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GRINDELIA MITLANA (ASTERACEAE: ASTEREAE), A NEW SPECIES FROM OAXACA RELATED TO *GRINDELIA OXYLEPIS*

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ABSTRACT

Grindelia mitlana Nesom, **sp. nov.**, endemic to a small area southeast of Cd. Oaxaca, is hypothesized to be most closely related to *G. oxylepis* (USA, Chihuahua, Coahuila Durango, Zacatecas, San Luis Potosí) and *G. eligulata* (Coahuila, Nuevo León, Zacatecas, San Luis Potosí), based on leaf and fruit morphology. Each is mapped, as is *G. aphanactis* in Mexico (Chihuahua, Sonora), the only other rayless Mexican species.

The annual duration, small, thickened, gland-dotted leaves, and transversely furrowed achenes of *Grindelia oxylepis* Greene and *G. eligulata* (Steyerm.) Nesom are evidence of a close relationship. A previously undescribed species from central Oaxaca shares these distinctive features and is hypothesized here to be closely related.

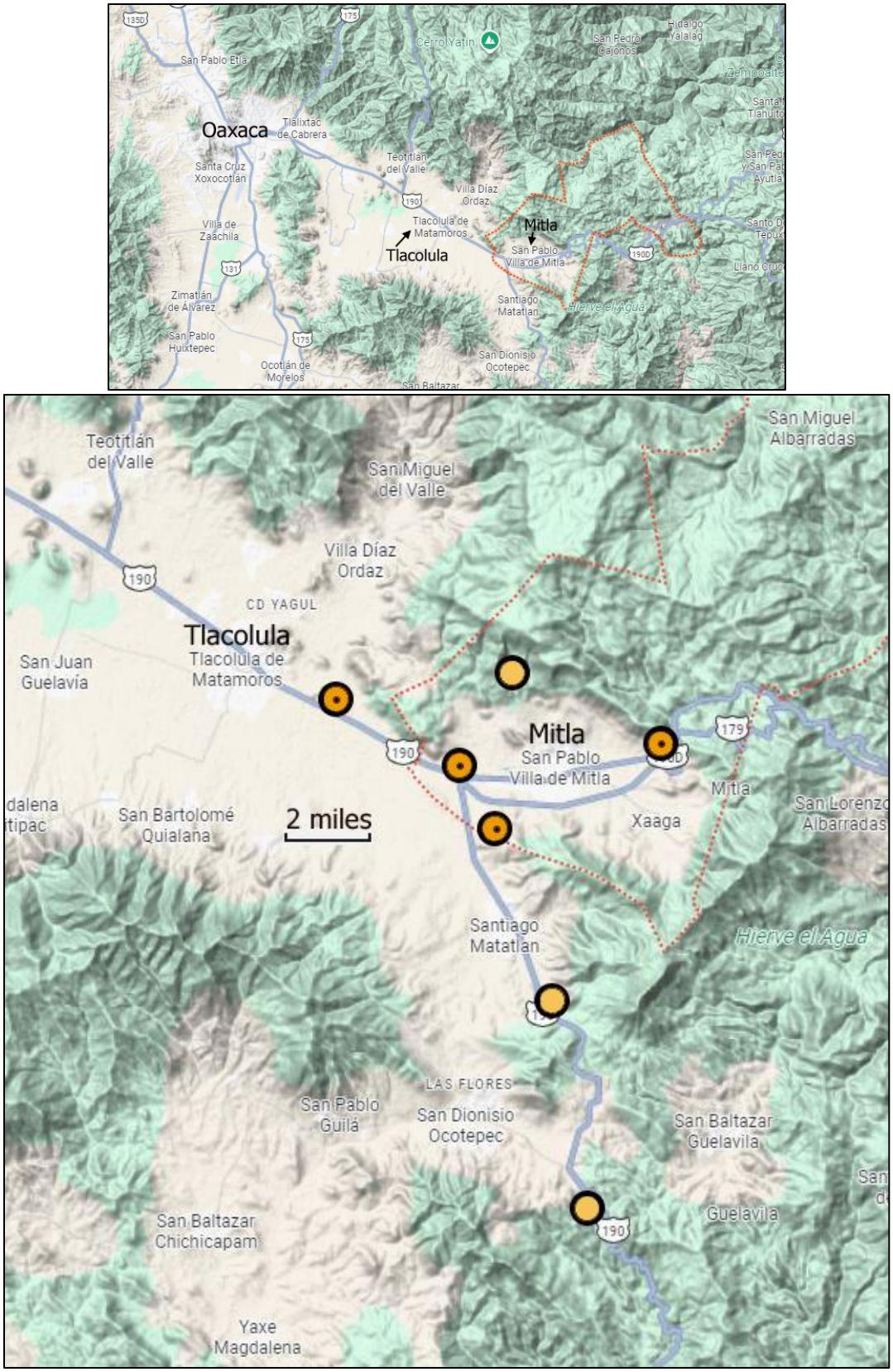
GRINDELIA MITLANA Nesom, **sp. nov. TYPE: MEXICO. Oaxaca**. [Mpio. Tlacolulana], Valley of Oaxaca, ca. 21 mi SE of Oaxaca [ca. 16.94 N, 96.45 W], fields along Hwy 190, locally abundant, ca. 25 cm tall, 24 Jul 1960, *R.M. King 3478* (holotype: TEX: isotypes: NY, US).

Distinct in its small, glabrous, gland-dotted, densely and evenly spaced leaves, the margins evenly crenulate-serrate with blunt, gland-tipped apices, phyllaries strongly graduate in length and green-resinous, narrowed, and sharply reflexed at the apex, and transversly furrowed achenes. Similar in duration, small, thickened, and gland-dotted leaves, and achene morphology to *G. oxylepis* but with villous stems, blunt, gland-tipped leaf teeth, and different involucral morphology.

Perennial herbs, taprooted. **Stems** 25–50 (probably more) cm, moderately villous with white hairs, eglandular. **Leaves**: basal not seen, cauline small, densely and evenly spaced and even-sized, lanceolate-triangular, 7–15 mm long, 3–7 mm wide, becoming slightly small close to the heads, glabrous, thickened, gland-dotted, resinous, margins evenly crenulate-serrate with blunt, gland-tipped teeth, base truncate, not clasping. **Heads** solitary or few on leafy branches, without immediately subtending bracts. **Involucres** 14–17 mm wide (pressed); phyllaries oblong, white-indurate-resinous except at the apex, strongly graduate in length, inner 8–10 mm long, erect, apex green-glandular, abruptly acute-acuminate, outer abruptly narrowed to a green-resinous, linear, sharply reflexing apex, outermost reflexing and nearly coiling. **Rays** 18–28. **Disc corollas** 5 mm long. **Achenes** oblong in outline, 3–3.5 mm long, slightly flattened, rugulose with prominent transverse furrows.

Flowering June-August. *Prosopis-Acacia*, selva baja caducifolia, grazed areas; 5000-5900 feet.

Additional collections. **Oaxaca**. Mpio. Mitla, El Manzanillal, 16.89889 N, 96.39072 W, selva baja caducifolia, sobre cerro, 1718 m, 3 Jul 2009, *Hernández Olivera* 172 "dupl. = 5" (TEX); Mpio. Mitla, Rio Grande [ca. 16.93 N, 96.32 W], bosque bajo en cañada, 1700 m, 15 Jul 1979, *Ventura A. 16345* (MEXU); [Mpio. Mitla], 24 mi E of Oaxaca, jct of road to Mitla and Hwy 190 to Tehuantepec [ca. 16.92 N, 96.40 W], campsite of *Prosopis-Acacia* thorn thicket, soil alkaline, area heavily grazed by goats, cows, and barrows, 5000 ft, 3 Aug 1975, *Wallace, Dunn, & LeDoux 356* (LL).



Map 1. Distribution of *Grindelia mitlana* (dotted) and putative *G. mitlana-hirtella* hybrids (undotted). Mpio. Mitla is outlined in red.

Figure 1. *Grindelia mitlana*. *King 3478* (TEX), holotype:

Figure 2. *Grindelia mitlana*. *King 3478* (US), isotype.

Figure 3. *Grindelia mitlana*. *Hernández Olivera 172* (TEX).

Figure 4. *Grindelia mitlana*. *Ventura A. 16345* (MEXU).

Figure 5. *Grindelia mitlana*. Representative heads.

Figure 6. *Grindelia oxylepis*. Representative head. Compare with *G. mitlana* in Figure 5. Also see Figs. 11 and 12.

Figure 7. *Grindelia mitlana*. Representative cauline leaves.

Figure 8. *Grindelia hirtella* influenced by *G. mitlana*. *Hernández Olivera 418* (TEX).

Figure 9. *Grindelia mitlana* with influence of *G. hirtella*. *King 2478* (TEX).

Figure 10. *Grindelia mitlana* with influence of *G. hirtella*. *Seigler & Holstein DS-9729* (TEX).

The bead-like aspect (leaves-on-the-stem) of these plants is distinctive, and with the annual duration, punctate leaves, distinctive involucral morphology, and transversely furrowed achenes, the basis for their formal recognition is secure. Among Mexican species, *Grindelia oxylepis* and *G. eligulata* are similar to *G. mitlana* in duration, leaf texture and glandularity, and achene morphology, and despite the long geographic disjunction, these three species probably are most closely related among themselves.

Grindelia hirtella occurs in the Mitla-Tlacolula area but the collections seen in this study have been influenced to some degree by *G. mitlana* (Figs. 8-10). Compared to *G. mitlana*, even the smallest leaves of typical *G. hirtella* are thinner in texture and lack pitted glands. Phyllaries of *G. hirtella* do not reflex apically and achenes are smooth, slightly grooved longitudinally. *Olivera 418* has large hairy minutely glandular leaves of *G. hirtella* but the involucres are more like *G. mitlana*. *King 2478* and *Seigler 9729* have small leaves and involucral morphology of *G. mitlana* but vestiture of *G. hirtella*.

* Mpio. Mitla, Corral de Piedra [16.96 N, 96.38 W], selva baja caducifolia, sobre cerro, 2253 m, 7 Aug 2009, *Hernández Olivera 418* (MEXU, TEX). Figure 8. [aspect of hirtella but with involucres of mitlana] **G. hirtella < mitlana**

* ca. 38 mi SE of Oaxaca along Hwy 190 [ca. 16.75 N, 96.33 W], uncommon, flrs white maturing to yellow, 30 Jan 1960, *King 2478* (TEX). Figure 9. [phyllaries like mitlana, leaves small and even-sized but hirsutulous and obscurely gland-pitted, stems densely villous and stipitate-glandular] **G. mitlana < > hirtella**

* 30 mi SE of Oaxaca on Hwy 190 [ca. 16.84 N, 96.37 W], 3 Aug 1975, *Seigler DS-9729* (LL). Figure 10. [some stems with involucres like mitlana, leaves not punctate, hirsutulous and minutely glandular, achenes smooth] **G. mitlana < > hirtella**

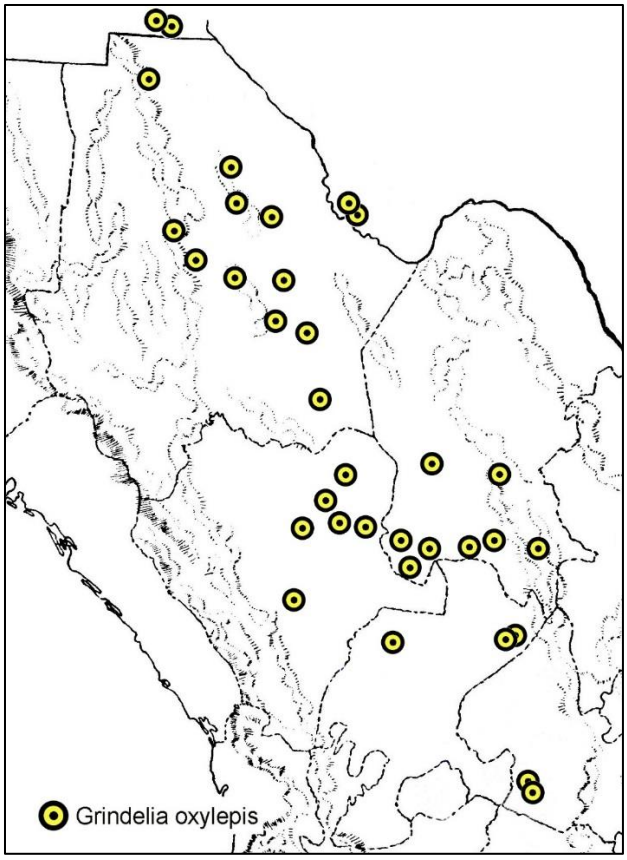
GRINDELIA OXYLEPIS Greene, Pittonia 4: 42. 1899. **TYPE**: **MEXICO**. **Durango**. Moist plains near Chihuahua, 1886, *C.G. Pringle 748* (holotype: NDG; isotypes: BM, BR, BRIT, E, GH, JE, KFTA, MEXU, MICH, MIN, MO-2, NY-3, PH, RSA, UC, US-2).

Grindelia oxylepis forma *capitellata* Steyerm., Ann. Missouri Bot. Gard. 21: 490. 1934. **TYPE**: **MEXICO**. **Durango**. Mapimi, 21-23 Oct 1898, *Edward Palmer 520* (holotype: GH; isotypes: UC, MO, NY, US).

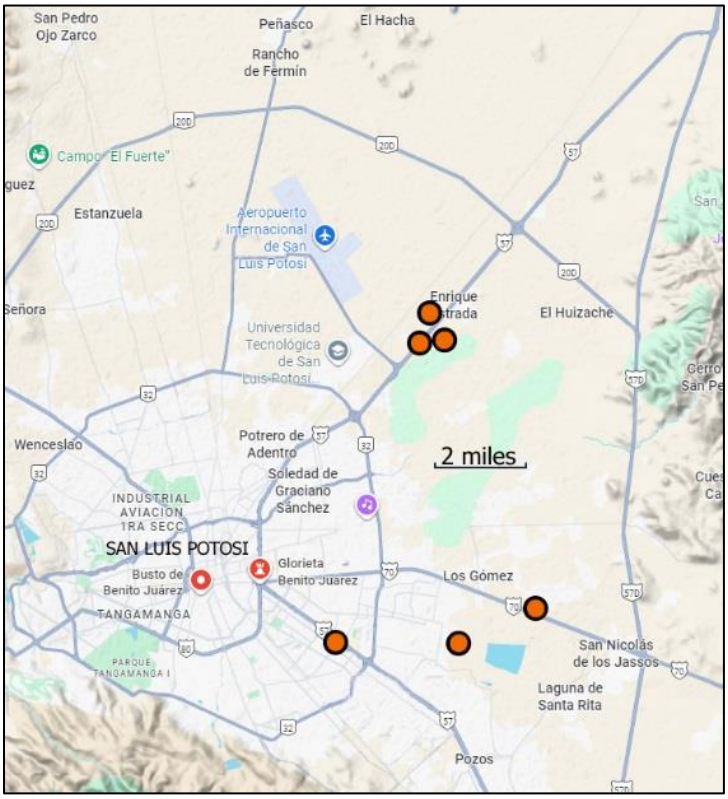
Annual (to biennial) herbs, taprooted. **Stems** ca. 50–120 cm, single or numerous from the base, glabrous. **Leaves**: basal deciduous by flowering proximal subpinnatifid to shallowly toothed cauline oblong, 7–25(–46) mm long, 2–5 mm wide, thickened, glabrous, gland-dotted, subclasping, margins serrate teeth usually acute, sometimes with a subspinulose tip or a small glandular callus. **Heads** solitary on short to long leafy branches, forming a loose panicle or corymboid panicle, without immediately subtending bracts. **Involucres** 10–12 mm wide (pressed); phyllaries sublinear to narrowly triangular, erect, strongly graduate in length, inner 6–7 mm long. **Ray florets** 18–22. **Achenes** prominently transversly furrowed, rugulose. Figures 6, 11-13.

Flowering (April) October-July. 3800-6550 feet. Recognized by its annual duration, glabrous vestiture, small, thickened, gland-dotted leaves with shallow, non-spinulose teeth, relatively small heads, and rugulose achenes.

Observations on the New Mexico population, with photos of achenes and plants in situ, are provided by Spellenberg (2014). Plants within the urban area of Cd. San Luis Potosí (Map 3) are likely to have been introduced there.



Map 2. Distribution of *Grindelia oxylepis*.



Map 3. Distribution of *Grindelia oxylepis* in the area of Cd. San Luis Potosí.

Additional collections. Chihuahua. Papalote Las Juntas (Preson de Anteojos) 2 km NW of Hacienda El Berrendo, on Las Pampas Ranch, with *Prosopis glandulosa*, *Acacia constricta*, 25 Aug 1972, *Chiang et al. 8864* (LL, NY); along Mexico 49 on the N end of Meoqui, 28.2669 N, 105.4819 W, 13 Aug 1983, *Freeman 2129* (NMC, NY); 52 mi W of Hwy 45 along Chihuahuan Hwy 2 towards Nuevo Casas Grandes, dry sandy margin of road along W end of dry lake; with *Larrea*, *Prosopis*, etc., 18 Aug 1971, *Henrickson 5726* (ARIZ, LL); 2 mi E of Villa Ahumada, wet ditch along trail in creosote scrub area, 20 Aug 1971, *Henrickson 5802-A* (LL); Meoqui, 4 Aug 1936, *LeSueur 974* (LL); 13.6 mi S of JimÉnez on Hwy 49, *Acacia-Prosopis* grassland, 25 Aug 1971, *McGill 8230* (ARIZ); plains near Chihuahua, 30 Aug 1885, *Pringle 589* (US); near Meoqui, roadside, 3800 ft, 28 Jul 1937, *Shreve 8060* (US); 1 mi S of Villa Ahumada along Hwy 45, 0. 5 mi E of highway, with *Atriplex canescens*, *Prosopis*, 30 Aug 1975, *Spellenberg 4042* (LL, NMC, NY). **Coahuila.** Torreón, 3789 ft, 12 Jul 1944, *Fisher 44165* (NY); 25.4 mi NW of San Pedro, wet roadside ditch area with whitish clay soil, along small pool, with *Prosopis* and annuals, 24 Aug 1971, *Henrickson 5988* (MEXU, NY, TEX); Mpio. Ramos Arizpe, S side of tule-containing laguna behind Presa Tulillo, ca. 0.1 mi W of Hwy 114 that extends between old Hwy 40 (Saltillo-Torreon) and Hipólito, 25.66333 N, 101.435 W, 3690 ft, heavily grazed clay flats with *Acacia farnesiana*, *Prosopis glandulosa*, *Chloracantha spinosa*, *Suaeda*, *Atriplex acanthocarpa*, etc., locally common rounded shrublets, 19 Oct 2004, *Henrickson 24146* (TEX, UCR); road from Parras to Torreon (via Peña and Viesca), 7 mi NE of Viesca, Laguna Viesca [ca. 25.40 N, 102.75 W], alkaline soil, 15-17 Sep 1938, *I.M. Johnston 7731* (US); Parras, 111.5 mi W of Saltillo, 22-30 Apr 1880, *Palmer 467* (US); plains near Filipinas [vicinity of Parras], Oct 1910, *Purpus 4701* (US); Mpio. General Cepeda, Presa El Tulillo, 9 km carr. a Hipólito del entronque carr Saltillo-Torreón, 25.66667 N, 101.43333 W, areas de escurrimiento e inundación de *Cyperus*, *Eleocharis*, *Distichlis*, *Aster*, *Typha*, matorral de *Larrea* y *Agave*, 22 Oct 1983, *Villarreal 2312* (KANU, TEX); 2 mi N of Parras de la Fuente, near Rincon del Montero, infrequent, 30 Jun 1966, *Ward 5755* (VDB); near Horizonte (E side of Gomez Palacio, ca. 25.53 N, 103.38 W], 24 Aug 1936, *Wynd 779* (US). **Durango.** Edge of Yermo, low ground, 4 May 1959, *Correll & IM Johnston 21441* (LL); 1 mi S of La Zarca along Hwy 45, in and around gravelpit, 1740 m, abundant, 7 Aug 1961, *de Jong 956* (CINC); Bolson de Mapimí, *Gregg 444* (MO); Bolson de Mapimí, valley of Nazas, *Gregg 627* (MO); Mpio. Lerdo, 12 mi SW of Lerdo, 25.48 N, 103.69 W, roadside, 3802 ft, 20 Aug 1971, *O'Brien M-247* (UCR); city of Durango, 1896, *Palmer 174* (LL, MEXU, US). **San Luis Potosi**. Hwy 57, 12.1 mi NNE of the Benito Juarez Monument in San Luis Potosi [ca. 22.28 N, 100.86 W], annuals or biennials, scarce to locally common along roadside, 6 Aug 1983, *Freeman 2072* (MEXU); 2.2 mi SSW of the Benito Juárez Monument on Hwy 57, ca. 22.13 N, 100.96 W, Aug 1983, *Freeman 2073* (NY); ca. 7 mi N of SLP on Hwy 57, ca. 22.3 N, 100.8 W, low roadside, 5 Aug 1964, *Jackson 5097* (TEX); ca. 20 mi NW of SLP on Hwy 57 to Matehuala, 9.8 mi S of RR crossing at Ventura, ca. 22.27 N, 100.87 W, roadside, area of scattered mesquite, hard-packed, light-colored, silty soil, 13 Sep 1988, *Nesom 6660* (TEX); 8 km E de San Luis Potosí, [ca. 22.14 N, 100.84 W]. terrenos inundables, [annual], 8 Jul 1959, *Rzedowski 11234* (MEXU); desviación a La Libertad (E edge of Cd. SLP, ca. 22.1 N, 100.9 W], 8.8 km de la carr. SLP-Rioverde, orilla de carretera, 1880 m, 26 Jul 1975, *Salas 60* (MEXU). **Zacatecas.** Mpio. Rio Grande, Km 145 Hwy 49 [just N of Rio Grande, ca. 23.86 N, 103.05 W], orilla de la carretera in zona de inundacion frecuente, 18 Jun 1992, *Balleza C. 4350* (MEXU); Mpio. Mazapil, por carr. de terracería a Nuevo Mercurio, entre el entronque con la carretera a Concepción del Oro y San Francisco, 24.139722 N, 101.54527 W, matorral desertico microfilo, orilla del camino, perenne, 1909 m, 30 Aug 1997, *Balleza 6641* (MEXU); Mpio. Mazapil, Km 150, carretera Zacatecas-Concepción del Oro, ca. 2 km N de San Benito, 23.92 N, 101.71 W, 2000 m, annual, abundante, 8 Sep 1999, *Balleza 10667* (MEXU). **USA**. **New Mexico**. Dona Ana Co.: *Spellenberg 14971* (NMC); *Worthington 37876* (ARIZ, GA, SRSC, UCR, UTEP). **Texas**. Presidio Co.: *Morey 259*, *271*, *279*, *282*, *283* (all SRSC); *Russell 2087* (TEX).

Figure 11. *Grindelia oxylepis.* Chihuahua, *Pringle 748* (GH). Isotype.

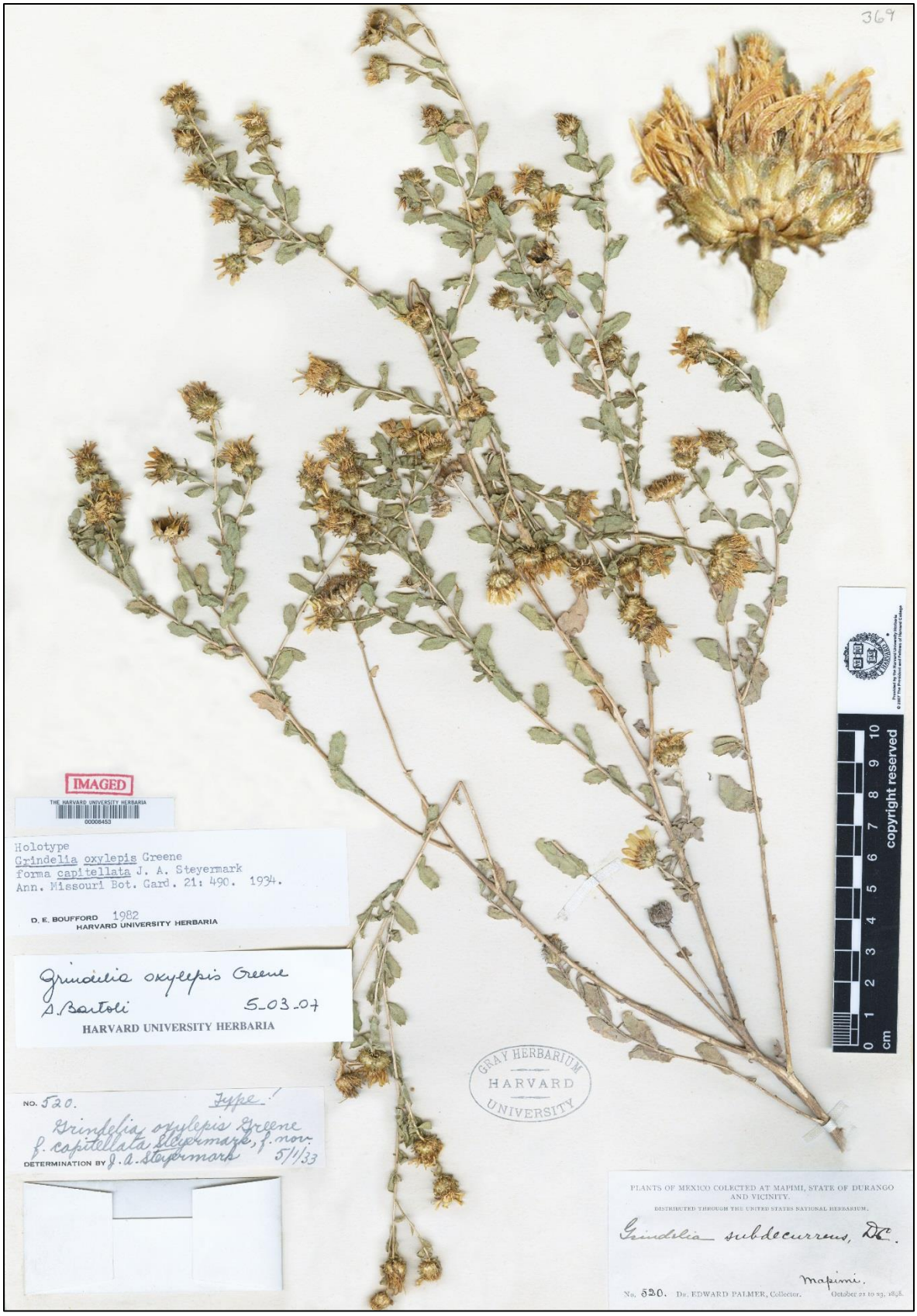
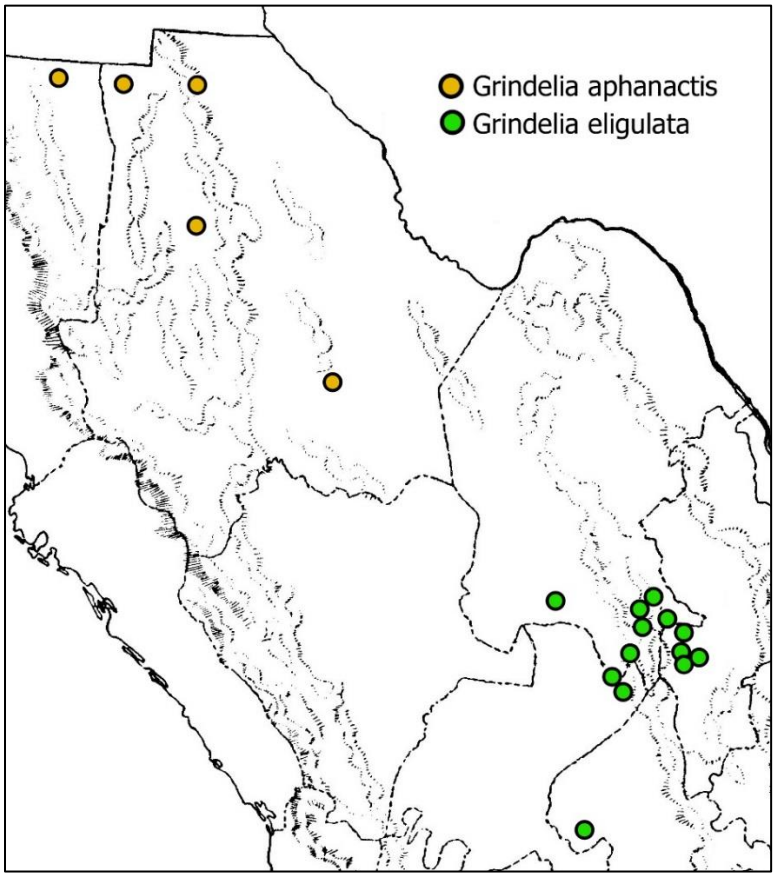


Figure 12. *Grindelia oxylepis*. Chihuahua, *Pringle 748* (GH). Holotype of *G. oxylepis* forma *capitellata*.

Figure 13. *Grindelia oxylepis*. Chihuahua, *Shreve 8060* (US).

GRINDELIA ELIGULATA (Steyerm.) Nesom, Phytologia 68: 311. 1990. *Grindelia oxylepis* var. *eligulata* Steyerm., Ann. Missouri Bot. Gard. 21: 490. 1934. *Grindelia squarrosa* var. *eligulata* (Steyerm.) Bartoli & Tortosa, Ann. Missouri Bot. Gard. 98: 499. 2012. **TYPE**: **MEXICO**. **Coahuila**. Saltillo, Sep 1898, *E. Palmer 316* (holotype: GH; isotypes: MO-2, NY, UC, US).

Formally associated with *Grindelia oxylepis* (Steyermark 1934) then with *G. squarrosa* (Bartoli & Tortosa 2012), but as noted above, the balance of morphological features indicates a close relationship with *G. oxylepis* (and *G. mitlana*). *Grindelia oxylepis* and *G. eligulata* have discrete ranges and are distinct in morphology (Nesom 1990). *Grindelia eligulata* occurs at the southeastern corner of the range of *G. oxylepis* (Map 2) and is essentially allopatric with it.



Map 4. Distribution of *Grindelia aphanactis* in Mexico and *G. eligulata*. Nesom (2025) for the distribution of *G. aphanactis* in the USA. Records are documented by collections cited.

Grindelia eligulata. Coahuila. Sierra de Zapalinamé, 5.74 km NE del ejido el Diamante, 22 Jul 2015, *Encina et al. 4964* (MEXU); along Hwy 57, 0.1 mi N of the jct of Hwy 57 and road to San Antonio, and 1.4 mi N of Las Rosas, 4 Aug 1983, *Freeman 2041* (MEXU, NY); along Hwy 57, 9.2 mi SSE of Las Llanos, and 1.5 mi NNE of the Coahuila-Nuevo León state line, 4 Aug 1983, *Freeman 2045* (MEXU, NY); valley near Saltillo, 2 Jun 1848, *Gregg 97* (GH, MO); San Antonio, 31 Aug 1848, *Gregg 354* (GH, MO, US); Sierra de Zapalinamé, *Hinton 20291* (MEXU); Saltillo, Sep 1898, *Palmer 316* (GH, MO, NY -- type collection); Sierra de Parras, Cañón de Gustrola, 2 Jul 1981, *Rodríguez & Carranza s.n.* (MEXU); 22 km NW of Fraile, mountan valley, *Stanford et al. 461* (MO). **Nuevo León**. Hwy 57, 3 mi N of San Roberto and the jct of the road to Linares and 7 mi S of Potosí, ca. 85 mi S of Saltillo, 27 Oct 1972, *Dunford 1384* (MEXU); along Hwy 57, 6.4 mi S of the Coahuila-Nuevo León state line, 5 Aug 1983, *Freeman 2054* (MEXU); Mpio. Galeana, near Rancho Aguililla, 26 Aug 1989, *Hinton 19581* (MEXU); N of Rancho Aguililla, *Hinton 27658* (MEXU). **San Luis Potosí**. Mpio. Salinas de Ramos, Rancho Guadalupe, 2 Sep

1978, *Alcérreca 5* (MEXU). **Zacatecas**. Mpio. Mazapil, carretera de terracería a Nuevo Mercurio, entre el entronque con la carretera a Concepción del Oro y San Francisco, 30 Aug 1997, *Balleza 6641* (MEXU); Mpio. Mazapil, Km 150, carretera Zacatecas-Concepción del Oro, ca. 2 km N de San Benito, 8 Sep 1999, *Balleza 10667* (MEXU).

GRINDELIA APHANACTIS Rydb., Bull. Torrey Bot. Club 31: 647. 1904. *Grindelia nuda* Alph. Wood var. *aphanactis* (Rydb.) Nesom, Phytologia 68: 310. 1990. **TYPE**: **USA**. **Colorado**. [La Plata Co.]: Durango, 21 Jul 1898, *C.F. Baker, F.S. Earle,* & *S.M. Tracy 526* (holotype: NY; isotypes: F, GH, MICH, MIN, MO, POM, RM-2 sheets).

Grindelia aphanactis is the only other rayless species in Mexico besides *G. eligulata*. The two are allopatric and not confused in identification.

Grindelia aphanactis in Mexico. **Chihuahua**. 1 km N of Rancho Santa Maria de Guadalupe on right bank of Río Casas Grandes, limestone hill surrounded by dark igneous rocks, 4101 ft, 18 Aug 1972, *Chiang 8683* (LL, NY); Papalote Las Juntas (Presón de Anteojos) 2 km NW of Hacienda El Berrendo on Las Pampas ranch, 25 Aug 1972, *Chiang et al. 8864* (MEXU); ca. 27 (air) mi SSW of Columbus, NM, 6.1 mi SW of jct of Hwy 23 S of Las Palomas and Hwy 2 to Cd Juárez, roadside, in creosote scrub, 22 Jul 1973, *Henrickson 11213* (LL); W of Buenaventura, along Hwy 28, 6.4 mi W of jct Hwy 10, roadside, 29 Aug 1989, *Mayfield 129* (TEX). **Sonora**. Mpio. Agua Prieta, Rancho El Valle, southern extension of the Animas Valley, Cuenca Los Ojos conservation area, ca. 59 km E of Agua Prieta on Hwy 2, 15 Aug 2007, *Van Devender 2007-779* (ARIZ, MEXU).

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