



## *Tillandsia dichromantha* (Tillandsioideae; Bromeliaceae), a new species from the state of Oaxaca, Mexico

RODRIGO ALEJANDRO HERNÁNDEZ-CÁRDENAS<sup>1,3\*</sup>, ADOLFO ESPEJO-SERNA<sup>1,4</sup>, ANA ROSA LÓPEZ-FERRARI<sup>1,5</sup> & SOFÍA ANA LUCRECIA LARA-GODÍNEZ<sup>2,6</sup>

<sup>1</sup> Herbario Metropolitano, Departamento de Biología, División de Ciencias Biológicas y de la Salud, Universidad Autónoma Metropolitana-Iztapalapa, Iztapalapa, Ciudad de México 09340, México.

<sup>2</sup> Centro de Investigación en Biodiversidad y Conservación, Universidad Autónoma del Estado de Morelos, Cuernavaca, Morelos, 62209, México.

<sup>3</sup> ✉ [ralejandroh@gmail.com](mailto:ralejandroh@gmail.com); <https://orcid.org/0000-0001-5903-4393>

<sup>4</sup> ✉ [aes@xanum.uam.mx](mailto:aes@xanum.uam.mx); <https://orcid.org/0000-0001-7192-4612>

<sup>5</sup> ✉ [arlf@xanum.uam.mx](mailto:arlf@xanum.uam.mx); <https://orcid.org/0000-0003-1071-7075>

<sup>6</sup> ✉ [sophialara482@gmail.com](mailto:sophialara482@gmail.com); <https://orcid.org/0000-0002-2573-9894>

\*Author for correspondence

### Abstract

*Tillandsia dichromantha*, a new species from the state of Oaxaca, Mexico, is described and illustrated. The proposed taxon is compared with *T. achyrostachys* and *T. ilseana*, species with which it has some similarities. Images and a distribution map are included.

**Keywords:** Endemic, Monocots, Poales

### Resumen

Se describe e ilustra *Tillandsia dichromantha*, una nueva especie del estado de Oaxaca, México. La especie propuesta se compara con *T. achyrostachys* y *T. ilseana*, taxa con los que presenta algunas similitudes. Se incluyen imágenes y un mapa de distribución.

**Palabras clave:** Endémica, Monocotiledóneas, Poales

### Introduction

*Tillandsia* Linnaeus (1753: 286) is distributed from southern United States to Northern Argentina and classified in the subfamily Tillandsioideae (Smith & Downs 1977). With 745 species and 152 infraspecific taxa (Gouda *et al.* 2018) it is the most species rich genus in Bromeliaceae; for Mexico 230 species have been recorded, 177 of them being endemic (Espejo Serna 2012; Espejo-Serna & López-Ferrari 2018). Oaxaca state has the highest number of species (112) and also of endemic taxa (36) followed by Chiapas (77) and Guerrero (52).

As a result of botanical explorations for the project Bromeliaceae of Mexico, we collected some individuals of a *Tillandsia* at the municipalities of San Juan Mixtepec and Santos Reyes Tepejillo, both in the Juxtlahuaca district in the state of Oaxaca. At first glance, we thought this plant could be *T. ilseana* Till *et al.* (1989: 153). Furthermore, we found a specimen at MEXU (*A. Campos 1222*) of the same taxon misidentified as *T. achyrostachys* Baker (1889: 171). A careful and detailed revision of the collected material, as well as of herbarium material deposited at ENCB, FCME, IBUG, IEB, MEXU, and UAMIZ (acronyms according to Thiers 2019) allowed us to determine that the collected specimens as well as the specimen in MEXU must be considered as a novelty to science.

## Material & methods

The collection of the specimens was carried out in accordance with Aguirre León (1986); the material collected was reviewed and measured, and descriptions were prepared; measurements were taken from dried material; morphological analysis of the leaves and flowers was made with a standard stereo-microscope. The terms of characters used in the description follow Brown & Gilmartin (1984), Radford *et al.* (1974), and Scharf & Gouda (2008). To ensure the status of the proposed new species, we reviewed protologues and type material of *T. achyrostachys* and *T. ilseana*, taxa with morphological most similarities. Also we analyzed specimens and type images from the following herbaria: BKL, BM, BR, E, F, GH, K, KFTA, LE, LECB, M, MEXU, MO, P, PH, S, UAMIZ, UC, US, VT, and WU (JStor Global Plants). The type material was deposited at Herbario Metropolitano (UAMIZ), Universidad Autónoma Metropolitana Iztapalapa, and at IBUG and MEXU. Conservation status was assigned following the regulations of IUCN (2019).

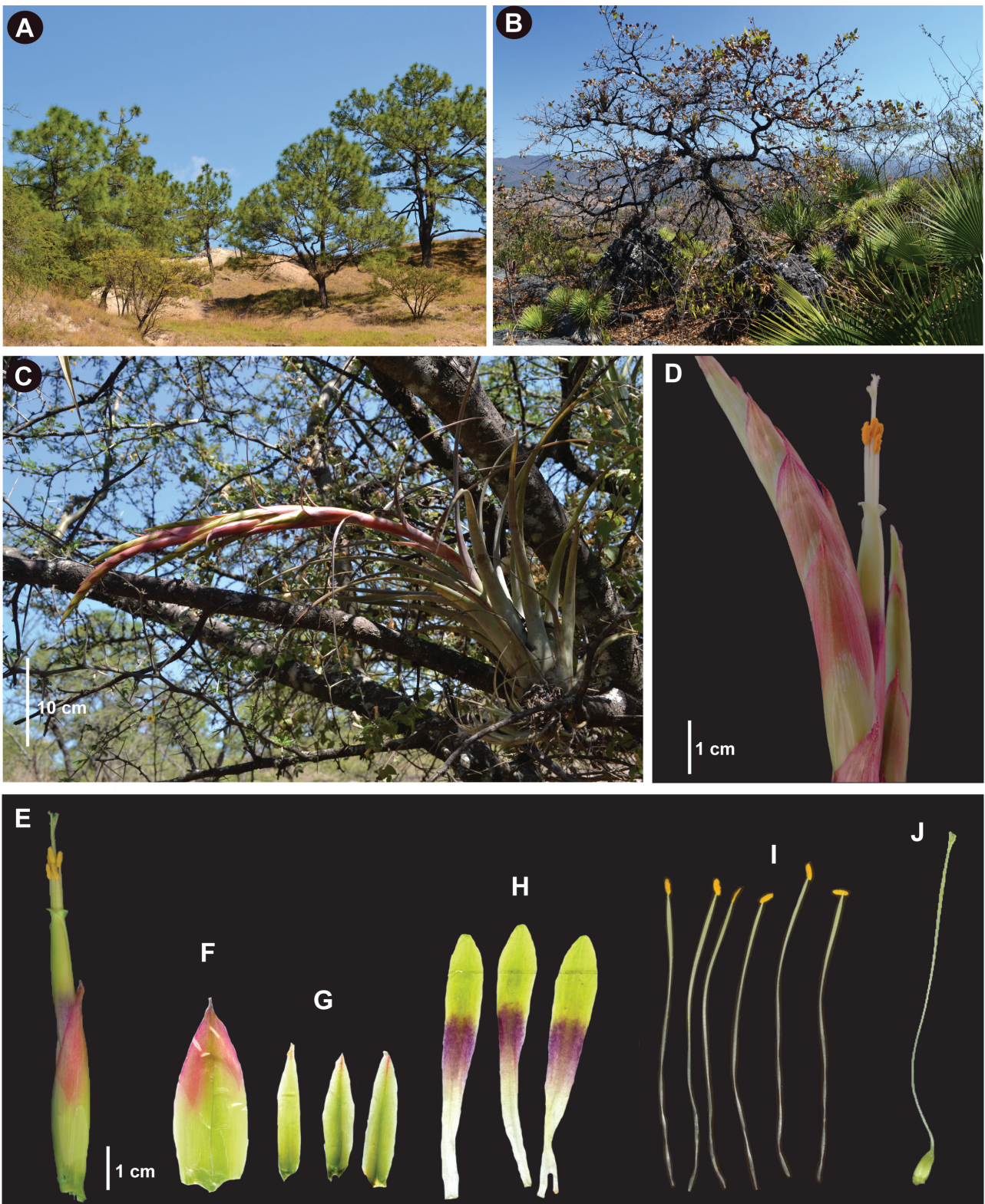
## Taxonomy

*Tillandsia dichromantha* Hern.-Cárdenas, López-Ferr. & Espejo, *sp. nov.* (Figs. 1, 2, 3A–B, Table 1)

The new species is similar to *Tillandsia ilseana* and *T. achyrostachys* but differs in the height of the flowering plants (45–55 vs.  $\pm 100$ , and 24–45 cm), the number of spikes (6–9 vs. (4)9–15, and one), the ecarinate and conspicuously nerved floral bracts (vs. carinate-smooth, and ecarinate-conspicuously nerved), the floral bracts width (1.3–1.6 vs. 0.7–0.8, and 1.6–2.3 cm), the sepals size (2.3–2.5  $\times$  0.5–0.6 vs.  $\pm 2.8 \times 0.8$ –0.9, and 2.7–2.9  $\times$  0.6–0.7 cm), the petal color (violet + green-chartreuse vs. very pale violet [*T. ilseana*], and chartreuse green [*T. achyrostachys*]), and in the style length (6–6.5 vs. 5.5–6, and 4.5–5 cm).

TYPE:—MÉXICO. Oaxaca: distrito de Juchitán, municipio de San Juan Mixtepec, camino que va de San Juan Mixtepec a Río Timbre, pasando Matanza, ca. 1,740 m, 17°20'24"N, 97°50'49"W, bosque de *Pinus* con leguminosas aisladas, 6 December 2019, R. Hernández-Cárdenas & S. Lara-Godínez 2333 (holotype UAMIZ!).

**Plants** epiphytic, acaulescent, solitary, in flower 45–55 cm tall, rosettes 30–35 cm tall, 8–10 cm in diameter at the base. **Leaves** 16–25 in number; *sheaths* dark-brownish adaxially, pale-brown abaxially, oblong to elliptic, 5–6  $\times$  2.8–3.2 cm, glabrous near the base and lepidote distally on both surfaces; *blades* greenish-gray, narrowly triangular, 23–30  $\times$  1.8–2.5 cm, long attenuate to filiform in the apical portion, lepidote on both surfaces. **Inflorescence** terminal, erect, once branched of 6–9 appressed to ascending spikes; *peduncle* pale brown, terete, 5–10 mm in diameter, glabrous, fully covered by the sheaths of the peduncle bracts; *peduncle bracts* greenish-gray, foliaceous, gradually decreasing in size distally, much exceeding the internodes, lepidote on both surfaces, densely imbricate; *primary bracts* reddish to green-reddish, the sheaths ovate, shorter than the spikes, conspicuously nerved abaxially, the blades linear to filiform, gradually decreasing in size distally, the lower ones exceeding the spikes with the foliaceous blade, the apical ones shorter, reduced and apiculate, glabrous near the base and lepidote distally on both surfaces. **Spikes** terete to slightly flattened, 4–10 flowered, 6.5–16  $\times$  0.9–1.2 cm, stipitate; *stipes* terete, ca. 2 mm in diameter, glabrous, bracteate; *stipe bracts* 2–3 in number, ovate, 2.8–3  $\times$  1–1.2 cm, glabrous, conspicuously nerved abaxially; *floral bracts* basally green, reddish toward the apex, ovate, 3.5–3.8  $\times$  1.3–1.6 cm, longer than the internodes and sepals, imbricate, acute to apiculate, glabrous on both surfaces, conspicuously nerved abaxially. **Flowers** distichous, appressed to the rachis, actinomorphic, corolla tubular; *sepals* free, pale green, lanceolate, 2.3–2.5  $\times$  0.5–0.6 cm, acute, hyaline at the margins, glabrous on both surfaces, the adaxial ones carinate; *petals* free, white towards the base, violet in the middle and chartreuse green towards the apex, oblanceolate to spatulate, 4.8–5  $\times$  0.7–0.8 cm, rounded at the apex, their tips revolute; *stamens* unequal, exserted; *filaments* free, white toward the base, green distally, flat at the base, dilated, fleshy and subterete in distal part, 54–56  $\times$  0.8–1 mm; *anthers* yellow, narrowly oblong, 3–3.5  $\times$  1.3–1.5 mm, subbasifixed, *ovary* green, ovoid, 6–7  $\times$  3–5 mm; *style* white toward the base, green distally, flat at the base, fleshy and subterete in distal part, 60–65  $\times$  0.8–1 mm, exceeding than the stamens; *stigma* green, conduplicate-spiral, ca. 3 mm long. **Capsules** not seen.



**FIGURE 1.** *Tillandsia dichromantha* Hern.-Cárdenas, López-Ferr. & Espejo. **A.** Habitat in San Juan Mixtepec, Oaxaca. **B.** Habitat in Santos Reyes Tepejillo, Oaxaca. **C.** Plant at the type locality. **D.** Detail of the spike. **E.** Flower. **F.** Floral bract. **G.** Sepals. **H.** Petals. **I.** Stamens. **J.** Pistil. (Photographs A–C by R. Hernández-Cárdenas; D–J by A. Espejo-Serna).

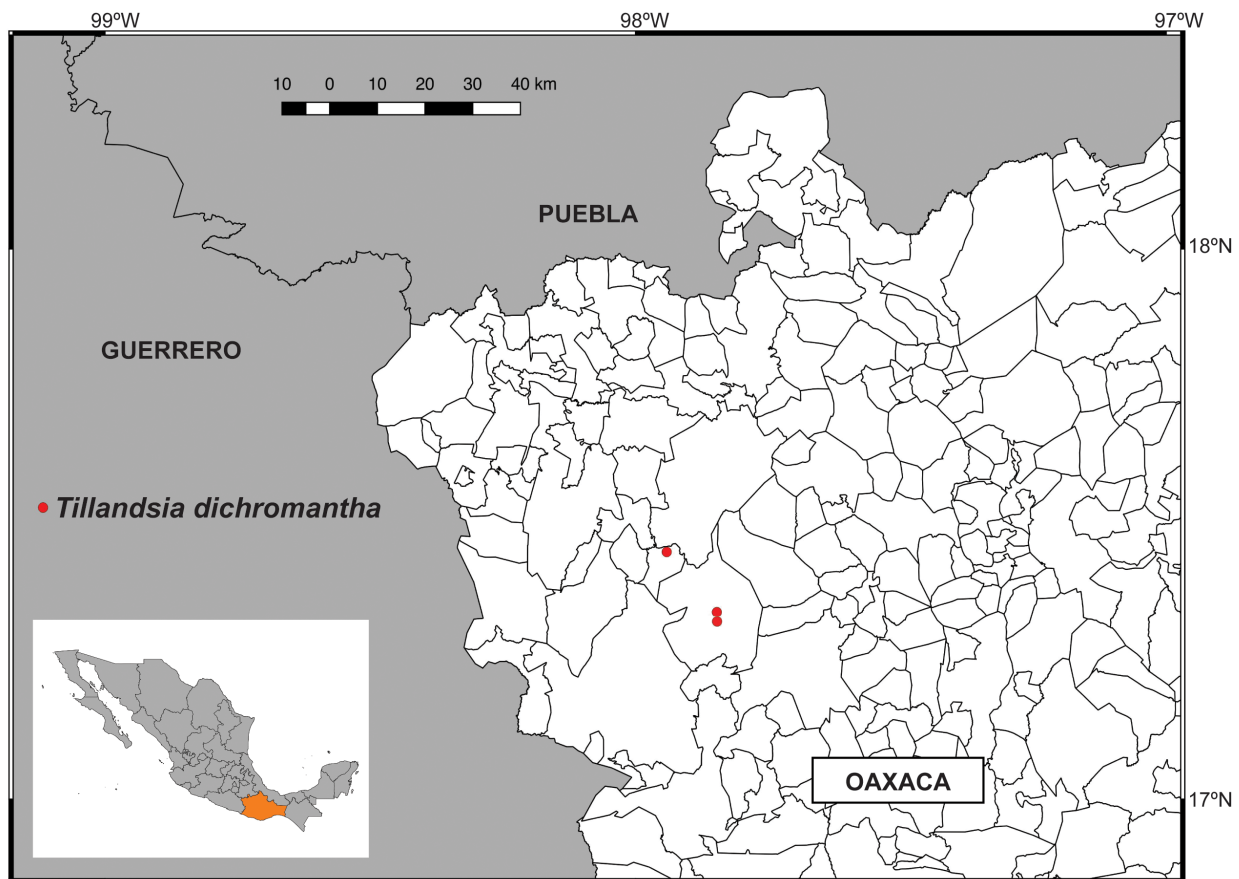


FIGURE 2. Distribution map of *Tillandsia dichromantha* Hern.-Cárdenas, López-Ferr. & Espejo.

**Distribution and habitat:**—*Tillandsia dichromantha* is only known from Oaxaca (Figure 2): the Sierra Madre del Sur in the municipalities of San Juan Mixtepec; and Santos Reyes Tepejillo, in the district of Juxtlahuaca, where it grows epiphytically on *Quercus* spp. and *Acacia* sp. in dry oak (*Quercus*) forests, *Pinus* forests, and tropical deciduous forests with species of *Arecaceae*, *Ipomoea* species, *Bursera* species, and *Juniperus* species (Figures 1A–B). *Tillandsia dichromantha* grows among other *Tillandsia* species like *T. achyrostachys*, *T. dugesii* Baker (1887: 278), *T. recurvata* L. (1762: 410), and *T. usneoides* L. (1762: 411). Plants of *T. dichromantha* inhabit localities between 1,730 and 1,960 m elevation and blooms from December to January. It should be mentioned that we found only three individuals during all the visits to the zone along a year, so probably the plants are scarce.

**Etymology:**—The specific epithet refers to the bicolorous petals, violet and chartreuse green, that distinguish this new species.

**Paratypes:**—MÉXICO. Oaxaca: distrito de Juxtlahuaca, municipio de San Juan Mixtepec, 12 km al N de San Juan Mixtepec, 1,800 m, bosque de *Quercus*, 17 February 1988, *A. Campos* 1222 (MEXU!); distrito de Juxtlahuaca, municipio de Santos Reyes Tepejillo, en los alrededores del boquerón de Santos Reyes Tepejillo, 1,960 m, 17°26'58"N, 97°56'29"W, bosque tropical caducifolio con encinos aislados, 22 February 2018, *R. Hernández-Cárdenas*, *A. Hernández* y *A. González* 2142 (UAMIZ!); 0.4 km al NW de San Juan Mixtepec, rumbo a Santiago Juxtlahuaca, ca. 1,790 m, 17°18'27.44"N, 97°50'21.2"W, bosque de *Pinus*, 6 December 2019, *R. Hernández-Cárdenas* y *S. Lara-Godínez* 2330 (IBUG!).

**Conservation status:** Due to the lack of detailed information about the precise distribution and abundance of the species, we suggest to include it in the Data Deficient (DD) category of the IUCN (2019).

**Observations:**—As far as we know, the bicolorous petals violet in the middle part and green-chartreuse in the apical portion, the diagnostic character of the new taxon, is also present in other species like for example *Tillandsia glabrior* Espejo-Serna *et al.* (2004: 60), however, in this species the petals are purple at the middle portion and yellow at the apical portion. Additionally, the conspicuously nerved floral bracts of *T. dichromantha* are reminiscent to those of *T. achyrostachys* which, however, differs in texture and color (papyraceous and rose to straw-colored in *T. achyrostachys* vs. membranaceous and green to reddish in *T. dichromantha*); finally the inflorescences of *T. achyrostachys* is always simple, while in *T. dichromantha* there are six to nine spikes, see also Table 1.



FIGURE 3. A–B. *Tillandsia dichromantha* Hern.-Cárdenas, López-Ferr. & Espejo. A. Holotype. B. Paratype. C. Herbarium specimen of *T. achyrostachys* E. Morren ex Baker, coll. A. Mendoza R. 1397 (UAMIZ). D. Iso-type of *T. ilseana* W. Till, Halbritt. & Zecher, coll. E. & I. Zecher 8/80 (UAMIZ).

**TABLE 1.** Comparative characters of *Tillandsia achyrostachys* E. Morren ex Baker, *T. dichromantha* Hern.-Cárdenas, López-Ferr. & Espejo, and *T. ilseana* W. Till, Halbritt. & Zecher.

Characters	<i>T. achyrostachys</i>	<i>T. dichromantha</i>	<i>T. ilseana</i>
Blooming	december–june	december–january	march–may
Flowering plant size (cm)	24–45	45–55	±100
Sheaths size (cm)	2.5–4 × 1.5–2.5	5–6 × 2.8–3.2	7–8 × 3.5–4
Blades size (cm)	7–16 × 0.9–1.2	23–30 × 1.8–2.5	35–60 × 2–2.5
Number of spikes	1	6–9	(4)9–15
Spike size (cm)	9–19 × 1.8–2	6.5–16 × 0.9–1.2	5–10 × 1.2–1.4
Floral bracts	ecarinate	ecarinate	carinate
Floral bracts indumentum	glabrous	glabrous	white lepidote
Floral bracts width (cm)	1.6–2.3	1.3–1.6	0.7–0.8
Sepal adaxial ones	connate	free	connate for 8.5 mm
Sepal size (cm)	2.7–2.9 × 0.6–0.7	2.3–2.5 × 0.5–0.6	±2.8 × 0.8–0.9
Petal color	green	violet and green	very pale violet
Filament length (cm)	4.7–5	5.4–5.6	5.3–6.3
Anther color	yellow	yellow	brownish
Style length (cm)	4.5–5	6–6.5	5.5–6
Geographical distribution	Colima, Guanajuato, Guerrero, Jalisco, Estado de México, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Sinaloa, Sonora, and Zacatecas	Oaxaca	Guerrero

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