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A new species of *Vernonia* (Asteraceae, Vernonieae) from the state of Oaxaca, Mexico

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Abstract

A new species of *Vernonia* (Asteraceae, Vernonieae) is described from mountain cloud forest, *Pinus* forest and *Pinus–Quercus* forest in the State of Oaxaca, Mexico. Typical characters of this species are the lax corymbiform inflorescences, formed by 3–10 heads on peduncles > 4.5 cm long, and the lanceolate or elliptic-ovate shape of leaves. A key to the Mexican species of *Vernonia* is included.

Key words: new taxon, endemism, lageniform trichomes, Compositae.

Introduction

The genus *Vernonia* Schreber (1791: 541) s.str. includes 22 species (Robinson 1999); earlier the genus was the most diverse in the tribe Vernonieae, as it included more than 1500 species (Jones 1977), grouped in two subgenera and numerous sections and subsections. Robinson (1999) segregated a large series of genera, thus diminishing the number of species in *Vernonia* s.str. The species of *Vernonia* are distributed in tropical regions of both hemispheres and are characterized by corymbiform inflorescences, with few or many short- or long-pedunculate heads, leaves with pilose or glandular indumentum, constituted by unicellular trichomes, uniseriate, lageniform and/or glandular (Redonda-Martínez *et al.* 2012), occasionally with a tomentose indumentum in the leaf abaxial surface, as in *V. bolleana* Sch. Bip. (1856: 297) and *V. lindheimeri* A. Gray & Engelm. in Gray (1846: 46), and pollen type A (sub-echinolophate, tricolporate, with microperforated tectum (Keeley & Jones 1979).

Most of North American species of *Vernonia* s.str. were often included in *V.* sect. *Lepidaploa* subsect. *Paniculatae* ser. *Umbelliformes* or *Verae* (Gleason 1906, Jones 1976), which all have paniculate inflorescences, with aggregate or separate heads with short internodes, pedicels with a uniform length, giving the grouping of heads a subumbellate appearance. These species are perennial herbs or bushes with distributions in the mountains, and are endemic to Mexico. Due to the continuous identification of botanical material of Mexican species of Vernonieae, a new taxon of *Vernonia* was found, which is herewith described.

Taxonomy

Vernonia confusa Redonda-Mart., Villaseñor & A. Campos, **sp. nov.** (Figs. 1–2)

Type:—MEXICO. Oaxaca: Distrito Miahuatlán, Mpio. San Jerónimo Coatlán, 38.6 km SO San Jerónimo Coatlán, brecha a Piedra Larga, 30 noviembre 1990, *A. Campos 3468* (holotype MEXU!; isotypes MEXU!, K!, US!).

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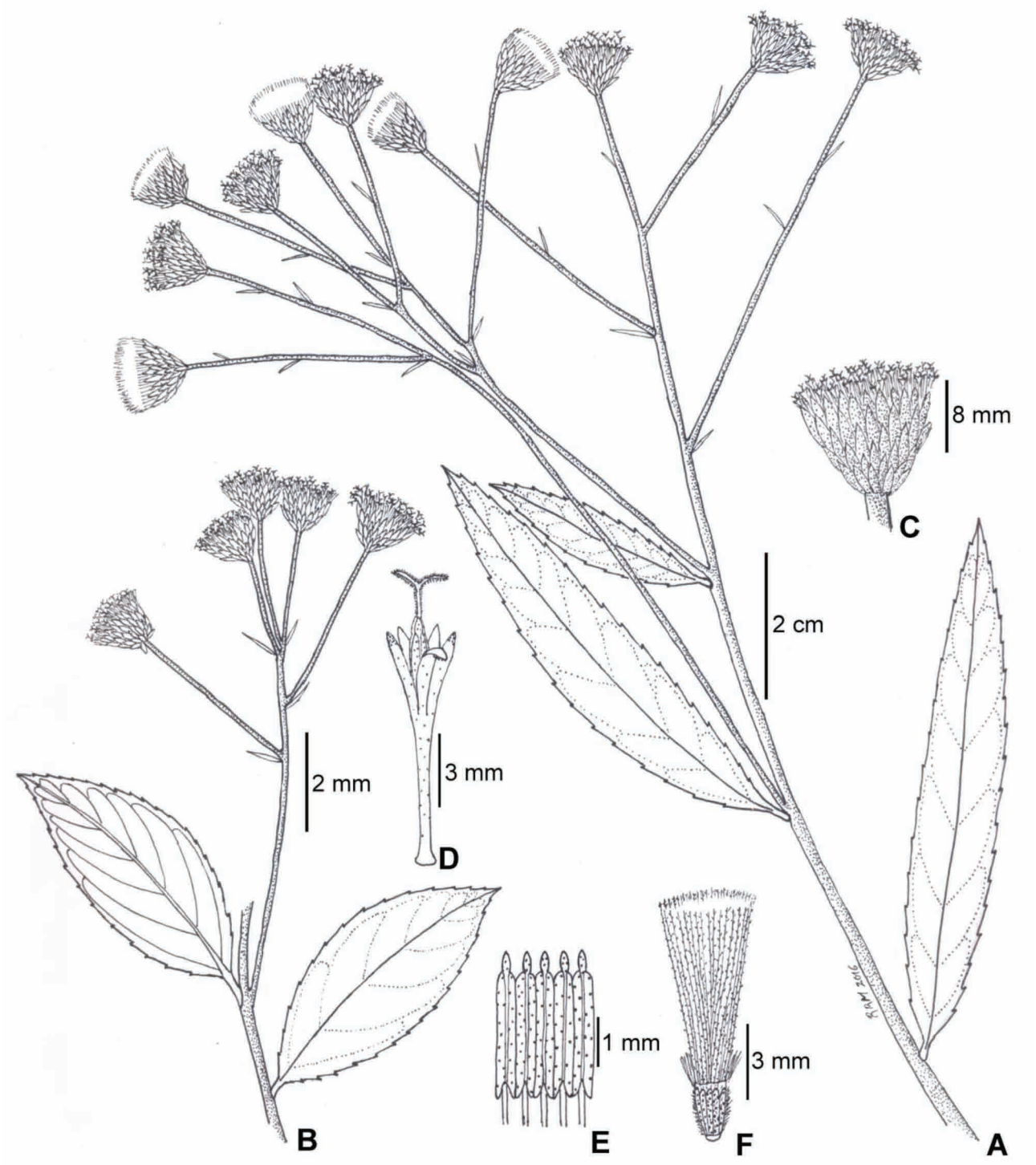

FIGURE 1. *Vernonia confusa* Redonda-Mart., Villaseñor & A. Campos. **A & B.** Branches with inflorescences showing variation of leaves. **C.** Head. **D.** Floret. **E.** Androecium. **F.** Cypsela with pappus.

Perennial herbs or suffruticoses 0.4–1.0 m high. Stems glabrous, striate. Leaves alternate, petioles 3.0–8.0 mm in length, blades lanceolate, rarely elliptic–ovate, 6.0–15 cm long, 1.0–2.2 (–5.0) cm wide; leaf adaxial surface pilose or glabrate, with multicellular uniseriate trichomes, with apical cell subulate and with scattered glands (Fig. 3, A); leaf abaxial surface with abundant lageniform trichomes and some simple trichomes (Fig. 3, B–C); base occasionally decurrent on petioles; apex acute–apiculate, margins serrate and revolute. Heads homogamous, long-pedunculate, peduncles (3.0–)4.5–12.0 cm, glabrous, with subulate–lanceolate bracteoles, 4.0–14.0 mm long; inflorescence corymbose lax, with 3–10 heads, involucre campanulate to hemispheric,1.2–1.8 cm long, 1.2–2.3 cm wide; 5–6-seriate, glabrescent. Phyllaries linear–lanceolate, glabrate, imbricate, apex mucronate. Florets 50–60 per head, purple, actinomorphic, corollas 9.0–

FIGURE 2. Holotype of *Vernonia confusa*, specimen housed at Herbario Nacional de Mexico (MEXU).

13.0 mm long, lobes 3.0–4.0 mm long, tube 6.0–9.0 mm long, with abundant glands at apex of lobes and spread on tube. Style branches long, acute and hairy, 2.0–3.0 mm long. Anthers 3.0–4.0 mm long, with glandular indumentum, apex acute, base sagitate. Cypselae with 8–10 ribs, 3.0–5.0 mm long, with a pilose–glandular indumentum (Fig. 2, D). Pappus persistent, 2-seriate, external series shorter, of capillary bristles, 1.0–2.2 mm long, internal series longer, of capillary bristles, 6.0–8. 0 mm long. Pollen 25.0–35.0 µm in diameter, subechinolophate with a microperforated tectum (Fig. 3, E–F).

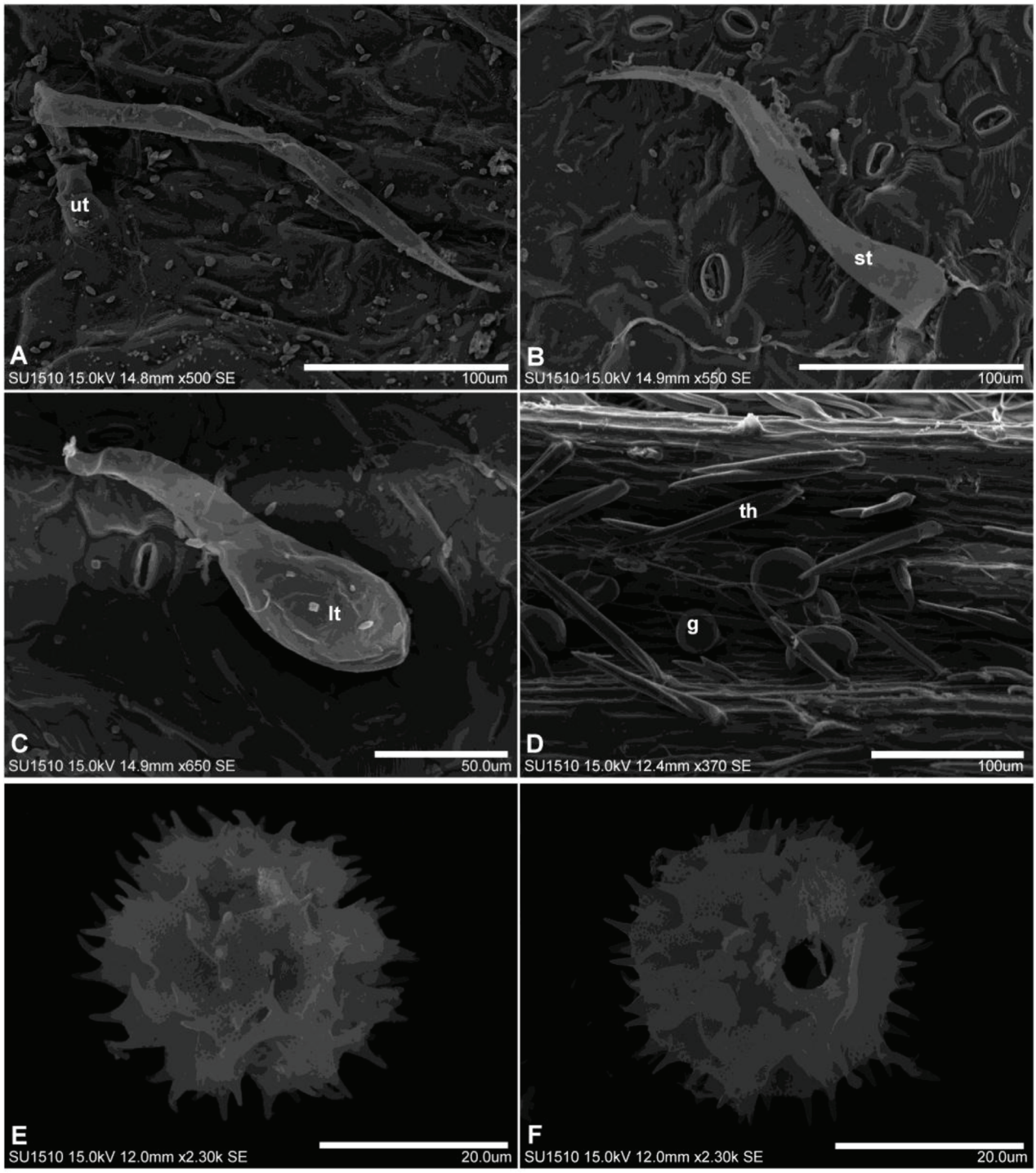

FIGURE 3. Trichome diversity and pollen type of *Vernonia confusa*. **A.** Trichome on abaxial surface of leaves, uniseriate, with apical cell subulate (ut). **B & C.** Trichomes on adaxial surface of leaves. **B.** Simple trichome (st). **C.** Lageniform trichome (lt). **D.** Indumentum of cypselae, pilose-glandular, with glands (g) and twin hairs (th). **E & F.** Pollen type A. **E.** Polar view. **F.** Equatorial view.

Distribution, habitat and phenology:—*Vernonia confusa* is known only from six collections in the State of Oaxaca, at the mountain cloud forest, *Pinus* forest and *Pinus–Quercus* forest, at elevations of 1260–1790 m. It grows in association with *Pinus*, *Quercus* and associated species of mountain cloud forest types. Flowering and fruiting from August to December.

Ethymology:—The name of this species refers to the group of characters that have allowed the new species to be confused with other vernonias that have lanceolate blades, such as *V. greggii* A. Gray (1882: 204), or an 5–6-seriate involucre, a pilose–glandular indument of the cypsela, and the same geographic distribution as *V. karvinskiana* DC. (1836: 62) subsp. *karvinskiana*.

Discussion:—The new species is recognized as a member of the genus *Vernonia* s.str., which shares the corymbose inflorescences, the presence of glands at the tips of the lobes, the tube of the corolla and the cypselae, the lageniform trichomes on the abaxial surface of the leaves, the latter being characteristic of the North American species of the genus (Faust & Jones 1973, Redonda-Martínez *et al.* 2012), and the type A pollen which is characteristic of *Vernonia* (Keeley & Jones 1979, Robinson 1999).

Considering the infrageneric classification of *Vernonia* by Gleason (1906), this new taxon could be included in *V.* series *Umbelliformes* because it presents characters in common with the taxa here grouped, such as the perennial or sufruticose herbaceous habit, and the grouped heads in subumbellate inflorescences with a uniform peduncle length. It is important to point out that the leaves present an intraspecific variation, yet they are lanceolate in most specimens but having elliptic–ovate leaves (*Campos 3266, 3280*).

TABLE 1. Characters of *Vernonia confusa* and related taxa.

Characters	*Vernonia confusa*	*V. greggii*	*V. karvinskiana* subsp. *karvinskiana*
Shape of leaf blade	lanceolate, rarely elliptic-lanceolate	lanceolate or elliptic-lanceolate	lanceolate
Trichomes on adaxial surface	multicelular uniseriate, with apical cell subulate, glands	lageniform, T-shaped	multicelular uniseriate, with apical cell acute, glands
Trichomes on abaxial surface	lageniform, simple	lageniform, T-shaped	multicelular uniseriate, with apical cell subulate, lageniform, glands
Length of peduncles	(3.0–)4.5–12.0 cm	2.6–5.4 cm	0.8–3.6 cm
Shape of involucre	campanulate or hemispheric	hemispheric	turbinate
Indumentum of involucre	glabrescent	pilose	pilose
Shape of phyllaries	lanceolate	oblong-eliptic	lanceolate
Number of series of phyllaries	5–6	4	5–6
Inflorescence type	lax corymbose	lax cymose	compact corymbose
Number of heads per inflorescence	3–10	5–18	6–15
Number of florets per head	50–60	40–60	30–40
Indumentum of cypselae	pilose-glandular	glandular	glandular
Color of pappus	white	brown-purple	white
Geographic distribution	Oaxaca	Coahuila, Durango, Guanajuato, Hidalgo, Nuevo León, Querétaro, San Luis Potosí, Tamaulipas	Guerrero, Oaxaca

The new species is similar to *Vernonia greggii* but with the glabrous stems, both share the same shape of the leaf blades, and the campanulate to hemispheric involucre. It differs from *V. greggii* in the absence of T-shaped trichomes on both surfaces of the leaves, the lanceolate–oblong phyllaries in *V. greggii*, the higher number of series of the involucre (4-seriate in *V. greggii* vs. 5–6-seriate in *V. confusa),* and the purple-brown pappus in *V. greggii* vs. the white pappus in *V. confusa.* The new taxon shares the presence of glands and multicellular uniseriate trichomes with *V. karvinskiana* subsp. *karvinskiana* on the adaxial surface of the leaves; yet the later shows a difference in the apical cell of trichomes, as it is subulate in *V. confusa* but acute in *V. karvinskiana* subsp. *karvinskiana*. Both species have lageniform trichomes on the abaxial surface, but in *V. confusa* simple trichomes also present (Fig. 2 B), whereas in *V. karvisnkiana* subsp. *karvinskiana* the indumentum is formed also by uniseriate multicellular trichomes with the apical cell subulate (long

uniseriate trichomes of subtype b1; Redonda-Martinez *et al.* 2012) and glands. Both species have a 5–6-seriate involucre with lanceolate phyllaries, indumentum pilose–glandular on the cypselae and their inflorescences corymbose; yet in *V. confusa* the inflorescence is lax, formed by 3–10 heads, while in *V. karvinskian*a subsp. *karvinskiana* it is compact with 6–15 heads. These species also differ in the number of florets. *Vernonia karvinskiana* subsp. *karvinskiana* has 30–40 florets, while *V. confusa* has 50–60 florets. These characteristics, together with the others included in Table 1, prove that the taxon described here is new to science.

Additional specimens examined:—MEXICO. Distrito Miahuatlán, Mpio. San Jerónimo Coatlán, 10.3 km NE de Piedra Larga, 15 diciembre 1987, *A. Campos* y *R. Torres 816* (MEXU); 41 km SO de San Jerónimo Coatlán, brecha a Progreso, 7 agosto 1990, *A. Campos 3266* (MEXU); 40 km SO de San Jerónimo Coatlán, brecha a Progreso, 7 agosto 1980, *A. Campos 3280* (MEXU); 10 km SO del campamento Santo Domingo, 27 octubre 1980, *R. Hernández M. et al. 5244* (ENCB, MEXU); 17 km NE de Piedra Larga, camino Piedra Larga–Miahuatlán, 22 noviembre 1982, *E. Martínez S. et al. 2739* (MEXU).

The distribution map of the new species is presented on Fig. 4.

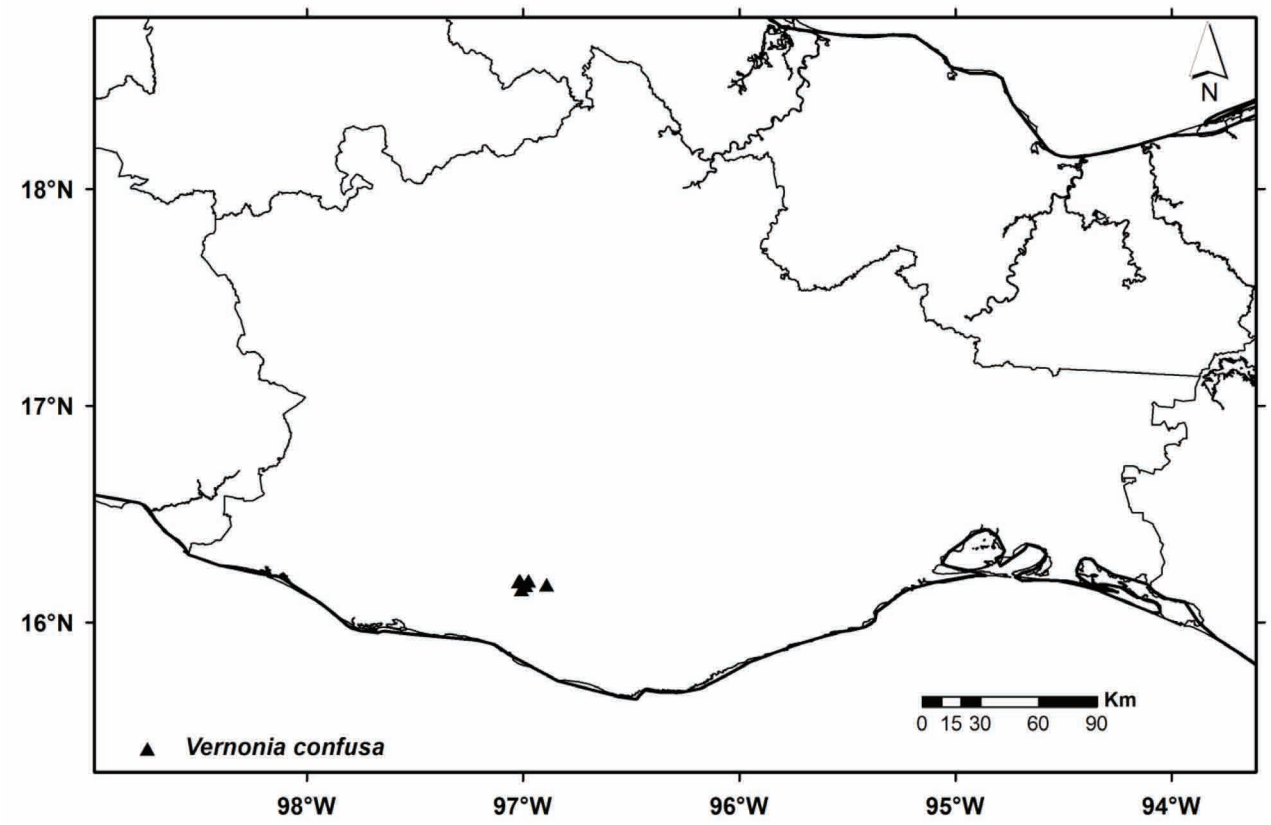

FIGURE 4. Distribution map of *Vernonia confusa* in the state of Oaxaca, México.

Artificial key to the Mexican species of *Vernonia* s.str.

1. Plants mainly distributed in Northern Mexico, generally with tomentose stems, occasionally pilose, puberulent or glabrescent .. 2
– Plants distributed in Central and Southern Mexico, rarely in the north, generally with pilose or glabrous stems 8
2. Leaves sessile, petioles absent; blades linear, < 8 mm wide 3
– Leaves short petiolate, petioles > 3 mm, blades lanceolate or elliptical, > 1.2 mm wide 6
3. Pappus purple; heads with 30 or less florets 4
– Pappus white; heads with 40 or more florets 5
4. Stems tomentose; phyllaries and abaxial surface of leaves with tomentose indumentum ..... *V. lindheimeri*
– Stems puberulent or glabrous; phyllaries and abaxial surface of leaves with pilose–glandular indumentum ..... *V. marginata*
5. Cypselae with glandular indumentum; inflorescences with 10 or more heads; plants known from Coahuila ..... *V. larsenii*
– Cypselae with sericeous indumentum; inflorescences with 4 or less heads; plants known from Durango, Nayarit and Sinaloa ..... *V. bolleana*
6. Plants known from Coahuila; phyllaries pilose; cypselae with glandular indumentum ..... *V. faustiana*
– Plants known from Sonora; phyllaries tomentose; cypselae with pilose indumentum 7
7. Leaves elliptical; both surfaces of leaves with tomentose indumentum; involucre 5–6-seriate; phyllaries lanceolate; florets 50–60 per head; internal series of pappus < 7 mm long ..... *V. barclayi*

– Leaves lanceolate; adaxial surface of leaves with pilose indumentum, abaxial surface tomentose; involucre 6–8-seriate; phyllaries linear–lanceolate; florets 30–40 per head; internal series of pappus > 10 mm long ..... *V. joyaliae*
8. Involucre hemispheric; cypselae with glandular–pilose, or sometimes glandular indumentum 9
– Involucre campanulate or turbinate; cypselae with glandular indumentum 10
9. Inflorescences cymose; involucre 4-seriate, phyllaries oblong–elliptical, purple, with pilose indumentum; plants unknown from Oaxaca ..... *V. greggii*
– Inflorescences corymbose; involucre 5–6-seriate, phyllaries linear–lanceolate, green, with apex purple, glabrescent; plants only known of Oaxaca ..... *V. confusa*
10. Leaves lanceolate or lanceolate–elliptic; 30 or less florets per head 11
– Leaves ovate or ovate–elliptic; 40 or more florets per head 12
11. Involucre campanulate; phyllaries triangular, glabrous; plants from Jalisco and Michoacan ..... *V. bealliae*
– Involucre turbinate; phyllaries lanceolate, sparcely pilose; plants from Guerrero and Oaxaca ..... *V. karvinskiana* subsp. *karvinskiana*
12. Apex of phyllaries aristate, awn > 2 mm long; cypselae > 5.0 mm long; internal series of pappus > 9 mm long; plants unknown from Oaxaca ..... *V. alamanii*
– Apex of phyllaries mucronate, mucro < 1 mm long; cypselae < 4.5 mm long; internal series of pappus < 7 mm long; plants only known from Oaxaca ..... *V. karvinskiana* subsp. *inuloides*

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