Manual of the Saltbushes (*Atriplex* spp.)
in New Mexico

Warren L. Wagner and Earl F. Aldon

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Forest Service
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Abstract

This manual of Antipea species commonly found in New Mexico has been prepared so that both the experienced taxonomist and the non-specialist can identify these plants from detailed drawings and a simplified key.

Acknowledgments

We wish to especially thank Dan Godfrey for the exceptional effort he expended in the preparation of these original illustrations.
Manual of the Saltbushes (Atriplex spp.) in New Mexico

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Rocky Mountain Forest and Range Experiment Station

The research reported here is a contribution of the SEAM program. SEAM, an acronym for Surface Environment and Mining, is a Forest Service program to research, develop, and apply technology that will help maintain a quality environment and other surface values while helping meet the Nation's mineral requirements.

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Introduction

The genus *Artemisia* has a host of desirable characteristics. The genus includes both annual and perennial species that can tolerate extreme site conditions, are constituents of both early spring and summer mature plant communities, are excellent sources of food and cover for domestic livestock and wildlife, and can be planted successfully on badly eroded and/or mine spoil areas.

Species identification for the nonspecialist has been difficult, however, due to pheno-
typic variations, hybridization, and similar flower, fruit, and vegetative characteristics. To assist both trained and inexperienced field personnel in the identification of *Artemisia* species, several approaches to identification of a species are presented.

How to Use the Manual

Most field personnel will find the polygon (multiple-path) key easiest to use. One can start anywhere in the key, and use the process of elimination to arrive at an identification. Examine the specimen for characteristics used in the key. Evaluation of each character will eliminate some species, so that, after a few characters are examined, only one or two species possibilities will remain. A quick check of the species drawings and New Mexico distribution maps should provide conclusive identification. Both general morphological and vegetative dichotomous keys have also been constructed.

The original illustrations for each species are especially useful in identification. They include a sketch of typical growth form, pistillate and staminate branches for dioecious species or one branch for monocious species, enlarged views of leaf variation, and dorsal views of the fruiting structures.

Specimens and Literature Examined

Detailed botanical descriptions are based on literature sources cited in the text, and morphological data collected from all material examined. We studied collections from all but northeastern New Mexico. The New Mexico State University (NMC), Arizona State University (ASU), and University of New Mexico (UNM) herbaria holdings were also examined.

Following each description is ecological information that reflects situations encoun-
tered in New Mexican populations. Also included are other *Artemisia* species that may be sympatric with the species considered. Distribution maps for the known ranges of the species in New Mexico are based on herbarium material and field observations.

Specimens examined are listed alphabetically by county at the end of this manual.

We have freely consulted and benefited from the major monographs of the genus in North America. S. Watson's work in the Revision of the North American Chamissonaceae *Proc. Am. Acad.* 9:82-126, 1874 was the earliest we consulted. P. C. Standley (N Am. Fl. 21:111-140, 1916 added numerous species to the 40 recognized by Watson. Thamnosera was partly due to Standley's more narrow species concept. More recently, H. M. Hall and P. R. Clemettin (Carnegie Inst. Wash. No. 325:235-346, 1923 adopted an extremely broad species concept in their monumental account of the genus. They reduced the 153 species recognized by Standley to 42 broadly defined species with numerous subspecies and minor varieties. The present study of the New Mexican species largely follows Hall and Clemettin.

Other revisions covering certain moody members of the genus based on a smaller geographical region were also useful; they include Brown, G. D. (Am Mid. Nat. 55:201- 210, 1956), Hamson, C. A. (M.S. thesis, Brigham Young Univ., 1942) and Reed, C. F. (Plants of Texas III:52-68, 1969).
Glossary

This is not a complete glossary of all terms appearing in this manual. It does, how-
ever, define the words you will need to use the polyclass key. A basic knowledge of common terms used in the identification of plants is assumed, and only less common terms used in the polyclass key are listed here. For a more complete and illustrated glossary see H. D. Harrington and L. W. Darrel's "How to Identify Plants" (1957), Swallow Press.

1. Attenuate: gradually narrowing to a base
2. Clad: cut in, about half way
3. Cordate: heart shaped
4. Conic: wedge-shaped
5. Facetative: capable of occurring or not occurring depending on environmental factors
6. Furfuraceous: resembling flakes or grains of bran
7. Glabrate: becoming hairless in age
8. Glomerules: a dense, crowded cluster
9. Hastate: arrow shaped with basal lobes pointing outward
10. Scatulic: without a stalk
11. Stamina:aromatic: floral bracts of male flower (see plate 1)
12. Terete: circular in cross-section
13. Truncate: squared at base
14. Tuberculate: bearing small pimplelike structures
Plate 1.—Flowers, seed, and fruit characters used in classification.
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<tbody>
<tr>
<td>1.</td>
<td>A. patula L. subsp. hastata (L.) H &amp; C. (Halbert-leaved saltbush)</td>
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<td>2.</td>
<td>A. rostrata L. (Red scaphe)</td>
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<td>3.</td>
<td>A. semibaccata R. Br. (Austrakan saltbush)</td>
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<td>4.</td>
<td>A. setacea S. Wats. (Tansacale)</td>
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<td>22</td>
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<tr>
<td>5.</td>
<td>A. argentea Nutt. subsp. argentea (Silverscale saltbush)</td>
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<td>6.</td>
<td>A. argentea Nutt. subsp. maximus (S. Wats.) H &amp; C.</td>
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<td></td>
<td>(Maxim's saltbush)</td>
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<td>7.</td>
<td>A. powellii S. Wats. (Blusscale)</td>
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<td>8.</td>
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<td>9.</td>
<td>A. elegans (Moq.) D. Dietr. subsp. thomsettiana (Jones) W. E. Wiggins</td>
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<td></td>
<td>(Thomsett's saltbush)</td>
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<td>10.</td>
<td>A. urqhuiri S. Wats. (Wright saltbush)</td>
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<td>A. acaenophylla (Tott.) S. Wats. (Brownscale)</td>
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<td>12.</td>
<td>A. oblonga Moq. (Broadbale)</td>
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<td>13.</td>
<td>A. cuneata A. Nels. (Moundscale)</td>
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<td>14.</td>
<td>A. corniculata S. Wats. (Mastscale)</td>
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<td>15.</td>
<td>A. griffithii Standl. (Griffith's saltbush)</td>
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<td>16.</td>
<td>A. corniculata (Tott. &amp; Frem.) S. Wats. (Brownscale)</td>
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<td>17.</td>
<td>A. conocephala (Parsh) Nutt. (Four-wing saltbush)</td>
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<td>Planta monoeccosa</td>
<td>Planta dioeciosa</td>
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<th>Leaves equal width throughout</th>
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<td>A. argentea argentea</td>
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<td>A. griffithi</td>
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1E=Evergreen, FE=Facultative evergreen, S=Shrub, SS=Subshrub, CP=Crown perennial.
Leaves grayish-turquoise
A. rosea
A. secunda
A. argentea argentea
A. argentea expansa
A. ohouri
A. connata
A. griffithii
A. coniferifolia
A. canescens

Leaves whiteish-turquoise
A. rosea
A. semibaccata
A. secunda
A. powellii
A. elegans elegans
A. elegans thomsonii
A. urvillei
A. acanthocarpa
A. obovata
A. connata
A. corrigata

Fruitig bracts
distinctly stalked
A. semibaccata
A. elegans elegans
A. elegans thomsonii
A. urvillei
A. acanthocarpa
A. obovata
A. connata
A. canescens

Fruitig bracts
sessile
A. confertifolia
A. pataula hastata
A. canescens
A. rosea
A. semibaccata
A. secunda (smaller bract type)
A. argentea argentea
A. argentea expansa
A. powellii
A. urvillei
A. obovata
A. connata
A. corrigata
A. griffithii

Seeds pale brown
A. elegans elegans
A. elegans thomsonii
A. obovata (reddish)
A. corrigata (reddish)
A. confertifolia (reddish)

Seeds brown
A. argentea argentea
A. argentea expansa
A. urvillei
A. acanthocarpa
A. connata
A. griffithii
A. canescens

Seeds dark brown
A. rosea
A. semibaccata
A. pataula hastata

Seeds black
A. pataula hastata
A. semibaccata
A. rosea

Leaves yellowish-turquoise
A. argentea A. secunda (see text 6a)
A. obovata
A. connata
Leaves glabrate
A. pataula hastata (light grayish-turquoise in youth)
Fruiting bracts united only at base
A. patula hastata
A. griffithii
A. confertifolia (over seed)

Fruiting bracts united nearly or to apex
A. accertia
A. powelli
A. elegans elegans
A. elegans thorowasi
A. acanthocarpa
A. cuneata
A. corvusata
A. canescens

Radicle superior
A. griffithii
A. accertia
A. confertifolia
A. argentea argentea
A. argentea espinosa
A. powelli
A. elegans elegans
A. elegans thorowasi
A. urquilii
A. acanthocarpa
A. obovata
A. cuneata
A. corvusata
A. canescens

Radicle laterals
A. rosea
A. semispicata

Radicle inferior
A. patula hastata

Staminate inflorences of auxiliary glomerules or terminal leafy glomerules
A. elegans elegans
A. elegans thorowasi
A. patula hastata
A. argentea argentea
A. argentea espinosa
A. rosea
A. semispicata
A. accertia
A. powelli

Staminate inflorences of terminal spikes or spike-like glomerules
A. patula hastata
A. rosea
A. argentea argentea
A. argentea espinosa
A. cuneata (dark brown flowers)
A. corvusata (light brown or yellow flowers)
A. confertifolia

Staminate inflorences of panicles
A. accertia
A. urquilii
A. griffithii
A. acanthocarpa
A. obovata
A. canescens
Fruiting bracts smooth face
A. semibaccata
A. megalocarpa (smaller bract type)
A. argentea argentea (rarely)
A. argentea eburnea
A. poueili (rarely)
A. elegans elegans
A. urighiti
A. ovata
A. griffithii
A. coniferoloba

Leaf bases cuneate
A. coniferoloba
A. griffithii
A. corrigata
A. rosae
A. semibaccata
A. cotyledon
A. argentea argentea
A. argentea eburnea (rarely)
A. poueili
A. urighiti
A. elegans elegans
A. elegans thornberi
A. acanthocarpa
A. obovata
A. cotyledon

Fruiting bracts tuberculate
A. canescens (rarely)
A. patula hastata
A. rosea
A. semicarpus (larger bract type)
A. argentea argentea
A. argentea eburnea (rarely)
A. poueili
A. elegans thornberi
A. urighiti (rarely)
A. acanthocarpa
A. obovata (rarely and inconspicuous)
A. coniferoloba
A. corrigata

Leaf bases attenuate
A. semibaccata
A. urighiti
A. elegans elegans
A. elegans thornberi

Leaf bases truncate or cordate
A. griffithii
A. semicarpus
A. argentea argentea
A. argentea eburnea

Leaf bases hastate or subhastate
A. patula hastata
A. argentea eburnea (sub)
A. acanthocarpa (sub)
A. argentea argentea (rarely) (sub)
Lower leaf margins entire
A. griffithii
A. acaulis-cespitosa (rarely)
A. acaulina
dA. acaulis
A. argentea argentea (rarely)
A. confertifolia
A. corrugata
A. canescens
A. powellii
A. elegans elegans
A. elegans thomberi
A. argentea (rarely)
A. coriacea

Lower leaves opposite
A. argentea argentea
A. argentea argentea
A. obovata
A. canescens
A. acclinicaespicta
A. russa
A. pumila hastata

Leaves mostly opposite.
A. corrugata

Stamine perianth 4- or 5-creep.
A. potilia hastata

Stamine perianth 6- or 5-creep.
A. powellii
A. elegans elegans
A. elegans thomberi
A. griffithii
A. canescens
A. russa
A. semibaccata
A. argentea argentea

Stamine perianth 5-creep.
A. argentea argentea
A. argentea
A. acaulis-cespitosa
A. obovata
A. coriacea
A. confertifolia
Found in northeast quadrant of
N. Mex.
A. raucra
A. argentina argentina
A. canescens

Found in southwest quadrant of
N. Mex.
A. semibaccata
A. elegans elegans
A. elegans floribunda
A. urquidi
A. acanthocarpa
A. abovata
A. griffithii
A. canescens

Found in central N. Mex.
A. argentina argentina
A. argentina expansa
A. poueiri
A. abovata
A. canescens
A. potala hastata

Found in northeast quadrant of
N. Mex.
A. pr corda hastata
A. rosetu
A. seceraria
A. argentina argentina
A. poueiri
A. abovata
A. canescens
A. canescens

Found in southeast quadrant of
N. Mex.
A. raucra
A. semibaccata
A. argentina expansa
A. elegans elegans
A. acanthocarpa
A. canescens
1. Plants annual or crenal perennial, stems never woody above the caudex, commonly monocussus subdioecious in A. paulisi and occasionally dioecious in A. patula subsp. hastate ...........................................

2. Plants, subshrubs or shrubs, stems woody at least near the base, commonly dioecious (rarely monoecious in A. cunningh. and A. cunningh. var. ambigua) ...........................................

2(1). Plants perennial from a woody caudex; stems prostrate, forming spreading mass; terete; leaves elliptic-oblanceolate to slightly spatulate, irregularly and reniform-rendedentate; fruiting bracts succulent and reddish at maturity; the faces smooth; seeds dark brown or black (northern) ...........................................

2. Plants annual, old basal portions of stems sometimes woody in appearance; stems erect or if decumbent not forming spreading mats, commonly angulatus; leaves various; fruiting bracts never succulent or reddish at maturity, commonly ligulate, the faces smooth to tuberculate; seeds brown to greenish (except dark brown to black in A. rens and A. patula subsp. hastate) ...........................................

3. Leaves strongly 3-nerve from the base, the lateral nerves elongate, ascending, blades entire, thick and firm, ovate to oblong-obovate, densely whitish-hairy and sometimes at least beneath, plants sublunolacini, some plants pilose others chiefly staminiate with scattered pilose flowers in leaf axils (northeastern to central) ...........................................

4. Leaves strongly triangular-hastate, commonly becoming glabrate and green on both surfaces, lower leaves opposite; stems decumbent or procumbent; flowers in naked, terminal spike-like clusters and axillary glomerules, both staminate and pistillate flowers mixed in the same glomerule; staminate flowers 4-cleft; fruiting bracts rounded-subulate, the faces short tuberculate, united only at the base; seeds black; radicle inferior (moist alkaline soils, scattered) ...........................................

4(3). Lower leaves not triangular-hastate, sometimes subhastate, usually remaining furrowaceous at least on the lower surface, lower leaves alternate or opposite; stems erect; flowers not in naked terminal spike-like clusters or if so, then these with staminiate flowers superior to the perianth or the inflorescence entirely staminate; staminate flowers 4- or 5-cleft; fruiting bracts not rounded-subulate or if so, then the faces with flat or crested tubercles, united at least the middle; seeds black; radicle inferior (moist alkaline soils, scattered) ...........................................

4(5). Lower leaves not triangular-hastate, sometimes subhastate, usually remaining furrowaceous at least on the lower surface, lower leaves alternate or opposite; stems erect; flowers not in naked terminal spike-like clusters or if so, then these with staminiate flowers superior to the perianth or the inflorescence entirely staminate; staminate flowers 4- or 5-cleft; fruiting bracts not rounded-subulate or if so, then the faces with flat or crested tubercles, united at least the middle; seeds black; radicle inferior (moist alkaline soils, scattered) ...........................................

5. Leaves merely cordate, deltoid-ovate, lance-ovate, or oblong-obovate, broadest below the middle, cordate to broadly cuneate at the base, at least 3-nerve, the lateral nerves sometimes obscure ...........................................

6. Leaves oblong to elliptic-spatulate or obovate, broadest at or above the middle, cuneate or attenuate at the base, strongly 1-nerve ...........................................

6(5). Fruiting bracts (often those on the same plant, or even the same axis) distinctly dimorphic, the smaller type ovoid-conic with a recurved base, 9-15 mm long and narrowly oblong, the larger type narrowly obovate and much more smooth-faced, the larger rounded-triangular with numerous flat or crested tubercles, united only at the base, erect, often covering much of the entire plant (northeastern) ...........................................

7. Fruiting the faces dimorphic, verrucous with conspicuous, often scattered, smooth faces; leaf margins entire to reniform-rendedentate ...........................................

8. Leaves cordate-cuneate or ovate; leaves roughly triangular at the base, thick and moist to the touch when fresh, whitish-furrowaceous, alternate; staminate flowers in open terminal clusters and not in glomerules, never in terminal spikes or of spike-like clusters ...........................................

4. A. accorti ...........................................

7(6). Leaves ovate-acuminate or oblong-obovate; leaves broadly truncate at the base, thick and moist to the touch when fresh, yellowish-furrowaceous, alternate or sometimes opposite; staminate flowers never in open terminal clusters, usually only in radial series, rarely in terminal spikes or spike-like clusters ...........................................

4A. A. accorti x A. argenteus subsp. argenteus. ...........................................
8(6). Stems terete; fruiting bracts distinctly 3-ovate, becoming strongly indurate in age; leaves rhomboid-ovate, ovate, or oval, acutely and conspicuously sinuate-dentate, rarely subobtuse, sparsely grayish- or whitish-furrowed, sometimes paler beneath; seeds dark brown, radicle lateral (scattered, but widespread)..................2 A. roose

8. Stems acutely angled; fruiting bracts not distinctly 3-ovate, not becoming strongly indurate in age; leaves deltoid-ovate, ovate, or lance-ovate, entire to irregularly dentate, often densely grayish, whitish, or yellowish-furrowed; seeds brown, radicle superior..................9

9(8). Upper leaves sessile or clasping, commonly subobturate or truncate at the base, sparsely furrowed; fruiting bracts with herbaceous, dentate margins, the faces smooth or with a few green irregular tubercles (Rio Grande Valley, central to northern)..................6 A. argentea subsp. argentea

9. Upper leaves short-petiolate, not clasping, cuneate at the base, densely furrowed; fruiting bracts with or without herbaceous margins, subulate to laciniate or appendaged, the faces smooth to densely appendaged (northern to central)..................10

10(9). Stems and leaves grayish- or whitish-furrowed (northern and central)..................5 A. argentea subsp. argentea

10. Stems and leaves yellowish-furrowed (northwesterns)..................4 A. accuminata s. A. argentea subsp. argentea

11(5). Stems in conspicuously naked or nearly naked terminal panicles 3-20 cm long; plants usually over 3 dm tall, sparsely branched or simple; leaves distinctly bicolorous, densely whitish-furrowed beneath, green and glabrate above (southwesterns)..................10 A. argentea

11. Stems in flowers in few-flowered axillary glomerules mixed with the pubescent flowers at least below; plants usually less than 3 dm tall, much branched from the base; leaves not distinctly bicolorous, whitish-furrowed on both surfaces but usually paler above..................12

12(11). Fruiting bracts ciliate, the margins laciniate-dentate to the base, the terminal tooth sometimes larger, the faces smooth (southern)..................9 A. elegans subsp. elegans

12. Fruiting bracts ciliate-ovate, ciliate to truncate at the base, the margins irregularly laciniate, the terminal tooth larger, the faces with two prominent laciniate appendages near the base (southwesterns)..................10 A. elegans subsp. thumbieri

13(1). Fruiting bracts conspicuously 4-angled, never prominently tuberculate; plants shrub, usually over 3 dm tall; leaves entire, spathulate, obovate, linear or acutely elliptic (widespread)..................17 A. coccinea

13. Fruiting bracts not conspicuously 4-angled, smooth or tuberculate; plants shrub or subshrub, usually less than 5 dm tall; leaves variously shaped ..........................14

14(13). Stems glabrous, or sparsely to strongly strigose; leaves linear-ovate or oblong, 1- to 3-nerved; flowers in more or less interrupted, terminal, flexuous panicles, the peduncles persistent after flowering; fruiting bracts coriaceo-enformis (allkaline plays, southwesterns)..................15 A. griffithii

14. Stems with terete to obtusely angled, flexuose, pellucid; leaves not elliptic-ovate or oblong or so, then plants with branches either spinose or stout, 1- to 3-nerved; flowers not in terminal, flexuous panicles; fruiting bracts coriaceo-enformis ..................35

15(14). Stems becoming spinose; plants woody throughout, very compact and rigidly branched; fruiting bracts united only below the middle, orbicular or broadly elliptic, the faces smooth, the margins entire to dentate, rarely undulate (northwestern and central) ..................16 A. confertiflora

15. Stems not becoming spinose; plants woody only below the middle, not compact and rigidly branched; fruiting bracts united at least the middle, never orbicular or broadly elliptic or so, then the margins sharply dentate or the bracts tuberculate ..........................16

16(15). Leaves commonly sinuate-dentate, usually subobtuse; fruiting bracts on pedicels 2-10 mm long, the bracts 8-14 mm long, the faces with long handsome tubercules, the tubercules usually over 4 mm long; faces densely whitish-furrowed (southern)..................11 A. macracopha
16. Leaves entire, never suberect; fruiting bracts on pedicels less than 2 mm long or ovate, the bracts 5-7 mm long, the faces smooth or tuberculate, the tubercles less than 3 mm long; foliage white, grayish, or yellowish-fuscous _[17].

17(16). Staminate flowers in small glomerules along spike-like branches of terminal, nearly naked panicules; fruiting bracts broader than long, the faces usually smooth; stems ultimately stricte and rigidly erect, forming roundish subshrub; leaves oblong to broadly ellipsoid (northwestern, central, and southern) _[17].

17. Staminate flowers in large dense glomerules in sparsely leafy or naked spike-like panicules or spikes; fruiting bracts longer than broad, the faces tuberculate at least at the base; stems stricte or ascending, not strict or rigid, forming large mounds or mats; leaves linear or obovate to broadly ellipsoid (northwestern) _[18].

18(17). Staminate flowers dark brown or reddish-brown, in sparsely leafy spike-like panicules; pistillate flowers in terminal spikes or spike-like panicules, these sparsely leafy below; fruiting bracts globose, the faces with numerous flattened, rarely suberect) or obovate bracts up to 3 mm long; upper leaves alternate, narrowly ellipsoid to obovate or oblong, 0.6 cm wide or more _[19].

19. Staminate flowers light brown to yellow, in nearly naked terminal spikes; pistillate flowers in elongate, naked terminal spikes; fruiting bracts pandurate, obovate, or ovate, the faces with thick wart-like tubercles not less than 2 mm long; upper leaves usually opposite or sometimes alternate, narrowly linear or linear-spandulate, commonly 0.3 cm (rarely to 0.5 cm) wide _[20].

Vegetative Key

1. Plants annual or perennial, deciduous; stems never woody above the caudex .

2. 1. Plants perennial, evergreen or lecithophyll evergreen, stems woody, subshrubs .

3(2). Plants perennial from a spongy, compact, spongelike, forming spreading mats; leaves elliptic-oblong to slightly spatulate, short-petioled, irregularly and remotely repand-dentate (southwestern New Mexico) .

4. Plants annual herbs, old basal portions of stems sometimes slightly woody in appearance; stems mostly all erect; leaves various .

5(4). Leaves cordate-ovate or reniform, entire, cordate or rarely broadly incised at base, thick and moist to the touch when fresh, thin and brittle when dry, yellowish-fuscous, alternate (southwestern) .

6. Leaves never cordate-ovate or if so then other characters not as above, neither or -narrow, not thick and moist nor thin and brittle when dry, grayish, whitish, or yellowish-fuscous, alternate or the lower opposite .

7(6). Stems weak; leaves alternate or the lowest subopposite, widest to obovate or ovate, dentate-dentate, or rarely suberect, grayish- or whitish-fuscous on both surfaces, slightly paler beneath, not crowded (elevengrand) .

8. Stems angusti; leaves various but never with the above combinations of characters .

9(8). Leaves strongly 3-nerved from the base long, ascending, lateral nerves, entire, thick and firm, ovate to obovate-fuscous densely fuscous beneath (northwestern to central) .

10. Leaves not 3-nerved from the base or if so then the lateral nerves short or spreading or else the margins dentate, not thick and firm, variously fuscous .

11(10). Leaves entire, never suberect; fruiting bracts on pedicels less than 2 mm long or ovate, the bracts 5-7 mm long, the faces smooth or tuberculate, the tubercles less than 3 mm long; foliage white, grayish, or yellowish-fuscous _[17].

12. A. arbustae .

13. A. corymbosum .
6(5). Stems decumbent or procumbent; leaves triangular-hastate, commonly becoming glabrate and green on both surfaces at maturity, lower leaves opposite bracteate, sterile flowers with filiform spathes. 1. A. paniculata subsp. hastata.
6. Stems erect; leaves not hastate, rarely subulate in A. argentata; remaining acrly and whitish, greyish or yellowish, at least on the lower surface at maturity; lower leaves alternate or opposite. 7.
7(6). Leaves oblong to elliptic-oblanceolate or ovate, usually broadest at or above the middle, cuneate or attenuate at the base, in- or dentate or rarely entire, lower surface lighter than the upper, strongly 3-veined (southern). 8.
7. Leaves oblong to elliptic-oblanceolate or lanceolate, usually broader below the middle, cuneate to truncate or rarely slightly truncate at the base, entire to toothed, lower surface similar in color to the upper surface, sometimes upper surface lighter, 1-3-nerved. 9.
8(7). Plants usually over 3 dm tall, sparsely branched or unbranched. 10. A. greggii.
8. Plants usually less than 3 (rarely to 6) dm tall, much-branched from the base. 9.
9(8). Upper leaves sessile or clasping, usually subulate or truncate at the base, sparsely tomentose (Rio Grande Valley, south-central to southern). 10. A. argentea subsp. argentea.
9. Upper leaves short petiolate, never clasping, cuneate at the base, densely tomentose. 11.
10(9). Stems and leaves glabrous or pubescent (northern and central). 11. A. argentea subsp. argentea.
11. Stems slender or obtusely angled subulate to inconspicuous, stout, simple to much branched; leaves not elliptic-oblanceolate or oblong or 3-nerved, with plants with spinose or stout branches, 1-3-nerved. 13.
12(11). Leaves mostly opposite, broadly linear or linear-lanceolate, commonly 0.3-0.5 cm wide or less; plants forming densely leafy mats 1-2 dm high; stems sometimes rooting at the nodes (extreme northwestern). 13. A. caraguata.
12. Leaves mostly alternate, or lower leaves opposite or subopposite, usually not linear or linear-lanceolate, often over 0.6 cm wide; plants not forming spreading mats or mats, then A. canescens leaves elliptic to spatulate or oblong and stems not rooting at the nodes. 14.
13(12). Stems becoming spinose; plants woody throughout, very compact and rigidly branched; leaves oblanceolate or linear-lanceolate, coarsely serrate (southern). 14. A. canescens.
13. Stems not becoming spinose; plants somewhat woody throughout, loosely to densely branched but not compact and rigidly branched. 15.
14(13). Leaves mostly parallel or nearly so; upper, oblanceolate or oblong-lanceolate, broader if mostly below the middle, usually subulate, thick, densely whitish-tomentose; subulate or rarely lanceolate; 1/4 acanthocephaloid. 15. A. acanthocephaloides.
14. Leaves never subulate-dentate (rarely dentate in A. canescens), oblong, elliptic, spatulate, or oblanceolate, rarely linear; broadest mostly at or above the middle, never subulate, grayish, white, or yellowish-tomentose, subulate or subshrub. 16.
15(14). Plants woolly throughout, usually over 5 dm tall, forming variously shaped plastic, leaves spatulate, oblong, linear, or rarely elliptic (indigocarpos). 17.
15. Plants woolly only at base, usually less than 5 dm tall, forming roundish or spreading plants with erect stems; leaves oblong or broadly elliptic, rarely spatulate or oblonging. 18.
16(15). Stems mostly and rigidly erect from decumbent bases, forming roundish subshrub, nearly large mounds or mats; leaves ovate to broadly elliptic (northwestern, central, and southern). 17. A. obovata.
16. Stems erect to ascending, but not erect or rigid, from spreading decumbent bases, forming large mounds or mats; leaves broadly elliptic to spatulate or oblonging (northeastern). 18. A. canescens.
Systematic Treatment


*Phlox* L., Sp. Pl. 463, 1753.
*Sisyrinchium* L., Sp. Pl. 360, 1753.
*Clematis* L., Sp. Pl. 191, 1753.
*Laburnum* L., Sp. Pl. 11, 1753.
*

Summer annuals, subhakeous, or subshrubs, the woody forms either deciduous or evergreen, more or less pubescent with scabrate hairs, leaves alternate or the lower opposite, rarely all opposite, sessile or stipitate, entire or dentate, serrate, or irregularly and deeply toothed; plants dioecious or monoeccious, flowers solitary or in glomerules, the single or clustered flowers in leaf-axils and/or in terminal spikes or panicles, the stamens and pistillate flowers mixed in the same cluster or the staminate superior or terminal to the pistillate axillary glomerules; staminate flowers bisexual, perianth 3-5, stamens 3-5, filaments long or short, anthers 2-celled, ovary superior or inferior, style 1-2, ovule 1, fruit a capsule, seeds many or few, brown, black, or red, unilocular, many-locular, or rarelyilocular, enclosed or free, sometimes the carpels united in various ways.

*Arthropitum* sylvaticum R. Br. Type species *Arthropitum* horridum L.
Halberd-leaved salvinia

Annual herb; stems erect, decumbent or prostrate; 3-9 dm long, usually much branched, branches ascending or spreading, ultimately angled; sparsely or densely forreestance when young, often glabrous, green or amenta in age; leaves opposite below, the others alternate, petioles of the lower leaves up to half as long as the blade, upper leaves very short-petioled, the blades of the lower leaves broadly triangular, hastate or crenate-hastate, 2.5-7 cm long and nearly as broad, acute or obtuse at the apex, truncate at the base or with a rounded sinus, the margins entire or more or less sinuate-dentate or shallowly repand-dentate, the basal lobes acute, the upper blade hastate-oblong to lanceolate, smaller, mostly entire margined, acute at the apex, truncate or broadly cuneate at the base, the cauline leaves narrower, the petioles acute, the above slender, withering, the lower blades mostly obtuse to rounded, hairless, membranous or sometimes glaucous; flowers in slender or stout, dense or interrupted, naked, simple or broadly paniculate spikes and usually also in axillary fascicles, both axillaries and pedicellate flowers usually in the same small glomerules; staminate petals usually 4-6; pistillate wanting, fruiting bracts sessile, rounded-difoliate or ovate-difoliate, 5-7 mm long, herbaceous, united only at the truncate or rounded base, often redshin in age, acute or obtuse, dentate or nearly entire on the margin, densely furrowed or glabrate; seed 1.25-2.5 mm long, nearly black, the radicle inferior, New England to South Carolina, Ohio, Indiana, Illinois, Missouri, west to British Columbia and California, and south to Texas; Europe, Asia, and North Africa; flowering from June to October. A very sporadic halophytic annual in New Mexico; presently known only from moist, alkaline soils of Socorro and San Juan Counties. It may occur with other Aquilegia species.
Red orache saltbush

Erect summer annual herb; stems 2-10 dm tall, much branched, or simple at the base, ascending or widely spreading, terete, stramineous or whitish, canescent, furfuraceous or glabrate; leaves alternate, rarely the lowest subopposite, on petioles one-third as long as the blade or sessile, upper leaves sessile, blades ovate, rhombic-ovate, or ovate, 2.8 cm long, 1.5 cm wide, oblong or acute, mucronate, broadly cuneate or rounded at the base, sinuate-crenate or repand-dentate with acute or obtuse teeth, thinly to densely furfuraceous, grayish to whitish, rarely greenish, soft but persistent, entire or subacute, with 3-5-angled pod, to densely cuneate-ovate, 4.5 mm (1.2 mm) long, acute, dentate on the margins, short tuberculate on the sides, 3-nerved, becoming strongly indurated in age; seeds orbicular, 2.5 mm in diameter, dark brown, dull; radicle lateral; Wyoming to southern Washington, south to southern California and Chihuahua,appearing native; adventive New York to Florida; Europe, western Asia, northern Africa and Australia; flowering from July to September. Very sporadic in New Mexico at road sides, cultivated fields or waste places, as a wild species in moderately alkaline soils. It is rarely an abundant species in any local observed in New Mexico. A. roseus occasionally grows with A. argentea, subsp argentea, A. canescens, A. shoshone, A. powelli, or A. saccaria.
2. *A. roseo*
**Australian saltbush**

Prostrate crown perennial from an elongated tap-root, forming spreading mats; stems prostrate, diffusely spreading from the base, 6-15 dm long, much branched, branches wiry, terete, sparsely furfuraceous in youth, later glabrate and then stramineous, the bark rough only on old basal portions; leaves alternate, numerous, short petioled, bladde elliptic, elliptic-oblong, or spatulate, 1.3-5 cm long, 2-9 mm wide, obtuse or acute, ciliate at the base, irregularly and remotely repand-dentate or the upper entire, thin, densely and finely white-furfuraceous beneath, sparsely furfuraceous to glabrate and green on the upper surface, strongly 1-nerved; plants monochorous, staminate flowers in small terminal leafy-bracted glomerules or mixed with the pistillate, pistillate flowers solitary or in few-flowered clusters in the axils of nearly all but the upper leaves; staminate perianth either 6- or 5-lobed, pistillate wanting; fruiting bracts sejate or short stalked, reddish, convex and slightly succulent when fresh but compressed when dry, rhombic, 3.6-6 mm long, 3.5-8 mm wide, acute, cuneate at base, united to about the middle, margins distinctate to entire, faces smooth, strongly (when dry) 3- or 5-nerved; seeds either black or brown, 1.5-3 mm long, grooved near the margin, radicle lateral, from Australia; introduced as a forage plant in California, now established from western Texas to southern New Mexico, southern Arizona, and California; flowering from June to September. Scattered to locally abundant, plains, roadides, and waste places as a serial species in moderately alkaline soils.

This species is an effective soil binder because of its spreading mat habit.

A. semibaccata acts as a native and is often found with A. arborescens, A. elegans and A. strictiflora in or around the margins of playas, A. camascens, A. elegans, or A. strictiflora.


*Atriplex succo* var. *conspicua* Standl., N. Am. Fl. 2(1):45, 1916 (as a synonym, apparently as overnight for A. *succotai*).

Taxoname

Erect annual herbs; stems 1-5 dm high, much branched throughout to form a dense globoid plant, stout, angled, roughly whitish-tanaceous, glabrate in age, the back white and cracking in age; leaves mostly alternate, 1.3 cm long, 1.2-2.5 cm wide, petiolate, the petioles 1.5-5 mm long, the upper leaves occasionally subulate. Blades broadly cordate-ovate to subcordate, to broadly transectate at the base, acute at the apex, entire, thick and moist to the touch when fresh, drying thin, grassy to whitish with a dense rough scurf, plants monocious, staminate flowers in glomerules in the upper axils and in open terminal panicles, these usually deciduous on mature plants, pistillate flowers in few-flowered axillary clusters; perianth of the staminate flowers 5-cloth, pistillate wanting; fruiting bracts sparsely compressed, united to the apex, of two kinds, the larger bracts on pedicels 4.6-6.4 mm long, rounded-triangular or orbicular, 4.6 mm long, irregularly heart or sometimes heartlike appendages, the smaller bracts short stalked or sessile, 3 mm long, conic at base, trunsectate at apex, denticulate and sometimes slightly undulate at apex, faces smooth, densely scurfy, the veins not prominent; seeds brown, 1.6-2.3 mm long; radicle superior; southwestern Wyoming to eastern Utah and Nevada, south to southwestern New Mexico and northeastern Arizona; blooming from June to September. Jones (1904) listed it in Hall and Clements (1923) as collected at El Paso, Texas, far out of the normal range of this species. No recent collections of *A. succotai* have been seen from this Texas locality or from any surrounding areas. Common on badlands, roadcuts and along arroyos, as a dominant on badlands or as a rare species in the other situations. It is often found growing in heavy clay soils without associated species. *A. succotai* when it occurs in less harsh situations is commonly associated with *A. argentea* subsp. *argentea*, *A. pessifilis*, *A. confertifolia*, *A. canescens* or *A. obovata*.

4A. Several specimens from southwestern New Mexico exhibit morphological characters of both *A. succotai* and *A. argentea* subsp. *argentea*. The plants have the characteristic heteromorphic fruiting structures of *A. succotai* but conuate leaf bases like *A. argentea*. These data suggest the possibility of hybridization between the two species which are sympatric in all areas where the aberrant specimens have been taken. These specimens may also represent a distinctive taxon. Support for this hypothesis is shown in the vestiture of the specimens which is more or less densely whitish-tanaceous, unlike either putative parent or any other annual *Atriplex* of southwestern New Mexico. Except for the heteromorphic fruiting bracts on the specimens examined, the aberrant specimens fit the combination of morphological characters established for *A. capitata-medioria Eastw.* (Proc. Calif. Acad. E. 6:306, 1896; Standl., N. Am. Fl. 2(1):45, 1916) which was described by Standley as occurring throughout the Four Corners region. Further field and study is needed to determine whether or not these specimens are hybrids of *A. succotai* and *A. argentea*, *A. capitata-medioria* Eastw. or an as yet undescribed taxon. In this paper these specimens are referred to as *A. argentea* x *A. succotai*. 22
Silverscale saltbush
Erect summer annual bush, 1.5-8 dm tall, freely branched from the base forming a globular plant, rarely more strict or with fewer branches; stems stout, angled, furfuraceous when young, the bark becoming scabrous and exfoliating in age; leaves opposite below, alternate above, all at least short petiolate, distichous to rounded-ovate, 2.5 cm long, 1.4 cm wide, curvate to subobtuse at the base, obtuse or rarely acute at the apex, entire or irregularly dentate, slightly thick, gray-furfuraceous, glabrate; plants monoecious, staminate and pistillate flowers mixing in both axillary glomerules and terminal interposed spikes, sometimes the staminate flowers in pure clusters in terminal spikes, staminate perianth 4- or 5-cleft, pistillate wanting; fruiting bracts sessile or subsessile, compressed, united at least to the middle, obovate or obovate-elliptic, 4-8 mm long, 4.10 mm wide including the green herbaceous margins, adnate to the laminas, the face smooth to variously appressed; seeds brown, 1.5 mm long; radicle tufted; southern Saskatchewan to North Dakota, northern New Mexico and California, also westers Texas; introduced to the midwestern and eastern United States, flowering from July to September.

Scattered to locally common in alkaline usually clay soils, either to mature halophytic communities or as a scleral species. It may occur with A. prostrata, A. acutifolia, A. parellii, A. abrotanum, A. canescens, or A. cupularis. Aberrant forms which are apparent hybrids are discussed under A. canescens. These forms could possibly be A. cupularis-mixtus, presently listed as a synonym of A. arizonicus subsp. argenteus but upon further study these forms may prove to be specifically distinct.
5. *A. argentea*, subsp. *argentea*
Spreading saltbush

Erect summer annual herb, 3-12 dm tall, much branched from the base, rarely with fewer branches; stems stout, sharply angled, sparsely furfuraceous when young, glabrate and stramineous in age; leaves alternate, the lower opipellate or alternate, prilled, the petioles equaling the blades or shorter, the upper closely sessile or clasping; commissural erect, broadly coriaceous or dehiscing to lanceolate, often subhastate or rarely tapering to the petiole, with a spine at the apex, irregularly and sharply dentate or ciliate, 2.5-7.5 cm long, 2-4 cm wide, sparsely furfuraceous; plants monoeocious, staminate and pistillate flowers freely mixing in terminal glomerules or in naked terminal spikes which tend to be mostly staminate; staminate pistil 5-cleft; pistillate wanting; fruiting branch sessile or subcylindrical, united to above the middle, obconic or ovoid-urceolate; 5-7 mm long, 2-4 mm wide, including the coriaceous dentate margins, the face smooth or with a few green irregular tubercles; seeds brown 2.0 mm long; adaxial superior; western Texas to California and northern Mexico; flowering from June to September or October. Scattered in valleys usually in alkaline soils, sand or clays, sometimes as a rare species. It may occur with A. pectinatus, hystrix, A. semibaccata, A. elegans, A. utahii, or A. canescens.

Further investigations in the field and lab, especially breeding and cytogenetic studies may prove this taxon a hill species status rather than subsp. rank.
6. *A. argentea*, subsp. *exposa*


Rhscale
Strictly erect summer annual herb; stems 3-14 dm tall, simple to sparingly-branched from the base forming a prostrate or colonnlar plant, ascending or erect, somewhat woody and brittle in age, obtusely angled, white-turbinatose, the old bark exfoliating in papery layers, pilose, upper ones subulate or sessile, petals nearly as long as the blades, blades broadly obovate or rhombic-ovate, rounded or abruptly cuneate at the base, acute at apex, 1.3-1.5 cm long, 0.8-3 cm wide, entire, thick and firm, not flabby, densely white-turbinatose especially on lower surface, prominently 3-nerved from the base; plants imperfectly dioecious, some plants purplish-pilose, others chiefly staminiate but with scattered pistillate flowers in the lower half, and some plants with pistillate flowers below the staminate, flowers all in axillary glomerules exceeded by subending leaves; staminate perianth 4- or 3-lobed, pistillate wanting; fruiting bracts sessile, thick, united to apex, broadly spatulate to oblanceolate, 3-4 mm long, the faces with prominent thickened ascending processes or these rarely wanting, the apex margined with a truncate green lobes; seeds 2 mm long, greenish-yellow; radicle superior; Alberta to eastern Colorado, northeastern New Mexico, northeastern Arizona, and Utah. Blooming from July to September.

Common to locally abundant in alkaline clay or sometimes sandy soils, often acting as a weed species. It often occurs with A. seors, A. argentea, A. obsoleta, A. canescens, A. corrugata, A. cuneata, or A. rainier.
7. *A. powellii*


Whitesclade sablach

Exact summer annual herb; stems 1.4–3 dm tall, much branched from the base, obtusely angled, ascending (rarely prostrate), coarsely luteaceous when young, glabrate and then stramineous to red; leaves alternate, sessile or short-petioled, oblong to obovoid or elliptic-ovate, cuneate to attenuate at the base, obtuse at the apex, 0.3–4.5 cm long, 0.9 to 0.9 cm wide, entire or irregularly and remotely short-dentate, bluish-white luteaceous on both surfaces but generally lighter above, only the midvein prominent; plants monochasium, lower few-flowered axillary glomerules, lower glomerules usually rarely pediunculate, the upper mixed or rarely pediunculate near the apex; perianth of staminates flowers 4–or 5-cleft, pistillate wavy; fruits bracts short pedicelled, strongly compressed, united throughout except the herbaeaceous margins, orbicular, 0.2–0.4 cm in diameter, margins lacinate-dentate usually to the base, the terminal tooth occasionally larger, the faces flat and unappressed, the midrib prominent, glabrate; seeds pale brown or whitish; radicle superior; winter Texas to southern California; south to Durango, Mexico; flowering after early summer rains through fall, rarely in spring after heavy winter moisture. Species in grasslands, arroyos, or as a serial species where it is usually abundant, generally in moderately alkaline soils. This species does not usually grow with other *Artipea* species, but may be found occasionally with *A. urvillei*, *A. argentea subsp. expera*, *A. connexa*, or *A. elegans* subsp. thomberi.


Thomber wheelscale

Characters as in *A. elegans* subsp. *elegans* except that the fruiting bracts are cuneate-obtusely, cuneate to truncate at the base, the faces with the prominent luteaceous appendages near the base, the margins irregularly and deeply lacinate, the terminal tooth occasionally larger; south-central New Mexico to south-central Arizona and northern Mexico; flowering after early summer rains throughout fall. Species in grasslands, arroyos, or as a serial species generally in moderately alkaline soils. This species may grow with *A. elegans* subsp. *elegans*, *A. connexa*, or *A. urvillei*. *A. elegans* subsp. *thomberi* does not appear to intergrade morphologically with *A. elegans* subsp. *elegans*.
Ophiopogon elegans var. nudata Torr., U.S. & Mex. B. & R. Bot. 333, 1859 (partite; not Ophiopogon nudata Torr.)


Wrightia salishii

Erect or ascending annual herb; stems 2-10 dm tall, simple or sparingly branched from the base, the branches stout, obtusely angled, sparingly hirsute at young, glabrate and stramineous or reddish in age; leaves alternate, short petiolate or sessile, the blades oblong to elliptic-oblanceolate, 1.7-7.5 cm long, 0.3-1.5 cm wide, obtuse and mucronate or the upper ones acute at the apex, coriaceous, long-attenuate at the base, coarsely sinuate-dentate or repand-dentate, or these nearly entire, thin, densely white-hirsute beneath, green and glaucous above at least in age, strongly 1-nerved, plane or concave, exstipulate, in cymes axillaries or erect on peduncles 0.5-3 cm long, 2-4 mm broad, the margins entire, obtuse or subacute; flowers in Racemes 1-2 cm long, few, in several clusters, short-pedicellate; calyx-lobes 0.9-1.1 mm long, narrowly ovate, strongly compressed, united to about the middle, coriaceous; petals whitish, 2.5-3 mm long, 2-9 mm broad, the margins entire, obtuse or subacute; seeds 1.2-1.3 mm long, brown, radicile superior; western Texas, southwestern New Mexico, central Arizona and northern Mexico. Also reported by Reed (1969) from California and Nevada; probably flowering from July to September.

Occasional to common along intermittent streams and arroyos in desert and grassland regions, also occurs at several species and grows along roadways, in grassed and cultivated fields. It usually grows in slightly alkaline soils and may occur with A. elegans, A. convoluta, A. ambiscutata and possibly A. argentea subsp. expansa.


**Burscale**

Erect evergreen shrub, 2-10 dm tall; stems woody up to the riddle or only at the base, freely branching from the base, stout, obtusely angled or nearly square, densely furrowed; stemate plants occasionally less densely furrowed, the bark on Woody portions exfoliating in age; leaves alternate or the lower opposite, short petiolate or sessile, the blades oblong to obovate-elliptic or ovate, usually subhyaline, 1.5-5 cm long, 0.5-2.5 cm wide, broadly cuneate at base, obtuse at the apex, usually entire or rarely crenate, thick, white with a dense scurf, plants discursive, stemate flowers in dense glomerules in sparsely leafy, intermixed pinulate spikes, pistillate flowers in leafy pedicels or racemes; stemate pedicels 5-cleft, pistillate wanting; fructing bracts on stalks 2-50 mm long, thick, and spongy but hardended in age, united nearly to the linear oblong apex, angulate or broadly elliptic, 8-14 mm long, the faces bearing numerous Suned, irregular, wartylike, often toothed tubercles, to 8 mm long; seeds 1.5-2.0 mm long, fleshy; radical superior; western Texas to southern Arizona, Chihuahua, and San Luis Potosi; flowering from late June to September.

Occasionally common in alkali flats and along the margins of playas, rarely on slopes or along arroyos. *A. acanthocarpa* often grows with *A. obectes*, *A. griffithii* and may also be found with *A. canescens*. 

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Artemesia tridentata Nutt. in Nuttall, Mem. N. Am. Bot. 3:9, 1816.

Artemesia tridentata var. tridentata Nutt. in Nuttall, Mem. N. Am. Bot. 3:9, 1816.

Broadleaf
Facultative evergreen subshrub, forming roundish bushes, 2-5 dm high; stems rigidly erect, from decumbent to ascending, much branched, spreading bases, terete, gray-green-tomentose, the bark exfoliating in strips from basal portions; leaves alternate except the lowest sometimes opposite, short petioled, obovate or broadly elliptic, 1.3-5 cm long, 0.5-2 cm wide, obuse to acute at the base, obtuse or rarely renate at the apex, entire, thick, yellowish to whitish with a dense scurf; pacts distinct, stipitate flowers in dense glomerules along the spike-like branches of elongated terminal nearly naked panicles; platyleaf flowers in small glochidiums in the axils of elongated terminal leafy spikes, rarely in panicles; staminate petals 3-fld, platyleaf wanting; fruiting bracts short stellate or semi-elliptic, compressed or slightly convex, united to the middle, obtuse or cuneate-ovate, 4.5-7 mm long, 5-7 mm wide, the apex and margins sharply dentate or denticulate, the faces smooth or with scattered small scales; seeds 2.4-2.8 mm long, light or reddish brown; pedicel superior; known from two disjunct regions, south-central New Mexico, and southwestern Arizona, and western Texas to southeastern Arizona, south to Chihuahua and Zacatecas, flowering from June to October. Occasional on alkaline flats, mesas, and slopes with other halophytic species; sometimes the dominant element of the vegetation on compacted, alkaline clay flats. If not inimical stands A. obovata is often found associated with A. conspersa, A. corrugata, A. canescens, A. scopulorum, A. pumilio, A. elegans, or A. confertiflora. The northern (A. pumilio) and southern (A. obovata) forms of A. obovata (the northern forms with larger leaves, large bracts, and a more yellowish vestiture) are best treated as one taxon after Hall and Clements (1923). The disjunct distribution, the climate differences in each portion of the range, and the apparent but overlapping morphological differences do not appear to be sufficient evidence for separation into two taxa without further morpho-geographical and cytogenetic analysis.
Moonscale

Spreading evergreen shrub, forming large mats 4-16 dm high; stems erect from a decumbent, woody, much branched base, terete, gray- or white-hairy, the bark dark and rough on old basal portions; leaves alternate, except the lower opposite, short petiolate, broadly elliptic to spatulate or rarely oblong, obtuse at the apex, cusate at the base, 1.2-6 cm long, 0.6-2.5 cm wide, entire or sometimes dentate, white, yellow or gray with a dense acror, thick and firm; plants dioecious, staminate flowers in globose to subglobose, greenish to yellow, tightly packed, powdery flowers in few-flowered globose to long compact, terminal spikes or spikelike spikes, the spikes subulate below, staminate perianth 3-leaved, pistillate wanting; fruiting bracts sessile or short stalked, indurate, united nearly to the apex, glabrous to ovate or oblong usually longer than wide, 5-7 mm long, irregularly dentate or triangular-subulate at the apex, the faces with numerous flattened rarely suberect crestedlike tubercles, up to 3 mm long, the tubercles rarely spaced, weekly 2.5-5 mm long, brown; the radicle superior, southwestern Colorado to southeastern Utah, and southwestern New Mexico; flowering from April to May. A common species in southwestern New Mexico on Mancos clay mesas and slopes with A. corrugata, A. confertifolia, A. abscisca, Hilaria jamaicens (Torr.) Bentth. Asteraceae ormonocos D.C. East. and Frankenia ussuriensis Torr. Occasionally it may be associated with A. corrugata but usually is not quite as tolerant of extreme conditions as A. corrugata. A. corrugata may also grow with A. asaroides or A. pumilis in addition to the Antiplex species mentioned above.

A. corrugata sometimes difficult to distinguish from A. corrugata. However, A. corrugata is discernible by the broader, mostly alternate leaves, the bracts which are orbicular or orbicular, the ovate-oblong leaves never broader above the middle and usually with a dense coating of flattened tubercles. A. neomexicana Standl. (N. Am. Fl. 21(1):67, 1916) was described from northwest New Mexico. It differs from A. corrugata in the larger foliaceous free tips on the fruiting bracts. Hanscom (1962) suggests that A. neomexicana is merely a hybrid between A. corrugata x A. confertifolia. A. neomexicana is common near Shiprock, New Mexico (S. Sta. personal communication).


**Mocanica**

Surrounding evergreen subshrub, forming dense leafy mats 1-2 dm high; stems decumbent but the flowering stems strictly erect and slender, rooting at the nodes. leaves densely hirsute-crenate, the white bark thick and spongy shredding into brown sheaths on old parts; leaves mostly opposite, the upper alternate, crowded, sessile, broadly lanceolate or linear-lanceolate, current at the base, glaze at the apex, 0.5-2.0 cm long, 0.7-6.5 cm wide, entire, densely white-tomentose, plants dioecious, rarely monoecious, staminate flowers in large glomerules along nearly naked terminal spires, yellow in light brown pistillate flowers in elongate terminal spikes far exceeding the leaves; staminate perianth 3-4th, pistillate wanting; bractlets sessile, thick, united nearly to apex, pandent, oblong-ovate to ovate, the terminal free petals broadly obovate, 4-6 mm long, 3-4 mm wide, the sides with thick waxylike or somewhat flattened subepidermis; seeds 3 mm long, reddish brown, radicle shorter; southwestern Colorado to southern Utah and southwestern New Mexico; flowering from April to early June.

A co-dominant species in southwestern New Mexico on Mancos clay slopes and slopes with Hilaria juncea. A. cuscuta, A. confertiflora, A. oblonga, Artemisia spinescens, and Fouquieria splendens. Sometimes A. corrugatus will occur in parts stands in the extremely alkaline and saline sites. A. corrugatus may grow with A. pusilla or A. aconitifolia in addition to the Arctopus species mentioned above. A. corrugatus is often difficult to distinguish from A. cuscuta. However, A. corrugatus is discernible by the narrower opposite leaves and the bracts which are broader above the free portion developed into a smooth nearly entire leaflike appendage. This identification problem is further complicated by occasional hybridization between the two species (Hasson, 1962).
Erect, deciduous evergreen (r) shrub, woody throughout. 3-10 dm tall; branches much branched, usually globoid in outline; stems slender, ascendent, angled by prominent striae, finely tuberculate, the bark rough and gray on older stems; leaves alternate, chart papillate or nectar, elliptic to narrowly oblong, 0.5-2 cm long, 0.3-1.2 cm wide, oblong at the apex, truncate to cuneate at the base, entire or sometimes applaudate, thin, grayish or a fine acule, 1- or more branched from the base, plants dioecious, staminate and pistillate flowers in axillary or lateral panicles, fruit a nutlet, coarsely-ribbed and coriaceous, 1.2 cm long, united at the base, 0.6-1.2 mm wide, aborts before maturity, seeds 1.3 mm long, light brown, radius superior; known from three disjunct locations: 3 miles east of Dunning, New Mexico; now by elfiti, E. dehiscens, Ph. to the Playas, New Mexico and Willcox Playa, Arizona; probably flowering mostly in late summer.

A. griffithii is usually a dominant element of the vegetation in the playas cited above, occurring primarily around the margins and in areas not subject to monsoon periods of time. A. griffithii also acts as a soil species revegetating disturbed areas, but only around playas. It commonly grows with A. concinnae and A. obtusa and rarely with A. concinnae.
Siblelicole

Erect, fusculative evergreen shrub, wide throughout, rigidly leathery, very compact, usually forming a rounded bush, 3-8 dm tall; stems stout, terre, erect or ascending, furrowed in youth becoming smooth and stramineous, old bark exfoliating and gray, branches and twigs becoming white; leaves alternate, crowded, short petiolate, entire, oblong-obovate, obtuse or acut, tinged or canescent at the base, subulate at the apex, 1-2 cm long, 0.5-1.6 cm wide, entire, firm, gray with a fine wort, 3-5-nerved from the spine plants dichotomous, stamens flowers in glomerules in the axil of the upper leaves forming feathery-branched spikes, pistillate flowers solitary or several in the upper leaf axils, forming dense subpaniculate spikes; staminate pistillate 3-cleft, pistillate wanting fruitlet's usual, cornet, exerted over the ovary, oblong or broadly obovate, 6-13 mm long, 3-12 mm wide, the base smooth, the margin entire, rarely undulate, dehiscence of simple; seeds oval, 1.2-2 mm long, reddish-brown; radius superior. Western North Dakota to Oregon, south to Chihuahua, New Mexico, northern Arizona and California. Blooming from March to May. Occasional or sometimes abundant species an alkaline, usually rocky soils on benches and slopes throughout most of the species range in New Mexico. The wide occurrence of A. conifereifolia in New Mexico is on the Mesita clay out on the Mesita and slopes in San Juan County where it is a common cut with Hillsides. A. conifereifolia, A. corrigata, A. obvata, Artemisia spinosula, and Frankenia angustifolia. A. conifereifolia may be found growing with A. conifereifolia, A. corrigata, A. obvata, A. canescens, A. powellii, A. argentea subsp. argentea, or A. secundiflorum.
16. *A. confertifolia*

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This manual of Atriplex species commonly found in New Mexico has been prepared so that both the experienced taxonomist and the non-specialist can identify these plants from detailed drawings and a simplified key.

Keywords: New Mexico Atriplex, taxonomic studies, foraging saltbush distribution.

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