red; note the curled leaf blade bases where the blades have fallen away (PN)

Pitcairnia imbricata

- Commonly seen as a terrestrial, but also can grow as an epiphyte, found in humid forests of **Ca, SC, T;** 100–1110 m elev.
- Leaves long and with spines only at leaf base; distinctive flower clusters of red/orange bracts and pale yellow flowers.

Level 4 spines, stout, but only found on the leaf bases, with the blade smooth and soft (EB)

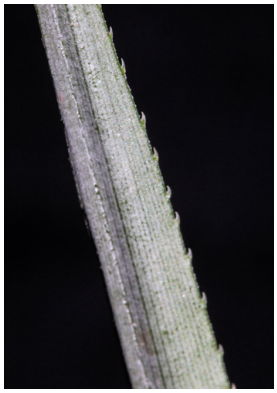
The leaves, above the leaf stalk are long, and soft to the touch; the flower cluster is unbranched (BH)

The soft leaf blades arch and reflex with age, and are green on the lower surface (PN)

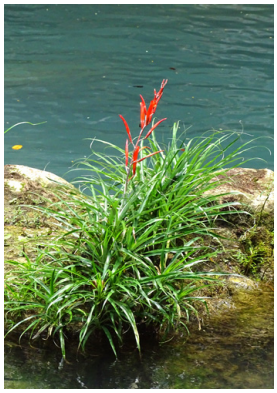
Bract color varies from dark to light orange, spreading flowers pale yellow (PN)

Pitcairnia punicea

- Lithophyte, rare in Belize, only known from rocky cave-fed streams of **T;** 20–120 m elev.
- The short blades are soft but have regular small spines toward the tips, and the bright red flowers are striking.



Level 4 spines, only found on the upper half of the leaf; view of the lower leaf surface (MP)



Found in small colonies on rocks; the flower stalk is taller than the leaves (BH)

The leaves are white below due to a dense covering of trichomes (BH)

All parts of the flower cluster are red, except for the yellow anthers (BH)

Pitcairnia recurvata

- Terrestrial or lithophyte; rare in Belize, restricted to limestone walls in **T;** 120–130 m elev.
- Distinct among Belizean pitcairnias with long leaves and green/white flower clusters (versus red); plants form colonies on the walls of humid sinkholes.

Level 4 spines are small, but sharp, found mostly towards the apex of the leaf (EB)

The long leaves droop from limestone walls, the inflorescences ascend (EB)

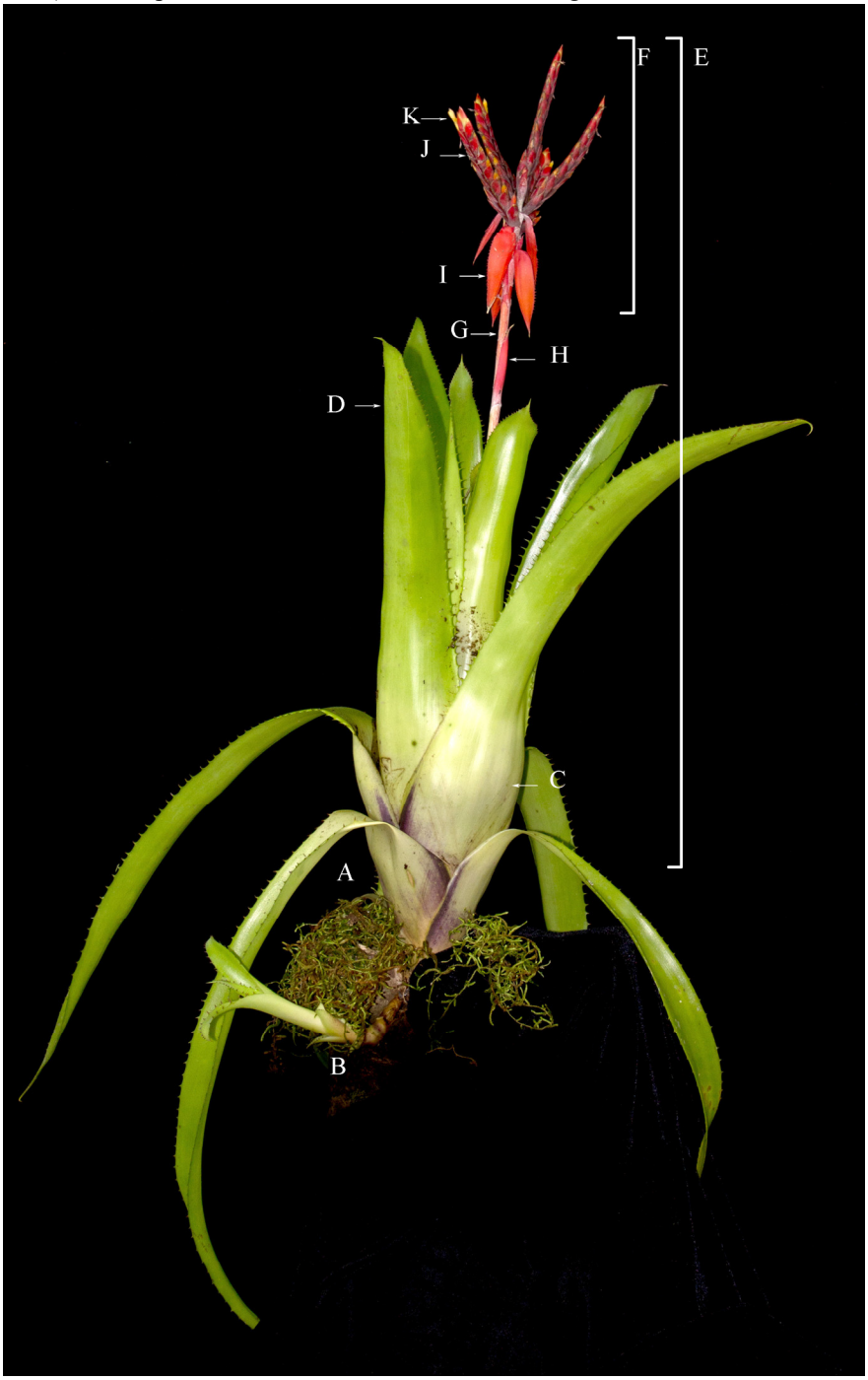
The inflorescences are shades of green and white, which tend to attract moths for pollination (EB)

The flowers recurve sharply, and have white petals and yellow stamens (EB)

Illustrated Glossary

Letters in parentheses below refer to those in the illustration.

- **Floral bract (J):** the modified leaf subtending a flower, which can be longer than, and obscure the calyx from view.
- **Flower (K):** In this image, only the petals are visible, but upon further inspection the flower consists of the sepals (together called calyx), the petals (together called corolla), the androecium (the male part of the flower, or stamen, consisting of the filament and the anther), and the gynoecium [the female part of the flower, or pistil, consisting of the ovary, style, and stigma].
- **Flower cluster (F):** the portion of the inflorescence consisting of the flowering region, includes the associated primary and floral bracts, the axes, and the flowers themselves.
- **Habit (A).** General shape and growth form of a plant.
- **Inflorescence (E):** the flowering portion of the plant, which consists of the scape and flower cluster.
- **Inflorescence type:** bromeliad inflorescences can be simple (unbranched; e.g., *Pitcairnia imbricata*) or compound (branched; e.g., *Aechmea bracteata*).
- **Leaf (C, D):** The vegetative portion of the plant, including the broad basal leaf sheath **(C)** and the usually narrower blade, or lamina **(D)**.
- **Primary bract (G):** the modified leaf at the base of an inflorescence branch; it can be colorful (e.g., *Aechmea tillandsioides*), or small and green, and inconspicuous (e.g., *Androlepis skinneri*)
- **Scale** (see "Trichome" below).
- **Scape (G):** the stalk that connects the vegetative portion of the plant to the flower cluster; the scape may be short and hidden among the leaves and bracts (e.g., *Bromelia karatas*), or elongate and evident (e.g., *Aechmea bracteata*). Note, the term "peduncle" is used for the same structure in many other plant families.
- **Scape bract (H):** the modified leaf borne along the nodes of the scape that can be from scale-like to leaf-like in appearance.
- **Trichome (not shown):** minute structures analogous to plant "hairs" and often called scales, that cover the leaves of many bromeliads. These are present in the spiny bromeliads, but not usually as abundant throughout the plant, rather they are often found on the lower leaf surface or on the inflorescence. Trichomes in bromeliads are often scale-like and have an elegant "mosaic-window" appearance. They can help to facilitate the movement of water and nutrients into the plant, as well as to help regulate water loss.



Aechmea tillandsioides. **A:** Habit. **B:** Ramet, commonly called "pup" or "offset." **C:** Leaf Sheath. **D:** Leaf blade. **E:** Inflorescence, here compound (branched). **F:** Flower cluster. **G:** Scape (mostly hidden among leaves). **H:** Scape bract. **I:** Primary bract. **J:** Floral bract. **K:** Flower, with yellow corolla evident. Photo by Marvin Paredes.