

THE MEXICAN *GRINDELIA CONFUSA* (ASTERACEAE: ASTEREAE) AND RELATED SPECIES

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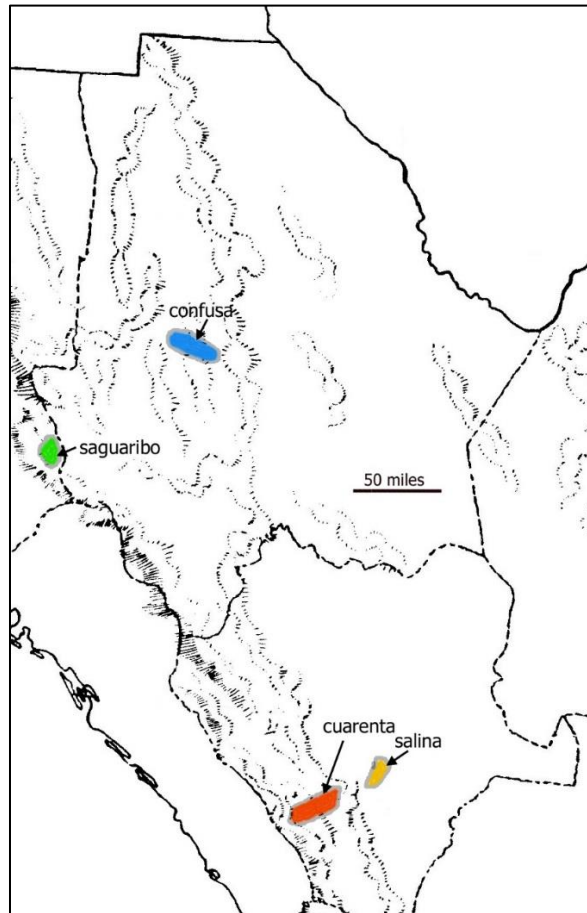
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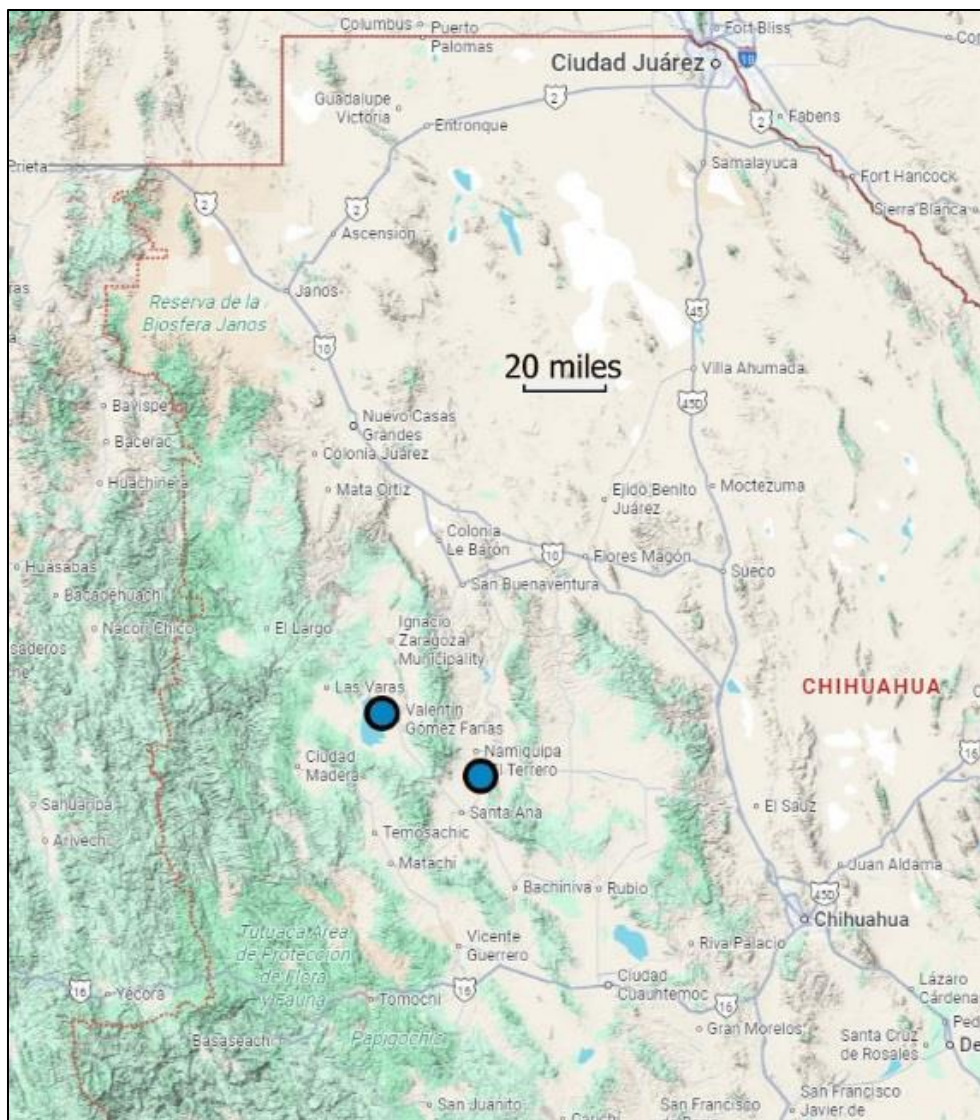
ABSTRACT

Three morphologically and geographically (allopatric) distinct species are segregated from the concept of *G. confusa* (the type from central Chihuahua) — ***Grindelia cuarenta*** Nesom, **sp. nov.**, from montane Durango, ***Grindelia salina*** Nesom, **sp. nov.**, from saline flats northeast of Cd. Durango, and ***Grindelia saguaribo*** Nesom, **sp. nov.**, from mountains northeast of Alamos in Sonora.

Grindelia confusa Steyerl. was described from a collection from central Chihuahua of annuals with a slender taproot, glandular-hairy stems, narrow and subpinnatifid leaves, and linear phyllaries. Other Mexican collections have been identified as such, but while they have obvious similarities (duration, vestiture, involucre morphology), they are plants of Sonora (Mpio. Alamos) and Durango (from northeast of Cd. Durango and from along Hwy 40 between Cd. Durango and Mazatlán), far-removed from the apparent range of typical *G. confusa*. Here, the concept of *G. confusa* is narrowed to the Chihuahuan plants, the others representing three previously undescribed species.



Map 1. Distribution of *Grindelia confusa* sensu stricto and related species, as hypothesized here.



Map 2. Distribution of *Grindelia confusa* sensu stricto. The boundary of Chihuahua is outlined in red.

1. **GRINDELIA CONFUSA** Steyerl., Publ. Field Mus. Nat. Hist., Bot. Ser. 17: 442. 1938. **TYPE:** MEXICO. **Chihuahua.** Namiquipa plains, swale, [ca. 6100 ft], 17 Aug 1936, *H. LeSueur 1016* (holotype: F; isotypes: MEXU, PH, TEX).

Annuals from a slender taproot. **Stems** 1 or 2–5 from the base, 15–25 cm, moderately to densely stipitate-glandular, without eglandular hairs. **Leaves:** basal pinnatifid, cauline narrowly oblong-ob lanceolate in outline, sometimes lyrate-lobed, sessile, sometimes basally subtruncate but not clasping, margins with sharp-pointed, aristate teeth, the middle portion 1–7 mm wide, relatively even-sized upwards, sparsely and minutely stipitate-glandular. **Heads** solitary or in loose, few-headed corymbs, immediately subtended by narrow bracts. **Involucres** 10–11 mm wide; phyllaries linear-oblong, loose but not recurving or coiling, sparsely stipitate-glandular. **Ray florets** 25–35. **Achenes** monomorphic, quadrate to subquadrate, nearly smooth to deeply longitudinally or laterally furrowed; pappus awns 3–5, minutely setulose. Figures 1–4.

Additional collection. **Chihuahua.** Gómez Farías, Laguna de Babícora, pastizal inundable, [ca. 7000 ft], 18 Aug 1994, *Lebgue & Estrada 3316* (TEX).



Figure 1. *Grindelia confusa*. LeSueur 1016 (F), holotype.



Figure 2. *Grindelia confusa*. LeSueur 1016 (MEXU). Isotype.



Figure 3. *Grindelia confusa*. Details from *LeSueur 1016* (F).



Figure 4. *Grindelia confusa*. Details from *LeSueur 1016* (F, MEXU, and TEX).

2. GRINDELIA SALINA Nesom, **sp. nov.** **TYPE: MEXICO. Durango.** 19 mi NE of Durango on Hwy 31 [ca. 24.4 N, 104.2 W], slightly saline meadow, 25 Jul 1958, *D.S. Correll & I.M. Johnston 20165* (holotype: MEXU; isotype: LL).

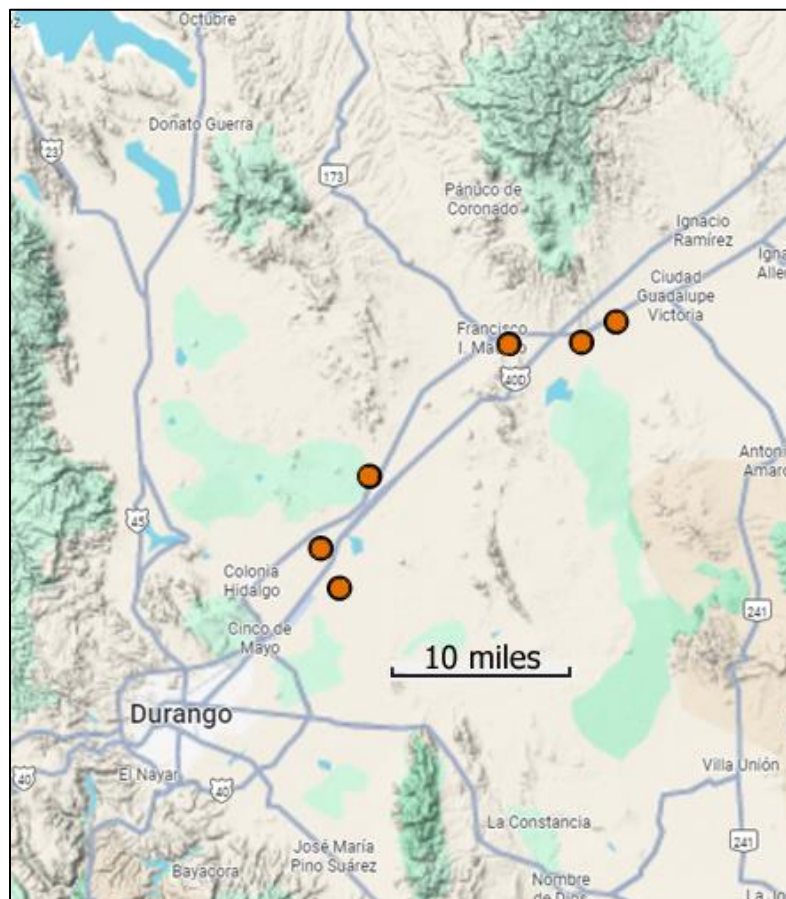
Similar to *Grindelia confusa* sensu stricto in its annual duration, stipitate-glandular vestiture, sharp-pointed leaf teeth, and linear phyllaries; different in its taller stems, larger, subclasping leaves, and larger involucre. The epithet alludes to the saline habitats characteristic of the species.

Annual herbs from a thin shallow taproot. **Stems** 20–90 cm, mostly 1 but sometimes several from the base, unbranched or few-branched distally, reddish, stipitate-glandular, with or without

eglandular hairs. **Leaves:** basal oblanceolate-spatulate, 2–8 cm long, toothed to subpinnatifid or sublyrate, usually deciduous by flowering, cauline (proximal) spatulate, becoming oblanceolate, 2–5 cm long, 5–10 mm wide, subauriculate, subclasping to barely so, stipitate-glandular, not punctate, margins regularly serrate with sharp, subspinulose teeth. **Heads** 1 or 2–4 on leafy peduncles, not immediately subtended by bracts. **Involucres** 14–16 mm wide (pressed); phyllaries linear-lanceolate, subequal in length, inner 9–10 mm long, outer reflexing. **Rays** 14–25. **Disc corollas** 6 mm long. **Achenes** subquadrate, 2–2.5 mm long, with shallow longitudinal furrows. **Chromosome number**, $2n=12$. Figures 4–12.

Flowering July–September. Low, slightly saline fields, pastures, and roadsides, grassland with salty flats; 6100–6550 feet.

Additional collections. Durango. 32 km (by air) NE of Durango along Hwy 40, 3 km SW of turnoff to Carlos Real, 24.25 N, 104.45 W, arid grassland with salty flats, [ca. 6100 ft], 26 Jul 1982, *Diggs & Nee 3038* (TEX); NE of Durango on Hwy 40, 12.3 road mi W of the town plaza of the town of Guadalupe Victoria just W of tiny village of Hernandez [ca. 24.40 N, 104.22 W], roadside low places near field in damp, sandy soil [ca. 6550 ft], 13 Aug 1977, *Lane 2273* (COLO, TEX); 23.2 road mi W of Guadalupe Victoria (town plaza) and 11.3 road mi W of Francisco I. Madero on Hwy 40, grassland with low trees, *Acacia*, *Opuntia*, 6150 ft, 13 Aug 1977, *Lane 2276* (TEX); NE of Durango along Hwy 40, near road to Ejido 27 de Noviembre, [ca. 24.2 N, 104.5 W], all through pastures for about 1 km each direction from locality, [ca. 6100 ft], 21 Aug 1978, *Lane 2476-A*, $n=6$ (TEX); Mpio. Pánuco de Coronado, Francisco I. Madero, ca. 2.5 km SE por el camino a Las Huertas [ca. 24.4 N, 104.3 W], matorral xerófilo (matorral abierto de *Acacia shaffneri*), terreno plano, 2 Aug 2001, *López et al. 30* (MEXU); NE of Durango along Hwy 40, 14.4 mi NE of Morteros [ca. El Puente Morteros, [ca. 24.16 N, 104.50 W], roadside, [ca. 6100 ft], 26 Sep 1984, *Sundberg 2859* (MEXU).



Map 3. Distribution of *Grindelia salina*.



Figure 5. *Grindelia salina*. Sundberg 2859 (MEXU).



Figure 6. *Grindelia salina*. Detail from *Sundberg 2859* (MEXU).

Figure 7. *Grindelia salina*. Lane 2273 (COLO).



Figure 8. *Grindelia salina*. Correll & Johnston 20165 (MEXU).



Figure 9. *Grindelia salina*. Detail from Correll & Johnston 20165 (MEXU).



Figure 10. *Grindelia salina*. López 30 (MEXU).



Figure 11. *Grindelia salina*. Detail from *Lopez 30* (MEXU).



Figure 12. Detail from *Grindelia salina*. Lopez 30 (MEXU).

3. GRINDELIA CUARENTA Nesom, **sp. nov.** **TYPE: MEXICO. Durango.** 1 km SW de El Salto, en una barranca, [ca. 23.78 N, 105.39 W], ca. 8700 ft, bosque de pino-encino, abundante, 9 Jul 1982, *P. Tenorio L. 933* (holotype: MEXU 789050; isotype: MEXU 819961).

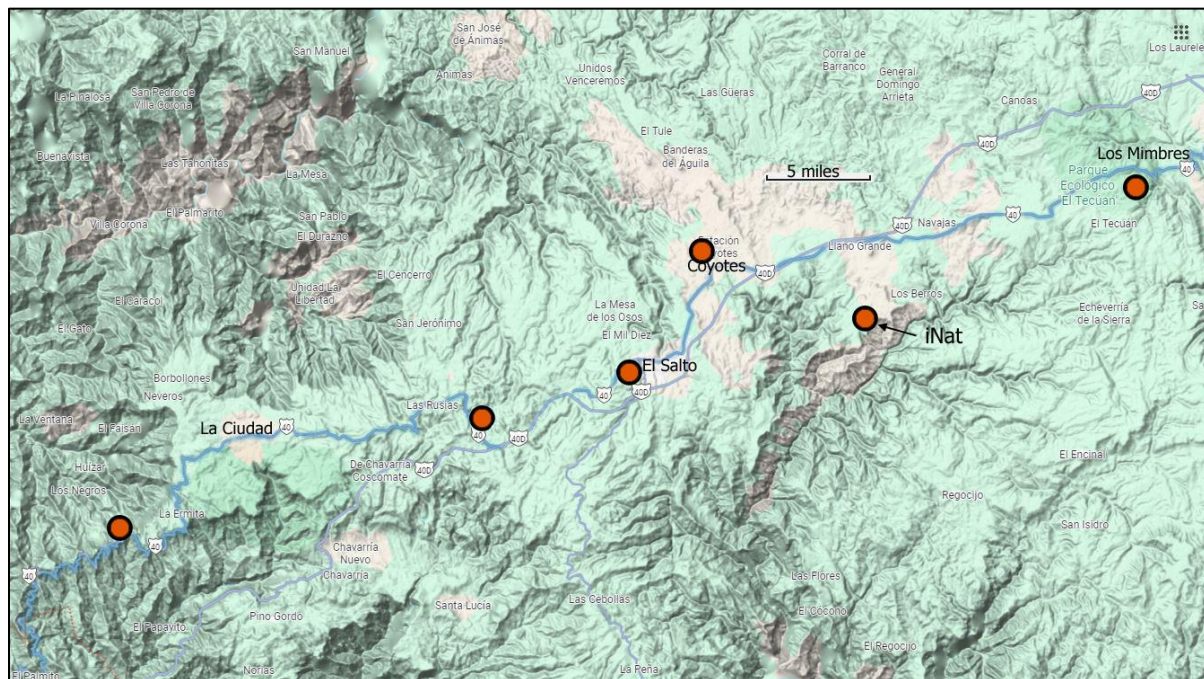
Similar to *Grindelia confusa* and *G. salina* in its annual duration, stipitate-glandular vestiture, and sharp-pointed leaf teeth; different from *G. salina* in its leaf teeth without an indurate apex, smaller involucre with broader phyllaries, greater number of rays, and shorter disc corollas.

Annual herbs from a short, thin taproot. **Stems** ca. 30–50 cm, stipitate-glandular mixed with long, vitreous, multicellular, eglandular hairs. **Leaves:** basal spatulate, sometimes sublyrate, withered or deciduous by flowering, cauline oblanceolate to obovate in outline, sessile, not clasping (base sometimes broadened and truncate), 2–6 cm long, 5–10 mm wide, gradually reduced in size distally, sparsely stipitate-glandular mixed with vitreous, eglandular hairs, not punctate, margins coarsely serrate with sharp-pointed teeth. **Heads** (1–)2–5, loosely cymoid, without immediately subtending bracts. **Involucre**s 11–12 mm wide (pressed); phyllaries oblong-lanceolate, in 2–3 series of equal to subequal length, inner 7–8 mm long, green on the distal 2/3 and stipitate-glandular mixed with vitreous non-glandular hairs. **Ray florets** 30–52. **Disc corollas** 3.5–4 mm long. Figures 13-21.

Flowering June-August. Open, boggy and marshy areas, meadows, stony slopes, areas of pine-oak and pine woods; 7700-8700 feet (elevations of some of the label data modified by reference to Google Earth).

Additional collections. Durango. Hwy 40, 7.1 mi SW of La Ciudad, 23.66 N, 105.77 W, disturbed, boggy area at the edge of a pine-oak forest, [ca. 8000 ft], locally common, 11 Aug 1983, *Freeman & Wetter 2123* (KANU); Mpio. Pueblo Nuevo, 8 km E de El Salto, Bajío Atascoso [23.85 N, 105.33 W], bosque de encino-pino, abundante, 8220 ft, 1 Jul 1982, *Hernández M. 7529* (MEXU); Hwy 40, ca. 11 mi W of El Salto, ca. 23.74 N, 105.50 W, pine woodland with open marshy areas in full sun, [ca. 7900 ft], 23 Aug 1991, *Soule 2754* (TEX) and *Soule 2755* (TEX); 39 mi W of Durango [ca. 23.9 N, 105.0 W, area of Los Mimbres], stony slopes with oaks and pines [ca. 7700 ft], 11 Aug 1956, *Waterfall 12660* (BRY).

iNaturalist observation: 23.81 N, 105.20 W [vicinity of Los Alamillos], ca. 8200 ft, Hugo van Vliet, 3 Aug 2021 <<https://www.inaturalist.org/observations/90145417>>



Map 4. Distribution of *Grindelia cuarenta*. Highway 40 is highlighted in blue.

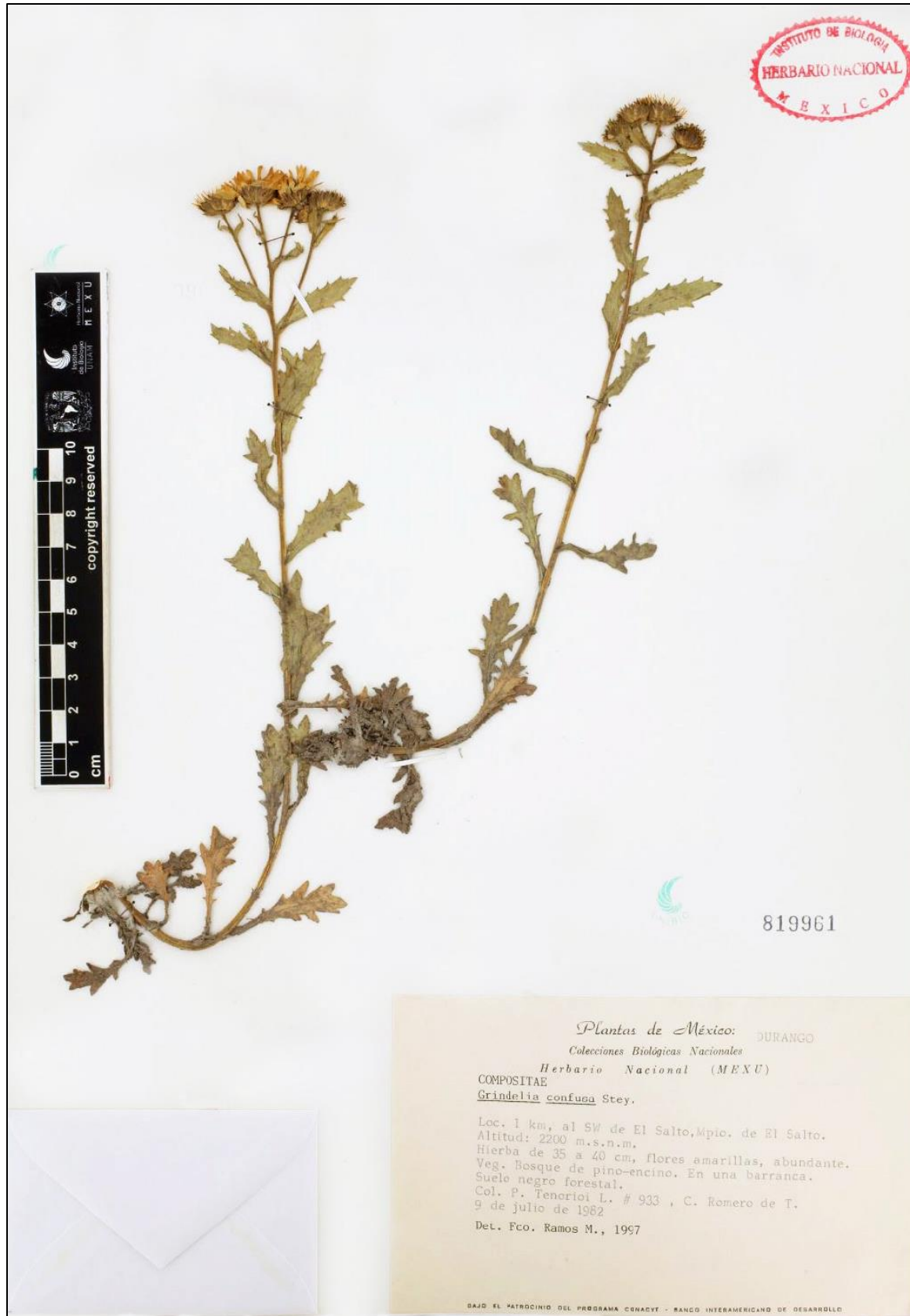


Figure 13. *Grindelia cuarenta*. Tenorio L. 933 (MEXU).



Figure 14. *Grindelia cuarenta*. Detail from *Tenorio L. 933* (MEXU).



Figure 15. *Grindelia cuarenta*. Detail from Tenorio L. 933 (MEXU).



Figure 16. *Grindelia cuarenta*. Waterfall 12660 (BRY).



Figure 17. *Grindelia cuarenta*. Freeman 2123 (KANU).



Figure 18. *Grindelia cuarenta*. Detail from *Freeman 2123* (KANU).



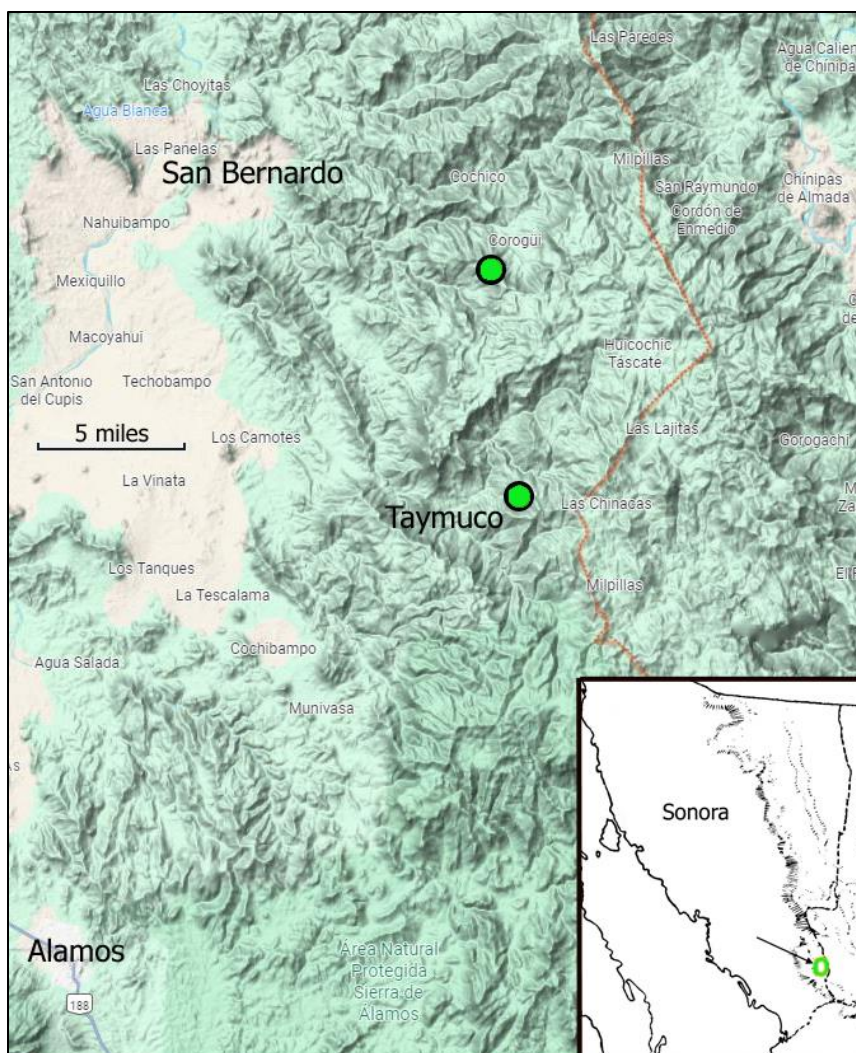
Figure 19. *Grindelia cuarenta*. Durango, vicinity of Los Alamillos, Hugo van Vliet, 3 Aug 2021, iNaturalist photo.



Figure 20. *Grindelia cuarenta*. Durango, vicinity of Los Alamillos, Hugo van Vliet, 3 Aug 2021, iNaturalist photo.



Figure 21. *Grindelia cuarenta*. Durango, vicinity of Los Alamillos, Hugo van Vliet, 3 Aug 2021, iNaturalist photo.



Map 5. Distribution of *Grindelia saguaribo*. The Sonora-Chihuahua border is in red.

4. **GRINDELIA SAGUARIBO** Nesom, **sp. nov.** **TYPE: MEXICO. Sonora.** [Mpio. Alamos, Sierra Saguaribo]: 15 km E de Taymuco, 1000-1460 m [3280-4790 ft], ecotono de selva baja caducifolia-encinar, suelo amarillo arcilloso-arenoso, 3 Oct 1983, *P. Tenorio L. 10137* (holotype: MEXU 825205; isotype: MEXU 807331). Figures 22, 23.

Distinct in its annual duration, glandular-hirsute stems, large, mostly oblong cauline leaves with truncate-clasping base and evenly serrate margins with sharp-pointed, non-glandular teeth, heads on long peduncles or leafy branches, and linear-lanceolate phyllaries of subequal length. Endemic to the Sierra Saguaribo.

Annual herbs, taprooted. **Stems** 35–80 cm, stipitate-glandular and hirsute to hirsute-villous. **Leaves:** basal oblong to oblong-obovate, sometimes spatulate with a narrow petiole, sometimes sublyrate, withering by flowering, cauline mostly oblong-obovate to oblong-ovate, sessile, base truncate to rounded, clasping but not amplexicaule, 2.5–5 cm long, 7–22 mm wide, gradually reduced in size distally, subbracteate on the peduncles, thin-herbaceous, minutely glandular (but not gland-dotted) and sparsely hirsutulous-villous, glabrescent, margins evenly serrate with 6–12(–15) pairs of teeth with a sharp-pointed, subspinulose (non-glandular) apex. **Heads** few on leafy branches from the distal 1/2 of the axis, loosely cymoid, without immediately subtending bracts. **Involucres** 11–14 mm wide (pressed); phyllaries oblong-lanceolate to narrowly triangular, in 2–3(–4) series of equal to

subequal length, loose and spreading or reflexing on the distal (green) portion, inner 7–8 mm long, green on the distal 1/2–2/3 and minutely stipitate-glandular. **Ray florets** 12–18. **Disc corollas** ca. 4 mm long. **Achenes** not seen. Figures 22–27.

Additional collection. Sonora. [Mpio. Alamos]: Cerro Saguarivo, E of San Bernardo, rocky bank above arroyo, 1500 m [4920 ft], 7–8 Aug 1935, *Pennell 19614* (US). The closest elevation of 1500 meters is about 9 air miles ESE of San Bernardo, near the community of Corogui (ca. 27.369 N, 108.696 W).

The locality of *Tenorio 10137* perhaps is in Chihuahua — from Taymuco eastward, it is about 10 road miles to elevations around 5000 feet at the Chihuahua border. It seems likely, however (from the elevation), that the collection was made closer to Taymuco (as mapped here), from where the road eastward rises to 3500 feet in the first 6 miles (elevation and distances fide Google Earth).



Figure 22. *Grindelia saguaribo*. Tenorio 10137 (MEXU). Holotype.

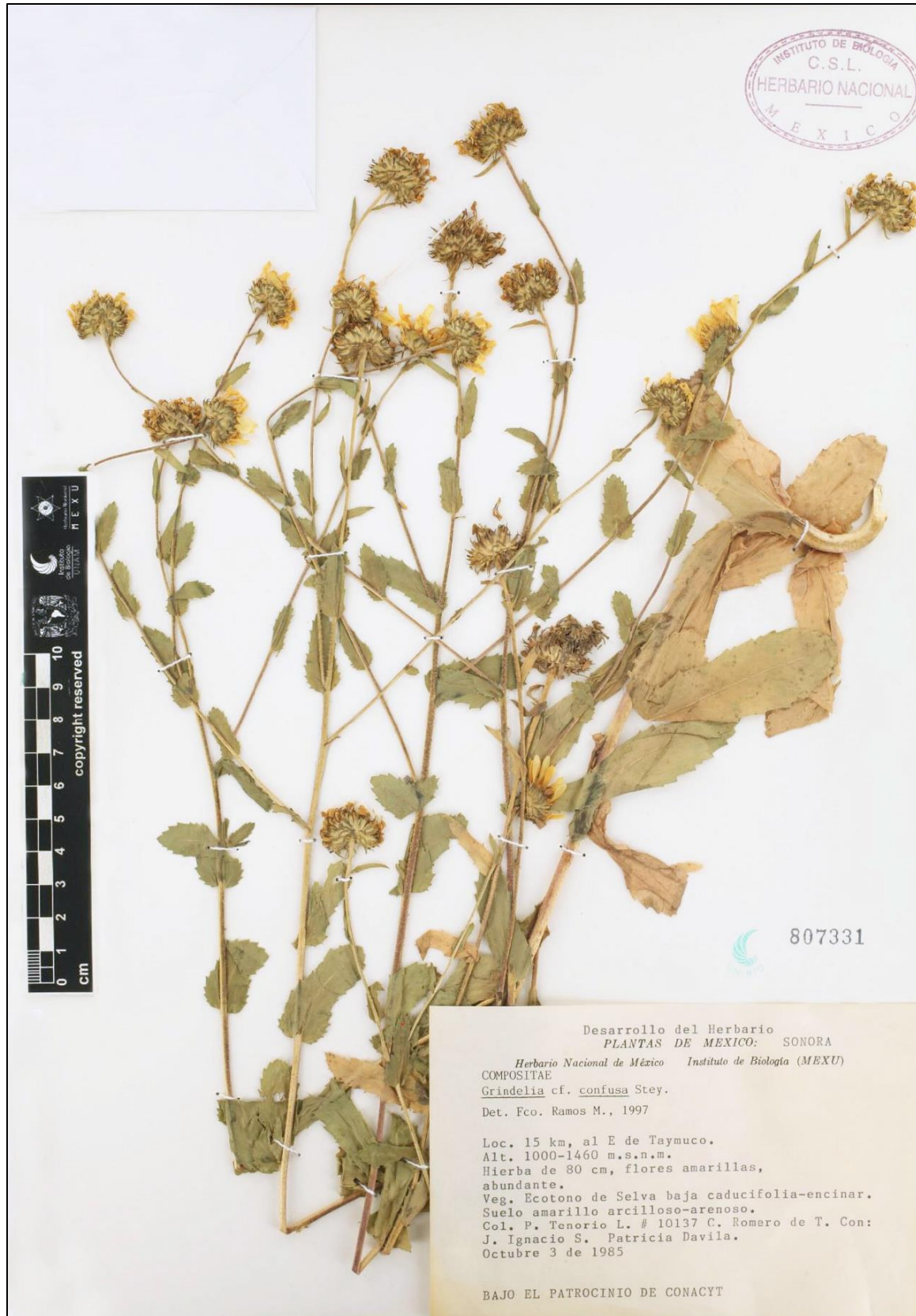


Figure 23. *Grindelia saguaribo*. Tenorio 10137 (MEXU). Isotype.



Figure 24. *Grindelia saguaribo*. Pennell 19614 (US).



Figure 25. *Grindelia saguaribo*. Details from *Tenorio 10137*.



Figure 26. *Grindelia saguaribo*. Details from *Tenorio 10137*.



Figure 27. *Grindelia saguaribo*. Detail from Pennell 19614 (US).

ACKNOWLEDGEMENTS

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