

**TAXONOMIC REVIEW OF *GRINDELIA SCABRA*
(ASTERACEAE: ASTEREAE)
AND SIMILAR SPECIES**

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ABSTRACT

Grindelia scabra Greene is endemic to the Sacramento and White Mountains of Otero and Lincoln cos., New Mexico. ***Grindelia ventosa* Nesom, sp. nov.** (previously identified as *G. arizonica*), is restricted to Jeff Davis, Presidio, and northern Brewster cos., Texas. ***Grindelia chihuahuana* Nesom, sp. nov.** (also previously identified as *G. arizonica*) is restricted to Chihuahua, Mexico. *Grindelia havardii* Steyerm. sensu stricto is endemic to the Guadalupe Mountains of Culberson Co. (Texas) and Eddy, Chaves, and Lincoln cos. (New Mexico) and a nearby locality in Hudspeth County; plants of trans-Pecos Texas also tentatively identified here as *G. havardii* occur in two isolated-disjunct population systems. ***Grindelia delnortana* Nesom, sp. nov.**, is recognized as an endemic of the Del Norte and Glass Mountains of Brewster County, ***Grindelia chisosensis* Nesom, sp. nov.**, an endemic of the Chisos Mountains of Brewster County, and ***Grindelia spinulosissima* Nesom, sp. nov.**, an endemic of northern Coahuila. The Texan-Coahuilan *G. grandiflora* Hook. is a member of this morphological group and is mapped here. *Grindelia lanceolata* Nutt. and *G. texana* Scheele also belong here, as does *G. neomexicana* (southwestern New Mexico).

A group of *Grindelia* species from southern New Mexico, southwestern Texas, and adjacent Mexico (Chihuahua, Coahuila) have a distinctive involucre morphology and are hypothesized here to be closely related. The group includes *G. neomexicana* (see Nesom 2026), *G. lanceolata* and *G. texana* (Nesom 2019), *grandiflora*, *G. scabra*, *G. havardii*, and five previously unrecognized species (two of which were previously identified as *G. arizonica*).

1. *GRINDELIA SCABRA* Greene, Bull. Torrey Bot. Club 25: 120, plate 332. 1898. **LECTOTYPE (Nesom 1990): **New Mexico.** Lincoln Co.: White Mountains, 6300 ft, 28 Jul 1897, *E.O. Wooton* 224 (holotype: NDG 53647; islectotypes: GH, MIN, MO, NDG, NMC, NY-2, RM, US).**

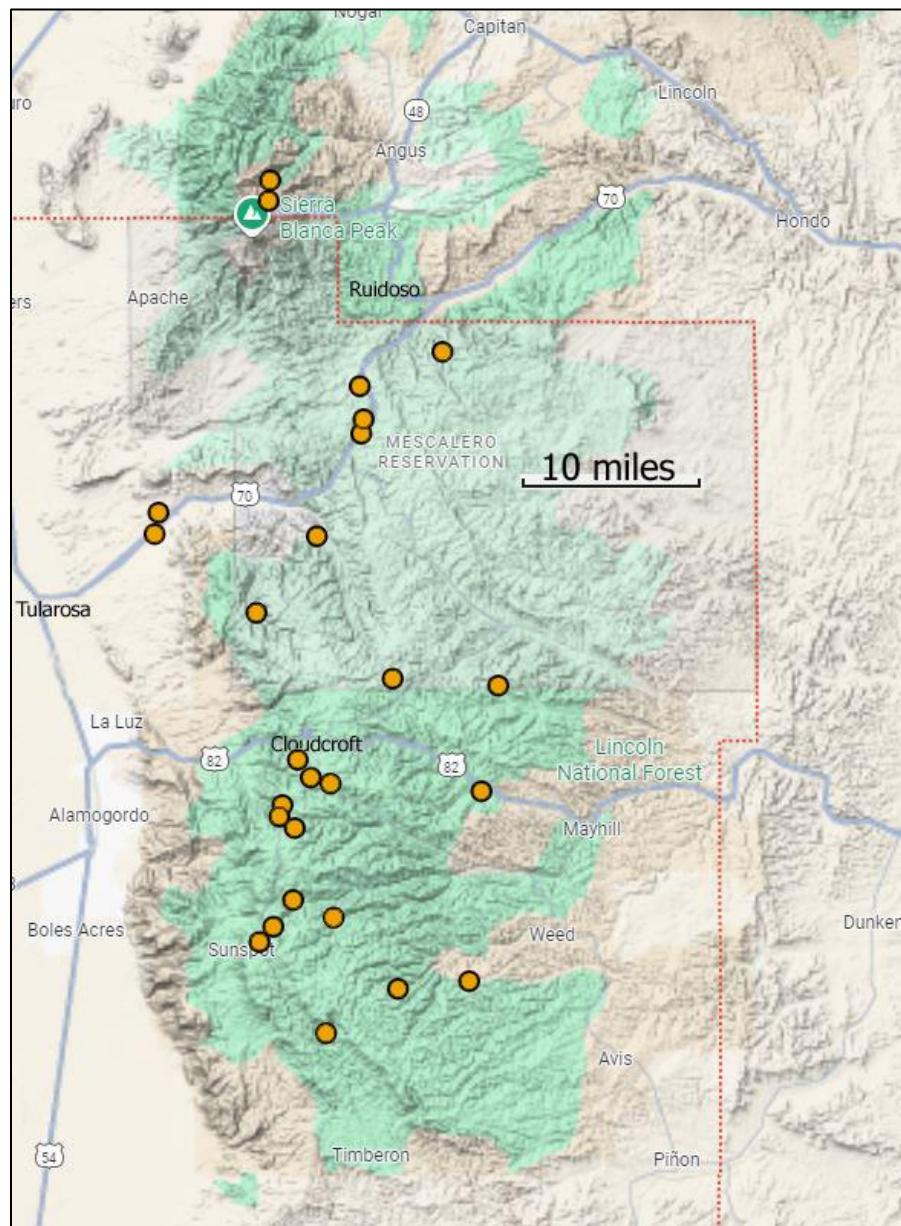
Perennial herbs, taprooted. **Stems** 30–100 cm, *sparsely hirsute-villous*. **Leaves:** basal and lower cauline sometimes persistent, shallowly denticulate to serrate or sometimes subpinnatifid, cauline mostly oblong to oblong-lanceolate, sometimes narrowly truncate to rounded at the base but not clasping, glabrous, not gland-dotted, relatively even-sized, *teeth sharp-pointed and subspinulose*, not glandular. **Heads** few, loosely corymboid, *immediately subtended by foliaceous bracts*. **Involucres** 11–14 mm wide (pressed); phyllaries equal to subequal length, inner 8–11 mm long, apices long, linear, loose, outer linear. **Rays** 17–30. **Disc corollas** 6–7 mm long. **Achenes** essentially smooth. Figs. 1-2.

Flowering (June-) July-September. Meadows, gravelly forest openings, canyon bottoms, limestone ridges, roadsides, douglas fir, pine-fir, pine-oak, mixed conifers and oaks; (5200-, *Bennett s.n.*) (6300-, the type collection) (7000-) 8100-9100 feet. Endemic to Otero and southwestern Lincoln counties, New Mexico, and particularly distinctive in its heads closely subtended by prominent leafy bracts.

The Bennett collection is from low elevation and also is atypical in aspect, with capitular bracts greatly reduced or lacking. **Otero Co.:** 8 mi NE from Tularosa along Hwy 70 near Rio Tularosa, 33.132547 N, 105.908756 W, moist open ground, 5200 ft, 4 Aug 1965, *Bennett s.n.* (UNM). Other

plants of *G. scabra* rarely have reduced capitular bracts (e.g., *Worthington 39544*) but are within the geography and otherwise belong with the species.

Additional collections. New Mexico. Otero Co.: *Allred 6116* (BRY, NMCR); *Baad 827* (DES); *Baker 14649* (UNM); *Bennett 8617* (EMC, UNM), *8668* (BRY, EMC, GREE-2); *Bleakly 2963* (UNM); *Castetter 9320* (UNM); *Christy s.n.* (NMC); *Clifton 50035* (UNM); *Dunford 1099-7-15* (NMC); *Frey s.n.* (FSU); *Heil 33721* (SJNM); *Hodgson 10160* (DES); *Hutchins 3516* (UNM), *12437* (COLO); *Keil 14166* (OBI); *McGrath 984* (UNM); *Martin 4486* (UNM); *O’Kane 9581* (SJNM); *Peterson 86-388* (SFBG), *92-124* (NMC); *Raven 20351* (NY); *Roth 2087* (UNM); *Wagner 2560* (UNM); *Wetter 587* (CM, GA), *589* (NY), *588* (BRY-2, CS, COLO, NY-2), *590* (BRY, COLO, CS, NY), *896* (NY), *897* (GA, NMC, NY, TEX), *1018* (CM, NY, TEX); *Worthington 8554* (UCR), *12166* (NY, UCR, UTEP), *32184* (SAT, TROY, UCR), *34896* (GA, TROY), *35944* (GA, VDB), *37354* (SRSC, UTEP), *4780* (COLO, UTEP). **Lincoln Co.:** White Mtns, 6300 ft, 21 Aug 1897, *Wooton 372* (GH, MIN, MO, NMC, NY, RM, US); White Mtns, 7400 ft, 25 Aug 1907, *Wooton & Standley 3595* (NMC).



Map 1. Distribution of *Grindelia scabra*. Otero Co. is outlined in red.

2. GRINDELIA VENTOSA Nesom, **sp. nov.** **TYPE: USA. Texas.** Presidio Co.: Chinati Mtns State Natural Area, Pelillos Canyon, at fork of Tinaja Prieta Canyon, 29.8625 N, 104.455556 W, 4047 ft, riparian vegetation, igneous gravel and bedrock, with *Cephalanthus*, *Ungnadia*, *Salix*, *Quercus*, *Baccharis*, *Salix gooddingii*, *Rhus virens*, *Muhlenbergia rigens*, *Hedeoma molle*, *Perityle dissecta*, 18 Sep 2004, *E. Lott 5357* (holotype: SRSC; isotype: TEX).

Different from *Grindelia havardii* in its annual or weakly perennial duration, leaf margins with sharp-pointed, short-spinulose teeth (vs. usually blunt with glandular apex), narrower leaves, and smaller heads (involucres 11–14 mm wide vs. 15–17 mm wide).

Annual herbs, taprooted. **Stems** 30–100 cm, single or several from the base, *glabrous*, green to purplish. **Leaves**: basal usually deciduous by flowering, cauline narrowly oblong to oblong-lanceolate or oblong-oblong-lanceolate, mostly 1–3(–4.5) cm long, 3–7 mm wide, evenly distributed and relatively even-sized, *subclasping but not auriculate*, not decurrent, glabrous, obscurely gland-dotted, margins serrate with *sharp-pointed, apically short-spinulose teeth* (rarely acute-glandular). **Heads** 1 or few on leafy branches, without immediately subtending bracts. **Involucres** 11–14 mm wide (pressed); phyllaries equal to subequal length, inner 8–11 mm long, oblong, 3-veined, apex gland-dotted and abruptly narrowed to a linear-acuminate extension, outer linear, loose and spreading to reflexing. **Rays** 18–25. **Disc corollas** 4 mm long, narrowly tubular. **Achenes** oblong to subsquarrose, slightly flattened, 2–2.5 mm long, weakly furrowed longitudinally. Figs. 3-11.

Some label notes observe that plants are annual, some that they are perennial — apparently they may flower the first year but persist in duration with an enlarging taproot. They apparently are not strongly perennial as in *G. havardii*.

Flowering (June-) August-September (-October). Rocky slopes and ledges, canyon floors, oak-madroño, oak-juniper-pinyon pine grassland; 4050-5500 feet.

I earlier identified these plants as *Grindelia arizonica* (Nesom 1990), but involucre morphology is more similar to *G. scabra* and *G. havardii* and the subclasping leaves are a distinction. The closest relative probably is *G. chihuahuana*. The epithet alludes to the long, linear, loose phyllaries, disheveled (whimsy) as if hair in a windy place.

Collections from the vicinity of Alpine are without basal parts but are tentatively identified here as *Grindelia ventosa* but vary in the nature of the leaf teeth apex:

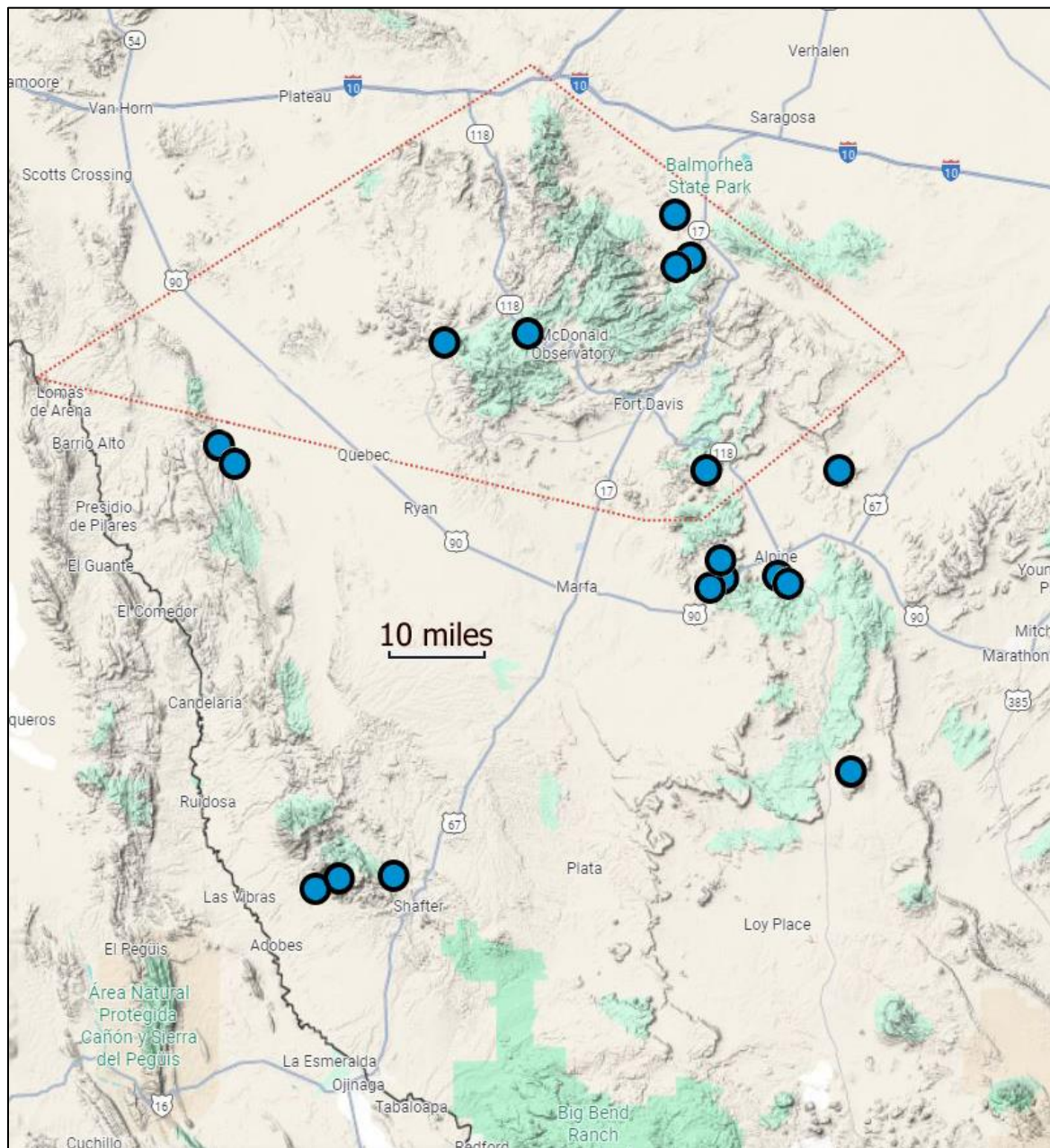
Warnock T487 (Alpine golf course creek) — leaf teeth acute but gland-tipped (SRSC), acute but eglandular (LL), or distinctly short-spinulose (GH).

Cottle W21-201 (SRSC, dry mesa in Alpine) — leaf teeth acute but eglandular or slightly glandular at the apex

Cottle W46-292 (SRSC, rich soil in Alpine) — leaf teeth unambiguously glandular

Additional collections. USA. Texas. Brewster Co.: Elephant Mtn, E slope, 5500 ft, infrequent, 17 Aug 1959, *Allen 234* (SRSC); 6 mi W of Alpine, 25 Sep 1942, *Cory 40301* (GH); Alpine, dry mesa, 3 Jul 1926, *Cottle W21-201* (SRSC); Alpine, rich soil, 4 Sep 1927, *Cottle W46 292* (SRSC); 8 mi W of Alpine, narrow canyon, on the Stradley development [ca. 30.37 N, 103.77 W], crevice, 13 Nov 1983, *Powell 4275* (SRSC); Musquiz Cañon, flats N of Alpine, 30.51 N, 103.57 W, 4700 ft, 14 Aug 1935, *Steiger 1942* (NY); 5 air mi W of Alpine, Turners' Canyon, 30.35 N, 103.75 W, NN, facing canyon, igneous intrusives, floor of canyon dominated by *Quercus* and *Arbutus*, 22 Sep 1996, *Turner 96, 119* (TEX); Alpine golf course creek, infrequent, 26 Jul 1938, *Warnock T487* (GH, LL, SRSC-2); old Marfa hwy, 3 mi W of Alpine, 6 Jul 1941, *Warnock 21379* (SMU, TEX); ca. 5 mi W of Alpine, valley of McIntyre Creek, roadside park along Hwy 90, 30.3230 N, 103.7428 W, 4900 ft, grassland with scattered oaks and igneous soil, 5 Oct 2016, *Worthington 38968* (UCR, UTEP). **Jeff Davis Co.:** Davis Mtns, Big Aguja Canyon, 28 Aug 1937, *Hinckley 1040* (TEX-2); above falls on route to Fern Canyon at Mitre Peak Girl Scout Camp, 4775 ft, igneous soil, infrequent perennial, 30 Sep 1964, *Keough 169* (SRSC, TEX); Boy Scout Ranch, Little Aguja Canyon,

rocky slope, canyon scrub, grama grassland, oak, juniper, pinyon grassland, 5000 ft, 9 Jun 1985, *Larke 181* (SRSC); Davis Mtns, dry rocky hillside above Little Aguja Canyon, 17 Jun 1931, *Moore & Steyermark 3151* (MO); Sawtooth Mtn, rocky ledges, 3 Oct 1926, *Palmer 31877* (TEX); lower Madera Canyon, above creek along jeep trail, 5500 ft, 29 Jun 1977, *Weedin 818* (SRSC, TEX); Nations Ranch, around tank 2, 22 Jul 1997, *Zech 168* (SRSC). **Presidio Co.:** ca. 3 mi NW of Sam Bunton ranch house, at red windmill in draw, 30.476 N, 103.811 W, 23 Sep 1944, *Hinckley 3330* (NY); Chinati Mtns State Natural Area, Pelillos Canyon, between the dam and Tinaja Prieta fork, 29.86194 N, 104.49944 W, riparian area with *Salix* sp., *Juglans microcarpa*, and *Baccharis salicifolia*, CDR scrub above canyon, 22 Aug 2006, *Lott 5677* (TEX); SW of Valentine, Tierra Vieja Mtns, Vieja Pass, 4200 ft, limestone, infrequent, 7 Aug 1949, *Warnock 8929* (SRSC); ZH Canyon [ca. 30.552 N, 104.660 W, on the Miller Ranch, ca. 11 mi W of Valentine], lava joints, 7 Jul 1948, *York 48222* (TEX).



Map 2. Distribution of *Grindelia ventosa*. Brewster, Jeff Davis, and Presidio counties. Jeff Davis Co. is outlined in red. Also see Map 4.

3. GRINDELIA CHIHUAHUANA Nesom, **sp. nov.** **TYPE: MEXICO. Chihuahua.** 2 mi S of Cuauhtémoc on Hwy 16 [ca. 28.40 N, 106.92 W], cultivated fields, [ca. 6800 ft], 20 Aug 1967, *T.F. Stuessy 1041* (holotype: MEXU; isotypes: COLO, TAES, TEX).

Distinct in its annual duration, slender taproot, glabrous stems and leaves, gland-dotted, narrowly oblong cauline leaves with subclasping base and shallowly serrate margins with acute, subspinulose teeth, and linear phyllaries subequal in length. Similar to *G. arizonica* in its annual duration, glabrous red stems, narrow, gland-dotted leaves, and spinulose teeth but different in its subclasping leaves, more open inflorescence (longer peduncles), larger involucre, phyllaries mostly subequal in length, and more numerous rays. Different from *G. ventosa* in its larger involucre (14–18 mm wide vs. 10–15 mm) and phyllaries subequal in length (vs outer shorter than the inner). Different from *G. oxylepis* (partially sympatric, probably not closely related within the genus) in its more narrowly oblong leaves with more narrowly acute teeth, larger heads, subequal phyllaries, and smooth achenes.

Annual herbs from a slender taproot. **Stems** 10–45 cm, single or 2–6 from the base, branching most above midstem, glabrous, green to purplish. **Leaves:** basal usually absent at flowering, cauline narrowly oblong to narrowly oblong-lanceolate, 2–5 cm long, median portion 3–12 mm wide, evenly distributed and relatively even-sized up to the heads, glabrous, gland-dotted, *subclasping but not auriculate, short-decurrent*, serrate, often mostly on the proximal margins, less commonly denticulate to subentire, teeth shallow, *sharp with a short-spinulose tip*. **Heads** essentially solitary on short to long peduncles, loosely corymboid to paniculate, without immediately subtending bracts. **Involucre** 14–18 mm wide (pressed); phyllaries linear-lanceolate, green on distal 1/2–1/3, subequal to weakly graduate in length, inner 7–8 mm long, outer ca. 1/2 as long, outermost linear and spreading. **Ray florets** 20–26. **Disc corollas** 5–6 mm long. **Achenes** subquadrate, longitudinally furrowed. Figures 12–19.

Flowering (July–) August–September. Grassland, pastures, cultivated areas, roadsides, depressions and slightly saline low areas, matorral with *Acacia-Larrea-Prosopis*; 3800–7900 feet.

As with *Grindelia ventosa*, I previously identified these plants as *G. arizonica* (Nesom 1990), but involucre morphology of *G. chihuahuana* is more similar to that of *G. scabra* and close relatives, including *G. ventosa*. The close similarity of *G. chihuahuana* and *G. ventosa* and their geographical proximity suggests they are sister species.

Additional collections. Chihuahua. Mpio. Bocoyna, ca. 5.5 road km NE of San Juanito, Paraje Las Lomas, Talayotes, depressions between arroyo and RR tracks, with standing water, hierba perenne, 28.00619 N, 107.57178 W, 7920 ft, 16 Aug 2013, *Bye 37475* (MEXU); 6 mi NW of Parral, oak woodland and grama grassland, 1950–2200 m, 2 Oct 1959, *Gentry et al. 17912* (US); Mpio. de Balleza, 46 km E de Cabórachi, entre Cabórachi y Baquiriachi [Baquiriachi is ca. 45 km E of Cabórachi, thus mapped here at Baquiriachi, ca. 26.95 N, 106.62 W], 6890 ft, bosque de pino-encino chaparro principalmente, 15 Aug 1982, *Hernández M. 8968* (MEXU); 6 mi W of Cuauhtémoc along gravel road to Guerrero [ca. 28.39 N, 107.01 W], 6900 ft, sandy, gravelly soil, rare, 5 Aug 1961, *DeJong 940* (CINC, annotated as "voucher for n=6"); 22 mi S of Hidalgo del Parral along Hwy 45 [ca. 26.66 N, 105.55 W], pastures, 5510 ft, abundant, 6 Aug 1961, *DeJong 948* (CINC); Rancho Experimental La Campana, KM 1746 Carr. Chihuahua–Cd. Juárez–Potrero de la Sa, [ca. 17 mi NW of Cd. Chihuahua on Hwy 16, ca. 28.84 N, 105.87 W], pendiente fuerte hacia el este, zacates amacollados, [ca. 4100 ft], 1 Sep 1958, *Martínez 46* (TEX); 24 mi E of Cd. Guerrero on Hwy 16, 28.55514 N, 107.492401 W, small meandering stream course in upland grassland plateau, 27 Aug 1971, *McGill 8367* (ARIZ); 29 km W of Colonia Alvaro [ca. 28.81 N, 107.21 W], [ca. 6700 ft], 19 Aug 1991, *Neff 3* (MEXU, TEX); 0.5 mi W of Cuauhtémoc on Hwy 16 [ca. 28.40 N, 106.91 W], roadside, [ca. 6800 ft], 29 Aug 1961, *Powell 991* (TEX); ca. "87" [incorrect] mi E of Guachochi toward San Pablo Balleza, ca. 26.9 N, 106.5 W, high plateau, grassland with *Pinus cembroides*, juniper, 7220 ft, 4 Nov 1992, *Soule 3450* (TEX); ca. 22 mi WSW of Cuauhtémoc along Hwy 16 [ca. 28.43 N, 107.17 W], [ca. 7050 ft], 8 Aug 1977, *Wells & Nesom 625* (TEX); brecha rumbo a San Diego de Alcalá [ca. 28.5 N, 105.6 W], matorral *Acacia-Larrea-Prosopis*, areas de cultivo, [ca. 3800 ft], 16 Aug 1997, *Yen & Estrada 7885* (TEX); alrededores del Rancho

- 4. GRINDELIA HAVARDII** Steyerl., Ann. Missouri Bot. Gard. 21: 474. 1934. **TYPE: Texas.** Culberson Co.: Guadalupe Mountains, near mouth of McKittrick Canyon, [ca. 31.98 N, 104.75 W], dry gravelly wash, 2000 ft, 23 Jul 1931, *J.A. Moore & J.A. Steyermark 3607* (holotype: MO; isotypes: GH, MO-2, NY, PH, RM, TEX).

Perennial herbs (sometimes flowering the first year). **Stems** 40-100 cm, glabrous. **Leaves:** basal deciduous before flowering; cauline mostly oblong, sessile, base truncate to rounded, evenly spaced along the stem, even-sized or sometimes larger proximally, glabrous, gland-dotted, margins serrate to crenate, *teeth apically blunt and glandular*. **Heads** 1 or few on leafy branches, not immediately subtended by foliaceous bracts. **Involucres** 15–20 mm wide (pressed); phyllaries narrowly lanceolate, of *unequal length*, inner 00-00 mm long and apically spreading or reflexing, outer ca. 1/2 the length of the inner. **Rays** (15–)20–24. **Disc corollas** 5-6 mm long. Figs. 20-27.

Flowering July-September; 3450-6000 feet (typical).

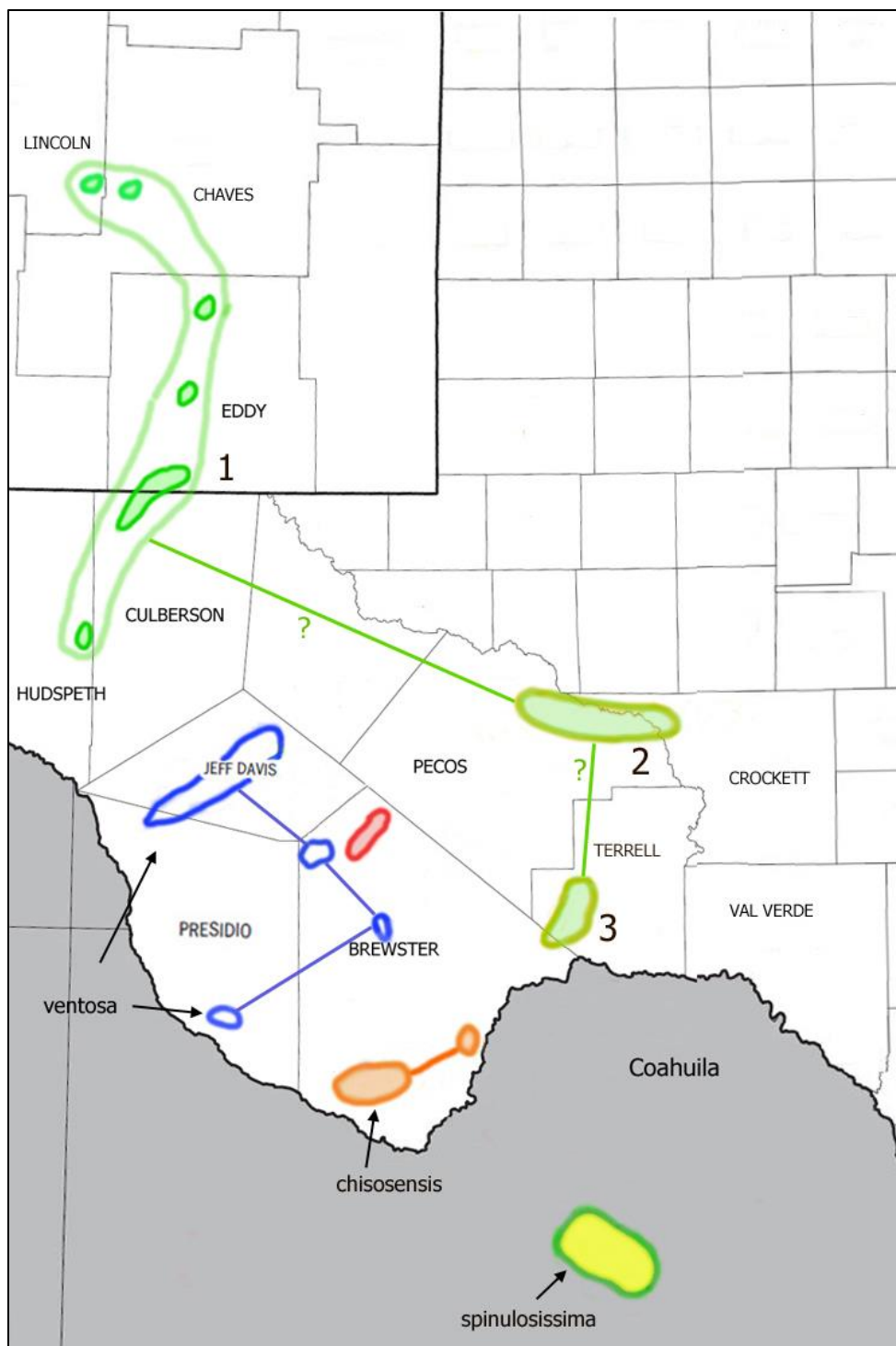
Grindelia havardii is tentatively considered here to include two allopatric population systems south of the typical one (Map 5). Leaves in each of them have gland-tipped teeth, even though the teeth vary from apically blunt to acute, and their perennial duration and unequal phyllaries are taken as further features justifying their tentative identification. Each of the two southern systems (Regions 2 and 3 here) is genetically distinct and perhaps not even each other's closest relative (Moore et al. 2012) but the nature of their relationship with typical *G. havardii* is unknown — with further study it would not be surprising to find evidence for formal recognition of the two systems.

Collections examined (map vouchers).

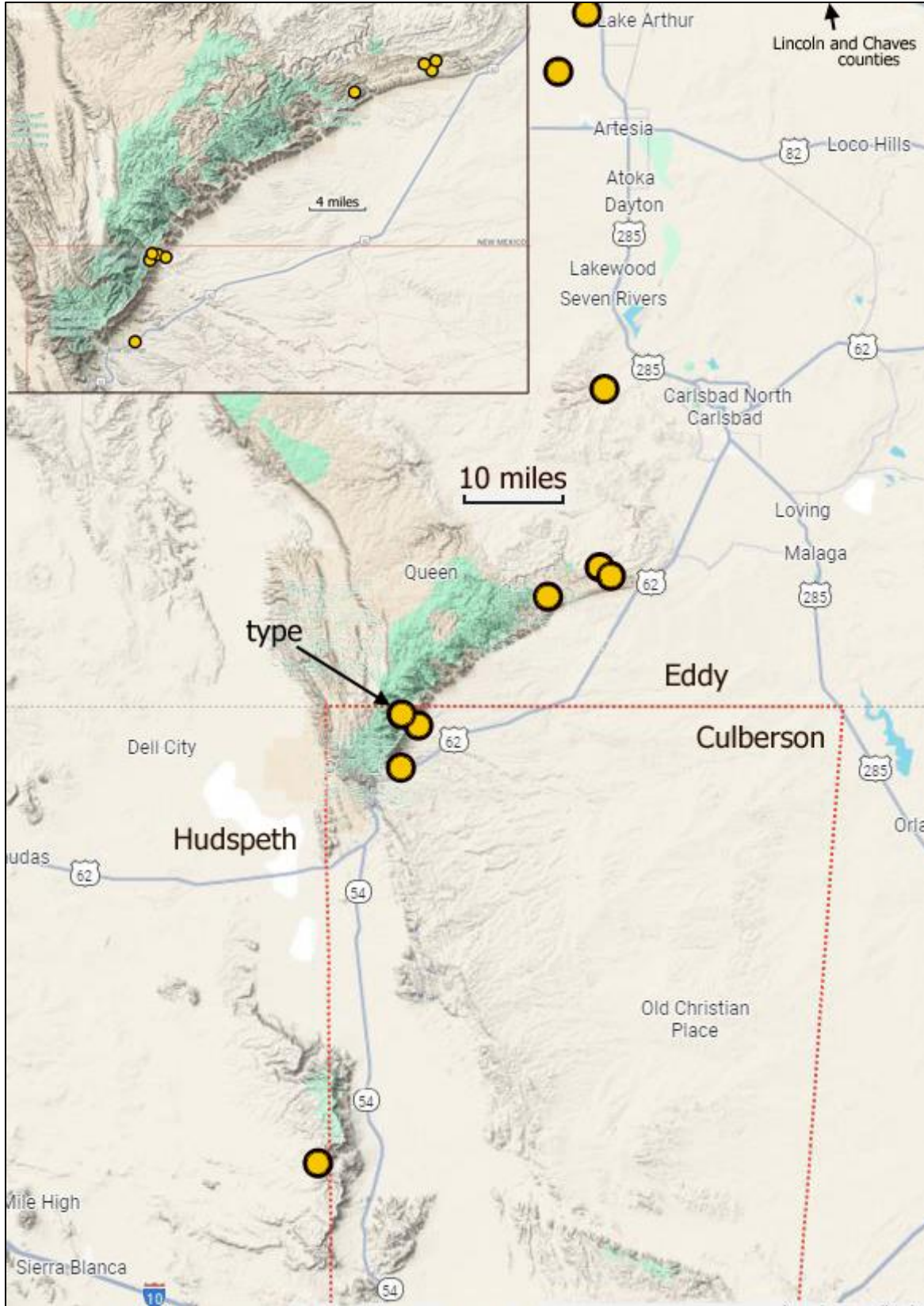
REGION 1 (typical *G. havardii*)

New Mexico. "**Chaves Co.**": 35 mi W of Roswell (mileage indicates Lincoln Co.) [ca. 33.34 N, 105.09 W], ca. 3800 ft, 30 Aug 1900, *Earle 509* (MO, NY!) and 29 Aug 1900, *Earle 571* (MO, NY); Rio Felix at Hwy 285 crossing, S of Rio Felix (16 mi N of Artesia), 33.10 N, 104.44 W, 3477 ft, high ground, 3 Oct 2004, *Peterson 04-185* (SFBG not seen); 20 mi W of Roswell [ca. 33.37 N, 104.86 W], 28 Jul 1905, *Wootton s.n.* (NMC, US). **Eddy Co.:** Carlsbad Caverns Natl Park, Walnut Canyon, dry gravel streambed SW of road, perennial, 21 Jul 1977, *Burgess 4625* (TEX); CCNP, vicinity of seep next to Visitor Center road, 1.1 km N 0.7 km E of Visitor Center, common perennial on open mesic sites, NE-facing ledges, ca. 4200 ft, 21 Jul 1977, *Burgess 6631* (TEX); CCNP, Rattlesnake Canyon, spring across canyon from Stone Ranch site, 32.160 N, 104.520 W, ca. halfway up E-facing slope of canyon, 4500 ft, small riparian grove with *Populus wislizeni*, *Celtis reticulata*, *Quercus*, locally abundant in immediate vicinity of springs, 3 Sep 1977, *Burgess 4652* (TTC); CCNP, Big Hill, [32.183 N, 104.438 W], 1952, *Castetter 8521* (UNM); CCNP, 32.185 N, 104.435 W, 3928 ft, limestone, stream terrace, with *Celtis laevigata* var. *reticulata*N, *Juglans microcarpa*, 3 Oct 1999, *Chauvin 99YC052N, F5* (UNM); Azotea Peak Quad, rocky arroyo, 32.466836 N, 104.441868 W, 3440 ft, sandy-gravel on the creek margin, 16 Sep 2009, *Clifton 49911* (UNM); CCNP, Walnut Canyon Rd, 32.18282 N, 104.43368 W, with *Dasyllirion leiophyllum*, 24 May 2006, *Coop 06JC007N, F1* (UNM); CCNP Headquarters area, 32.178 N, 104.443 W, 4400 ft, NE slope, 22 Sep 1944, *Dittmer 8526* (UNM); ca. 8 mi NW of Artesia, Cottonwood Spring, 32.941 N, 104.546 W, riparian understory of *Populus*, *Salix goodingii* and *Celtis reticulata*, abundant, 12 Sep 1993, *Sivinski 2605* (NMC, TEX, UNM); Black River, dry field, 12-20 Aug 1924, *Standley 40439* (US). **Texas.** **Culberson Co.:** Guadalupe Mtns Natl Park, Chozas Spring, S of Nipple Hill, 31.90595 N, 104.785781 W, 5300 ft, near streams, no date, *Anonymous s.n.* (TTC); Guadalupe Mtns Natl Park, lower McKittrick Canyon. ca. 0.2 km N, 1.4 km E of Pratt Lodge, streambed above second crossing W of parking area, 31.984985 N, 104.766309 W, near margin of gravel bed, occasional, 20 Jul 1974, *Burgess 2155* (TTC); Guadalupe Mtns, north McKittrick Canyon, open dry soil, 18 Aug 1946, *Correll 13934* (LL, NCSC, SMU); Guadalupe Mtns, near mouth of McKittrick Canyon, gravelly places near stream, 25 Jul 1957, *Correll & Johnston 18517* (LL, SMU); Guadalupe Mtns, south McKittrick Canyon, ca. 5 mi N of Pine Springs, 9 Aug 1950, *Fischer s.n.* (OKLA); Guadalupe Mtns Natl Park, McKittrick Canyon, 0.7 mi SW of Pratt Lodge, 5400 ft, limestone hillsides, *Quercus*, *Acer* community, 7 Jul 1987, *Higgins 17313* (BRY, WTU); Pratt Ranch [upper McKittrick Canyon], *McKechnie 283* (MO); Guadalupe Mtns, McKittrick Canyon, 5500 ft, limestone, 3 Aug 1952, *Warnock 10966* (LL, SMU, SRSC);

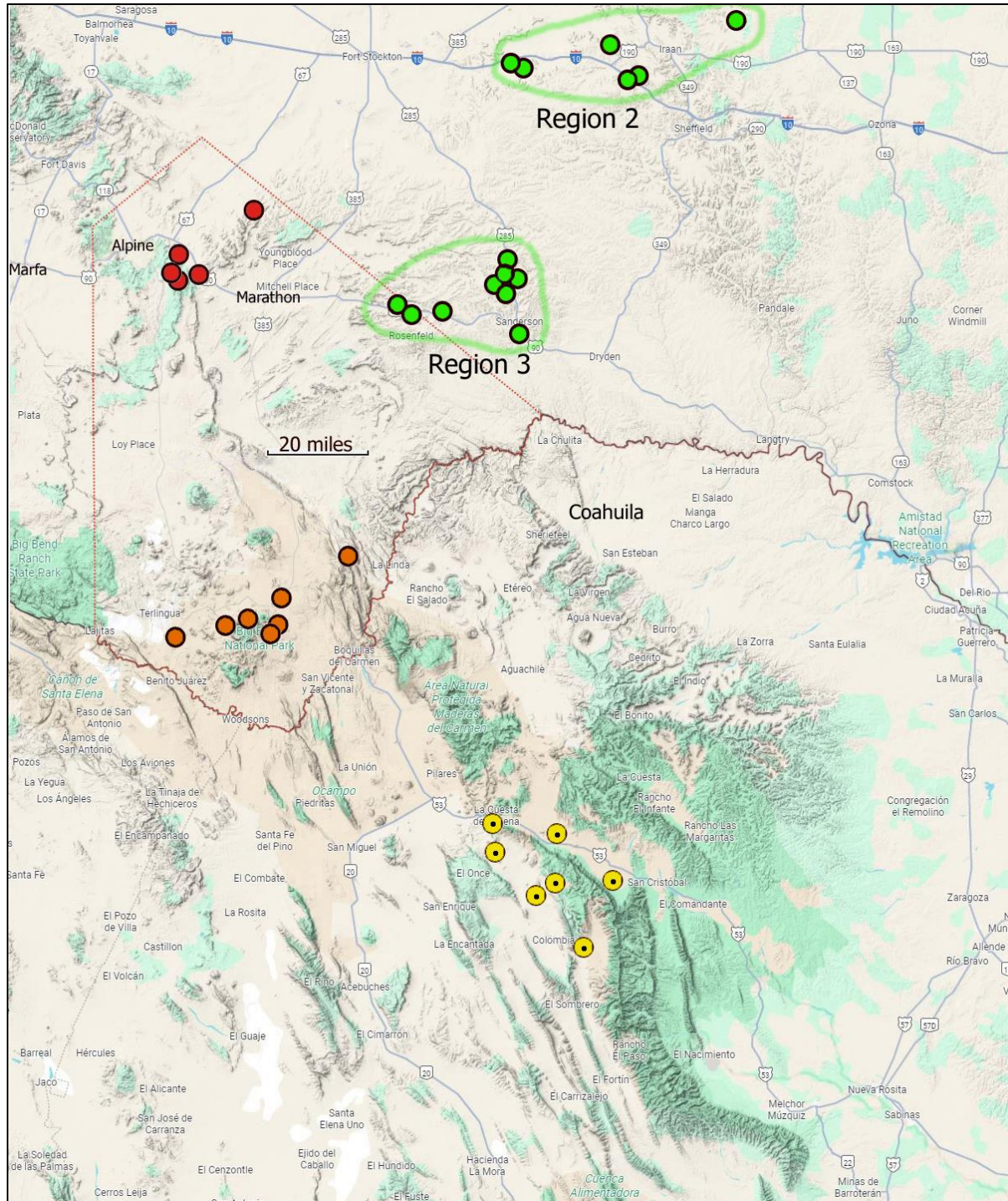
Guadalupe Mtns, north McKittrick Canyon, 6000 ft, limestone, 4 Aug 1962, Warnock 18907 (SRSC, TTC).
 Hudspeth Co.: Ca. 20 mi N of Allamore, Sierra Diablo, Victorio Canyon near its upper end, [ca. 31.327 N,
 104.901 W], along bottom of canyon, limestone cliffs and ledges, with *Juniperus*, *Pinus*, and *Fraxinus*
cuspidata, 28 Jul 1943, Waterfall 5389 (GH).



Map 5. Distribution of *Grindelia ventosa* (blue), *Grindelia havardii* (green, including Regions 1, 2, and 3), *G. delnortana* (red), *G. chisosensis* (orange), and *G. spinulosissima*. Detailed distributions are shown in Maps 2 and 6-8. Vouchers for distributions are listed by regions (1-3).



Map 6. Distribution of *Grindelia havardii* sensu stricto. Culberson Co. is outlined in red. Localities in Chaves/Lincoln Co. (see Map 5) are not shown but vouchers are cited.



Map 7. Distribution of *Grindelia havardii* (green, Regions 2 and 3, south of the localities for the typical population system), *G. delnortana* (red), *G. chisosensis* (orange), and *G. spinulosissima* (yellow). Brewster County is outlined in red.

REGION 2

Crockett Co.: *Salviastrum* Mesa [ca. 31.00 N, 101.68 W], 32 air mi NW of Ozona, 7 Sep 1942, *Cory 40105* (TEX). Pecos Co.: 12 mi W of Iraan, 30.91 N, 102.10 W, ledges of rimrock, 8 Aug 1966, *Correll 33362* (LL); Hwy 290, 24 mi W of Sheffield, open rocky soil, 19 Jul 1957, *Correll & Johnston 18270* (LL,

TEX); 14 mi W of Pecos River along IN, 10, 30.82 N, 102.01 W, S side of hwy, base of mesa, calcareous, 27 Jul 2003, *Turner 23N, 207* (SRSC, TEX); 14 mi W of Pecos River on IN, 10, 30.825 N, 102.009 W, along the base of prominent mesa, S side of hwy, calcareous soils, 6 Oct 1997, *Turner 97N, 452* (SRSC, TEX); 14 mi W of Sanderson, roadside, 2750 feet, limestone, infrequent, 23 Aug 1947, *Warnock 6737* (SRSC); 20N, 35 mi S of Fort Stockton, along Sanderson hwy, 3100 ft, roadside, infrequent, 1 Jul 1955, *Warnock 13336* (SRSC); hwy between Iraan and Fort Stockton, roadside, 2675 ft, infrequent, 1 Nov 1958, *Warnock 17331* (SRSC).

REGION 3

Brewster Co.: ca. 10 mi NW of Sanderson on Hwy 285, roadside, limestone, common, 17 Sep 2009, *Manning 5084* (SRSC); 24 mi W of Sanderson, ["near Pecos"] on county line, [ca. ca. 30.17 N, N, 102.74 W], rocky pasture, 1 Dec 1943, *Wolff s.n.* (SMU). **Terrell Co.:** 8 mi N of Sanderson on Hwy 285, limestone hills, 22 Jun 1961, *Johnston 6460* (LL); Hwy 285, ca. 8.3 mi NW of Hwy 90 (at Sanderson) near steep limestone roadcut, roadside in loose soil, 30 Sep 2015, *Manning 7009* (SRSC); ca. 8 mi N of Sanderson, Hwy 285, large limestone roadcut, 3243 ft, 8 Jun 2019, *Powell 7683* (SRSC); eastern limits of Sanderson, weedy ground, 31 May 1964, *Raven 19196* (SMU); 8.2 mi N of Sanderson on Hwy 285, 30.28333 N, 102.46667 W, rocky limestone soils, 18 Oct 2002, *Turner 22N, 254* (SRSC, TEX-2); ca. 9.5 mi N of Sanderson on Hwy 285, 30.255 N, 102.448 W, road cut on W side of hwy, shoulder between the limestone bedrock and asphalt, 3362 ft, 29 Apr 2019, *Wogan 65* (SRSC).

GRINDELIA DELNORTANA Nesom, **sp. nov.** **TYPE:** Texas. Brewster Co.: Del Norte Mtns, E side of Mt. Ord, Gage Estate, deep limestone canyon, infrequent, 14 Jul 1947, *B.H. Warnock 6466* (holotype: SMU; isotypes: SRSC, TEX).

Similar to *Grindelia scabra* in its pubescent stems, sharp-pointed leaf teeth, and tendency to produce foliaceous capitular bracts, different in its hirsutulous, clasping leaves, larger heads, and broader phyllaries.

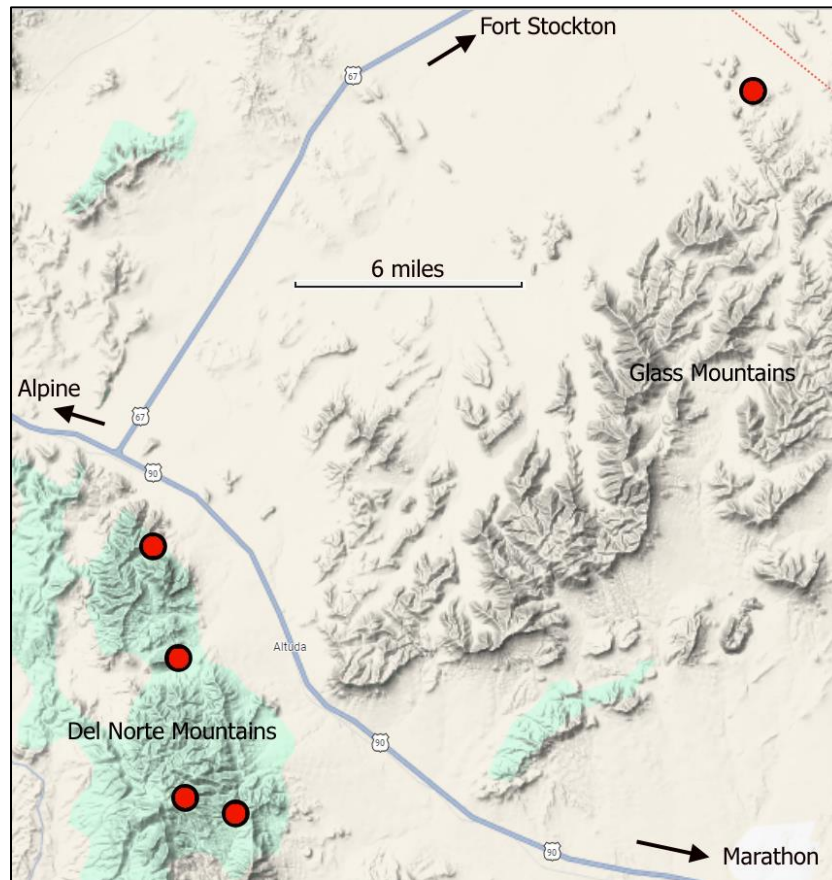
Perennial herbs, taprooted. **Stems** 20–80 cm, *evenly and sparsely to densely hirsutulous to hirsute-villous*, eglandular. **Leaves:** basal and lower cauline usually deciduous by flowering, cauline oblong to oblong-lanceolate or oblong-oblong-lanceolate, 1–2.5 cm long, 5–14 mm wide, *sparsely and minutely hirsutulous to hirtellous, not gland-dotted*, regularly serrate with acute, *mostly sharp-pointed and subspinulose teeth* or sometimes apparently slightly glandular at the apex or at least not spinulose (*Carigan 149, Warnock W276*), relatively even-spaced and even-sized or becoming smaller distally, sessile at the insertion but blade *basally truncate-rounded to subauriculate and distinctly clasping*. **Heads** solitary on leafy branches from the distal 1/2–1/3 of the stem, without closely subtending foliaceous bracts (or with them, *Carigan 149, Warnock 6466*). **Involucres** 15–20 mm wide (pressed); phyllaries narrowly lanceolate with a linear apical portion, unequal in length, inner 8–10 mm, outermost ca. 1/2 as long. **Rays** 20–24. **Disc corollas** 5 mm long. **Achenes** ca. 3–3.5 mm long. Figs. 28–35.

Flowering July–September. Limestone canyons, among igneous boulders; 3950–5100 feet. Maps 5, 7.

Additional collections. **Brewster Co.:** 12.5 mi SE of Alpine, off Hwy 90 E, north Del Norte Mtns, Seal Altuda Ranch, [ca. 30.30 N, 103.51 W], upper mines area, igneous boulders, 5080 ft, 29 Aug 1987, *Carigan 149* (SRSC); Glass Mtns, Burnt House Canyon [close to Pecos Co., ca. 30.547 N, 103.224 W, ca. 3950 ft], infrequent, 20 Aug 1949, *Warnock W276* (TEX); Del Norte Mtns, E side of Mount Ord, ca. 2/3 way up big canyon, [ca. 30.250 N, 103.498 W], 4700 ft, 13 Jul 1947, *Warnock 3915* (SRSC); Del Norte Mtns, Altuda Mtn, Bird Canyon, [ca. 30.343 N, 103.516 W], 4700 ft, limestone, infrequent, 7 Jul 1947, *Warnock 6358* (SMU, SRSC).

In 1989 and 2001 I annotated these collections as *Grindelia scabra* (e.g., Figs. 28, 31; and that is how they are identified in Powell & Turner 2018), emphasizing their hairy stems, sharp-pointed leaf teeth, and foliaceous capitular bracts, but the long geographical disjunction from typical *G. scabra* and different habitat, with clasping leaves, larger heads, and different involucre morphology, set them

apart. The leaf teeth are mostly sharp-pointed and subspinulose but sometimes are apically and glandular more like those of *G. havardii*. Leaf morphology of *G. delnortana* is more similar to *G. ventosa*, but the leaves are broader and plants of the latter are annuals, glabrous-stemmed and -leaved, with long, linear outer phyllaries, and are separate in geography. *Grindelia delnortana* is unambiguously distinct among the geographically discrete population systems of trans-Pecos Texas.



Map 8. Distribution of *Grindelia delnortana*. Brewster Co., Del Norte and Glass Mountains.

GRINDELIA CHISOSENSIS Nesom, **sp. nov.** **TYPE:** Texas. Brewster Co.: Big Bend Natl Park, Green Gulch, [29.364° N, 103.199° W], 4800 ft, igneous soil, infrequent perennial, 30 Aug 1965, *B.H. Warnock* 23459 (holotype: TEX; isotype: SRSC).

Distinct from *Grindelia havardii* in its persistent basal leaves and sharp-pointed leaf teeth short-spinulose at the apex. Distinct from *G. delnortana* in its glabrous stems, non-clasping, glabrous, and gland-dotted leaves, and smaller heads. Distinct from *G. spinulosissima* in its longer duration, persistent basal leaves, non-punctate leaves, and smaller heads.

Perennial herbs, taprooted. **Stems** 1 or few from the base, 30–40 cm, reddish, glabrous. **Leaves:** basal spatulate-obovate, usually persistent through flowering, cauline mostly oblong-obovate to oblong, densely arranged, most 2–3 cm long, 7–13 mm wide, relatively even-sized upward to beneath the heads, glabrous, obscurely gland-dotted, *sessile (not at all clasping or decurrent)*, margins weakly scabrous (hispidulous), *serrate with sharp-pointed, short-spinulose teeth*. **Heads** 1 or 2–3 on leafy stems, not immediately subtended by bracts. **Involucres** 10–15 mm wide (pressed); phyllaries (inner) oblong, 3–veined with an acute-glandular apex, (outer) linear to linear-lanceolate, loose, spreading to spreading-reflexing, inner 8–11 mm long, outermost ca. 1/2 as long as the inner. **Rays** 20–26. **Disc corollas** 5 mm long, narrowly linear-tubular. **Mature achenes** not seen. Figs. 36–40.

Flowering July-November. 3600-6000 feet. Map 7.

Additional collections. Texas. Brewster Co.: Dead Horse Mountains, Big Brushy Canyon, small rise along old road SW of Shackelford cabin, 29.462338 N, 102.956546 W, 4280 ft, 7 Nov 2004, *Fenstermacher 1043* (SRSC); Wilson Ranch, Green Valley, [29.21 N, 103.37 W], 3650 ft, limestone, 27 Oct 1933, *Fletcher 945* (SRSC); Wilson Ranch, Terlingua Creek, 3560 ft, limestone, 27 Oct 1933, *Fletcher 1082* (SRSC); Big Bend Natl Park, N slope of Pulliam Peak at entrance to Chisos Basin, shrubs and small trees in drainage gulches and on granite talus, 6000 ft, 5 Jul 1958, *Hall et al. s.n.* (OKL); Big Bend Natl Park, Panther Junction, Panther Canyon wash, 29.320346 N, 103.213309 W, [ca. 3900 ft], 16 Nov 2005, *Leavitt 351* (SRSC); Chisos Mtns, out of Pine Canyon, frequent in shrubby growth, 4 Sep 1940, *Sperry s.n.* (US); Chisos Mtns, low hillsides, 12 Aug 1915, *Young s.n.* (SRSC); Chisos Mtns, Nail place [Sam Nail Ranch, 29.279 N, 103.370 W, ca. 3600 ft], open valley, 1916, *Young s.n.* (TEX).

Grindelia chisosensis might be seen as the southernmost population system of *G. havardii* (Map 5), but the sharp-pointed, subspinulose leaf teeth are more like those of *G. ventosa*, *G. chihuahuana*, and *G. spinulosissima*.

GRINDELIA SPINULOSISSIMA Nesom, **sp. nov.** **TYPE: MEXICO. Coahuila.** Sierra de La Encantada, Cuesta de Malena, brecha a Boquillas del Carmén, 28.73° N, 102.48° W, bosque de *Juniperus flaccida*, *Quercus gravesii*, *Leucaena retusa*, [ca. 4300 ft], 8 Sep 1990, *M.A. Carranza 801* (holotype: TEX; isotype: ANSM).

Distinct in its annual or biennial duration, mostly glabrous vestiture, relatively large, oblong, non-punctate, non-clasping leaves sharply serrate with long-spinulose teeth. Different from *G. chisosensis* in its shorter duration, quickly deciduous basal leaves, thinner leaves without evident glandular punctation, and larger heads.

Annual or biennial herbs (possibly short-lived perennial), taprooted. **Stems** 20–ca. 50 cm, single or several from the base, glabrous or sometimes minutely stipitate-glandular. **Leaves:** basal spatulate, senescent-deciduous before flowering, cauline mostly oblong to oblong-ob lanceolate or oblong-lanceolate, 2–5 cm long, (5–)10–20 mm wide, glabrous or minutely hirtellous, sometimes minutely sessile-glandular in early expansion, *not punctate-glandular or resinous*, margins serrate with *sharp-pointed, long-spinulose teeth*, base obtuse to truncate and abruptly narrowed to a petiole-like insertion, *not clasping*. **Heads** 1 or several on short, leafy branches and loosely corymboid, not immediately subtended by bracts or sometimes the distal leaves closely approaching the heads. **Involucre** 15–18 mm wide (pressed); phyllaries in 3–4 series of subequal length, inner oblong-lanceolate, 7–10 mm long, proximal 2/3 stramineous and multinerved, resinous, apex punctate and green, outer linear-lanceolate with a linear, green and punctate apex, outermost spreading-reflexing. **Rays** 18–25. **Disc corollas** 5–7 mm long, narrowly linear-tubular. **Achenes** oblong, 3.5–4 mm long, slightly flattened or 3-angled, with shallow longitudinal furrows. Figs. 41-43.

Flowering July-September. Oak matorral with yucca, matorral with *Leucophyllum* and *Acacia*, roadsides hillsides; 2650-5400 feet. Map 7.

Additional collections. MEXICO. Coahuila. Mpio. Acuna, ca 80 km SE of Big Bend National Park, Texas, on SW margin of Serranías del Burro (part of Sierra del Carmen), Rancho El Rincón, Cañon Becerro, 28.66667 N, 102.25 W, 9 Aug 1991, *Aguilar Ruíz 167* (SRSC, TEX); Sierra La Encantada, entronque Boquillas del Carmen brecha y túnel, flourita de Méx Unidad Minera, 6 km al pasando el túnel, 28.65 N, 102.5 W, matorral de encino, *Yucca*, *Dasyllirion*, *Muhlenbergia setifolia*, *Bouteloua curtipendula*, 7 Sep 1990, *Carranza et al. C-704* (MEXU, TEX); Mpio. Muzquiz, ca. 130 road km NW of Muzquiz, on Hwy 2A (Muzquiz-Boquillas), then SW of 2A on tunnel road to La Encantada mining area, through the tunnel to the S side, 28.48333 N, 102.31667 W, disturbed vegetation along roadside, slopes and general area of oak-yucca with *Dasyllirion*, *Acacia*, and other shrubs/small trees, [ca. 4600 ft], 3 Jun 1992 (in bud), *Nesom & Mayfield 7394* (MEXU, TEX); Valle de los Guajes (E of the Sierra de la Encantada, 10 km S of Rancho Buena Vista, 28.34 N, 102.47 W, grassy hillside, [ca. 5400 ft], 3 Sep 1941, *Stewart 1360* (LL); high mesas

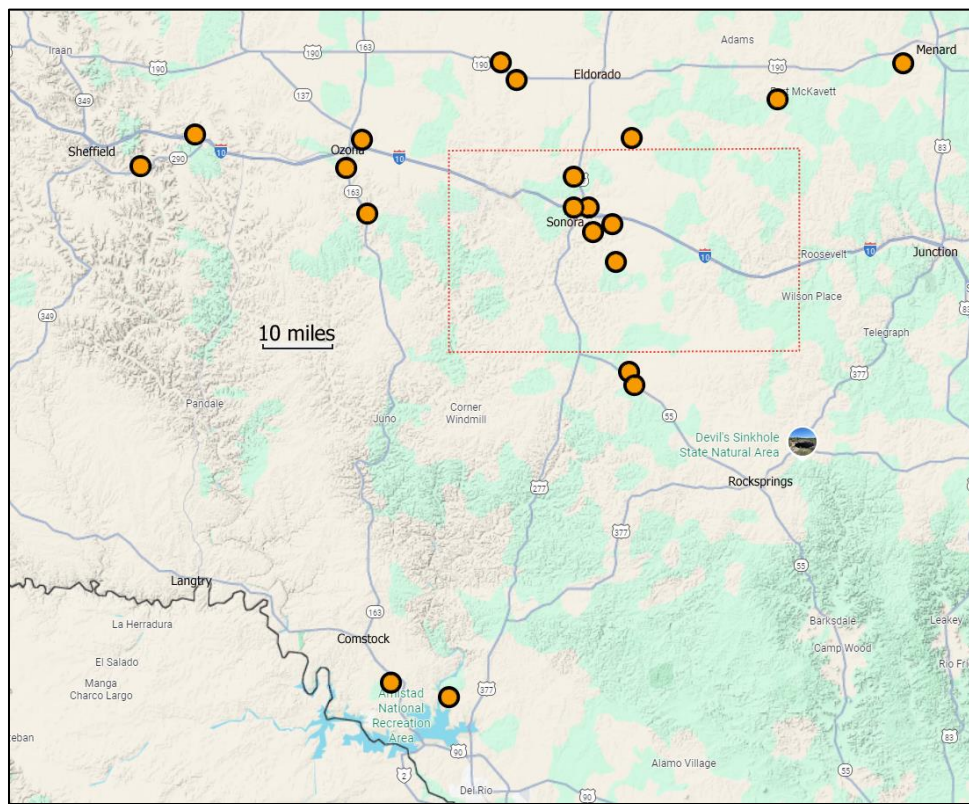
40 km [26 mi] NW of Hacienda de la Encantada, Mesa Grande [ca 28.9 N, 102.8 W? or 29.11 N, 102.75 W], hillsides, meadows, 14 Sep 1941, *Stewart 1635* (LL); W slopes of Sierra del Carmen [Sierra Santa Rosa], 8 km E of Hacienda Encantada, [ca. 28.5 N, 102.2 W], 15 Sep 1941, *Stewart 1702* (GH); Carr. Múzquiz-Boquillas (Hwy 53), Rancho La Babia, aéreas cercanas al arroyo La Babia, 28.55 N, 102.08333 W, matorral de *Leucophyllum frutescens*, *Acacia rigidula* con *Rhus virens*, *Ephedra*, *Rhus lanceolata*, [ca. 2650 ft], 17 Sep 1992, *Villarreal 6953* (TEX).

Two collections from the vicinity of Monclova (Coahuila) are sterile and without basal parts, but they appear to be *Grindelia*, a single species, and the leaves of each are sharply serrate with long-spinulose apices as in *G. spinulosissima*. They seem to be out of range for *G. spinulosissima* and are in need of further observation: Monclova, 20 Jul 1939, *Marsh 1845* (TEX); Monclova, Gloria Mtns, 3 Aug 1939, *Marsh 1883* (TEX).

Another collection, farther south from the Sierra Paila, has similar leaf morphology and needs further study: Mpio. Ramos Arizpe: Ca. 25 km al N de Saltillo on Carr. 57, [cañon] El Carmen [of Sierra Paila], 2 km E de la entrada, [ca. 26.04 N, 101.34 W], huertos de *Carya illinoensis* con *Quercus* en arroyos y acequias, 25 Oct 1994, *Villarreal 7935* (MEXU).

0. GRINDELIA GRANDIFLORA Hook., Bot. Mag. 78 (ser. 3, 8), plate 4628. 1852. *Grindelia squarrosa* var. *grandiflora* (Hook.) A. Gray, Smithson. Contr. Knowl. 3 (5): 98. 1852. **TYPE:** Protologue: "Raised from seeds sent by Dr. Wright from Texas." Label: "Texas, Cult. in Hort. Kew," Dr. Wright: s.n. (holotype: K 884783).

Grindelia costata A. Gray, Proc. Amer. Acad. Arts 17: 208. 1882. **TYPE:** MEXICO. Coahuila. "Juraz, about 100 miles north from Monclova, on the Sabinas river," 23-24 Sep 1880, *E. Palmer 472* (holotype: GH; isotypes: K, NY, PH, US). Mpio. Juarez on the Sabinas River is at 27.61 N, 100.73 W.

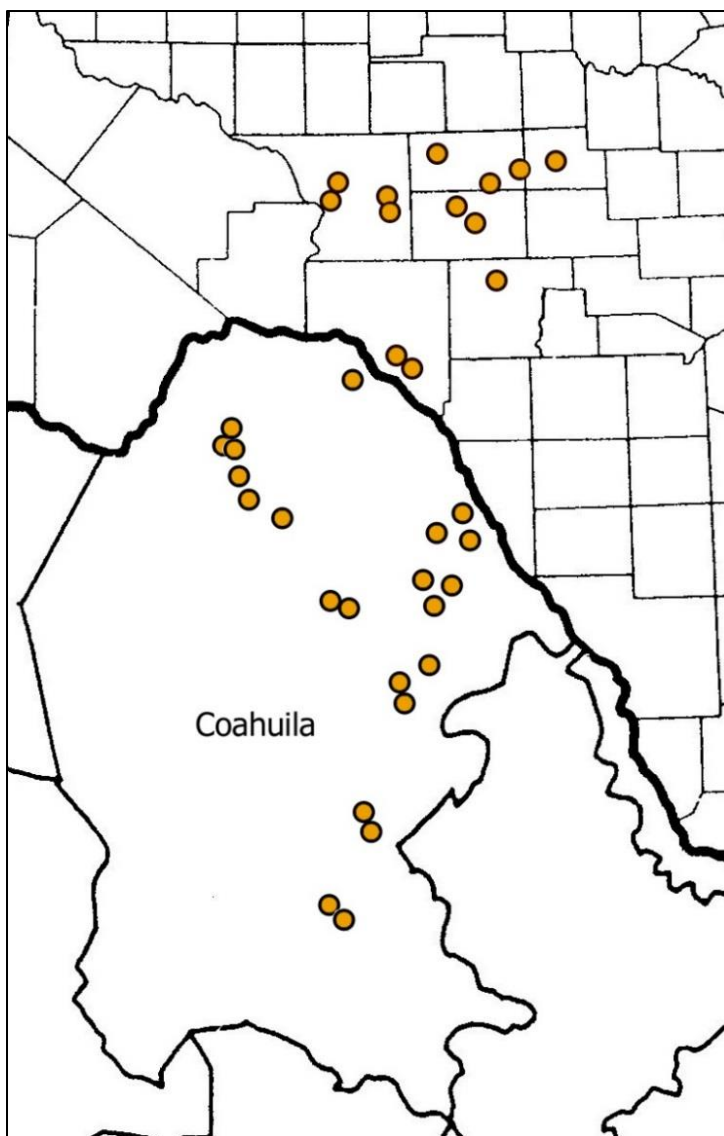


Map 9. Distribution of *Grindelia grandiflora* in Texas — Crockett, Sutton, Schleicher, Edwards, Menard, and Val Verde counties. Sutton County is outlined in red.

Grindelia grandiflora is an easily identified species — consistently annual duration, leaves not gland-dotted, usually oblong to oblong-lanceolate with clasping to subclasping base and with margins closely and uniformly (base to apex) crenulate, the teeth with glandular apices. **Achenes** dimorphic, outer with 9–10 longitudinal furrows, inner strongly flattened, with numerous, longitudinal, thin, superficial nerves. Figs. 44-47.

Flowering (July-) August-September (-November). Roadsides, arroyos, grasslands, open slopes in chaparral, acacia-mesquite, pine-oak, oak-juniper, oak, and pinyon-juniper; 1000-6000 (-7900 in the Sierra del Carmen) feet.

Grindelia grandiflora in the USA is restricted to a relatively small area of the western Edwards Plateau (Maps 9, 10). The collections from southern Val Verde Co. are these: Along Devil's River, 13 Sep 1900, *Eggert s.n.* (MO); between the head of the San Pedro River [Devils River] and Live Oak Creek, Nov 1851, *Schott 514* (F, GH, NY); Rio Bravo del Norte, Rio San Pedro [=Devil's River], Oct/Nov 1851, *Schott s.n.* with the Emory Expedition (NY, probably the same as the previously cited). More recent collections from Val Verde Co. apparently have not been made but the species has been collected from several places in Coahuila close to the border. In Coahuila it extends southward to the Sierra Paila, northwest of Saltillo.

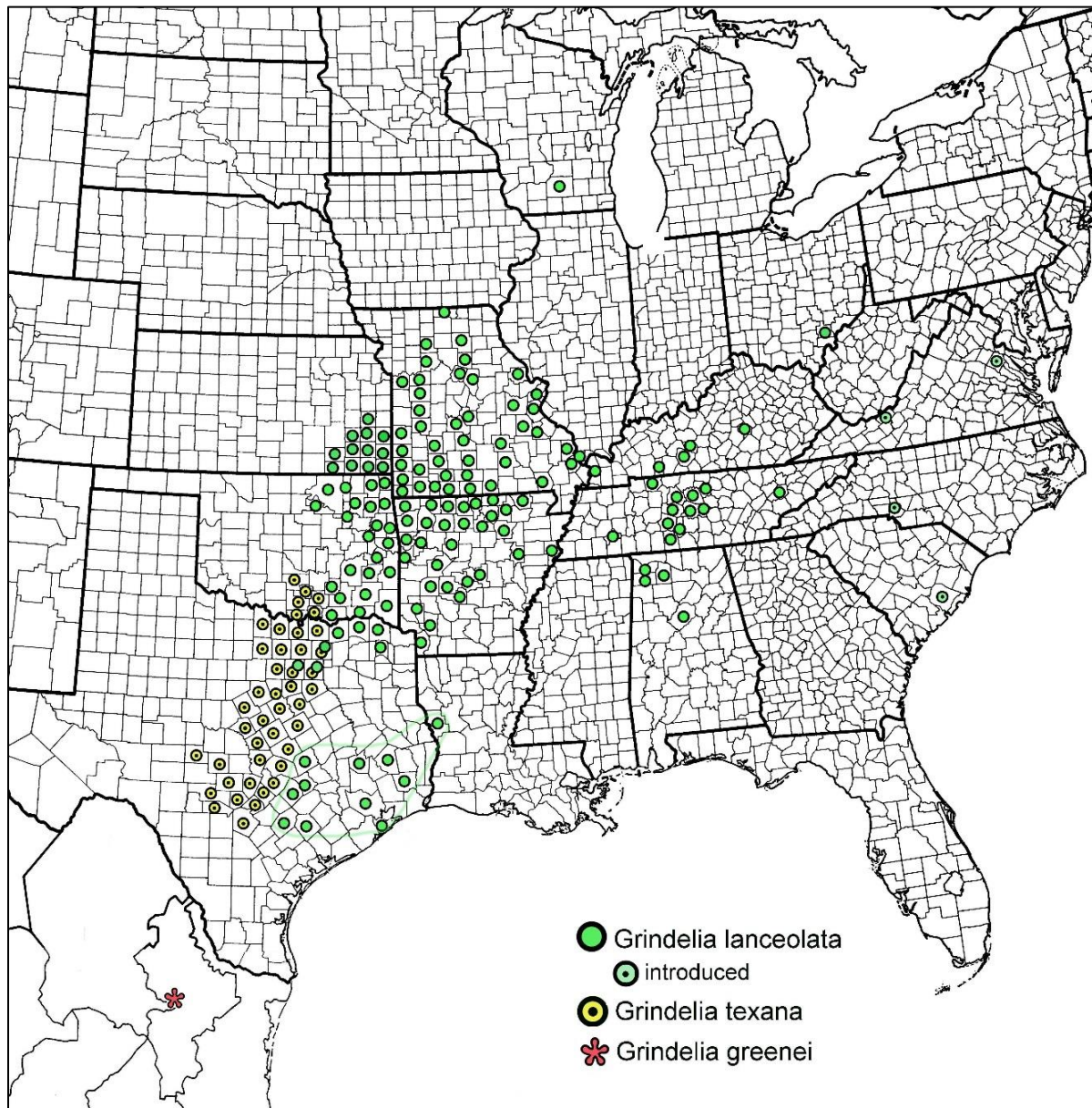


Map 10. Distribution of *Grindelia grandiflora*. Texas and Coahuila.

Grindelia grandiflora in MEXICO. Coahuila. Cd. Acuña, 21 km S by winding road from Rancho Chupadero del Caballo toward Las Norias, in Cañon del Colorado, broad valley through limestone hills, 29.4267 N, 102.02 W, 2789 ft, matorral subdesertico inerme, 12 Sep 1972, *Chiang 9170* (LL, NY); La Cuesta del Plomo on the Muzquiz-Boquillas hwy, 28.733333 N, 102.516667 W, steep limestone slopes and canyons, 5740-5820 ft, calcareous soil, izotal or encinar (almost chaparral) vegetation, with *Nolina*, *Yucca carnerosana*, *Dasyllirion*, *Quercus*, 14 Sep 1972, *Chiang et al. 9200* (ARIZ-3, LL, MEXU, NY); Hwy 57, 17 mi S of Allende [ca. 28.22 N, 101.05 W], roadside, 1400 ft, mesquite-*Acacia*-grassland, 28 Oct 1972, *Dunford 1388* (MEXU, NMC); Hwy 2, 5 mi N of Zaragoza, [28.55 n, 100.91 W], roadside, 1000 ft, mesquite-*Leucophyllum*-grassland, rocky clay soil, 28 Oct 1972, *Dunford 1389* (MEXU); Mpio. Jiménez, Río San Rodrigo, 28.85 N, 100.76 W, riparian integrating to *Carya illinoensis*, *Morus celtidifolia*, y *Platanus glabrata*, 13 Sep 2002, *Encina 1082* (MEXU); Mpio. Nava, 18 km S de Piedras Negras, Rancho Los Cuates, 28.58 N, 100.66 W, 11 Sep 2007, *Encina 2197* (MEXU); ca. 54 air mi NW of Múzquiz, on the trail to the Rincón de María region of the limestone Sierra de la Encantada (Sierra de Santa Rosa), 4-6 mi due S of the Hacienda, 28.46667 N, 102.03333 W, <near 28 29'N, 102 04 W> 1000 m, with *Rhus virens*, *Juniperus*, *Pistachia*, *Sophora*, *Eysenhardtia*, *Prosopis*, *Acacia*, *Mimosa*, *Yucca*, *Dasyllirion*, 18 Sep 1999, *Henrickson 22582* (MEXU, TEX); Sierra del Carmen, between Campo Cinco & Cohos Mine, on road to Madera del Carmen, ca. 29.05 N, 102.62 W, open roadsides to sparse forest, [ca. 7300 ft], 11 Aug 1981, *Lowry 3162* (TEX); ca. 26 mi S of Monclova, 26.50 N, 101.35 W, 3300 ft, desert scrub, 16 Oct 1986, *McLaughlin 4226* (MEXU); Rancho La Morada, limestone soil, grassy area, 22 Sep 1968, *McKellar s.n.* (TEX); Jardín de Sur (S side of Cd. Allende, ca. 28.33 N, 100.85 W], 3 Sep 1936, *Marsh 771* (MEXU, TEX-2); Mpio. Allende, Hwy 57 ca. 25 mi NNE of Nueva Rosita, 11.5 mi S of Río Bravo (centro), 3.8 m S of Ejido la Estrella, [28.22 N, 101.05 W]. brushland with common *Acacia* and *Prosopis*, 1980 ft, large population but local in distribution, 5 Jun 1992, *Nesom 7465* (MEXU, NMC, TEX); ca. 13 road mi SE of Rancho El Palmito at goat herders' camp [ca. 26.42, 101.36 W], disturbed soil below tank dam, 11 Oct 1968, *Patterson 88* (TEX); Muzquiz, roadside swamp, 12 Aug 1975, *Pinkava 13009* (ASU; n=6, David Keil); 24 mi W of Cd. Acuña, 20 Aug 1966, *Powell 1415* (TEX); Mpio. Ocampo, Sierra Maderas del Carmen, 3.7 road mi SW from Campo Cinco towards Las Pilares, 28.92167 N, 102.60667 W, W-facing open slopes in the lower chaparral zone, 0.5 mi above the flats below, road margin, with *Cercocarpus*, *Juniperus flaccida*, *Quercus grisea*, *Pinus cembroides*, *Dasyllirion*, *Opuntia*, and many grasses, [ca. 6300 ft], 11 Aug 2004, *Riskind et al. 23842* (TEX); Mpio. Ocampo, Sierra Maderas del Carmen, 3.1 road mi SW of Rancho San Isidro via Cañón del Alamo, 28.87333 N, 102.55833 W, margin of arroyo with *Acacia constricta*, *Mimosa*, *Rhus microphylla*, *Atriplex canescens*, 12 Aug 2004, *Riskind et al. 23854* (TEX); Muzquiz, Palm Canyon, 19 Sep 1936, *Tharp 1003* (MEXU, TEX-2); 37 mi N of Monclova on Hwy 57, roadside, 24 Sep 1976, *Urbatsch 2778* (LSU); ca. 47 mi S of Piedras Negras on Hwy 53-57, roadside ditch, Tamaulipan scrub, 19 May 1972, *Urbatsch 999* (LSU); dirt road to Oballos, 2.6 mi from jct with Hwy 57 [ca. 27.44 N, 101.27 W], 19 May 1972, *Urbatsch 1011* (LSU); Mpio. Ramos Arizpe, Sierra de la Paila, Ejido el Cedral por el cañon El Carmen 25.97 N, 101.54 W, 1300-1600 m, 26 Aug 1992, *Valdez R. 2232* (MEXU); Mpio. Ramos Arizpe, Sierra de la Paila, El Cedral, 26.03333 N, 101.38333 W, bosque esparcido de *Quercus glaucooides*, *Pinus arizonica*, *Juniperus flaccida*, 20 Aug 1987, *Villarreal 3932* (TEX); Mpio. General Cepeda, Sierra de la Paila, Valle de Parreños, 25 58 N, 101 25 W, 1600-2000 m, 31 Oct 1977, *Villarreal 4174* (MEXU); Mpio. General Cepeda, Sierra de La Paila, Valle de Parreños, 25 58 N, 101 25 W, 12 Sep 1989, *Villarreal & Carranza C-475* (MEXU, NY); Sierra Madera del Carmen, Cañón El Dos, ca 0.75 mi below (SE of) Campo Dos and above most mesic central part of canyon, 28.975 N, 102.6 W, [ca. 7900 ft], huizache, nogal criollo, jara (*Baccharis neglecta*), 16 Sep 1992, *Villarreal 6923* (TEX-2 sheets); Sierra del Carmen, El Uno, 28.9540 N, 102.5561 W, 6835 ft, Madrean oak woodland with Arizona oak and alligator juniper codominants, weedy site, 25 Aug 1997, *Wood s.n.* (SRSC, UNM); Sierra del Carmen, 5996 ft, pinyon-juniper woodland, not locally clumped, 25 Aug 1997, *Wood 140* (SRSC).

GRINDELIA LANCEOLATA, G. TEXANA, AND G. GREENEI

These three species (Map 11) are similar in involucre morphology to *Grindelia scabra*. Only *G. greenei* occurs in Mexico, though I earlier identified plants of Coahuila as disjunct representatives of *G. texana* (here as *G. spinulosissima*). Figs. 48, 49.



Map 11. Distribution of *Grindelia lanceolata*, *G. texana*, and *G. greenei*. Modified from Nesom (2019). The coastal plain populations of *G. lanceolata* (Texas and Louisiana) might be expected to be genetically distinct.

ACKNOWLEDGEMENTS

Thanks to the staff at TEX,LL for help during recent study there.

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Figure 1. *Grindelia scabra*. Lincoln Co., New Mexico, Wooton 372 (GH). Isolectotype.



Figure 2. *Grindelia scabra*. Otero Co., New Mexico, Raven 20351 (NY). Diploid chromosome count.



Figure 3. *Grindelia ventosa*. Jeff Davis Co., Keough 169 (SRSC).



Figure 4. *Grindelia ventosa*. Jeff Davis Co., Weedin 818 (SRSC).



Figure 5. *Grindelia ventosa*. Jeff Davis Co., Zech 168 (SRSC).



Figure 6. *Grindelia ventosa*. Jeff Davis Co., Hinckley 1040 (TEX).



Figure 7. *Grindelia ventosa*. Jeff Davis Co., Cory 27 (US).



Figure 8. *Grindelia ventosa*. Brewster Co. [not Presidio Co. as on the label], Allen 234 (SRSC).



Figure 9. *Grindelia ventosa*. Brewster Co., Fletcher 945 (SRSC).



Figure 10. *Grindelia ventosa*. Presidio Co., Lott 5677 (TEX).



Figure 12. *Grindelia chihuahuana*. Stuessy 1041 (COLO). Isotype.



Figure 13. *Grindelia chihuahuana*. Hernández M. 8968 (MEXU).



Figure 14. *Grindelia chihuahuana*. Gentry 17912 (US).



Figure 15. *Grindelia chihuahuana*. McGill 8367 (ASU).



Figure 16. *Grindelia chihuahuana*. Detail of McGill 8367 (ASU).



Figure 17. *Grindelia chihuahuana*. DeJong 948 (CINC).



Figure 18. *Grindelia chihuahuana*. Detail from *DeJong 948* (CINC).

Figure 19. *Grindelia chihuahuana*. DeJong 940 (CINC).



Figure 20. *Grindelia havardii*. REGION 1. Culberson Co., Texas, Moore & Steyermark 3607 (MO). Holotype.



Figure 21. *Grindelia havardii*. REGION 1. Culberson Co., Texas, Moore & Steyermark 3607 (MO). Isotype.



Figure 22. *Grindelia havardii*. REGION 1. Culberson Co., Texas, Moore & Steyermark 3607 (NY). Isotype.



Figure 23. *Grindelia havardii*. REGION 1. Culberson Co., Texas, *Higgins 17313* (BRY).

Figure 24. *Grindelia havardii*. REGION 2. Pecos Co., Correll 33362 (LL).



Figure 25. *Grindelia havardii*. REGION 2. Pecos Co., Turner 23.207 (SRSC).



Figure 26. *Grindelia havardii*. REGION 3. Terrell Co., Johnston 6460 (LL).



Figure 27. *Grindelia havardii*. REGION 3. Terrell Co., Raven 19196 (SMU).



Figure 28. *Grindelia delnortana*. Warnock 6358 (SRSC).



Figure 29. *Grindelia delnortana*. Characteristic leaf margin.

Figure 30. *Grindelia delnortana*. Warnock 6358 (SMU).

Figure 31. *Grindelia delnortana*. Carigan 149 (SRSC).



Figure 32. *Grindelia delnortana*. Warnock 3915 (SRSC).



Figure 33. *Grindelia delnortana*. Warnock 6466 (SMU). Holotype.



Figure 34. *Grindelia delnortana*. Warnock 6466 (SRSC). Isotype.

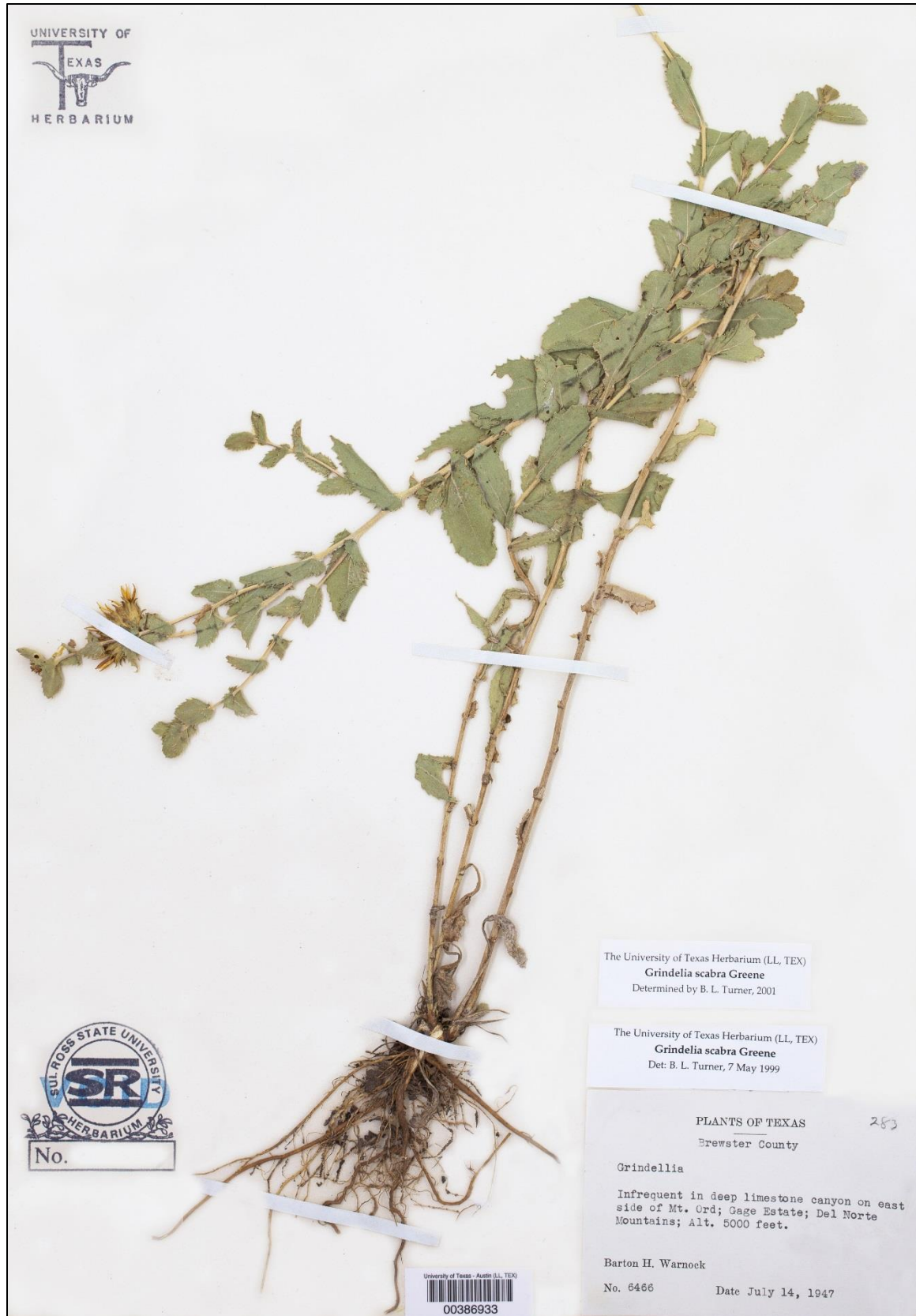


Figure 35. *Grindelia delnortana*. Warnock 6466 (TEX). Isotype.



Figure 36. *Grindelia chisosensis*. Brewster Co., Big Bend Natl Park, Warnock 23459 (SRSC). Holotype.



Figure 37. *Grindelia chisosensis*. Brewster Co., Big Bend Natl Park, Warnock 23459 (TEX). Isotype.



Figure 38. *Grindelia chisosensis*. Brewster Co., Chisos Mtns, Young s.n. (SRSC).



Figure 39. *Grindelia chisosensis*. Brewster Co., Chisos Mtns, Sperry s.n. (US).



Figure 40. *Grindelia chisosensis*. Brewster Co., Dead Horse Mtns, Fenstermacher 1043 (SRSC).

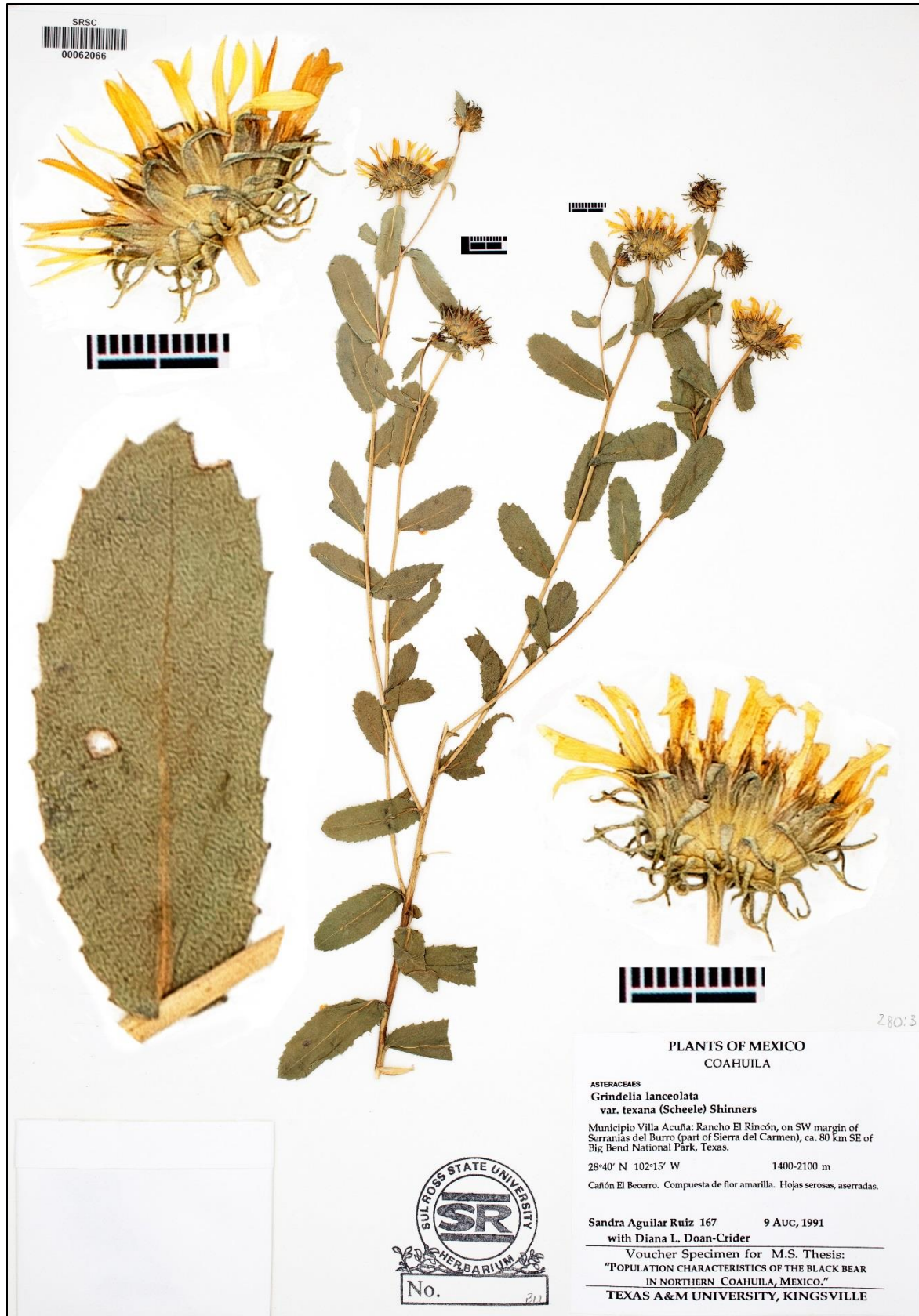
Figure 41. *Grindelia spinulosissima*. Aguilar Ruiz 167 (SRSC).



Figure 42. *Grindelia spinulosissima*. Carranza C-704 (MEXU).



Figure 43. *Grindelia spinulosissima*. Details from Aguilar Ruíz 167 and Villarreal 6953.



Figure 44. *Grindelia grandiflora*. Schleicher Co., Texas, Turner 98-491 (TEX).



Figure 45. *Grindelia grandiflora*. Sutton Co., Texas, Cory 50344 (SMU).



Figure 46. *Grindelia grandiflora*. Val Verde Co., "between the head of the San Pedro river and Live Oak Creek," Schott s.n. (NY).



Figure 47. *Grindelia grandiflora*. Val Verde Co., "Rio Bravo del N., Rio San Pedro," Devil's River, Schott s.n. (NY).



Figure 48. *Grindelia texana*. Tarrant Co., Texas, Byerly 524 (BRIT).



Figure 49. *Grindelia lanceolata*. Polk Co., Texas, *Hillhouse s.n.* (TEX). Coastal plain system.