Phytotaxa 607 (1): 001–007
https://www.mapress.com/pt/

Article

ISSN 1179-3155 (print edition)
PHYTOTAXA
ISSN 1179-3163 (online edition)

https://doi.org/10.11646/phytotaxa.607.1.1

Viridantha minuscula (Tillandsioideae; Bromeliaceae), a new species from Guanajuato, Mexico

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Abstract

Viridantha minuscula from the state of Guanajuato, Mexico, is described and illustrated as new to science. The proposed taxon is compared to *V. lepidosepala* and *V. tortilis*, species with the most similarities. Images and a distribution map of the taxa involved are provided.

Keywords: Endemism, Mexico, Monocots, Poales

Resumen

Se describe e ilustra *Viridantha minuscula,* especie nueva del estado de Guanajuato, México. El taxon propuesto se compara con *V. lepidosepala* y *V. tortilis*, especies con las cuales presenta algunas similitudes. Se proporcionan imágenes y un mapa de distribución de los taxa involucrados.

Palabrasclave: Endemismo, México, Monocotiledóneas, Poales

Introduction

In the subfamily Tillandsioideae (Barfuss *et al*. 2016; Leme *et al*. 2017), twenty-two genera were recognized. The genus *Viridantha* Espejo-Serna (2002: 27) and the *Tillandsia tectorum* Morren (1877: 328) complex (Hromadnik 2005) were circumscribed as *Tillandsia* subgenus *Viridantha* (Barfuss *et al*. 2016). However, the subgeneric classification and the clades proposed in *Tillandsia* Linnaeus (1753: 286) are not fully supported and require more detailed studies (Barfuss *et al*. 2016). Furthermore, in some phylogenies so far (Barfuss *et al*. 2016; Machado *et al*. 2020; Vera-Paz *et al*. 2022) *Tillandsia* emerged as polyphyletic or paraphyletic and, consequently, its validity as a formal taxonomic entity (genus) is questionable. On the other hand, *Viridantha* has always emerged as monophyletic and related to the *T. tectorum* complex (Barfuss *et al*. 2016). In addition, *Viridantha* species present a congruent morphology and geographical distribution (Hernández-Cárdenas 2021).

Viridantha species are herbaceous plants with leaves arranged in acaulescent to shortly caulescent rosettes; protandrous flowers with the petals mostly dark green towards the apex and white towards the base; included stamens equal in length, with filiform filaments and sub-basifixed anthers, and simple-erect type style branches (Espejo-Serna 2002). The genus is endemic to Mexico and includes 18 species (Hernández-Cárdenas *et al*. 2018, 2019, 2021). The taxa of *Tillandsia tectorum* complex are clearly distinct from those of *Viridantha* by the presence of often large

Accepted by Eric J. Gouda: 20 Jul. 2023; published: 3 Aug. 2023

caulescent rosettes and petals purple towards the apex and white towards the base; besides the taxa of *T. tectorum* clade are endemic to northern Peru and southern Ecuador (Hromadnik 2005). For these reasons, we prefer to maintain *Viridantha* as a genus.

As a result of botanical explorations for the project Bromeliaceae of Mexico, we collected some individuals of *Viridantha* in the municipality of San Miguel de Allende, Guanajuato. Initially, we thought that this material could correspond to *V. lepidosepala* (Smith 1935: 155) Espejo-Serna (2002: 31–32). After a careful and detailed revision of the living material, herbarium specimens, type material, and protologues, we conclude that this population pertains to an undescribed taxon that we propose here.

Material & Methods

Plants were collected in San Miguel de Allende municipality in the state of Guanajuato, Mexico. The gathering of the specimens was carried out in accordance with Aguirre León (1986). Measurements and description were prepared from live and mostly from dry material. The morphological terms used in the description are those proposed by Radford *et al.* (1974) and Scharf & Gouda (2008). The type material was deposited at UAMIZ, MEXU, and WLM (acronyms according to Thiers (2023 [continuously updated])). We revised herbarium material of the genus *Viridantha* deposited at ENCB, FCME, IBUG, IEB, MEXU, QMEX, UAMIZ, WLM, and XAL. To ensure the status of the proposed new species, we reviewed protologues, living specimens, as well as herbarium specimens and type material of *V. lepidosepala* and *V. tortilis* (Baker 1887: 237–238) Espejo-Serna (2002: 32–35), taxa morphologically similar (Appendix 1). We use the vegetation types proposed by Rzedowski (1978) and the biogeographic provinces proposed by Morrone *et al.* (2017).

Taxonomy

Viridantha minuscula Hern.-Cárdenas, Espejo & López-Ferr., *sp. nov.* (Figs. 1, 2, 3B, 3B1. Table 1)

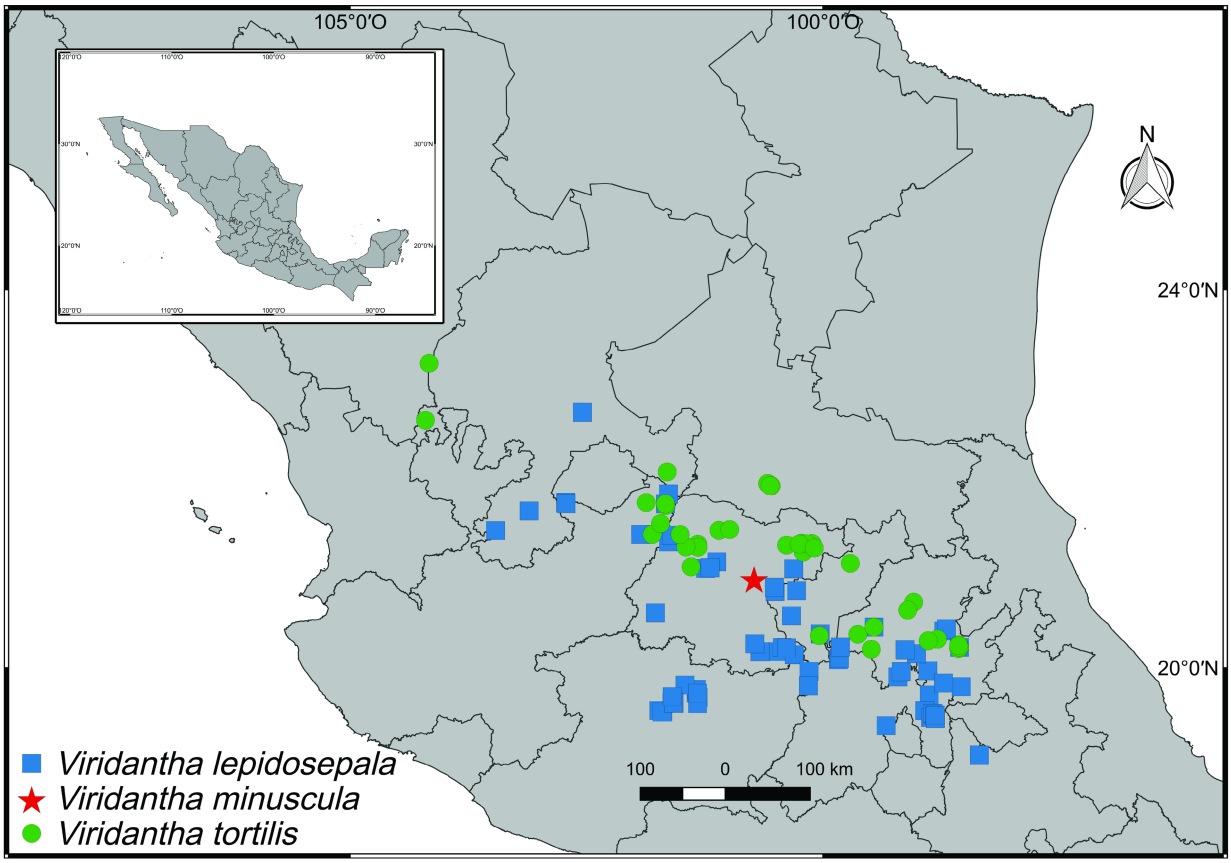

FIGURE 1. Distribution map of *Viridantha lepidosepala* (L.B. Sm.) Espejo, *V. minuscula* Hern.-Cárdenas, Espejo & López-Ferr., and *V. tortilis* (Klotzsch ex Baker) Espejo.

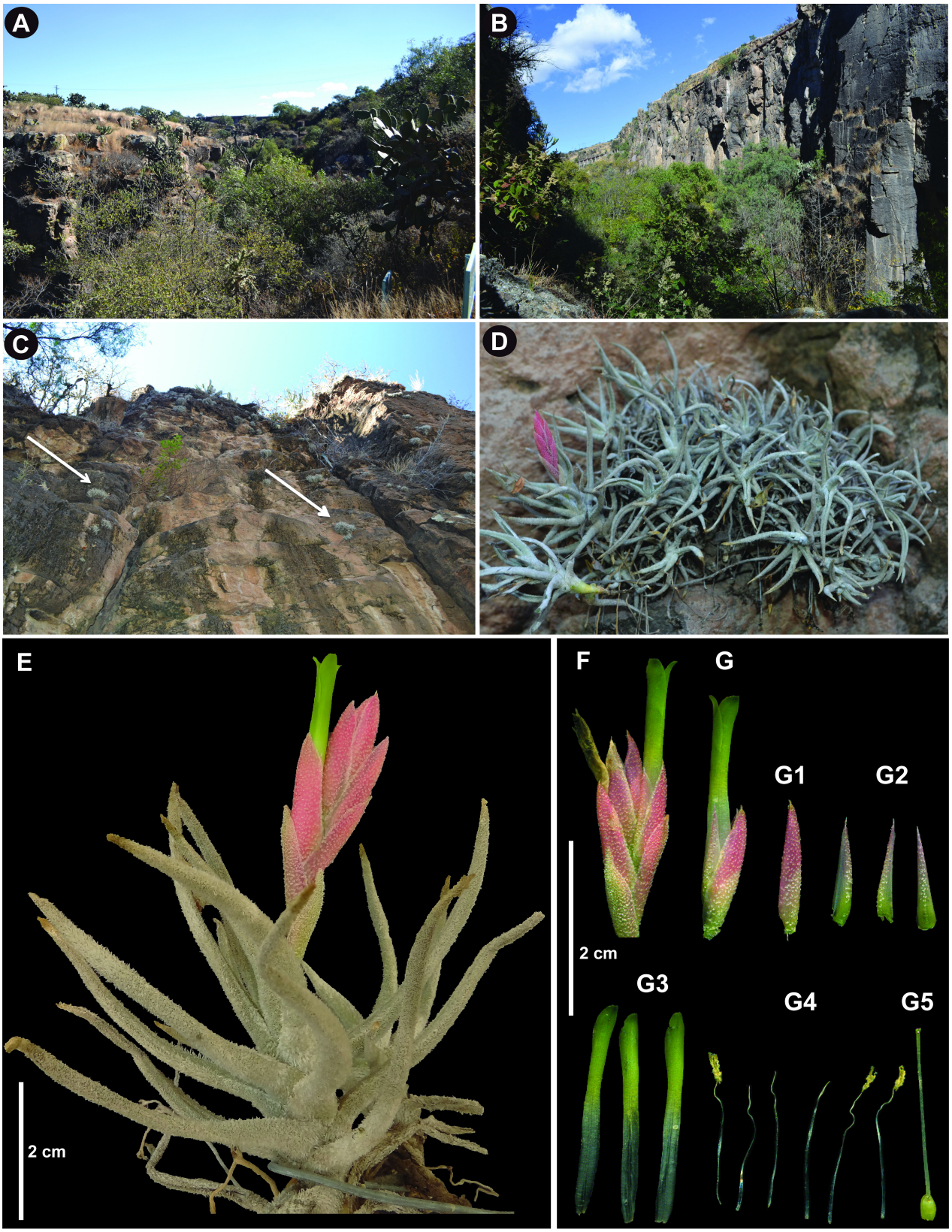

FIGURE 2. *Viridantha minuscula* Hern.-Cárdenas, Espejo & López-Ferr. **A.** Ravine that crosses the zone of El Charco del Ingenio, the habitat of the species. **B.** View of the ravine walls. **C.** Plants on cliffs. **D.** Clump of rosettes. **E.** Plant in bloom. **F.** Spike. **G.** Flower with floral bract. **G1.** Floral bract. **G2.** Sepals. **G3.** Petals. **G4.** Stamens. **G5.** Pistil. (Photographs A–D, F–G5 by R. Hernández-Cárdenas; E by A. Espejo-Serna).

The new species is similar to *Viridantha lepidosepala* but differs in the size of the leaf blades (4–5 × 0.3–0.4 *vs*. 7–12 × 0.5–0.8 cm), in the characteristics of the peduncle (conspicuous *vs*. inconspicuous, 1–1.5 *vs*. 3–4 mm diameter), in

the length of the peduncle bracts (shorter than the inflorescence *vs*. longer than the inflorescence), and in the length of the petals (2.5–2.8 *vs*. 1.5–2.5 cm).

TYPE**:**—MÉXICO. Guanajuato: municipio de San Miguel de Allende, El Charco del Ingenio (20°55′09.68″N, 100°43′44.78″W), 2,000 m, January 3, 2023, *R. Hernández-Cárdenas, J. Viccon-Esquivel & S. Lara-Godínez 2648* (holotype UAMIZ!, isotypes MEXU!, WLM!).

Plants saxicolous, flowering 6–8 cm tall, 7–8 cm in diameter; *rosettes* short caulescent, irregular in outline, forming clumps of many rosettes. **Leaves** 13–16, shorter than or equal to the inflorescence; *sheath* yellow green, pale brown when dry on both surfaces, very widely ovate, 8–10 mm long, 8–10 mm wide, glabrous at the base and lepidote distally on both surfaces; *blade* densely grey lepidote, very narrowly triangular, 4–5 cm long, 3–4 mm wide, attenuate, divaricate to ascending. **Inflorescence** pedunculate, erect, simple; *peduncle* conspicuous, green, pale brown when dry, 1–2 cm long, 1–1.5 mm in diameter, glabrous; *peduncle bracts* similar to the leaves but reducing in size distally, shorter than the inflorescence, densely grey lepidote. **Spike** red rose, pale rose when dry, flattened, narrowly elliptic, 2.5–3 cm long, 8–10 mm wide, 2–4 flowered; *floral bracts* red rose at the apex, yellow green towards the base, pale rose when dry, ovate when extended, 1.5–2 cm long, 6–8 mm wide, apex acute to acuminate, slightly nerved, carinate at the apex, glabrous adaxially, lepidote abaxially. **Flowers** distichous, erect and appressed to the rachis; *sepals* red-rose at the apex, yellow green towards the base, narrowly ovate, 1.2–1.5 cm long, 4–5 mm wide, apex acuminate, the two adaxial ones carinate, free, glabrous adaxially, scatteredly lepidote abaxially; *petals* white in its basal half, dark green in its apical half, narrowly oblong, 2.5–2.8 cm long, 3–4 mm wide, apex rounded to obtuse; *stamens* all equal; *filaments* white, filiform, 1.7–2 cm long; *anthers* pale green, pale brown when dry, 3–4 mm long; *ovary* green, pale green when dry, ovoid to globose, 3–5 mm long, 3–4 mm in diameter; *style* white, pale green when dry, 1.5–2 cm long; *stigma branches* green. **Capsules** unknown.

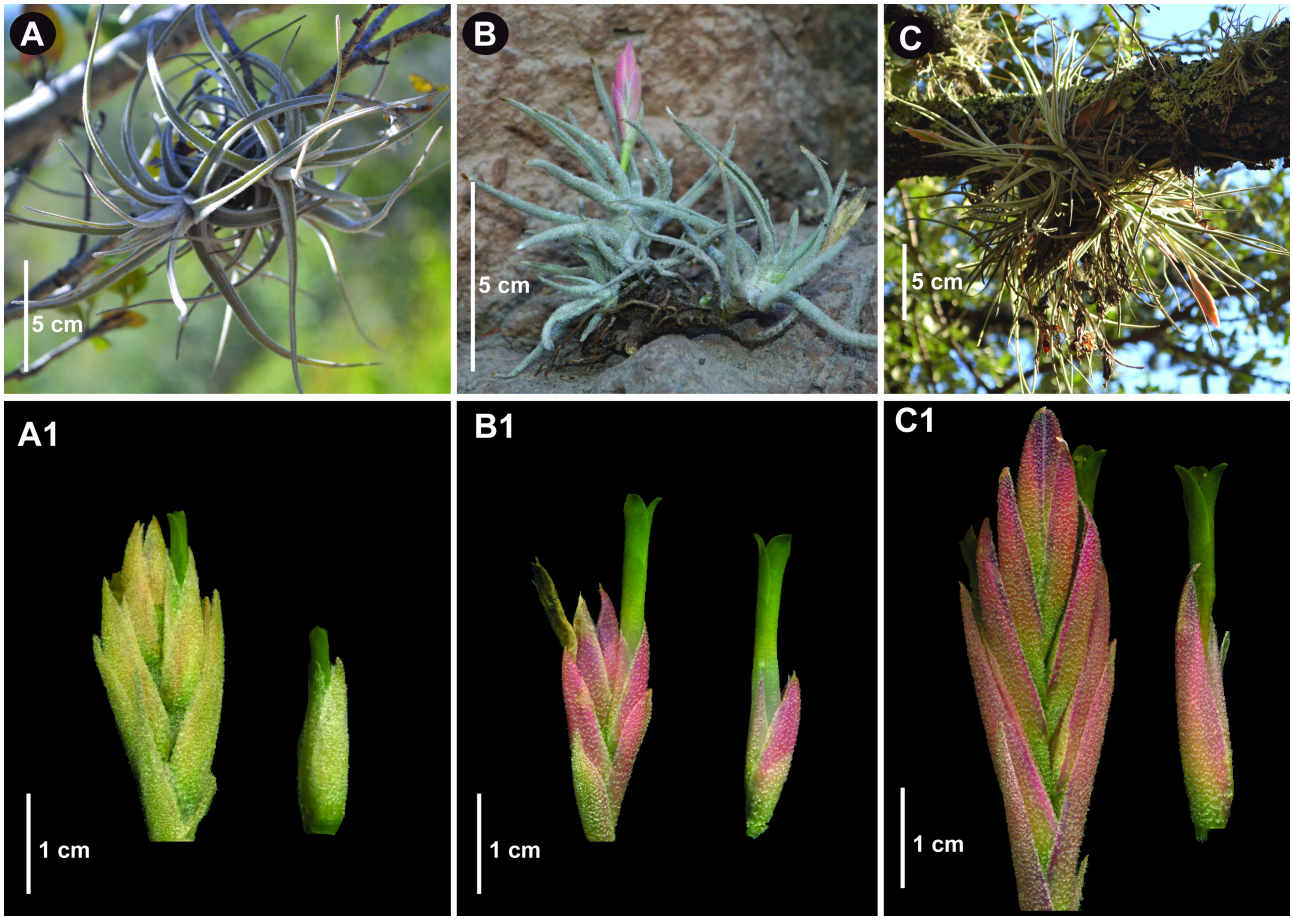

FIGURE 3. Comparison of rosettes, spikes and flowers with floral bract of **A, A1.** *Viridantha lepidosepala* (L.B. Sm.) Espejo, **B, B1.** *V. minuscula* Hern.-Cárdenas, Espejo & López-Ferr., and **C, C1.** *V. tortilis* (Klotzsch ex Baker) Espejo (Photographs by R. Hernández-Cárdenas).

Distribution and habitat:—*Viridantha minuscula* is known so far from the municipality of San Miguel de Allende in Central Guanajuato (Fig. 1), in the biogeographic province of Chihuahuan Desert, were it grows on vertical

rock walls predominated by xerophilous scrub vegetation with the presence of *Tillandsia recurvata* (Linnaeus 1753: 287) Linnaeus (1762: 410) and species of *Bursera*, Cactaceae, Fabaceae, and Poaceae. There is a ravine that crosses the zone of the Botanic Garden El Charco del Ingenio and on the side walls of this ravine *V. minuscula* plants grow at elevations between 1,990 and 2,020 m a.s.l. The new species blooms from January to February.

Etymology:—The specific epithet refers to the small size of the plants of the new species.

Paratypes:—MÉXICO. Guanajuato: municipio de San Miguel de Allende, El Charco del Ingenio, December, 2004, *F. Rodríguez s.n.* (IEB!, WLM!); El Charco del Ingenio, September 2005, *M. Mendoza s.n.* (IEB!).

Observations:—The new species is characterized by the small size of the plants (6–8 × 7–8 cm), the clumps of many rosettes, the size of the leaf sheath (8–10 × 8–10 mm) and the leaf blade (40–50 × 3–4 mm), the size of the peduncle (10–20 × 1–1.5 mm), the size of the spike (25–30 × 8–10 mm), the length of the floral bract (1.5–2 cm), and the length of the petals (2.5–2.8 cm). *Viridantha minuscula* shares some similarities with *V. tortilis* including the shortly caulescent and irregular rosettes and the leaf blade orientation (divaricate to ascending). However, *V. minuscula* differs from *V. tortilis* in the size of the rosettes (6–8 ×7–8 *vs*. 15–23 ×15–20 cm), in the size of the leaf sheaths (0.8–1 × 0.8–1 *vs*. 1.5–2.5 × 1–1.5 cm), in the length of the leaf blades (4–5 *vs*. 10–18 cm), in the length of the peduncle (1–2 *vs*. 6–17 cm), and in the size of the spikes (2.5–3 × 0.8–1 *vs*. 3–4 × 1–1.5 cm), see also Table 1 and Figure 3.

TABLE 1. Morphological differences between *Viridantha minuscula* Hern.-Cárdenas, Espejo & López-Ferr., *V. lepidosepala* (L.B. Sm.) Espejo, and *V. tortilis* (Klotzsch ex Baker) Espejo.

Characters	***V. minuscula***	***V. lepidosepala***	***V. tortilis***
Habit	saxicolous	epiphyte to saxicolous	epiphyte to saxicolous
Flowering plant size	6–8 × 7–8 cm	9–12 × 9–15 cm	15–23 × 15–20 cm
Leaf sheath size	0.8–10 × 0.8–1 cm	1–1.5 × 1–1.5 cm	1.5–2.5 × 1–1.5 cm
Leaf sheath shape	widely ovate	widely oblong to square	widely ovate to oblong
Leaf blade size	4–5 × 0.3–0.4 cm	7–12 × 0.5–0.8 cm	10–18 × 0.5–0.7 cm
Peduncle size	1–2 × 0.1–0.15 cm	0–3 × 0.3–0.4 cm	6–17 × 0.1–0.15 cm
Spike size	2.5–3 × 0.8–1 cm	2.5–4.5 × 1–1.5 cm	3–4 × 1–1.5 cm
Petals length	2.5–2.8 cm	1.5–2.5 cm	2.5–3.5 cm

Acknowledgments

To Sofía Lara for her invaluable help during fieldwork. To the curators of ENCB, FCME, IBUG, IEB, MEXU, QMEX, UAMIZ, WLM, and XAL for allowing us access to their collections. To Eric Gouda for the editorial comments and to the anonymous reviewers for their observations and suggestions that greatly improved the manuscript.

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APPENDIX 1. Specimen examined

Viridantha lepidosepala (L.B. Sm.) Espejo. AGUASCALIENTES: *G. García 4922* (MEXU); *R. Hernández et al. 2079* (UAMIZ). ESTADO DE MÉXICO: *M. Flores 988* (UAMIZ); *F. Gómez a* (ENCB); *L. Guzmán 1084* (ENCB, IEB); *M. Huidobro s.n.* (IEB); *E. Matuda 38433* (MEXU, XAL); *R. Noriega 1010* (UAMIZ); *S. Koch 852* (XAL), *8411* (IEB, UAMIZ, XAL); *M. Mitastein 174* (ENCB); *M. Pulido 218* (FCME); *429* (ENCB, FCME); *Romero 1304* (ENCB); *J. Rzedowski 36555* (ENCB, IEB); *A. Victoria s.n.* (IEB). GUANAJUATO: *A. Cabrera et al. 1006* (MEXU, QMEX); *A. Espejo et al. 5233* (IEB, UAMIZ), *6917* (IEB, UAMIZ, XAL); *R. Hernández et al. 2651* (UAMIZ), *2654* (UAMIZ); *A. López et al. 2488* (IEB, MEXU, UAMIZ), *2946bis* (IBUG, IEB, UAMIZ); *M. Martínez 8358* (QMEX); *J. Rzedowski 37479* (IEB, ENCB), *39673* (ENCB, IEB), *50770* (IEB, UAMIZ), *52191* (IEB, UAMIZ), *53221* (IEB). HIDALGO: *J. Ceja et al. 1556* (UAMIZ); *I. Díaz 687* (MEXU), *1209* (MEXU), *1213* (MEXU); *M. Equihua 565* (ENCB); *A. Espejo et al. 7507* (UAMIZ); *F. Jiménez 185a* (ENCB, IEB); *A. López et al. 2131* (UAMIZ); *J. Rzedowski 16952* (ENCB). JALISCO: *H. Arreola & L. Guzmán 611* (IBUG); *A. García 862* (IEB); *F. Santana 2506* (IBUG, MEXU). MICHOACÁN: *G. Contreras 186* (MEXU); *G. Cornejo & G. Ibarra 3081* (IEB, MEXU); *H. Díaz 3578* (IEB); *M. Flores et al. 582* (UAMIZ); *G. Galván & R. Cerros 596* (UAMIZ); *R. Hernández et al. 2076* (UAMIZ); *G. Ibarra 4573* (IEB). *A. López et al. 2317* (IEB, UAMIZ); *C. Medina 1081* (IEB, MEXU); *E. Molina & S. Zamudio 145a* (IEB); *J. Rzedowski 43226* (IEB), *45713* (IEB, UAMIZ), *45410* (IEB), *48909A* (IEB, MEXU, XAL), *50201* (IEB, UAMIZ), *51618* (IEB, UAMIZ). PUEBLA: *G. Arséne s.n.* (MEXU); *G. Nicolás s.n.* (MEXU). QUERÉTARO: *A. Cabrera 458* (IEB, QMEX); *J. Ceja et al. 641* (UAMIZ); *L. Hernández 5841* (IEB, QMEX). ZACATECAS: *A. Espejo et al. 7066* (IEB, UAMIZ); *E. Rodríguez 1326* (UAMIZ).

Viridantha tortilis (Klotzsch ex Baker) Espejo. DURANGO: *O. Ontiveros 8* (MEXU, UAMIZ). GUANAJUATO: *J. Ceja et al. 477* (UAMIZ); *C. Granados et al. 358* (MEXU); *R. Hernández et al. 2081* (UAMIZ), *2652* (UAMIZ); *M. Martínez 7742* (QMEX), *8866* (QMEX); *R. McVaugh 14810* (MEXU); *J. Rzedowski 49880* (IEB), *9063* (ENCB); *E. Ventura & E. López 9079A* (IBUG, IEB, MEXU, XAL). HIDALGO: *M. Carlson 2828* (MEXU); *M. Cházaro et al. 6880* (IEB, XAL); *A. Espejo et al. 5342* (IEB, UAMIZ), *5343* (UAMIZ), *6366* (UAMIZ), *7081* (IEB, UAMIZ); 7082 (IBUG, UAMIZ); *L. González 2041* (ENCB); *A. Mendoza et al. 832* (IEB, UAMIZ); *R. Osorio 352* (ENCB, IEB); *F. Zavala 903* (MEXU). JALISCO: *P. Carrillo & M. Harker 673* (IBUG, IEB); *A. García 862* (IBUG, IEB, MEXU), *998* (IBUG); *J. Machuca 8822* (IBUG); *R. McVaugh 12308* (MEXU); *J. Pérez 649* (IBUG); QUERÉTARO: *S. Zamudio 2110* (IEB, MEXU). SAN LUIS POTOSÍ: *F. García 2988* (UAMIZ), *4061* (UAMIZ); *J. Rzedowski 11329* (ENCB).