

TAXONOMIC NOTES ON MEXICAN *GRINDELIA* (ASTERACEAE)

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ABSTRACT

Grindelia palmeri (including *G. inuloides* var. *latamplexa* Nesom) is a distinctive species of San Luis Potosí and Querétaro — its distribution is mapped and collections cited. *Grindelia macvaughii* was described only from northeastern Jalisco, but it is documented here and mapped with additional localities from Aguascalientes, southern Zacatecas, and northeastern Michoacan. *Grindelia macvaughii* and *G. inuloides* are allopatric — the distribution of the latter also is mapped. *Grindelia subdecurrens* and *G. oxylepis* are similar but essentially allopatric in distribution — their ranges are mapped and a morphological contrast is provided.

In a taxonomic review of *Grindelia* in Mexico, clarifications from earlier observations (Nesom 1990) can be made. Observations here include *Grindelia palmeri*, *G. macvaughii*, and *G. subdecurrens*. Observations on variants of *G. inuloides* will follow in a separate account.

1. GRINDELIA PALMERI Steyerm., Ann. Missouri Bot. Gard. 21: 471. 1934. **TYPE: MEXICO. San Luis Potosí.** [Mpio. Zaragoza]: Alvarez, 28 Sep-3 Oct 1902, *E. Palmer 163* (holotype: US!; isotypes: BM image, CM image, F image, GH!, MEXU image, MO!, NY image).

Grindelia inuloides var. *latamplexa* Nesom, Phytologia 68: 327. 1990. **TYPE: MEXICO. Querétaro.** [Mpio. Pinal de Amoles]: 2.7 km SW of Pinal de Amoles on Hwy 120, 1.7 km NE of the SARH forestry fire station, 27 Dec 1980, *J.M. Canne 1941* (holotype: F!).

Perennial, from a woody, fibrous-rooted corm. **Stems** 25–80 cm tall, sometimes purplish, sparsely to moderately villous, stipitate-glandular. **Leaves** oblong or oblanceolate-oblong to ovate-lanceolate, becoming triangular-ovate distally, cauline mostly 3–5 cm long, 8–18 mm wide, somewhat to little reduced upward, often continuing to immediately below heads as foliar bracts, base auriculate-clasping, decurrent 1–3 mm, apex mostly obtuse to acute, margins with sharp-pointed, eglandular teeth, surfaces minutely hirtellous to sparsely short-pilose, stipitate-glandular to punctate-glandular, often viscid. **Involucres** 15–20 mm wide, phyllaries more or less even in length, relatively evenly herbaceous, narrowly triangular. **Achenes** apparently monomorphic; pappus awns smooth-edged.

Que, San; limestone soils in pine, pine-oak, oak, or oak-acacia woodlands, roadsides, pastures; 1520–2600 m; (Apr–)Jun–Jan.

Additional collections examined. Querétaro. Mpio. Pinal de Amoles: Al S de la ciudad de Pinal de Amoles, bosque latifoliado esclerofilo caducifolio, 2600 m, 24 Aug 1999, *Avlos 214* (MEXU); 2 km N del Puerto del Tejamanil, bosque de pino-encino en canada, 2450 m, 7 Jun 1983, *Fernandez N. 1565* (MEXU image); Pinal de Amoles, bosque de pinos, encinos, ailes y compuestas principalmente, 2000-2200 m, 19 Aug 1992, *Orozco et al. 10,081* (MEXU); 1.5 mi W of Pinal de Amoles, 11 Nov 1976, *Turner 76-13* (LL); 6.5 mi S of Pinal de Amoles along Hwy 120, 16 Jan 1977, *Urbatsch & Pridgeon 3038* (LL); aprox. 2 km al NE de Pinal de Amoles, por la carr. a Cadereyta, bosque mixto de *Pinus-Quercus*, 20 Jul 1986, *Villaseñor 940* (MEXU); Pinal de Amoles, bosque de *Pinus patula*, 2600 m, 10 Mar 1978, *Zamudio 2663* (MEXU). **Mpio. San Joaquín:** 8 km al E de San Joaquín, sobre camino al Ahuacate, orilla de camino, terreno de cultivo, 2400 m, 29 Nov 1992, *Fernández N. 4834* (MEXU). **San Luis Potosí.** [Mpio. Rayón?]: 5 mi W of San Francisco (33 km W of Santa Catarina) on hwy from Rio Verde to SLP, side road to microwave tower on side of hill with oaks, locally common along road and in pasture, 8100 ft, 18 Jul 1982, *Fryxell 3808* (MEXU image); microwave hill of Rte. 70 E of San Luis Potosí, W of Santa Catarina, *Loockerman*

40015 (TEX). Mpio. San Luis Potosí: Along Mex. Hwy 70 E of San Luis Potosí, crest of ridge with *Quercus* and *Buddleja* near microwave tower, 2590 m, 25 Oct 1983, *Breedlove 59337* (MEXU image). Mpio. Zaragoza: Alvarez, terreno abiertos de bosque de pino encino, 2340 m, 29 Oct 1995, *Bye 20579* (MEXU image); Sierra de Alvarez, comunidad de San Francisco, en el potrero, bosque de *Quercus*, 2044 m, 9 Sep 2003, *Colin M. 45* (MEXU image); Valle de los Fantasma, bosque de encino, 1680 m, Apr 1992, *Gómez L. 855* (MEXU image); Sierra de Alvarez, Alvarez, oak grove on limestone, 2200-2400 m, 30-31 Jun 1934, *Pennell 17892* (PH); 33 km E of San Luis Potosí or 1 km of Puerto de la Huerta on Hwy. 86, *Roe et al. 144* (TEX).

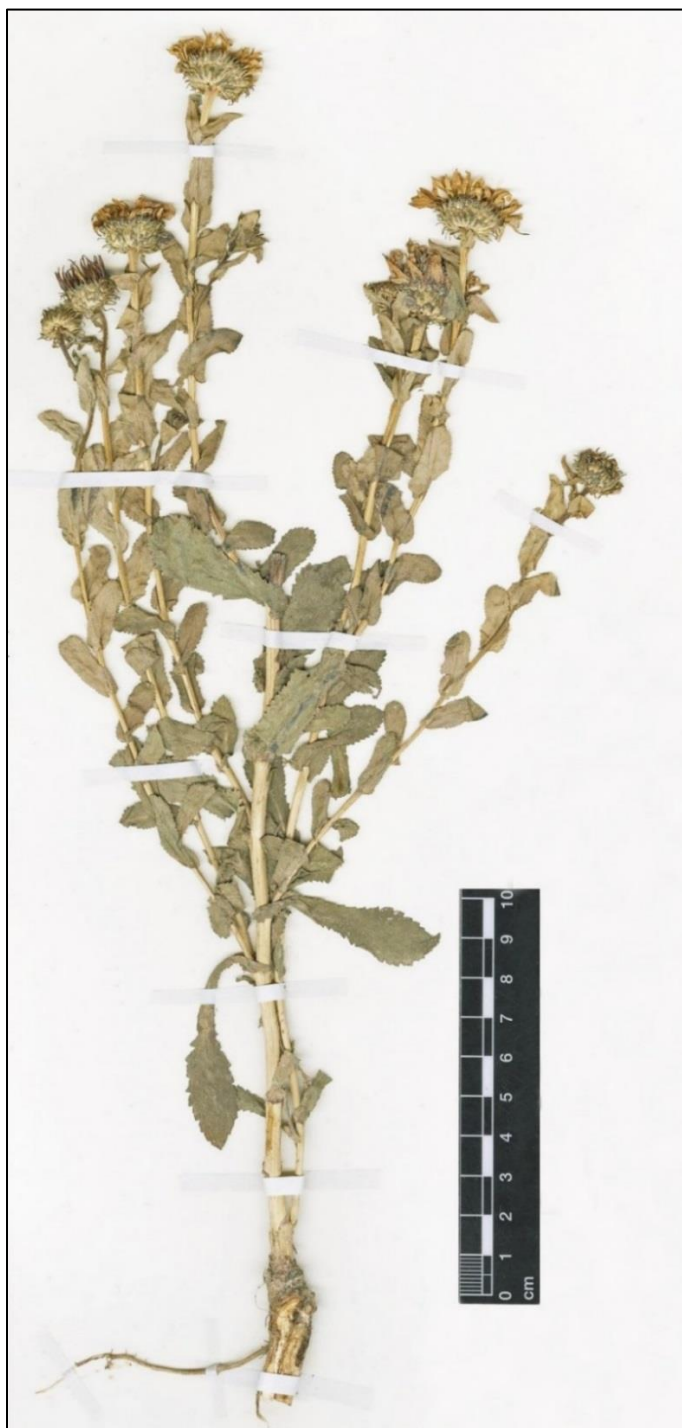


Figure 1. *Grindelia palmeri*, CM isotype. San Luis Potosí.



Figure 2. *Grindelia palmeri*. Alvarez, San Luis Potosí, *Colin M. 45*.



Figure 3. Representative morphology of *Grindelia palmeri* in Querétaro. Left: *Fernandez 4834*. Middle: *Orozco 10081*. Right: *Villaseñor 940*.

Grindelia palmeri is similar to *G. inuloides* in its sharp-toothed leaves and tendency to produce stipitate-glandular vestiture. Leaves usually are larger in *G. palmeri* and the auriculate-clasping leaf base is diagnostic even when basal parts are not collected. No unambiguous intermediates between them have been seen. Bartolia and Tortosa (2012) cited collections from Colima and Michoacan in their concept of *G. palmeri*.

1. Perennial from a woody taproot; cauline leaves clasping at base but not distinctly auriculate, at least distal-most strongly reduced to ovate-triangular bracts with acute-acuminate apices, involucre without foliar bracts ***Grindelia inuloides***

1. Perennial, from a woody, fibrous-rooted corm; cauline leaves distinctly auriculate-clasping at base, distal not strongly reduced in size, similar in shape to those proximal, often continuing to immediately below involucre as foliar bracts ***Grindelia palmeri***

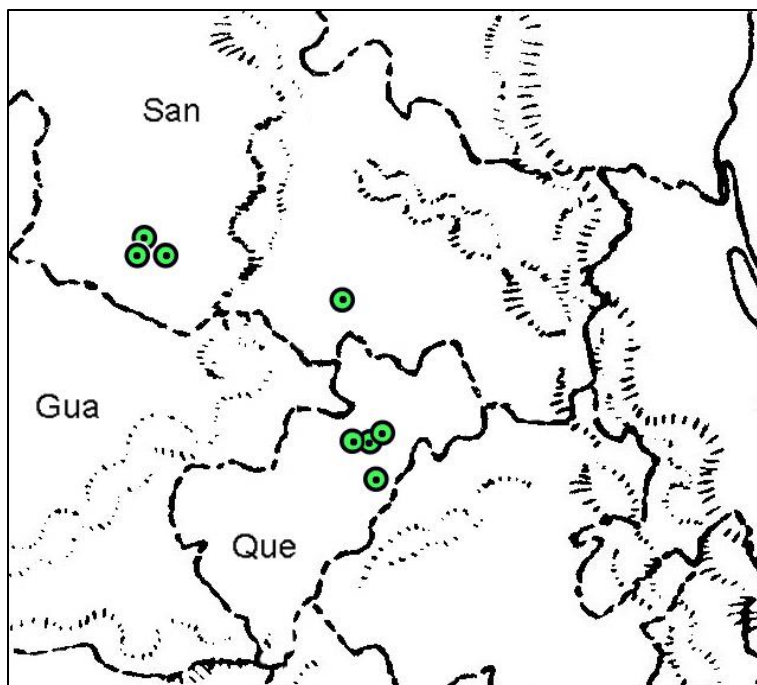


Figure 4. Distribution of *Grindelia palmeri*. Expected in the northeastern corner of Guanajuato.

2. GRINDELIA MACVAUGHII Nesom, *Phytologia* 68: 312. 1990. **TYPE: MEXICO. Jalisco.** [Mpio. Lagos de Moreno]: 15.9 km E of Agua El Obispo on Hwy 80, beside and in ditch on NW side of road, 1770 m, 29 Aug 1979, *M.E. Lane 2594* (holotype: TEX; isotypes: MEXU, TEX).

Perennial, from a woody taproot. **Stems** 30–90 cm tall, glabrous to sparsely pilose, eglandular. **Leaves** 1.5–4(–5.5) cm long, 4–15(–25) mm wide, oblong to oblong-lanceolate or ovate-lanceolate, base truncate, clasping but not decurrent, surfaces glabrous, not punctate or only weakly so, marginal teeth spinulose or sharp-pointed, eglandular. **Involucres** 12–20 mm wide; phyllaries strongly graduated in length, inner 7–9 mm long, white-indurate except at the tip, outer loose, erect to spreading or reflexing. **Achenes** usually prominently sculptured even at early maturity, with prominent transverse incisions and longitudinal furrows; pappus awns smooth.

Flowering Jul–Oct (–Nov). Oak, oak-pine, secondary vegetation, pastizal, grasslands, pastures, roadsides, ditches, clay or rocky soil, often wet or poorly drained; 1780–2500 m.

Additional collections examined. Aguascalientes. Mpio. Jesús María: El Rinconcito, 23 km W de Ags., orilla de camino, 2250 m, 12 Aug 1996, *Cerda L. 5649* (MEXU image). Mpio. San Jose de Gracia: La Congoja, orilla de camino, 2500 m, 17 Oct 1973, *Rzedowski & McVaugh 847* (MEXU-2 sheets images). **Jalisco.** [Mpio. Colotlan]: Near Colotlan, 29 Aug 1897, *Rose 3608* (MEXU). Mpio. Lagos de Moreno: Ca. 11 mi SE of Lagos de Moreno, near hwy to León, 1900 m, 7 Sep 1952, *McVaugh 12820* (F, SMU); 11 mi SE of Lagos de Moreno, 16 Aug 1957, *Waterfall 13869* (SMU). Mpio. Tepatitlán: 1 km adelante del Crucero a Arandas carr. Tepatitlán-Pegueros, pastizal secundario en suelos mal drenados cerca de la carretera, 1780 m, 28 Jul 1978, *Guzmán & Carvajal 953* (MEXU image). Mpio. Valle de Guadalupe: Campo Charro, carr. 80, entre Pegueros y Valle de Gpe., campo abierto, terreno semi-inundado, 1800 m, 19 Jul 1988, *Rodriguez C. et al. 1292* (MEXU image). **Michoacan.** Mpio. Churintzio: La Joya Sanguijuelas, 1880 m, 15 Aug 1986, *Labat 17210* (MEXU image). Mpio. Penjamillo: El Encinal, terreno plano, parcela de cultivo, 1950 m, 23 Aug 1990, *Pérez & García 1632* (MEXU image). Mpio. Tlazazalca: Presa La Yerbabuena, pastizal, terreno plano, orilla de la presa, 1950 m, 8 Aug 1990, *Pérez & García 1605* (MEXU image). **Zacatecas.** Mpio. Juchipila: Cerro de Piñones, rancho de Lorenzo Magallanes, bosque de coníferas, bosque mixto de encino-pino, zona agrícola, 2064 m, 21 Nov 1997, *Balleza C. 7867* (MEXU image); W de Pueblo Viejo, Sierra de Morones, Cerro de Piñones, rancho de Lorenzo Magallanes, 1 km N de la casa del rancho, rumbo a la Loma

de Enmedio, veg. secundaria, 2003 m, 16 Oct 1998, *Balleza C. 9668* (MEXU image). Mpio. Téal de González Ortega: Km 193, carr. Zacatecas-Guadalajara, aprox. 2 km al S del Lacandón, bosque de *Quercus*, orilla de un arroyo, 1890 m, 1 Aug 1997, *Balleza C. 6377* (MEXU image). Mpio. Momax: Momax, 10 km N de Tlaltenango, suelo casi rojo y pedregosos, 1900 m, 16 Aug 1983, *Hernandez M. 9382* (MEXU image); 2 km N de Momax, 10 km adelante de Tlaltenango, orilla del río, pastizal en campo abierto, 1800 m, 14 Aug 1983, *Santana & Hernandez 1253* (MEXU image).

The protologue (Nesom 1990) of *Grindelia macvaughii* described the plants as annual, but additional collections show that they apparently are perennial or at least biennial. The species is more widely distributed than first assumed. *Grindelia macvaughii* and *G. inuloides* are similar in their non-punctate leaves, but the two are allopatric (Fig. 8) and can be separated on the basis of a set of morphological features.

1. Stems glabrous, eglandular; distal cauline leaves not strongly reduced, similar in shape to those proximal; leaf margins strongly scabrous, surfaces glabrous; achenes subquadrate, with prominent transverse incisions and broad, shallow, longitudinal furrows ***Grindelia macvaughii***

1. Stems sparsely villous or pilose, sometimes glandular; at least distal-most cauline leaves reduced to ovate-triangular bracts with acute-acuminate apices; leaf margins glabrate, surfaces minutely and sparsely appressed-puberulent; achenes slightly flattened to 3-angled, smooth or with distinct transverse incisions near the top ***Grindelia inuloides***

Grindelia macvaughii is similar to *G. palmeri* (see below) in its perennial duration and leaves with sharp-pointed, eglandular marginal teeth. They are allopatric (Figs. 4, 5) and separated morphologically as follows:

1. Perennial from a woody taproot; involucre without foliar bracts; leaves with punctate-glandular surfaces, glabrous, base truncate-clasping, not auriculate ***Grindelia macvaughii***

1. Perennial from a woody, fibrous-rooted corm; involucre usually with foliar bracts; leaves often with hirtellous and stipitate-glandular surfaces, base auriculate-clasping ***Grindelia palmeri***

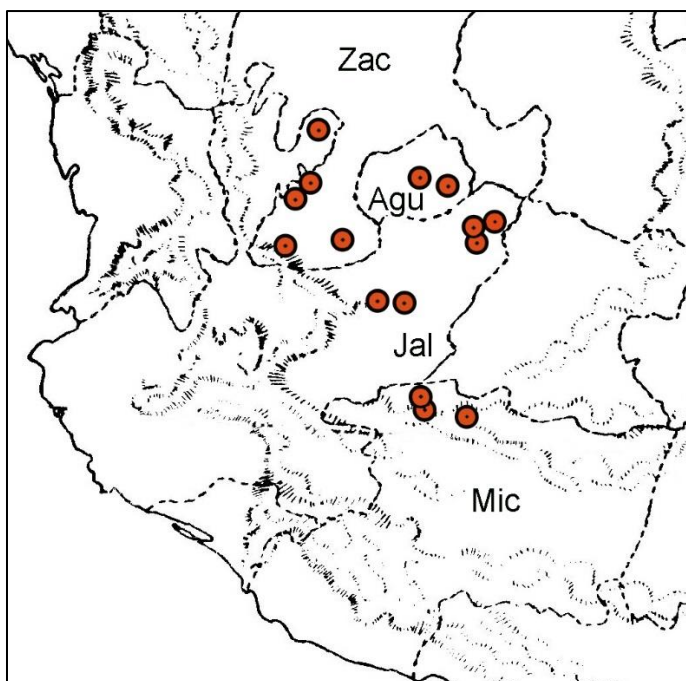


Figure 5. Distribution of *Grindelia macvaughii*. See allopatry of *G. macvaughii* and *G. inuloides* in Figure 6.



Figure 6. Representative morphology of *Grindelia macvaughii*. Top left: *Balleza* C. 10344, Zacatecas. Bottom left: *Rzedowski & McVaugh* 847, Aguascalientes. Right top and bottom: *Balleza* C. 9668, Zacatecas, a large-leaved form.



Figure 7. *Grindelia inuloides*, representative plant showing characteristic distal bracts. Hidalgo, Pringle 6962 (MEXU, isotype of *Grindelia glandulosa* Greenman).

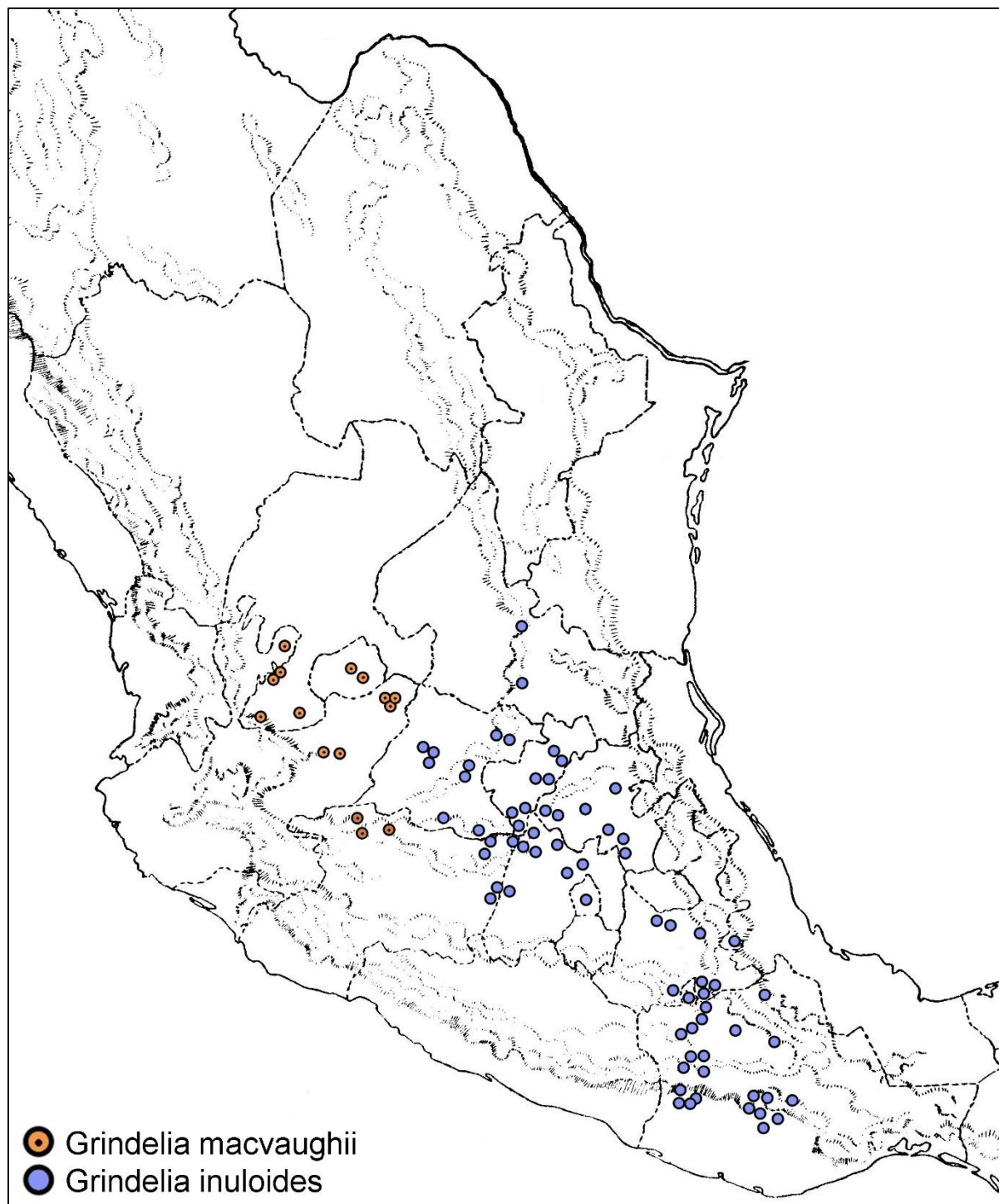


Figure 8. Distribution of *Grindelia inuloides* and *G. macvaughii*. Plants with stipitate-glandular leaves, distal stems, and phyllaries are scattered through the range of *G. inuloides* — the name *G. inuloides* var. *glandulosa*, which has been applied to these, is regarded here as a synonym of typical *G. inuloides*, the glandular plants as populational variants. Variants of *G. inuloides* in Oaxaca have been named as *G. inuloides* var. *hirtella* / *G. hirtella* — the taxonomy of the Oaxaca system, will be treated in a forthcoming study. Plants of Nuevo León and Coahuila identified as *G. inuloides* are not that species (Nesom in prep.).

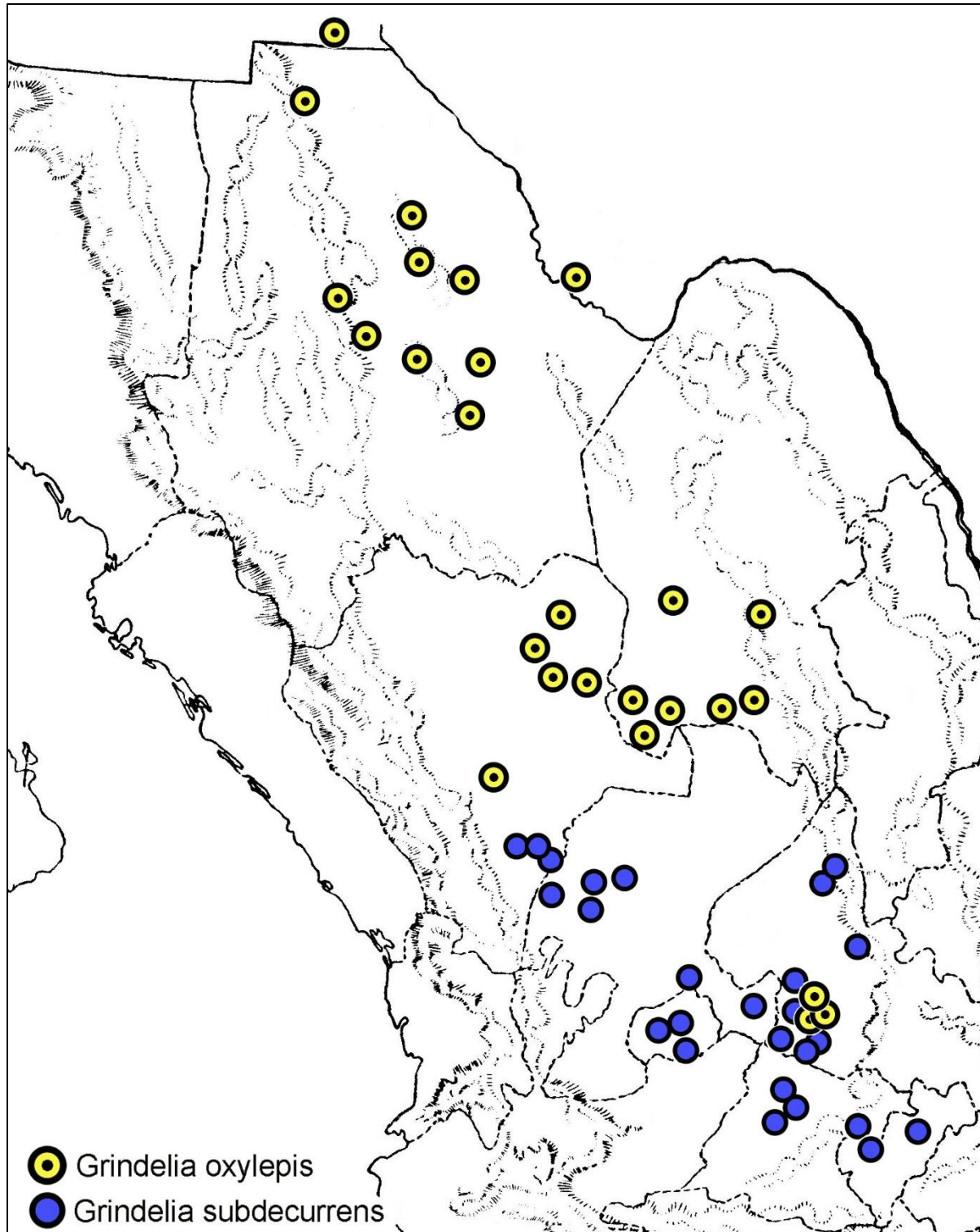


Figure 9. Distribution of *Grindelia subdecurrens* and *G. oxylepis*. Localities for *G. oxylepis* in Texas (Presidio Co.) and New Mexico (Dona Ana Co.) are from Nesom (1990) and Spellenberg (2014). See text for citations of collections from the vicinity of Cd. San Luis Potosí, where the perhaps are adventive.

3. GRINDELIA SUBDECURRENS DC., Prodr. 5: 315. 1836. **TYPE: MEXICO. Guanajuato.**
[Mpio. Guanajuato]: Villalpando, 1829, *J. Mendez s.n.* (holotype: G-DC image!; isotype: GH!).

Perennial, taprooted. **Stems** mostly 0.3-1 m tall, usually with several ascending branches from the base, glabrous (sometimes hairy in Gua). **Leaves** oblong to oblong-lanceolate or ovate-triangular, cauline 10–22 mm long, (3–)5–12 mm wide, decreasing in size distally, base clasping, not decurrent or slightly so, surfaces prominently punctate, often resinous-sticky, glabrous except for scabrous margins, with blunt (rarely slightly sharpened), gland-tipped teeth. **Heads** solitary; phyllaries strongly graduated, apices punctate. **Achenes** monomorphic, slightly compressed or 3-angled, smooth until the last moments of ontogeny when prominent longitudinal furrows appear; pappus awns smooth edged. $2n=12$.

Dur, Zac, Agu, San, Gua, Que; pastizal, matorral, grassy areas in open juniper woods, oak woods, roadsides, roadcuts, 1100–2620 m; (Jun–) Jul–Oct.

Leaves of *Grindelia subdecurrens* and *G. oxylepis* have punctate surfaces and margins with blunt, gland-tipped teeth — they can be separated by the following contrasts:

1. Annual, usually single-stemmed from the base, basal leaves deciduous by flowering; cauline leaves mostly 8–15 mm long, 3–5 mm wide, 2–2.5(–5) times longer than wide; achenes with deep transverse and longitudinal furrows (irregularly blocky) at early maturity (see Fig. 8) ***Grindelia oxylepis***

1. Perennials, usually several-stemmed from the base, basal leaves often persistent; cauline leaves mostly 10–22 mm long, 5–12 mm wide, 2.5–5 times longer than wide; achenes smooth at early maturity, developing longitudinal furrows at late maturity ***Grindelia subdecurrens***

The apparently disjunct occurrence of *Grindelia oxylepis* in San Luis Potosí (Fig. 9) is documented by the collections cited here. Mpio. Villa Hidalgo: Ca. 20 mi NW of SLP on Hwy 57 to Matehuala, 9.8 mi S of RR crossing at Ventura, *Nesom 6660* (TEX). [Mpio. San Luis Potosí]: Along Mex Hwy 57, 12.1 mi NNE of the Benito Juarez Monument in San Luis Potosí, scarce to common along roadside in disturbed loamy soil, 6 Aug 1983, *Freeman & Wetter 2072* (MEXU image); 8.7 mi N of San Luis Potosí, *Kral 27380* (MO); 8 km E de San Luis Potosí, terrenos inundables, 1850 m, 8 Jul 1959, *Rzedowski 11234* (MEXU image).

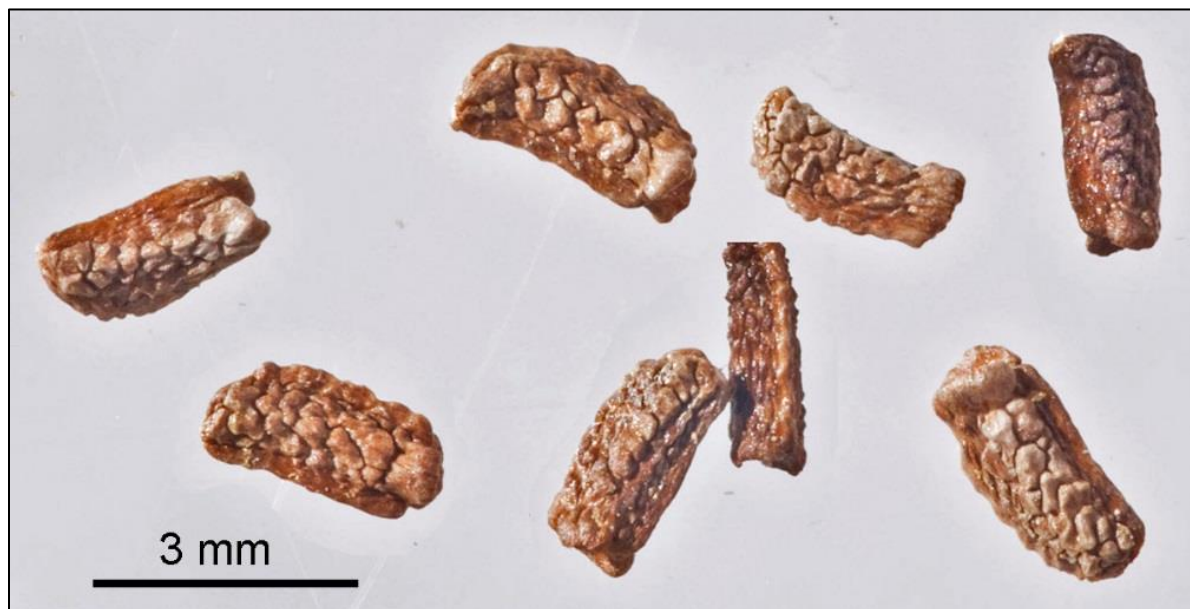


Figure 10. *Grindelia oxylepis*, Dona Ana Co., New Mexico. Pappus awns have been shed. From Spellenberg (2014), used by permission.



Figure 11. *Grindelia subdecurrens*, G DC holotype.



Figure 12. *Grindelia subdecurrens*, GH isotype. Leaves with punctate surfaces and blunt, gland-tipped marginal teeth.

LITERATURE CITED

- Bartoli, A. and R.D. Tortosa. 2012. Revision of the North American species of *Grindelia* (Asteraceae). *Ann. Missouri Bot. Gard.* 98: 447–513.
- Nesom, G.L. 1990. Studies in the systematics of Mexican and Texan *Grindelia* (Asteraceae: Astereae). *Phytologia* 68: 303–332.
- Spellenberg, R. 2014. *Grindelia oxylepis* (Asteraceae, Astereae) new to New Mexico. *Phytoneuron* 2014-102: 1–4.