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TECHNOLOGY TRANSFER

NEW INVADERS OF THE SOUTHWEST

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About This Field Guide

Invasive plants are a major concern worldwide. They displace native species, decrease forage and agricultural production, alter soil nutrients and water cycling, and lower the aesthetic value of natural areas. With the increase of world travel, exotic plant introductions are on the rise.

Not all newly introduced species become invasive. Those which do often follow an invasion pattern; they remain at low levels for several years (lag phase) and then enter a phase where they increase dramatically. Attempting to control large weed infestations is a costly endeavor; it is much more cost effective to allocate resources toward weed prevention or the rapid treatment of new introductions. Unfortunately, the process of adding newly introduced species to watch lists or control lists is frequently tedious and lengthy. By the time many invasive species are on the radar, they have become widely established. The purpose of this guide is to help land users recognize new invasive plants, so they can be treated rapidly and eradicated rather than becoming large and expensive problems.

This guide focuses on hot and arid regions of southwestern USA, including portions of: Arizona, California, Nevada, New Mexico, and Utah. The cool and temperate regions of northwestern North America are the focus of the sister guide, New Invaders of the Northwest. There is overlap between species and regions, especially in areas bordering our superficial boundary.

The species in this guide were selected by:

1. Combining state and provincial noxious weed, watch, and new invader lists/alerts
2. Adding species with high ecological impact ratings as assigned by the California Invasive Plant Council and NatureServe
3. Identifying those species not yet widespread throughout southwestern USA as first-round candidates
4. Combining the opinions of numerous state and regional weed experts to narrow the candidate list to those present in this guide

It was not possible to include all new species of concern, but this manual will hopefully serve as a good starting point. The plants included herein are arranged first by flower color, and then grouped with related species progressing from grasses through forbs, vines, shrubs, and trees. Select definitions for plant terms are included in the glossary. For more in-depth explanations of plant parts and life cycles, or for more help with plant identification, please see the references listed at the end of this guide.

Each plant is represented by multiple photos and descriptions emphasizing key

identification traits and ways to distinguish it from look-alike species. Attempts were made to utilize the most current scientific names for all weeds. The USDA GRIN database (Germplasm Resources Information Network) was followed in this regard. Please note the scientific names for many species have changed since previous weed publications.

Plant distribution data is presented in a map for each species. The sources used to compile current distribution information are included in a table below. Distribution information was also provided by individuals and recent weed alert reports.

Weed Distribution Sources	
Consortium of California Herbaria	ucjeps.berkeley.edu/consortium/
EDDMapS	eddmaps.org
Southwest Environmental Information Network	swbiodiversity.org/portal/index.php
USDA-NRCS PLANTS Database	plants.usda.gov/java/

Where information was available, counties where the weed has been documented are represented by a solid gray fill. Some documented populations of weeds have since been eradicated. The locations of these populations are still included in the distribution maps because it is possible some plants, seeds, or propagules survived.

Weed spread is often rapid. Even if a weed is not depicted as occurring in a specific region, it could have spread into that region since the collection of distribution information presented herein. Particular care should be taken searching for species in regions surrounding known infestations, as weed spread into nearby areas is likely.

All states where a weed is listed as noxious are included in a special section. Some states have sub-levels for noxious weed designations. These are included in abbreviated form where applicable, and are explained in greater detail in a table on the following pages.

If you find a new invader

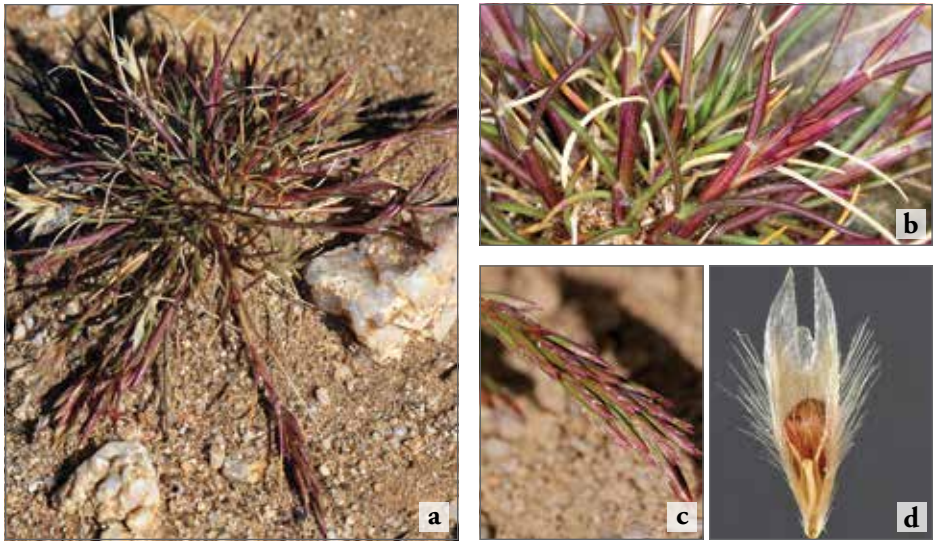
Should you find one of the species listed in this manual in a new region (or a species you believe to be a new invader), notify your local weed authority immediately, and devise a treatment plan to eradicate the infestation as promptly as possible.

State	Noxious Weed Classification
Arizona (AZ)	Regulated
	Prohibited
	Restricted
California (CA)	No sub-categories
Nevada (NV)	A
	B
	C
New Mexico (NM)	A
	B
	C
	Watch List
Utah (UT)	A
	B
	C

Definition
Species (including plants, stolons, rhizomes, cuttings, and seed) that, if found within the state, may be controlled or quarantined to prevent further infestation or contamination.
Species (including plants, stolons, rhizomes, cuttings, and seed) that are prohibited from entry into the state.
Species (including plants, stolons, rhizomes, cuttings, and seed) that, if found within the state, shall be quarantined to prevent further infestation or contamination.
Weeds not found or limited in distribution throughout the state; actively excluded from the state and actively eradicated wherever found.
Weeds established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur.
Weeds currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer.
Species are currently not present in New Mexico, or have limited distribution. Preventing new infestations of these species and eradicating existing infestations is the highest priority.
Species are limited to portions of the state. In areas with severe infestations, management should be designed to contain the infestation and stop any further spread.
Species are wide-spread in the state. Management decisions for these species should be determined at the local level, based on feasibility of control and level of infestation.
These species are of concern in the state and have the potential to become problematic. More data is needed to determine if these species should be listed; when these species are encountered please document their location and contact appropriate authorities.
Species declared as “Early Detection and Rapid Response (EDRR)”. These are not native to the state of Utah, pose a serious threat to the state, have a relatively low population size within the state and are of the highest priority for control.
Species declared as "Control". These are not native to the state of Utah, pose a threat to the state, have a moderate population throughout the state, and generally are thought to be controllable in most areas.
Species declared as "Containment". These are not native to the state of Utah, pose a threat to the agricultural industry and agricultural products, are found extensively in the state, and are thought to be beyond control. Statewide efforts are generally towards containment of smaller infestations.

Arabian schismus & Mediterraneangrass

Schismus arabicus Nees & *S. barbatus* (L.) Thell.



Arabian schismus: a) plant, b) leaves (a,b Western New Mexico University Department of Natural Sciences & Dale A. Zimmerman Herbarium), c) inflorescence (Patrick Alexander, swbiodiversity.org), d) floret (D. Walters and C. Southwick, USDA, www.bugwood.org)

Mediterraneangrass: e) plant (Max Licher, swbiodiversity.org), f) leaves, g) inflorescences (f,g Joseph M. DiTomaso, University of California - Davis), h) floret (D. Walters and C. Southwick, USDA) (f-h www.bugwood.org)

SYNONYMS: Arabian schismus (AS): Arabian grass, camel grass; Mediterraneangrass (MG): common Mediterranean grass, old han schismus, *Festuca barbata* L.

ORIGIN: northern Africa, Mediterranean, Middle East (both species)

GROWTH TRAITS: Both species are very similar and differentiated largely by details in the florets. They are annual bunchgrasses growing up to 8" tall (20 cm) from extensive root systems near the soil surface. Stems are round in cross-section and can be erect or sprawling. Leaves are usually inrolled and thread-like, typically up to 1 mm wide, and less than 8" long (20 cm). Ligules are rings of hairs. Flowering occurs in spring. Florets occur in dense clusters up to 2" long (5 cm). Florets are enclosed by 2 bracts. The outermost bract (lemma) has 2 lobes while the innermost bract (palea) does not. **AS** does not have an awn between the lemma lobes, and the palea is much shorter than the lemma lobes. **MG** has a short awn, and the palea extends nearly as long as the lemma lobes. All parts of the plants are green when young, turning purple with maturity.

REPRODUCTION: Both species spread by seed only. Seeds may remain viable in the soil for multiple years.

HABITAT: Both species thrive in arid to semi-arid regions, growing in between shrubs where they avoid extensive shading. They can be found in disturbed and undisturbed ground.

LOOK-ALIKES: Most bunchgrasses that resemble these two species are perennials and typically grow larger than Arabian schismus and Mediterraneangrass. The native six-weeks fescue (*Vulpia octoflora*) and exotic hardgrass (*Schlerochloa dura*) are annuals, low-growing, and have similar inflorescences. Six-weeks fescue has obvious awns 0.1-1" long (3-25 mm) while hardgrass has a short inflorescence (<1", 2 cm) with flattened florets clustered on one side of the flowering stem.

NOXIOUS WEED LISTINGS: Neither species is listed as noxious in any southwestern state.

NOTES: Though not listed as noxious, their potential ecological impact and distribution are both high.

Arabian schismus

Mediterraneangrass

Blue panicgrass

Panicum antidotale Retz.

SYNONYMS: blue panicum, *Panicum miliare* Lam.

ORIGIN: Asia

GROWTH TRAITS: Perennial, sod-forming grass growing 8-10' tall (2½-3 m) from a rhizomatous root system. Older plants are typically bush-like with multiple branches and a tough, knotty base. Leaves are light blue-green with swollen nodes. Leaf blades are 6-12" long (15-30 cm), smooth (without hair), and with obvious midveins obvious on the underside. Ligules have tiny hairs. The inflorescence is open and erect, but slightly droopy at maturity. It occurs on stalk tips from April to December. Inflorescences are typically up to 1' long (30 cm). Flowers are yellow-green and often shiny. Mature seeds are brown and shiny.

REPRODUCTION: By seed and vegetatively through rhizomes. Seeds remain viable in the soil for many years.

Blue panicgrass: a) recovering plants (©2001 CDFA), b) infestation (Forest and Kim Starr, Starr Environmental, www.bugwood.org)

Blue panicgrass: c) leaves, sheaths, and stem d) young inflorescence (Forest and Kim Starr, Starr Environmental, www.bugwood.org), e) mature inflorescence (c,e ©2001 CDFA)

HABITAT: Found in open, disturbed sites including roadsides, fields, irrigated pastures, and along irrigation waterways.

LOOK-ALIKES: Several native and exotic grasses may resemble blue panicgrass, the most similar being other species in the genus *Panicum,* including the native fall panicgrass (*Panicum dichotomiflorum*). Those overlapping the range of blue panicgrass differ by typically being summer annuals rather than sod-forming perennials. They can be further differentiated from blue panicgrass and from each other by differences in their inflorescence size and structure, as well as the size or presence of hairs on leaves or leaf parts.

Look-alike: fall panicgrass (John Hilty, swbiodiversity.org)

NOXIOUS WEED LISTINGS: CA

NOTES: This species is a nutritious forage grass intentionally planted in Arizona and Texas, though it is escaping pastures and becoming weedy in some regions.

Buffelgrass & Fountain grass

Pennisetum ciliare (L.) Link & *P. setaceum* (Forssk.) Chiov.

Buffelgrass: a) plant, b) leaf attachment and stalk (Joseph M. DiTomaso, University of California - Davis, www.bugwood.org), c) inflorescence (a,c Forest & Kim Starr)

Fountain grass: d) plant, e) leaf attachment and stalk (Joseph M. DiTomaso, University of California - Davis, www.bugwood.org), f) inflorescence (d,f Forest & Kim Starr)

SYNONYMS: Buffelgrass (BG): African foxtail grass, *Cenchrus ciliaris* L.; Fountain grass (FG): crimson fountain grass *Cenchrus setaceus* (Forssk.) Morrone

ORIGIN: **BG**: Africa, Middle East, India; **FG**: Africa, Middle East

GROWTH TRAITS: Both species are tufted perennials typically growing 16-59" tall (40-150 cm) with round stems. Leaves have prominent midveins. Ligules are a fringe of white hairs. Inflorescences are long, narrow spikes with numerous long, purplish bristles. **BG** has rhizomes and stolons, allowing it to form dense mats. Leaves are flat, up to 20" long (51 cm), and up to ½" wide (13 mm). Flowering occurs from spring through fall. Inflorescences are 0.8-8" long (2-20 cm), 0.4-1" wide (1-2½ cm), and erect. Bristles are stiff, wavy, and usually less than ½" long (12 mm). **FG** has a fibrous root system. Leaves are rolled or strongly folded, 8-25" long (20-65 cm), 0.08-0.14" wide (2-3½ mm), and slightly hairy. Flowering occurs nearly year-round. Inflorescences are 3-12" long (8-30 cm), up to 2" wide (5 cm), and tend to droop. Bristles are straight and unequal in length, with some reaching 0.7-1.4" long (18-35 mm).

REPRODUCTION: BG: By seed and vegetatively with rhizomes and stolons; FG: By seed. Seeds may remain viable in the soil for six years or more. Fertilization is not required for either species to produce viable seeds.

HABITAT: Both species prefer dry conditions and can be found in deserts, coastal dry forests, grasslands, thornscrub communities, and along roadsides.

LOOK-ALIKES: Many other species of *Pennisetum* (both native and exotic) occur in the SW; most can be differentiated by growing much shorter and ground-hugging, having non-spiky inflorescences, and/or having whitish bristles and florets. The native satintail (*Imperata brevifolia*) has a similar size and rhizomes, but its spike-like inflorescence is whitish and densely silky-hairy. Its ligules are membranous, flat, and hairy.

NOXIOUS WEED LISTINGS: **BG**: AZ (Prohibited); **FG**: NV (A), NM (Watch List)

NOTES: **BG** was intentionally introduced for forage, **FG** has been widely used as an ornamental.

Buffelgrass Fountain grass

Jubata & Pampas grass

Cortaderia jubata (Lemoine ex Carrière) Stapf & *C. selloana* (Schult. & Schult. f.) Asch. & Graebn.

Jubata grass: a) plant (Gordon Leppig & Andrea J. Pickart), b) leaf blade, c) inflorescence (b,c Forest & Kim Starr)

Pampas grass: d) plant (Wouter Hagens, taken in the Kijktuinen Nunspeet), e) leaves of cultivated plant (Kenpei), f) inflorescences (Kenneth M. Gale, www.bugwood.org)

SYNONYMS: Jubata grass (JG): Andean pampas grass, purple pampas grass, pampas grass; Pampas grass (PG): white pampas grass, Uruguayan pampas grass

ORIGIN: South America (both species)

GROWTH TRAITS: Both species are large, densely tufted, perennial grasses growing from dense fibrous roots with shallow, short rhizomes. Leaves are very long and have sharply serrated margins. Ligules are dense rings of hairs 0.08-0.12" long (2-3 mm). Dense flower plumes appear summer through fall and are 1-3' long (30-90 cm). **JG** are all-female plants growing 6-23' tall (1.8-7 m) with the stems at least 2 times longer than the spreading tussock. Leaves are 3-5' long (0.9-1.5 m) and flat or slightly v-shaped in cross-section. Plumes are deep violet, turning pinkish then gold at maturity. Awns are very short. **PG** grows 6-13' tall (1.8-4 m). Plants are either all-female or hermaphroditic. Stems of hermaphroditic plants are 2 times longer than the tussock; female plant stems are equal to or slightly longer than the tussock. Leaves are up to 6' long (1.8 m), v-shaped in cross-section, and with bristly, curled tips. Plumes are light pink to silver white; awns are long. Tussocks are more fountain-like than jubata grass.

REPRODUCTION: Both species spread by seed and fragmented tillers. Seeds are believed to remain viable in the soil for less than six months.

HABITAT: Both species prefer coastal, disturbed sites such as roadsides, bluffs, steep cliffs, riverbanks, and shrubland. However, both can be invasive at inland locations. **PG** can tolerate standing water.

LOOK-ALIKES: Several native and exotic grasses resemble jubata and pampas grass. The bunched tussocks help differentiate jubata and pampas grass from the rhizomatous and linear-growing giant and common reeds (*Arundo donax* and *Phragmites australis*, respectively). Ravenna grass (*Saccharum ravennae*) is a similar-looking bunchgrass, but its leaf and stem bases are densely hairy.

NOXIOUS WEED LISTINGS: **JG**: Not listed in any SW state; **PG**: NM (Watch List)

NOTES: Both species are escaped ornamentals.

Jubata grass Pampas grass

Puna grass

Amelichloa brachychaeta (Godr.) Arriaga & Barkworth

SYNONYMS: puna needlegrass, espartillo, Argentine needlegrass, *Achnatherum brachychaetum* (Godr.) Barkworth, *Stipa brachychaeta* Godr.

ORIGIN: South America

GROWTH TRAITS: Perennial bunchgrass with upright stems growing 16-39" tall (0.4-1 m) from a fibrous root system, sometimes with very short rhizomes. Leaf sheaths and blades have tiny hairs along margins. Leaf blades are 3-14" long (8-35 cm), rough, and typically rolled outwards (making them appear wiry). Ligules are short, flat membranes with tiny hairs at their sides. Florets are produced in two places. The more obvious inflorescence occurs at stem tips in spring and is 4-10" long (10-25 cm). Florets are sparse, open, and have awns 0.4-0.7" long (10-18 mm) that are often bent twice. The second set of florets develop in basal leaf sheaths from self-fertilization. These florets remain in the plant until the leaf sheaths are disturbed or senesce. Seeds are typically teardrop-shaped, tan, and up to 0.1" long (3 mm).

Puna grass: a) plant (Joseph M. DiTomaso, University of California - Davis, www.bugwood.org), b) infestation (©2001 CDFA)

Puna grass: c) florets within leaf sheaths, d) terminal inflorescence (c,d Joseph M. DiTomaso, University of California - Davis, www.bugwood.org), e) seeds (©2001 CDFA)

REPRODUCTION: By seed only. Seeds may remain viable in the soil for up to two years.

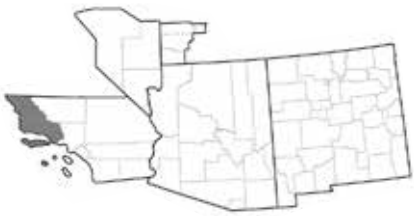
HABITAT: Capitalizes on disturbance and can be found in a variety of habitats, including roadsides, grasslands, pastures, open hillsides, streambanks, and waste areas. Often associated with alfalfa fields.

LOOK-ALIKES: Several needlegrass species (*Achnatherum, Nassella,* and *Stipa* spp.) resemble puna grass with their narrow leaves and bunched growth. However, they have narrow inflorescences with longer awns, and none have self-fertilized seeds develop in basal leaf sheaths.

Look-alike: green needlegrass, *Nassella viridula* (Matt Lavin)

NOXIOUS WEED LISTINGS: AZ (Prohibited), CA

NOTES: This species quickly becomes problematic in rangeland and grassland settings as the sharp, pointed leaves of older plants are unpalatable to grazing animals.



Ravenna grass

Saccharum ravennae (L.) L.

SYNONYMS: hardy pampas grass, elephant grass, plume grass, *Erianthus ravennae* (L.) Beauv., *Andropogon ravennae* L., *Ripidium ravennae* (L.) Trin., *Tripidium ravennae* (L.) H. Scholz

ORIGIN: Eurasia, Mediterranean

GROWTH TRAITS: Perennial bunchgrass growing 8-13' tall (2.4-4 m) from a densely fibrous root system. Leaves are basal and also distributed up the stem to the base of the inflorescence. Leaves have serrated margins, a thick, white midvein on upper sides of blades, and can be 20-40" long (0.5-1 m) and ½" wide (1.2 cm). Leaf bases are unlobed and are densely covered with long, fuzzy hairs that typically hide the ligule. Dense flower plumes are purplish (maturing to silver to tan), up to 2' long (0.6 m), and bloom from July through October. Florets are covered in tufts of silky hairs, giving the inflorescence an overall fluffy appearance.

Ravenna grass: a) plant (Jennifer Andreas, Washington State University Extension), b) infestation (The Nature Conservancy Archive, The Nature Conservancy, www.bugwood.org)

Ravenna grass: c) leaf blades with serrated margins and white midveins, d) hairy leaf base, e) inflorescences (c-e Wendy DesCamp, Washington State Noxious Weed Control Board)

REPRODUCTION: By seed only. Seed viability is unknown.

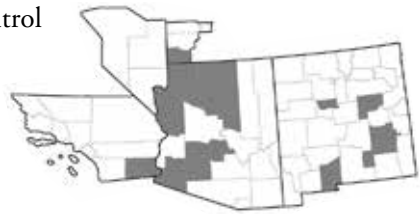
HABITAT: Found in open, disturbed locations at both moist and dry sites, including marshes, ditchbanks, seeps, floodplains, rocky hillsides, gravel roadsides, and escaped from yards. Tolerant of cold weather.

Look-alike: jubata grass (Gordon Leppig & Andrea J. Pickart)

LOOK-ALIKES: Several native and exotic grasses resemble Ravenna grass. The clumped bunches help differentiate Ravenna grass from the rhizomatous and linear-growing giant and common reeds (*Arundo donax* and *Phragmites australis*, respectively). Jubata and pampas grass (*Cortaderia jubata* and *C. selloana*) are similar-looking bunchgrasses, but Ravenna grass leaf and stem bases are densely hairy, its leaf margins are not as sharp, its leaf midveins are thick white on the upper sides of the blades, and its flowering stems can have red coloring.

NOXIOUS WEED LISTINGS: NM (A)

NOTES: Frequently used for soil erosion control and as an ornamental, but often escapes cultivation. Spreading rapidly in several parts of North America.



Veldtgrasses

Trait	Long-Flowered *Ehrharta longiflora*	Panic *Ehrharta erecta*	Perennial *Ehrharta calycina*
Life History	Annual	Perennial	Perennial
Preferred Habitat	Disturbed, sandy, open	Moist or shaded initially, spreading to dry, variety of soils	Disturbed, sandy, sometimes savannahs or woodlands
Growth Form	Erect to sprawling stems	Spreading bases, stems curving to become erect, produces tillers	Erect stems, plant tussock-forming
Height	8-31" (20-80 cm)	12-24" (30-60 cm)	12-30" (30-75 cm)
Leaves	≤8" (20 cm) long, flat, wrinkled partway along margin, tinged with purple	2-6" (5-15 cm) long, flat	3-8" (7-20 cm) long, flat, wrinkled partway along margin, tinged with purple
Florets	Green, awns 0.08-0.8" long (2-20 mm), subtended by 2 purple bracts	Green, no awns	Green, turning purple with age, no awns

Long-flowered veldtgrass: a) plants, b) leaf blade and inflorescence (a,b ©2005 Tom Chester, http://tchester.org/plants/analysis/ehrharta/longiflora.html), c) inflorescence (Harry Rose)

Panic veldtgrass: d) plant (©2011 Vernon Smith), e) leaf attachment and ligule (©2008 Zoya Akulova), f) inflorescence (Matt Lavin, Bozeman, MT)

Perennial veldtgrass: g) plant , h) leaf base pulled back to expose ligule (g,h Harry Rose), i) inflorescence (Jerry Kirkhart)

Veldtgrasses (continued)

NAMES: Long-flowered veldtgrass, *Ehrharta longiflora* Sm. (LV)
Panic veldtgrass, *Ehrharta erecta* Lam. (PanV)
Perennial veldtgrass, *Ehrharta calycina* Sm. (PerV)

SYNONYMS: **LV**: annual veldtgrass, tall ehrharta; **PanV**: erect veldtgrass, *Ehrharta panicea* Sm.; **PerV**: purple veldtgrass

ORIGIN: southern Africa (all species)

GROWTH TRAITS:

Long-flowered veldtgrass (LV): Annual growing upright to somewhat sprawling and typically 8-31" tall (20-80 cm) from a fibrous root system. Leaves are flat, up to 8" long (20 cm), 0.4" wide (1 cm), wrinkled partway along the margin, and often tinged with purple. The ligule is membranous and toothed. Flowering occurs in spring. Inflorescences are 4-8" long (10–20 cm), often spreading, and consist of numerous drooping clusters of 3 green florets subtended by 2 purplish bracts. The lower 2 florets are sterile with long awns 0.08-0.8" long (2-20 mm). The upper floret is fertile.

Panic veldtgrass (PanV): Sprawling perennial with stems curving upward from their prostrate bases. Stems typically grow 12-24" tall (30-60 cm) from a fibrous root system and can produce tillers that root from leaf nodes growing on or near the ground. Leaves are flat, 2-6" long (5-15 cm), and 0.16-0.6" wide (4-15 mm). The ligule is membranous and toothed. Flowering occurs in spring to early summer. Inflorescences are open, 2-8" long (6-20 cm), branched, and with clusters of 3 green florets. The lower 2 florets are sterile while the upper is fertile. All florets have no awns.

Perennial veldtgrass (PerV): Erect, tussock-forming perennial with stems growing 12-30" tall (30-75 cm) and forming dense tussocks. Roots are fibrous and occasionally rhizomatous. Leaves are flat, often purple-tinged, 3-8" long (7-20 cm), 0.08-0.3" wide (2-7 mm), and wrinkled partway along the margin. The ligule is membranous and toothed. Flowering occurs spring through summer. Inflorescences are 4-6" long (10-15 cm), open, and with clusters of 3 green florets that turn reddish-purple with age. The lower 2 florets are sterile while the upper is fertile. All florets have no awns.

REPRODUCTION: **LV**: By seed only. **PanV**: By both seed and vegetatively with tillers. **PerV**: Largely by seed, but very occasionally by rhizomes. Seeds of all three species are believed to remain viable in the soil for more than one year.

HABITAT: **LV** and **PerV** both capitalize on disturbance and are most frequently found in sandy soil. **PerV** has also been found in savannahs and woodlands. **PanV** typically occurs in more moist or partially shaded areas including urban, irrigated, riparian, and coastal habitats (especially stabilized dunes) in a wide variety of soils. Once established, PanV can expand into more dry and open areas.

LOOK-ALIKES: Grasses can be very difficult to differentiate, and several native and exotic grass species resemble veldtgrasses by sharing numerous features. Bromes (*Bromus* spp.) are quite similar with their stiff and often drooping inflorescences and their leafy bases. Many brome species have ligules similar to veldtgrasses as well as flat leaf blades of the same size and shape as those of veltgrasses. Bromes can be differentiated by having leaf sheaths that are closed for most of their length, awns that are typically inserted just beneath bract tips, usually more than 3 florets (3-30), and having hair on the female part (ovary) of a floret.

Look-alike: closed leaf sheaths of soft brome (Matt Lavin, Bozeman, MT)

NOXIOUS WEED LISTINGS: None of these species are listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, the potential ecological impact and distribution of all three species are high.

Long-flowered veldtgrass

Panic veldtgrass

Perennial veldtgrass

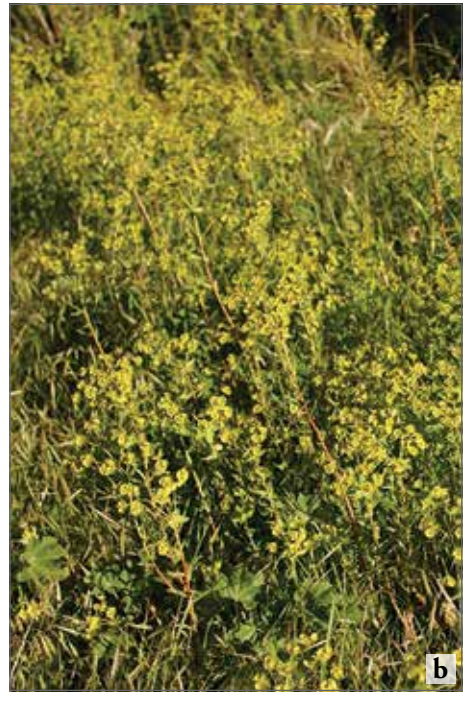
Carnation spurge

Euphorbia terracina L.

SYNONYMS: Geraldton carnation spurge, false caper, terracina spurge

ORIGIN: Mediterranean

GROWTH TRAITS: Herbaceous perennial growing up to 3.3' tall (1 m) from a robust vertical taproot with horizontal lateral roots. All parts of the plant exude a white latex sap when torn. Stems are green to reddish, hairless, slender, and unbranched at first but dividing into ≤5 primary flower stems. Leaves are bright green, alternate, oblong, lance-shaped, ½-2" long (1½-5 cm), and have rounded tips and no leaf stems. Flowers occur in an umbel-like inflorescence subtended by large, wide bracts. The umbel is divided, with branches forking into 2 flowers. All forks are subtended by the large, wide bracts. Individual flowers are inconspicuous and yellow and surrounded by green, showy bracts. Flowering occurs in early spring for early germinating plants. Plants germinate throughout the growing season, followed quickly by flowering. Fruits are smooth, 3-lobed capsules. Seeds are tan, oval, and have a fleshy projection. Seeds can be propelled several feet from the plant upon drying.



Carnation spurge: a) plant (©2007 Luigi Rignanese), b) infestation (©2010 Michael O'Brien)

Carnation spurge: c) leaf (Sunphlo), d) inflorescence and bracts (Sarah Gregg), e) seeds (Carole Ritchie, USDA-NRCS PLANTS Database)

REPRODUCTION: By seed and buds from the damaged root crown. Seeds remain viable in the soil for 3-5 years.

HABITAT: Capitalizes on disturbance to invade a variety of habitats including coastal sage scrub, grasslands, oak woodlands, riparian areas, and chaparral edges. Survives in high and low light and in both cool/moist and hot/dry climates.

Look-alike: eggleaf spurge (Marty Hudson, Klickitat County NWCB)

LOOK-ALIKES: Other species of *Euphorbia* resemble carnation spurge with their showy green bracts, lance-shaped and stemless leaves, and the production of latex sap when torn. The majority of those which occur in the Southwest are exotic weeds. Most can be differentiated by having rhizomatous or fibrous roots and having leaves with smooth margins. Eggleaf spurge (*Euphorbia oblongata*) is very similar but has a densely hairy stem.

NOXIOUS WEED LISTINGS: CA

NOTES: Spreading rapidly in southern California. The latex sap is toxic and should be handled with care.

Tree spurge

Euphorbia dendroides L.

SYNONYMS: woody spurge

ORIGIN: Mediterranean

GROWTH TRAITS: Perennial, rounded shrub or small tree growing up to 10' tall (3 m) from a fleshy root system. All parts of the plant exude a white latex sap when torn. Stems and branches are smooth, hairless, and have scars remaining from fallen leaves. Leaves are alternate, oblong lance-shaped with no leaf stems, and up to 3" long (7½ cm) with a single prominent midvein. Flowers are inconspicuous, yellow, and surrounded by yellowish-green, showy bracts. Flowering occurs in early spring. Fruits and foliage turn red in summer, and leaves fall to limit transpiration. Seeds are brown, round, smooth, and can be propelled several feet from the plant upon drying.

REPRODUCTION: By seed and buds from the damaged root crown. Seeds are typically short-lived but can be viable for approximately five years.

Tree spurge: a) plant (Tato Grasso), b) infestation (Frank Vincentz)

Tree spurge: c) leaves (Frank Vincentz), d) flowers, bracts, and immature fruits (Tato Grasso), e) mature fruits and foliage (Hans Hillewaert)

HABITAT: Found in semi-arid and Mediterranean climates, preferring sunny hillsides and open, coastal areas without frost.

LOOK-ALIKES: Other species of *Euphorbia* resemble tree spurge with their showy green bracts, lance-shaped and stemless leaves, and the production of latex sap when torn. The majority of those which occur in the Southwest are low-growing exotic weeds, such as leafy spurge (*Euphorbia esula*), which also may turn red in dry conditions during summer. Tree spurge can be differentiated by its combination of a much greater overall size, denser leaves, prominent leaf scars on stems, and the red color that fruits and leaves turn in summer.

Look-alike: leafy spurge (Jennifer Andreas, Washington State University)

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. The plant is an escaped ornamental and is spreading in Santa Barbara County, California. The latex sap is toxic and should be handled with care.

Devil's thorn

Emex spinosa (L.) Campd.

SYNONYMS: spiny emex, spiny three-corner jack, *Rumex spinosus* L.

ORIGIN: Mediterranean

GROWTH TRAITS: Herbaceous annual growing 12-24" tall (30-60 cm) from a long, thick taproot. Stems are round, ridged, sometimes reddish, often somewhat sprawling, and branch periodically. Leaves are alternate, smooth, triangular to egg-shaped, 2-4¾" long (5-12 cm), and have slightly wavy margins. Leaf stalks are long, hairless, and with membranous sheaths at their bases. Flowering occurs from early summer to winter with separate male and female flowers occurring on the same plant. Male flowers are small, inconspicuous, green, and occur in short clusters on stalks. Female flowers are spiny, without stalks, and occur in clusters around leaf axils. Fruits are produced in two places. Those occurring aerially on stems are triangular and green when young, turning reddish-brown, hardened, and with 3 sharp spines at maturity. Spines are up to 0.11" long (3 mm). Larger but less spiny fruits also form at the root crown. These are yellowish-red but turn

Devil's thorn: a) plant, b) infestation (a,b Forest & Kim Starr)

Devil's thorn: c) leaves, d) male flowers (c,d Forest & Kim Starr), e) fruits (Rolf Engstrand)

brown with maturity. Each fruit contains a single glossy seed. When the plant dies back, its drying root pulls the crown seeds into the soil.

REPRODUCTION: By seed only. Seeds remain viable in the soil for at least eight years.

HABITAT: Tolerates a wide variety of conditions but does best with disturbance. Frequently found along roadsides, railways, flood zones, field edges, pastures, grasslands, and other dry or sandy locations.

Look-alike: southern three-corner jack (Kevin Thiele)

LOOK-ALIKES: While various native and exotic species have similar triangular wavy leaves, non-showy male flower clusters, or spiny female flowers clustered around leaf axils, the combination of all of these traits helps differentiate *Emex* species from possible look-alikes. There are only two species in the genus. The exotic southern three-corner jack (*Emex australis*) is very similar but has larger spiny fruits, smaller leaves, and tends to grow more prostrate than devil's thorn.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high.

Carob tree

Ceratonia siliqua L.

SYNONYMS: St. John's bread, locust bean

ORIGIN: Mediterranean, Middle East

GROWTH TRAITS: Tree typically growing up to 33' tall (10 m) from a deep and extensive root system. The thick trunk has rough bark and spreads into several sturdy branches forming a broad, semi-spherical crown. Leaves are alternate and divided into 6-10 opposite leaflets. Leaflets are rounded-elliptic, shiny green, leathery, 1½-3" long (4-8 cm), and have wavy margins and prominent yellow midveins. Male and female flowers (both non-showy and lacking petals) typically appear on separate trees from July to November. Male flowers are long clusters of reddish-stamens while female flowers are greenish-yellow and are in long clusters. The fruit is a long pod 4-12" long (10-30 cm) that can be straight or strongly curved and is dark brown and leathery at maturity. Pods contain 5-15 small, flattened, brown seeds. Male flowers do not produce fruit.

REPRODUCTION: By seed only. Seeds may remain viable for up to five years.

Carob tree: a) tree (Giancarlo Dessì), b) bark (©2007 Luigi Rignanese)

Carob tree: c) leaf with leaflets (Frank Vincentz), d) female flower (Rickjpelleg), e) male flower (Seminsky), f) mature fruit (Riu Chixoy)

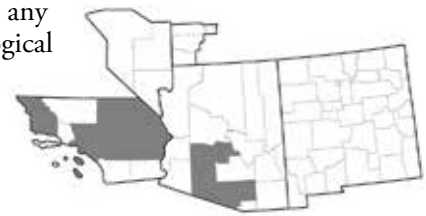
HABITAT: Can withstand a variety of conditions, but prefers full sun and dry, hot conditions without frost or acidic soil. Extremely drought tolerant and escapes cultivation to colonize disturbed sites.

LOOK-ALIKES: Though many trees may resemble carob tree by having either a half-spherical canopy, long clustered and non-showy flowers, compound leaves, or long seed pods, very few species have the full combination of all those traits. Other trees in the Fabaceae, such as honey locust *(Gleditsia triacanthos*), have similar flowers and fruits, but their canopy is more irregular, their leaflets are narrower and more numerous, and they often have thorns.

Look-alike: honey locust (Chris Evans, Illinois Wildlife Action Plan, www.bugwood.org)

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. It is frequently cultivated, but has recently been observed escaping into nearby disturbed habitats.



Edible fig

Ficus carica L.

SYNONYMS: common fig, *Ficus caprificus* Risso

ORIGIN: Middle East, southwestern Asia

GROWTH TRAITS: Tree growing up to 30' tall (9.1 m) from an extensive root system. New plants can sprout from root fragments, and fallen limbs can root and create new plants. Mature trees have a sprawling canopy, multiple trunks, and several branches with smooth, light gray-brown bark. Leaves are shaped like the palms of hands with multiple, rounded lobes. Leaves are alternate, 2-10" long (5-25 cm), 2-8" wide (5-20 cm), and have lighter-colored petioles 2-4" long (5-10 cm). The plant has two forms: the "caprifig" produces male flowers and female flowers with only short styles while the "fig" produces only female flowers with long styles. All flowers lack petals and occur within a pear-shaped fruit. Caprifig fruit is dry and unpalatable while fig fruit is fleshy and savored by many animals, including humans. Figs are 1½-3" long (4-8 cm) and vary from dark purple to greenish-yellow to pinkish-green. Caprifigs produce 3 crops per year while fig crops produce 2, each ripening in summer or late fall.

Edible fig: a) small wild tree, b) infestation (a,b John M. Randall, The Nature Conservancy, www.bugwood.org)

Edible fig: c) twigs and shoots (Robert Vidéki, Doronicum Kft.), d) leaves (Forest & Kim Starr), e) mature fruit, cut and whole (David Karp) (c,e www.bugwood.org)

REPRODUCTION: By seed and vegetatively through root sprouts or rooting limbs. It is unknown how long seeds may remain viable in the soil.

HABITAT: Typically invade riparian forests, streamside habitats, levees, and canalbanks.

Look-alike: Punjab fig (Liné1)

LOOK-ALIKES: While other species may have similar leaves and a growth form that overall resembles edible fig, most look-alikes do not have flowers that occur completely within the fleshy fruit. The exotic Punjab fig (*Ficus palmata*) grows to a similar height, has lobed leaves, and edible fruit varying in color similar to edible fig. Punjab fig leaves are not as lobed as edible fig and have serrated margins. Punjab fig fruits are also smaller (1" or 2½ cm in diameter).

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in the SW, its potential ecological impact and distribution are both high. Regularly cultivated in California, but has escaped cultivation in areas where soil stays moist. Successful fig production is dependent on pollination by the wasp *Blastophaga psenes*.

Evergreen ash

Fraxinus uhdei (Wenz.) Lingelsh.

SYNONYMS: shamel ash, tropical ash

ORIGIN: southern Mexico, Central America

GROWTH TRAITS: Fast-growing, upright tree reaching 60-80' tall (18-25 m) from a shallow root system. Trees are multi-branched with rounded canopies when growing solitary, but are less-branched and narrow in dense infestations. Bark is fissured and gray (often mottled). Leaves are opposite and divided into 5-9 leaflets. Leaflets are opposite but with a single terminal leaflet. Leaflets are glossy, dark green, lance-shaped, and have toothed margins. Trees are evergreen in warm climates. Flowers are inconspicuous and appear from winter through spring. Trees are either male or female with female plants producing clusters of fruits in spring and summer. Fruits are papery, winged, narrow, and ½-1½" long (1¼-4 cm).

REPRODUCTION: By seed. Seeds remain viable in the soil for up to eight years.

Evergreen ash: a) trees, b) infestation (a,b Forest & Kim Starr)

Evergreen ash: c) bark, d) leaf and leaflets (John M. Randall, The Nature Conservancy, www.bugwood.org, e) fruits (c,e Forest & Kim Starr)

HABITAT: Grows best in moist, well-drained soils including oak woodlands, riparian areas, and irrigated urban areas. Shade tolerant.

Look-alike: velvet ash (Patrick J. Alexander, USDA-NRCS PLANTS Database)

LOOK-ALIKES: The opposite leaves divided into 5-9 leaflets help differentiate evergreen ash from non-ash species. Several species of ash (both native and exotic) are established in North America, though the majority occur in the East. Evergreen ash can be differentiated from ash species in the Southwest by its combination of: growing as a tree rather than a shrub, having compound leaves, having smooth shoots (as compared to velvety), and having inconspicuous flowers rather than the obvious white flowers of other species. Evergreen ash leaflets are also green on the underside (as opposed to white), have pointed tips, always have serrated margins, and are more numerous (up to 9) compared to look-alike ashes.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Frequently escapes cultivation. Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high.

Iberian & Purple starthistle

Centaurea iberica Trevir. ex Spreng. & *C. calcitrapa* L.

Iberian starthistle: a) plant with flower heads (Eitan f), b) leaf, c) seeds (b,c ©2001 CDFA)

Purple starthistle: d) plant with flower heads (Xemenendura), e) leaf and stem (Solanum), f) seeds (D. Walters and C. Southwick, USDA, www.bugwood.org)

SYNONYMS: Iberian starthistle (IS): Iberian knapweed; Purple starthistle (PS): red starthistle

ORIGIN: southern Europe, Middle East (both species)

GROWTH TRAITS: Both species are herbaceous annuals to short-lived perennials typically growing 2-4' tall (0.6-1.2 m) from a stout taproot. Plants often grow as rosettes with spiny centers the first year and then flower the second year. Stems and leaves are covered with fine hairs. Lower and basal leaves are divided or deeply lobed while upper leaves are not. All leaves often have a light green or gray-green appearance. Flowering occurs from July to October when numerous lavender to purple flower heads (¾-1" or 2-2½ cm in diameter) develop at stem tips. Floral bracts are tipped with 1" long (2½ cm) straw-colored spines. The two species can be differentiated by their seeds. **IS** produces plumed seeds while seeds of **PS** are plumeless.

REPRODUCTION: Both species spread only by seed. Most seed germinates the first year, but buried seeds of both species can remain viable in the soil for approximately three years.

HABITAT: Both species are found in dry and/or disturbed areas, especially along roadways and in dry, grazed rangeland.

LOOK-ALIKES: Both species resemble other members of the *Centaurea* genus. Starthistles can be distinguished by the very long spines extending from bract tips. Yellow starthistle differs from these two species with its yellow flower color and winged stems.

NOXIOUS WEED LISTINGS: **IS**: CA, AZ (Prohibited), NV (A); **PS**: CA, AZ (Prohibited), NV & NM (A)

NOTES: Unpalatable to livestock; may cause the fatal "chewing disease" in horses.

Iberian starthistle

Purple starthistle

Three-lobed morning glory

Ipomoea triloba L.

SYNONYMS: littlebell, Aiea morning glory

ORIGIN: tropical Americas (southern Mexico, Caribbean, Central America)

GROWTH TRAITS: Annual vine with stems growing up to 10' long (3 m) from an extensive root system. Vines are highly twining so appear much shorter than they are, and they do not climb much higher than grasses and low shrubs. Leaves are alternate, ¾-4¾" long (2-12 cm), and vary in shape from deeply 3-5 lobed to heart-shaped. Cut stems and leaf petioles exude a milky sap. Flowers appear in leaf axils throughout summer and into fall. Flowers are funnel-shaped with fused petals, ½-1" across (1¼-2½ cm), and vary in color from white to pink to pale purple with darker centers. Fruits are round, brown capsules containing 2-4 dark brown seeds.

REPRODUCTION: By seed only. It is unknown how long seeds remain viable in the soil.

Three-lobed morning glory: a) plant (Neha Vindhya), b) patch (J.M.Garg)

Three-lobed morning glory: c) leaf (J.M.Garg), d) flower (USDA APHIS PPQ Archive, USDA APHIS PPQ, www.bugwood.org), e) seed capsules (Forest & Kim Starr)

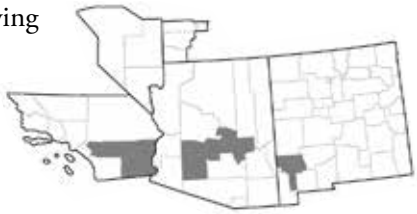
HABITAT: Tolerates a wide variety of conditions in warm climates and is found in cultivated fields, grassy swamp margins, in hedgerows, along roadsides, and in waste places in sandy ground.

Look-alike: sweet potato (Forest & Kim Starr)

LOOK-ALIKES: The vining habit combined with white to purple funnel-shaped flowers help differentiate this species from unrelated look-alikes. Several native and exotic morning glory species occur in North America and can be distinguished by their differences in flower color, leaf shape, and root structures. The weedy field bindweed (*Convolvulus arvensis*) is a perennial with a rhizomatous root system and smaller, arrowhead-shaped leaves. Hedge bindweed (*Calystegia sepium*) is a similar native but typically weedy species that climbs much higher on vegetation or structures (6½-13' or 2-4 m) compared to three-lobed morning glory. Hedge bindweed leaves are also narrower and much less lobed, appearing nearly triangular. Sweet potato (*Ipomoea batatas*) has larger flowers (1¼-2¾" or 3-7 cm across) and sweet potato tuber roots.

NOXIOUS WEED LISTINGS: AZ (Prohibited)

NOTES: Seed germination increased following scarification.



Highway iceplant, Sea fig & hybrids

Carpobrotus edulis (L.) N. E. Br. & *C. chilensis* (Molina) N. E. Br.

Highway iceplant: a) plant closeup (Carsten Niehaus), b) infestation (Hans Hillewaert), c) yellow flower (Carsten Niehaus), d) cross-section of fruit (©2014 Zoya Akulova)

Sea fig: e) plant (Joseph M. DiTomaso, University of California - Davis), f) flower (Joaquim Alves Gaspar), g) cross-section of fruit (©2014 Zoya Akulova)

SYNONYMS: Highway iceplant (HI): hottentot fig; Sea fig (SF): iceplant

ORIGIN: South Africa (both species)

GROWTH TRAITS: Both species are perennial, ground-hugging succulents that send out fibrous roots at every node. Each plant forms large mats up to 165' (50 m) in diameter. The fleshy leaf segments are 3-sided, 1½-5½" long (4-14 cm), waxy, and green but lined red with age. Flowering occurs almost year-round, peaking in spring. Flowers have numerous bright, narrow petals and numerous yellow stamens. The fruit is fleshy and contains several glossy brown seeds. **HI** leaf segments are widest below the middle. Flowers are yellow, pink, or magenta and 2½-6" in diameter (6-15 cm). **SF** leaf segments are widest above the middle. Flowers are magenta and 1½-2½" in diameter (4-6 cm). Flowers of hybrids are magenta and intermediate in size between the two species.

REPRODUCTION: Both species spread by seed and vegetatively. Every plant node can produce roots and shoots, so even small plant segments readily grow.

HABITAT: Both species capitalize on disturbance and can be found in coastal scrub, sand dunes, salt marshes, and along cliffs, roadways, and railway lines further inland. Both species are drought and salt tolerant, prefer full sun, and are sensitive to frost.

LOOK-ALIKES: The fleshy, triangular leaf segments, sprawling form, and magenta (sometimes yellow) daisy-like flowers differentiate these species from unrelated plants. See above for traits differentiating highway iceplant from sea fig.

NOXIOUS WEED LISTINGS: Neither species noxious in any SW state.

NOTES: Though not listed as noxious, their potential ecological impact and distribution are both high. While considered distinct species in California, there is reportedly much hybridization between *Carpobrotus edulis* and *C. chilensis,* making identification difficult. The origins of *C. chilensis* are somewhat obscure. It may itself be a hybrid species. Further study is required.

Highway iceplant Sea fig

Camelthorn

Alhagi maurorum Medik.

SYNONYMS: Caspian manna, Persian manna, *Alhagi camelorum* Fisch., *Alhagi pseudalhagi* (M. Bieb.) Desv. ex B. Keller & Shap.

ORIGIN: Mediterranean, Eurasia

GROWTH TRAITS: Perennial shrub growing 2-3' tall (0.6 to 0.9 m) from a deep and extensive rhizomatous root system. Stems and leaves are gray-green. Leaves are small, elliptic with smooth margins, and occur alternately up the stem. Sharp, yellow-tipped spines 1-2" long (2½-5 cm) are produced in leaf axils. Small, pea-like flowers (having a banner, wing and keel, typical of the pea family) are produced from June to August. Flowers range from pink to maroon and are borne on short, spine-tipped branches. Reddish-brown seed pods are constricted between the individual seeds and are tipped with a small beak. Seeds are dark brown and kidney-shaped. Plant growth varies with environmental conditions; thorns are smaller and fewer and leaves are larger and more numerous in moister climates.

Camelthorn: a) plant section (John M. Randall, The Nature Conservancy, www.bugwood.org), b) large plant, from above (Eitan f)

Camelthorn: c) leaves and thorns (Steve Dewey, Utah State University), d) flowers (Eitan f), e) seed pods from spine (John M. Randall, The Nature Conservancy) (c,e www.bugwood.org)

REPRODUCTION: By seed and the rhizomatous root system. Seeds may remain viable in the soil for many years.

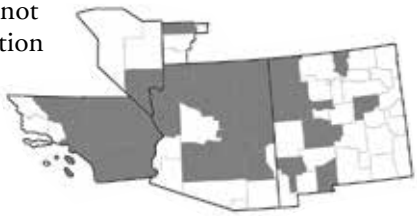
HABITAT: Found in moist to dry areas in disturbed soil.

Look-alike: Russian salt tree (Sten Porse)

LOOK-ALIKES: Though individual characteristics of camelthorn may resemble other plants, the combination of small, pink, and pea-like flowers, long spines, short height, and undivided, smooth-margined leaves help differentiate this species. Russian salt tree (*Halimodendron halodendron*) is also a spiny shrub with pink pea-like flowers. However, Russian salt tree grows larger (up to 10' or 3 m tall), has compound leaves, has wider and lighter-colored flowers, and has seed pods that are not constricted.

NOXIOUS WEED LISTINGS: CA, AZ (Prohibited), NV & NM (A)

NOTES: Seeds require scarification and do not germinate while exposed to light. Germination is highest following flash floods or after seeds pass through the digestive system of animals.



Russian salt tree

Halimodendron halodendron (Pall.) Voss

SYNONYMS: *Robinia halodendron* Pall.

ORIGIN: Eurasia

GROWTH TRAITS: Multi-branched perennial shrub growing up to 10' tall (3 m) from a deep and rhizomatous root system. Leaves are divided into 2-6 (usually 4) leaflets clustered on short spurs. Leaflets are egg-shaped, narrower at their base, and have tiny tips atop their broad ends. Spines arise from leaf bases and from branch tips. Flowers are pea-like (having a banner, wing and keel, typical of the pea family) and range from reddish-purple to pinkish-white. Flowers are 0.6-0.7" long (15-18 mm) and occur in clusters of 2-4 on short spurs in summer. Flowers have 10 stamens with 9 of the filaments fused into a tube. Seed pods are inflated, 2-parted, oblong, 0.6-1.2" long (1½-3 cm), and turn woody and black at maturity.

REPRODUCTION: By seed and vegetatively through rhizomes. Seed viability is unknown, though seeds of related species can remain viable for several years.

Russian salt tree: a) plant (Sten Porse), b) infestation (Pavel Buršík)

Russian salt tree: c) flowers (Sten Porse), d) leaflets and spine (Lazaregagnidze), e) maturing fruits (Yuriy Danilevsky)

HABITAT: Typically found in dry, disturbed sites including roadsides, field edges, and nearby hillsides. Tolerates saline soil.

LOOK-ALIKES: Though individual characteristics of Russian salt tree may resemble other plants, the combination of pink pea-like flowers, long spines, and compound leaves help differentiate this species. Camelthorn (*Alhagi maurorum*) is also a spiny shrub with pink pea-like flowers. However, camelthorn grows smaller (up to 3' or 0.9 m tall), has undivided leaves, has narrower and darker-colored flowers, and has reddish seed pods that are constricted between the seeds.

Look-alike: camelthorn (Eitan f)

NOXIOUS WEED LISTINGS: CA

NOTES: Introduced as an ornamental shrub. Seed pods have been considered good forage for livestock, but some seeds can survive ingestion, spreading the plant in grazed areas.

Red sesbania

Sesbania punicea (Cav.) Benth.

SYNONYMS: scarlet wisteria, rattlebox, bladderpod, *Piscidia punicea* Cav., *Daubentonia tripetii* Poit, *Daubentonia punicea* (Cav.) DC.

ORIGIN: South America

GROWTH TRAITS: Deciduous shrub or small tree typically growing up to 13' tall (4 m). The root system is not very extensive, especially in waterlogged conditions. The many slender, thornless branches have smooth green bark when young, turning red then brown at maturity. Leaves are alternate, 4-8" long (10-20 cm), and divided into 5-20 pairs of opposite leaflets. Each leaflet is oval-shaped and often ends in a tiny pointed tip. Flowering occurs throughout summer. Flowers occur in drooping clusters 3-10" long (8-25 cm). Each flower is approximately 1" long (2½ cm), red or orange-red, and pea-like (having a banner, wing and keel, typical of the pea family). Fruits are seed pods 2.4-3.1" long (6-8 cm) with pointed tips and 4 longitudinal wings. Pods turn dark brown and open when mature to release 4-10 small, light brown seeds.

Red sesbania: a) young plant (Chris Evans, Illinois Wildlife Action Plan), b) branches of mature plant (John D. Byrd, Mississippi State University) (a,b www.bugwood.org)

Red sesbania: c) leaf and leaflets (Rebekah D. Wallace, University of Georgia), d) flowers (Chris Evans, Illinois Wildlife Action Plan), e) fruits (Barry Rice, sarracenia.com) (c-e www.bugwood.org)

REPRODUCTION: By seed only. Seeds germinate rapidly and remain viable in the soil for no more than two years.

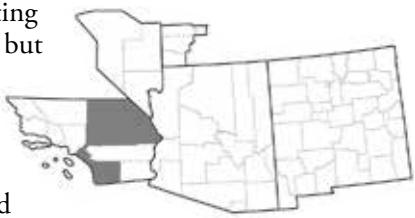
HABITAT: Predominantly found in moist soils including riverbanks, drainage ditches, and depressions where moisture accumulates, but can expand into pastures and dry grasslands after prolonged periods of rainfall.

Look-alike: hemp sesbania (Barry Rice, sarracenia.com, www.bugwood.org)

LOOK-ALIKES: Many species in the pea family (Fabaceae) have similar compound leaves, growth form, and preferred habitat. The combination of large red flower clusters, thornless branches, shrubby or small tree size, and presence in moist soils help differentiate red sesbania. The native hemp sesbania (*Sesbania exaltata*) can occur in similar habitats and has similar leaf shape and size. Hemp sesbania has yellow flowers and is typically smaller overall.

NOXIOUS WEED LISTINGS: CA

NOTES: Widely used as an ornamental planting because of its attractive flowers and foliage, but has escaped cultivation. It is especially problematic in South Africa where an extensive biological control program has been enacted to combat this weed. Foliage, flowers, and seeds are toxic to livestock and humans.



Canary Island knapweed

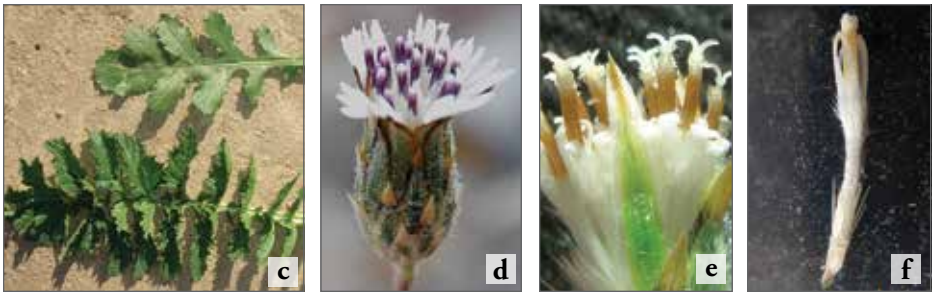
Volutaria canariensis Wagenitz

SYNONYMS: Canary Island starthistle

ORIGIN: Canary Islands

GROWTH TRAITS: Herbaceous annual typically growing to 24" tall (60 cm) from a taproot in its native habitat, though much larger individuals have been collected in North America. The plant is multi-branched; all branches and stems have narrow wings. Leaves are deeply lobed with individual lobes secondarily lobed or toothed. Leaves become smaller and less lobed further up the stem. Leaves and stems have small hairs. Flowering occurs from spring to summer. Flower heads are 0.4-0.6" in diameter (1-1½ cm) and appear singly or in just a few numbers at the ends of stems. Floral bracts are tipped with broadly triangular and tan-colored spines covered in tiny, tangled hairs. Some bracts are elongated, extending beyond florets. Outer petal-like florets are sterile while inner florets each produce a single seed. All florets are short; inner florets are hairy at their

Canary Island knapweed: a) plant (Kate Harper, http://tchester.org/bd/species/asteraceae/volutaria_canariensis.html), b) multiple smaller plants and habitat (Krzysztof Ziarnek, Kenraiz)



Canary Island knapweed: c) leaves (Kate Harper), d) flower head with purple-tinged florets (Krzysztof Ziarnek, Kenraiz), e) top of flower head with white florets, f) single inner floret (e,f Tom Chester)(c,e,f http://tchester.org/bd/species/asteraceae/volutaria_canariensis.html)

base and are often tinged in purple. Seeds are elliptic, tan, and have stiff pappus as long as seeds.

REPRODUCTION: By seed. Seeds remain viable in the soil for multiple years.

HABITAT: Found in hot, arid conditions. Seeds sprout following infrequent rain events.

Look-alike: diffuse knapweed (Jennifer Andreas, Washington State University Extension)

LOOK-ALIKES: Several related *Centaurea* species are invasive in the Southwest. Most can be differentiated by having yellow florets and/or very long, spiny bracts. Spotted, squarrose, and diffuse knapweed (*Centaurea stoebe, C. squarrosa*, and *C. diffusa,* respectively) have a similar growth form and bract shape, however spotted and squarrose knapweed have pinkish florets. Only diffuse knapweed can have white florets. All three have longer florets, non-winged stems, and are densely hairy, giving the foliage a gray-green appearance.

NOXIOUS WEED LISTINGS: Not listed as noxious in any SW state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. Discovered in southern California in 2010, a handful of plants spread to nearly 1,000 in just a few years.

Carolina horsenettle

Solanum carolinense L.

SYNONYMS: bull nettle, apple of Sodom

ORIGIN: North America, including regions as far west as (moving south) Ontario (Canada), South Dakota, Nebraska, New Mexico (US), and Sonora (Mexico).

GROWTH TRAITS: Herbaceous perennial with spiny stems growing up to 3.2' tall (1 m) from a deep taproot with an extensive rhizomatous root system. Leaves are triangular to oval with deep, irregular lobes. Both surfaces are covered with fine hairs and can have spines protruding from the midvein. Flowering occurs throughout the summer from April to October. Flowers have 5 whitish petals with 5 bright yellow stamens. Petals are fused at their bases. Fruits are clusters of round berries that resemble small tomatoes with light green stripes, turning yellow as they mature.

REPRODUCTION: By seed and creeping rhizomes. Seed may remain viable in the soil for up to 10 years.

Carolina horsenettle: a) plant (Ohio State Weed Lab Archive, The Ohio State University, www.bugwood.org), b) infestation (©2014 Keir Morse)

Carolina horsenettle: c) leaf with spines (Rebekah D. Wallace, University of Georgia), d) flower (Fritz Flohr Reynolds.), e) fruits and stem spines (James H. Miller & Ted Bodner, Southern Weed Science Society) (c,e www.bugwood.org)

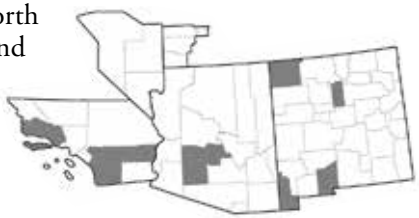
HABITAT: Found in arid to semi-arid disturbed areas such as pastures, roadsides, and railroad margins with sandy or loam soils.

LOOK-ALIKES: The 5-petaled flowers with yellow stamens and berry fruits help differentiate this species from unrelated look-alikes. Several similar-looking species of native and exotic *Solanum* occur in North America. Most of these can be differentiated by having non-lobed leaves, different colored fruits, non-spiny stems/leaves, or different colored flowers with non-fused petals. Sticky nightshade (*Solanum sisymbriifolium*) has similar flowers but produces red berries, and its lobed leaves appear almost fern-like. Buffalobur (*Solanum rostratum*) has more deeply lobed leaves and produces yellow flowers.

Look-alike: buffalobur nightshade (Jennifer Andreas, Washington State University Extension)

NOXIOUS WEED LISTINGS: AZ (Prohibited), CA, NV (B)

NOTES: Though native to portions of North America, it is regularly invasive inside and outside of its native range. All parts are poisonous. Spines can break off painfully after puncturing human skin.



Crystalline iceplant

Mesembryanthemum crystallinum L.

SYNONYMS: common iceplant, *Cryophytum crystallinum* (L.) N. E. Br.

ORIGIN: Africa, Mediterranean

GROWTH TRAITS: Succulent, herbaceous annual (most typical) to short-lived perennial with trailing and branched stems growing up to 3.2' wide (100 cm) and 4-8" high (10-20 cm) from a shallow and very short root system. Leaves are succulent, 0.8-4" long (2-10 cm), oval or triangular in outline with very wavy margins, and light green to red. Stems, leaves, and flower receptacles are covered in tiny, clear, blister-like projections resembling frozen dew. Flowering largely occurs in spring and early summer, but flowers can be found nearly year-round. Flowers are 0.3-0.6" in diameter (7-15 mm), occur on fleshy red receptacles, have numerous narrow, white petals aging to pink, and have multiple yellow-white stamens and styles. Fruits are 5-celled capsules that burst to release numerous brown seeds when conditions are moist.

REPRODUCTION: By seed. Seed viability is unknown.

Crystalline iceplant: a) plant (Yummifruitbat), b) small patch (Winfried Bruenken)

Crystalline iceplant: c) leaves (Frank Vincentz), d) flower, e) blisters on flower receptacle (d,e Yummifruitbat)

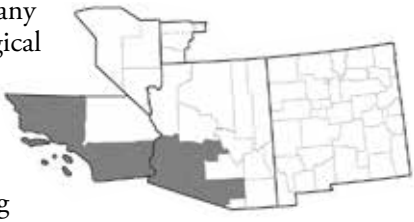
HABITAT: Found primarily in saline soils near the coast in sage scrub, coastal bluffs and cliffs, and other open, disturbed areas without frost.

Look-alike: slender iceplant (Frank Vincentz)

LOOK-ALIKES: The white petals and clear, tiny, blister-like projections covering the plant help differentiate this species from unrelated species as well as many other iceplants. The exotic slender iceplant (*Mesembryanthemum nodiflorum*) has a similar form and habitat, is also covered with the clear blisters, and varies from light green to red. Slender iceplant is smaller with stems growing to 8" long (20 cm), and is lined with knob-like, cylindrical, fleshy leaves up to 0.8" long (2 cm). Slender iceplant flowers are white but less than 0.4" in diameter (1 cm).

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. The stems, leaves, and fruits are edible, though the plant accumulates salt. After plant death, the salt leaches from the decaying plant into the surrounding soil, inhibiting the growth of less salt-tolerant species.



Greater swinecress

Lepidium coronopus (L.) Al-Shehbaz

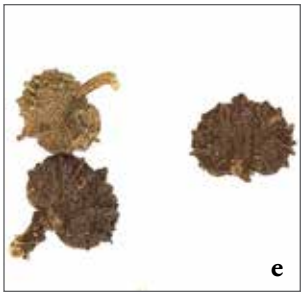
SYNONYMS: creeping watercress, creeping wart cress, *Coronopus squamatus* (Forssk.) Asch.

ORIGIN: Mediterranean

GROWTH TRAITS: Typically an annual (but occasionally a biennial) growing prostrate on the ground from a taproot. Flowering stems are up to 1' long (30 cm) but also grow prostrate on the ground. Leaves are alternate, 2-12" long (5-30 cm), and are deeply divided into lobes that are toothed or lobed again. Flowering occurs from May to October. Flowers are grouped in compact clusters in leaf axils. Each flower has 4 tiny white petals and is 1/8" across (3 mm). Fruits are small, very wrinkled, flattened, and round with 2 chambers. Each chamber contains 1 yellow-brown seed.

REPRODUCTION: By seed only. It is unknown how long seeds may remain viable in the soil.

Greater swinecress: a) plant (Joseph M. DiTomaso, University of California - Davis, www.bugwood.org), b) illustration (Jacob Sturm & Johann Georg Sturm, Deutschlands Flora in Abbildungen, © expired)



Greater swinecress: c) leaves and flowers (Joseph M. DiTomaso, University of California - Davis, www.bugwood.org), d) flowers (©2001 CDFA), e) fruits (Roger Culos)

HABITAT: Capitalizes on disturbance and can be found in agricultural fields, orchards, turf, roadsides, ditchbanks, and other disturbed areas. Tolerates saline soils.

LOOK-ALIKES: Though many prostrate weeds have similar leaves and growth form, greater swinecress can be differentiated by having its flowers in compact clusters from leaf axils and by its flowers having 4 white petals. Lesser swinecress (*Lepidium didymum*) closely resembles greater swinecress but has longer stems, and the foliage of lesser swinecress gives off a skunk-like odor when crushed or broken.

Look-alike: lesser swinecress (Rasbak)

NOXIOUS WEED LISTINGS: AZ (Prohibited), CA

NOTES: While the foliage of a closely related and very similar species (lesser swinecress) has a skunk-like odor, the leaves and stems of greater swinecress do not.

Onionweed

Asphodelus fistulosus L.

SYNONYMS: asphodel, hollow-stem asphodel

ORIGIN: Mediterranean

GROWTH TRAITS: Herbaceous annual to short-lived perennial growing up to 30" tall (76 cm) from a fibrous root system. The roots have a series of tuber-like parts at stem bases. There are multiple hollow, rigid flowering stems per plant. All leaves are basal, giving the plant a bunchgrass appearance. Leaves grow up to 20" long (50 cm) and are hollow, though not perfectly cylindrical. Flowering occurs in late summer. Flowers are approximately ½" across (13 mm) and have 3 true petals and 3 sepals resembling petals. Petals and sepals are elliptic, white (sometimes slightly pink), and have a conspicuous reddish-brown midvein. Flowers have 6 stamens with white filaments and reddish-brown tips. Fruits are wrinkled, round capsules that contain 6 triangular, rough, brown seeds.

REPRODUCTION: By seed. Seeds remain viable in the soil for many years.

Onionweed: a) plant (USDA APHIS PPQ Archive, www.bugwood.org), b) infestation (Fan of Zhirkov)

Onionweed: c) leaves (USDA APHIS PPQ Archive), d) flowers (Donald Hobern, Copenhagen, Denmark), e) seed (Steve Hurst, USDA-NRCS PLANTS Databae)(c,e www.bugwood.org)

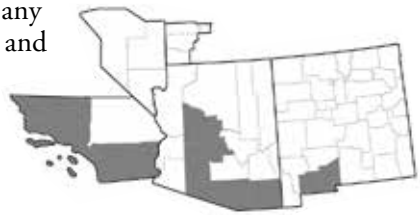
HABITAT: Found in disturbed places including pastures, field edges, roadsides, and dunes. Recently becoming problematic in grasslands and other wildland sites post burning.

LOOK-ALIKES: Though onionweed superficially resembles *Allium* species (true onion and garlic), onionweed lacks an onion or garlic odor. *Allium* spp. have similar leaves, and their flowers have 6 petals/sepals just like onionweed. However, *Allium* spp. flowers all arise from a single point in a spherical inflorescence rather than alternately up the stem. The combination of symmetrical flowers and clumped, basal, and hollow leaves help differentiate onionweed from other unrelated look-alikes.

Look-alike: *Allium* spp. (R.A. Howard, Smithsonian Institution, USDA-NRCS PLANTS Database)

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, it is federally listed, and its potential ecological impact and distribution are both high.



African rue

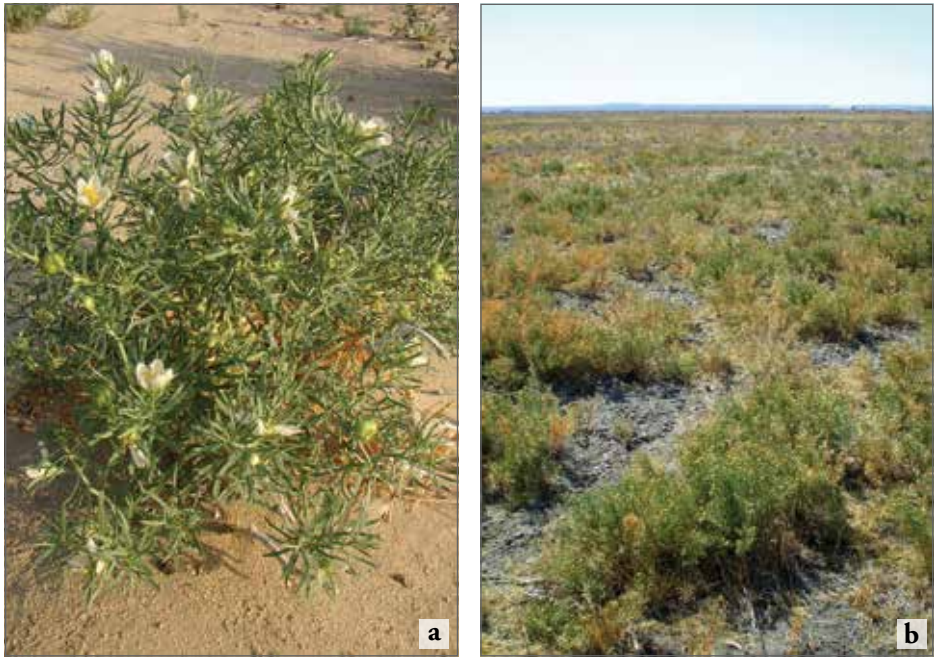
Peganum harmala L.

SYNONYMS: Syrian rue, wild rue, Esfand, harmel

ORIGIN: northern Africa, Asia, Europe

GROWTH TRAITS: Perennial shrub with a low-growing, bushy habit. The plant reaches 2-3' in height (0.6-0.9 m) and grows from a stout taproot with short, creeping lateral roots. Green stems are stiff, fleshy, highly branched, and hairless. Leaves are alternate, fleshy, bright green, 0.8-2" long (2-5 cm), and irregularly divided into linear segments. Flowering occurs from spring through fall. The white, 5-petaled flowers are 1" in diameter (2½ cm) and can be found on stalks from leaf axils. Each flower has 10-15 yellow stamens. The fruit is a 2- to 4-celled leathery capsule containing 45-60 dark brown, angular seeds. Seeds have a distinctive smell, especially when crushed. Aboveground plant parts die back in winter.

REPRODUCTION: Primarily by seed, though severed roots can produce new shoots. Seeds remain viable in the soil for many years.



African rue: a) plant (Yuriy Danilevsky), b) small infestation (Oregon Department of Agriculture)

African rue: c) leaves, d) flower (c,d Yuriy Danilevsky), e) fruit (e Douglas Barbe, California Department of Food and Agriculture, www.bugwood.org)

HABITAT: Found in disturbed environments including roadsides and fields in desert to semi-desert areas. Often found in soils with high salinity.

LOOK-ALIKES: Vaguely resembles shrubby species of sandwort (*Eremogone* spp.) which also have dark green and long, linear leaves and white, 5-petaled flowers. Shrubby sandworts usually grow no taller than ⅔' (20 cm). Flowers of African rue have 10 to 15 yellow-tipped stamens while those of sandworts have 10 white stamens tipped with brown.

Look-alike: sandwort (Steve Dewey, Utah State University, www.bugwood.org)

NOXIOUS WEED LISTINGS: AZ (Prohibited), CA, NV (A), NM (B)

NOTES: The plant is toxic to both livestock and people; the fruit and seeds are most poisonous. De-hulled seeds yield edible oil similar to cottonseed oil. Plants have been used medicinally and for producing red dye in the Middle East.

Bridal veil broom

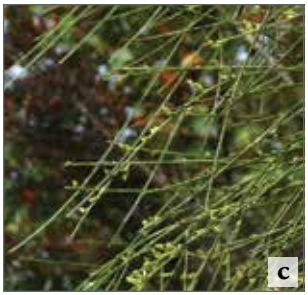
Retama monosperma (L.) Boiss.

SYNONYMS: *Genista monosperma* (L.) Lam., *Spartium monospermum* L., *Lygos* monosperma (L.) Heywood

ORIGIN: Mediterranean

GROWTH TRAITS: Perennial shrub growing up to 10' tall (3 m) and 20' across (6 m) from a deep taproot. Young plants are dominated by a leading stem; plants become more branched and broaden with age. Stems are slender, green, and drooping. Leaves are small, linear, and usually simple (not divided into leaflets). Leaves are quickly deciduous, making stems leafless much of the year. Flowers are small, have purple sepals, and have petals that are white and pea-like (having a banner, wing and keel, typical of the pea family). Flowers appear in short clusters of 2-20 from the stems in early spring, though some plants have been observed flowering all year in warm climates. The fruits are pods that are nearly round, typically 0.4" long (1 cm), and contain 1-2 seeds each.

Bridal veil broom: a) plant (Javier Martin), b) infestation prior to blooming (Jean-Paul Peltier)



Bridal veil broom: c) stems and leaves (James Gaither), d) flowers (Javier Martin), e) fruits (Fouad Msanda)

REPRODUCTION: By seed. Seeds can remain viable in the soil for several years.

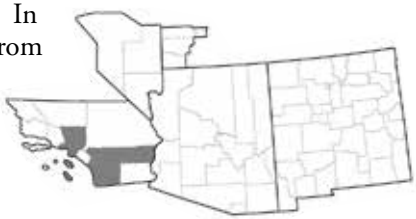
HABITAT: Does well in dry, rocky, infertile soils such as sage scrub, chaparral, and grasslands.

LOOK-ALIKES: Multiple exotic broom species are established in similar habitats in North America, such as Scotch broom (*Cytisus scoparius*). These other brooms resemble bridal veil broom when not in bloom or not fruiting. Their larger yellow flowers and long seed pods help differentiate them from bridal veil broom, which has small white flowers and nearly round pods.

Look-alike: Scotch broom (Steve Dewey, Utah State University, www.bugwood.org)

NOXIOUS WEED LISTINGS: CA

NOTES: Likely an escaped ornamental. In southern California, an infestation grew from 10 acres to over 2,000 acres in 6 years.



Croftonweed

Ageratina adenophora (Spreng.) R. M. King & H. Rob.

SYNONYMS: eupatory, sticky snakeroot, *Eupatorium adenophorum* Spreng., *Eupatorium glandulosum* Michx.

ORIGIN: southern Mexico

GROWTH TRAITS: Small, shrubby perennial growing up to 3-6½' tall (1-2 m) from a short, thick taproot with numerous side branches. Multiple stems are purplish and shortly branched at their tips. Stems are glandular hairy at first, becoming woody with age. Stems can root when they touch the ground, leading to a sprawling growth form. Leaves are opposite, triangular, have deep veins, have numerous rounded teeth on margins, and grow 1-3.2" long (5-8 cm). Buds appear in late winter, and flowering occurs in early spring. Inflorescences are 4" in diameter (10 cm) and consist of multiple flower heads ¼" across (6 mm). Each flower head is comprised of 10-60 tubular, white or pale pink florets. Seeds are dark brown, narrow, and topped with a pappus of long, sparse hairs.

REPRODUCTION: Primarily by seed and by producing roots when stems touch the ground. Seeds typically remain viable for up to three years.

Croftonweed: a) plant (Forest & Kim Starr), b) infestation (Frank Vincentz)

Croftonweed: c) leaves (John Tann), d) flowers (Christian Hummert), e) seeds (Julia Scher, USDA APHIS PPQ, www.bugwood.org)

HABITAT: Capitalizes on disturbance along roadsides, pastures, open woodlands, forest margins/clearings, and riparian zones in subtropical and warmer temperate regions.

Look-alike: redosier dogwood (Albert Herring, Superior National Forest)

LOOK-ALIKES: The combination of opposite leaves, purplish stems, and clusters of white flowers help differentiate this species from other shrubby look-alikes. Redosier dogwood (*Cornus sericea*) also has colored stems, opposite leaves, and clustered white flowers. Redosier dogwood stems are red, and its inflorescences consist of individual 4-petal flowers rather than clustered flower heads. Several *Ageratina* are native to the USA, though only seven occur west of Texas, and three of those have alternate leaves. Of the remaining, *A. herbacea* has yellow-green and smaller leaves, *A. lemmonii* leaves are typically stalkless, *A. paupercula* has much narrower leaves, and *A. rochrockii* grows shorter (up to 27" or 70 cm) from slender rhizomes.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, it is federally listed, and its potential ecological impact and distribution are both high. Fatally toxic to livestock, especieally horses. The root gives off a carrot-like odor when damaged.

Syrian beancaper

Zygophyllum fabago L.

SYNONYMS: Syrian bean-caper

ORIGIN: Eurasia

GROWTH TRAITS: Typically a shrubby perennial growing up to 3' tall (0.9 m) from a deep, woody taproot with creeping rhizomes. In cold climates, the plant may behave as an annual. Stems are multi-branched and hairless. Leaves are opposite and each composed of 2 leathery, oval-shaped leaflets. Leaflets have smooth margins and are up to 1" long (2½ cm). Flowers appear on stalks at leaf axils from spring through early summer. Flowers have 5 green sepals and 5 white or cream petals with salmon-colored markings. The 10 stamens are orangish and extend beyond the petals. Fruits are 5-celled, drooping capsules up to 1½" long (4 cm) that open at maturity to release the small, dark seeds.

REPRODUCTION: By seed, rhizomes, and root fragments. It is unknown how long seeds may remain viable in the soil.

Syrian beancaper: a) plant (Philmarin), b) infestation (Javier Martin)

Syrian beancaper: c) leaflets, flower, and immature fruit (Dell O. Clark, California Department of Food and Agriculture, www.bugwood.org), d) flower, e) split fruits and seeds (d,e Philmarin)

HABITAT: Found in dry, open habitats with well-drained soil including rangeland, roadsides, and desert areas.

Look-alike: common snowberry (Frank Vincentz)

LOOK-ALIKES: The opposite compound leaves, white flowers with exerted orange stamens, hanging capsule fruits, and shrubby growth form are not found in combination on any possible look-alike. Most species resembling Syrian beancaper have two or less of those traits. Various species in the Fabaceae may resemble young and small Syrian beancaper, including alfalfa, sweetclover, and medick. These can be distinguished by having 3 leaflets on alternate leaves and pea-like flowers. Common snowberry (*Symphoricarpos albus*) is a shrub with opposite leaves and whitish flowers; however its leaves are not compound, its flowers occur in small drooping pairs, its fruits are white berries, and it typically grows in more moist habitats than Syrian beancaper.

NOXIOUS WEED LISTINGS: CA, NV (A)

NOTES: The flowers have a taste and scent similar to caper.

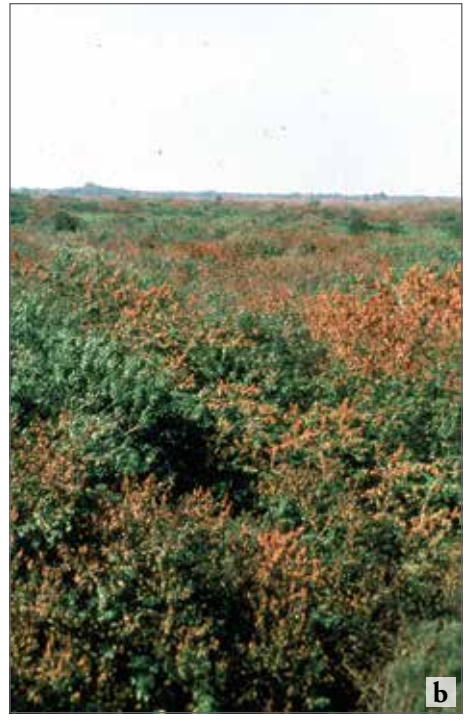
Brazilian peppertree

Schinus terebinthifolius Raddi

SYNONYMS: Brazilian pepper, Florida holly, Christmasberry

ORIGIN: South America

GROWTH TRAITS: Perennial sprawling shrub or small tree growing 10-32' tall (3-10 m) from a shallow root system. Plants are typically multi-stemmed, each with smooth bark that becomes furrowed and scaly with age. Stems can grow upright, reclining, or nearly vine-like. Leaves are alternate and divided into 2-14 opposite leaflets and a single terminal leaflet. Leaflets are dark green, lance-shaped but rounded, 1-4" long (2½-10 cm), and have prominent midveins and finely toothed margins. Plants are either male or female; both sexes produce large clusters of small, white, 5-petaled flowers from leaf axils in late fall. Some individuals may flower again in spring. Fruits appear on female plants in large clusters and are tiny, berry-like, and red when mature.



Brazilian peppertree: a) tree (James Steakley), b) infestation (Randy Westbrooks, Invasive Species Prevention Specialist, www.bugwood.org)

Brazilian peppertree: c) leaf with leaflets (James H. Miller, USDA Forest Service), d) flowers (Rebekah D. Wallace, University of Georgia), e) fruits (Stephanie Sanchez) (c-e www.bugwood.org)

REPRODUCTION: By seed and suckering from roots/stems damaged during control efforts. Seeds remain viable in the soil for less than six months.

HABITAT: Found along abandoned fields, roadsides, rights-of-way, levees, marshes, shorelines, and undisturbed habitats in surrounding hillsides. It tolerates a wide range of conditions at low elevations.

Look-alike: Chinese pistache (Magnus Manske)

LOOK-ALIKES: Many species may look similar from a distance (e.g. *Ilex* or holly species typically found in eastern states), but Brazilian peppertree can be differentiated by its combination of compound leaves and profuse red fruits. The related Chinese pistache (*Pistacia chinensis*) is an exotic ornamental with an even number of leaflets, reddish foliage in fall, and blue fruits (when ripe).

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. This species escaped cultivation as an ornamental and is especially problematic in Florida, and is becoming a concern in California and beyond. Plants give off a strong odor of turpentine or peppers when crushed.

Mexican fan palm

Washingtonia robusta H. Wendl.

SYNONYMS: Mexican palm, Washington fan palm, skyduster

ORIGIN: Mexico

GROWTH TRAITS: Tree typically growing 40-50' tall (12-15 m) from a fibrous root system, though some individuals may reach 80' tall or more (24.3 m). The single trunk is ringed by old leaf bases and tapers from 2' (60 cm) in diameter at the base to 8" (20 cm) near the top. The tree is topped by 20-25 erect leaves. Leaves are 3-6' long (0.9-1.8 m), compound, and split into numerous linear leaflets in the arrangement of a fan. Leaf petioles are brownish at their bases and edged with thick, sharp teeth. Leaflets frequently have threads along their margins. Old leaves remain attached to the trunk, forming a long brown skirt beneath healthy leaves. During spring and summer, small white flowers appear in clusters on branched inflorescences that are 8-10' long (2.4-3 m) and hang beyond the leaf canopy. These are followed by black berry-like fruits ~½" in diameter (1.2 cm).

Mexican fan palm: a) tree with fronds attached (Patti Anderson, Division of Plant Industry, www.bugwood.org), b) tree with fronds dropped, c) infestation (b,c Forest & Kim Starr)

Mexican fan palm: d) leaves and thorny leaf petioles (Forest & Kim Starr), e) inflorescences (Ginabovara), f) fruit (Mmcknight4)

REPRODUCTION: By seed only. It is unknown how many years seeds remain viable in the soil, though seeds of most palm species lose viability quickly.

HABITAT: Found in well-drained soil with full to partial sun and most often with moderate moisture, including urban areas, riparian zones, canyons, roadsides, and orchards. Can tolerate drought.

Look-alike: California fan palm (Forest & Kim Starr)

LOOK-ALIKES: The fan-like leaves with leaflets arising from one point help differentiate Mexican fan palm from other palm species whose leaflets are arranged linearly (feather-like). The native California fan palm (*Washingtonia filifera*) has very similar growth and fan-like leaves. California fan palm grows shorter with a thicker trunk, has leaf petioles more green in color and without obvious thorns, has more threads along leaflets, and is more cold and drought tolerant. Both fan palms hybridize.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. It has long been used as an ornamental, but frequently escapes to become problematic in rural and riparian areas.

Austrian & Creeping yellow cress

Rorippa austriaca (Crantz) Besser & *R. sylvestris* (L.) Besser

Austrian yellow cress: a) basal leaves, b) flowers, c) fruits (a-c Elizabeth Bella, USDA, bugwood.org)

Creeping yellow cress: d) plant (Joseph DiTomaso, University of California - Davis, www.bugwood.org), e) flowers and leaves (SB Johnny), f) fruits (Robert Mohlenbrock, USDA SCS, USDA PLANTS Database)

SYNONYMS: Austrian yellow cress (AYC): Austrian fieldcress, *Nasturtium austriacum* Crantz; Creeping yellow cress (CYC): creeping fieldcress

ORIGIN: Eurasia (both species)

GROWTH TRAITS: Both species are herbaceous perennials with rhizomes. Stems are 1-3' tall (0.3-0.9 m). Flowers have 4 petals and 6 stamens, are arranged alternately at branch tips, and appear late spring through summer. **AYC**: Stem leaves are alternate, 1-2" long (2½-5 cm), oblong, hairless, and can have slightly or very toothed margins. Basal leaves are twice as long and deeply lobed, sometimes appearing dissected. Stems are slightly hairy, and upper leaves clasp the stem. Flowers are yellow and ¼" (⅓ cm) in diameter. Fruits are small and spherical but are rarely produced. **CYC**: Plants often form a dense, creeping mat. Leaves are more finely divided than AYC and grow up to 8" long (20 cm). Flowers are yellow and less than ⅛" (0.6 cm) in diameter. Fruits are long (0.4" or 1 cm), thin, and somewhat constricted.

REPRODUCTION: Both species spread primarily by rhizomes.

HABITAT: Both species frequent moist and disturbed areas along roadsides, fields, and pastures. **CYC** almost always occurs near water.

LOOK-ALIKES: Many Brassicaceae in the Southwest have similar flowers and leaves. The exact combination of leaf shape, short stature, moist habitat, and small flower size differentiate these species from others. The rounded fruit of AYC differentiates it from the long, slender-fruited **CYC**.

NOXIOUS WEED LISTINGS: **AYC**: AZ (Prohibited), CA, NV (A); **CYC**: CA

NOTES: A hybrid of these species is more invasive in Europe than either alone.

Austrian yellow cress

Creeping yellow cress

Sahara mustard

Brassica tournefortii Gouan

SYNONYMS: Asian mustard, African mustard, wild turnip

ORIGIN: northern Africa, Mediterranean, Middle East

GROWTH TRAITS: Herbaceous annual growing 4-40" tall (10-100 cm) from a stout taproot. Stems are multi-branched near the top of the plant. Lower stems have small, stiff, white hairs. Basal leaves are 3-20" long (8-50 cm), deeply lobed but not divided, have toothed margins, and have a rough texture with small stiff hairs. Stem leaves are small and oblong, appearing bract-like further up the stem. Flowering typically occurs from February to April; flower stalks spread away from the stem. Flowers are dull yellow, inconspicuous, consist of 4 petals and 6 stamens, and are 0.6" in diameter (1½ cm). Fruits are 1½-2½" long (3-6 cm) and spread outward from stems at 45 degree angles. Each fruit has an obvious beak at the tip that is 0.4-0.6" long (10-15 mm) and has 1 seed inside.

REPRODUCTION: By seed. Seeds can remain viable for more than three years.

Sahara mustard: a) plant, b) infestation (a,b James M. André)

Sahara mustard: c) leaves (Stan Shebs), d) flowers, e) seed pods (d,e Patrick Alexander, USDA NRCS PLANTS Database)

HABITAT: Primarily invades disturbed, arid habitats and is typically found along roadsides and dry creek beds. Tolerates high salt concentrations.

LOOK-ALIKES: Many Brassicaceae species in the West have similar flowers and fruits. The undivided leaves of this plant help differentiate it. Most look-alikes have leaves that are either more deeply lobed (at times appearing divided), or leaves that clasp the stem. The exotic wild mustard (*Sinapis arvensis*) looks similar with its large basal leaves and more naked upper branches. However, wild mustard leaves are not as deeply lobed and its flowers are larger and a brighter yellow.

Look-alike: wild mustard (Olivier Pichard)

NOXIOUS WEED LISTINGS:
NV (B), NM (Watch List)

NOTES: The weak stems enable this plant to break and tumble in the wind, spreading seeds far and wide. When the seed coats are moistened, they become very sticky and readily adhere to people, animals, and objects.

Shortpod mustard

Hirschfeldia incana (L.) Lagr.-Foss.

SYNONYMS: buchanweed, hoary mustard and Mediterranean mustard, *Sinapis incana* L., *Brassica adpressa* Boiss., *Brassica geniculata* (Desf.) J. Ball

ORIGIN: Mediterranean

GROWTH TRAITS: Herbaceous, upright annual, biennial, or perennial growing 1-3.2' tall (30-100 cm) from a deep and slender taproot with multiple side branches. The upper half of the plant splits into multiple spreading branches. Stems and leaves are covered in hairs. Basal leaves are up to 14" long (35 cm), have toothed margins and indented veins, and are deeply lobed but not divided; the terminal lobe is the largest. Stem leaves become smaller and less lobed further up the stem. Flowering typically occurs from May to October; flower stalks spread away from the main stem. Flowers are yellow, consist of 4 petals and 6 stamens, and are 0.6" in diameter (1½ cm). Leaves are typically retained during flowering. Seed pods are ½" long (13 mm), have an obvious beak at the tip, and are held closely against the stem.

Shortpod mustard: a) small plant, b) large plant (a,b Harry Rose)

Shortpod mustard: c) basal leaves, d) flowers (Pato Novoa), e) fruits (c,e Harry Rose)

REPRODUCTION: Primarily by seed, but may regenerate from damaged roots/root crowns. It is unknown how long seeds remain viable in the soil.

HABITAT: Capitalizes on disturbance, occurring along roadsides, in waste places, fields, grasslands and creek bottoms.

Look-alike: black mustard (Magnus Manske)

LOOK-ALIKES: Many Brassicaceae species in the West have similar flowers and fruits. The undivided leaves of this plant help differentiate it. Most look-alikes have leaves that are either more deeply lobed (at times appearing divided), or leaves that clasp the stem. The exotic black mustard (*Brassica nigra*) looks most similar. However, black mustard typically grows taller, has smaller flowers, and always grows as an annual.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. The plant is becoming an increasing problem in California. Young leaves and flowers are edible.

Wall rocket

Diplotaxis tenuifolia (L.) DC.

SYNONYMS: perennial wall rocket, Lincoln weed, sand mustard, *Sisymbrium tenuifolium* L.

ORIGIN: Eurasia

GROWTH TRAITS: Herbaceous perennial typically growing 8-28" tall (20-70 cm) from a deep taproot. Basal leaves are up to 7" long (18 cm), have a prominent and light-colored midvein, and are deeply lobed but not divided. Lobes are asymmetrical, and lobe tips are rounded. Most leaves are basal; leaves grow alternate, smaller and less lobed further up the stem. Flowering occurs throughout summer. Flowers are 0.3-0.6" in diameter (8-1½ cm) and have 4 yellow petals and 6 yellow stamens. Fruits are narrow pods ¾-2" long (2-5 cm) with an obvious beak at their tip. Seeds are small, yellow-brown, and round. All parts of the plant have a peppery flavor when consumed.

REPRODUCTION: By seed. It is unknown how long seeds remain viable in the soil.

Wall rocket: a) plant (AnRo0002), b) infestation (Rasbak)

Wall rocket: c) leaves (Leo Michels), d) flower, e) fruits (d,e Rasbak)

HABITAT: Capitalizes on disturbance and is found along roadsides, waste places, streambanks, pastures and railway lines. Tolerates a wide variety of soils, but is most often encountered in sandy, well-drained soil with high calcium content.

LOOK-ALIKES: Many Brassicaceae species in the West have similar yellow flowers and/or long and narrow fruits. Most look-alikes do not have the peppery flavor of wall rocket, and they have leaves that either have larger lobes or leaves that clasp the stem. The widely cultivated arugula (rocket, *Eruca vesicaria* subsp. *sativa*) has very similar leaves and long beaked fruits as well as a peppery flavor. However, arugula is an annual, has white flowers with purplish veins, and has shorter fruits.

Look-alike: arugula (Javier Martin)

NOXIOUS WEED LISTINGS: NM (Watch List)

NOTES: Consumption by grazing livestock can taint meat and dairy.

Capeweed

Arctotheca calendula (L.) Levyns

SYNONYMS: South African capeweed, cape dandelion, cape gold, *Arctotis calendula* L, *Cryptostemma calendula* (L.) Druce

ORIGIN: South Africa

GROWTH TRAITS: Low-growing, herbaceous, winter annual to perennial with a stoloniferous root system. Stems are hairy, ribbed, and creep on top of or just below the surface, rooting at nodes and forming new rosettes. Stems can reach up to 9' long (2¾ m) in a single growing season and form a dense groundcover. Leaves are 2-10" long (5-25 cm) and deeply and irregularly lobed. Leaves are bright green and lightly hairy above; they are densely hairy and white beneath. Flowering occurs nearly year-round but peaks in spring. Flower heads are ~2" in diameter (5 cm) and occur singly on hairy stalks 6-8" tall (15-20 cm). Outer florets (<20) are petal-like, sterile, and yellow with purple-tinged bases. Inner florets are numerous, tiny, and dark purple or yellow. Inner florets produce oval, brown achenes, each surrounded by a dense tuft of light, woolly hairs. Seeds are sterile in the infertile form of the plant frequently used in landscaping.

Capeweed: a) plant (Xemenendura), b) infestation (Forest & Kim Starr)

Capeweed: c) leaves (Forest & Kim Starr), d) flower head (Ghislain Chenais), e) fruit (Deena Walters, USDA APHIS PPQ CPHST ITP, www.bugwood.org)

REPRODUCTION: Infertile form spreads only via stolons. Fertile form spreads with seeds and stolons. Seed viability is unknown.

HABITAT: Found in disturbed areas with well-drained soil and full sun including coastal sites, vacant urban areas, riparian zones, and roadsides. Tolerates wet or dry soils, but is limited by frost.

Look-alike: cape marigold (Malcolm Manners)

LOOK-ALIKES: The large flower heads with yellow outer florets, and tiny, usually darker, inner florets help set this species apart from many others in the Asteraceae family. It can be differentiated from most remaining look-alikes by being very low-growing and having deeply lobed leaves. Cape marigold (*Dimorphotheca sinuata*) is a winter annual that has also escaped cultivation. Cape marigold sometimes has similar yellowish flowers with purple-tinged florets and can form dense infestations. Cape marigold does not have stolons, or hairy leaf undersides, or woolly hairs around seeds.

NOXIOUS WEED LISTINGS: CA

NOTES: An infertile form widely used as an ornamental has frequently escaped cultivation. A fertile form that was more recently introduced has become problematic as well. These are considered by some to be separate species.

Crown daisy

Glebionis coronaria (L.) Cass. ex Spach

SYNONYMS: garland chrysanthemum, chop suey green, *Chrysanthemum coronarium* L.

ORIGIN: Mediterranean, southwestern Asia

GROWTH TRAITS: Herbaceous, upright annual growing up to 3.2' tall (1 m) from a taproot. The main stem spreads into numerous branches with smooth surfaces. Leaves are alternate, up to 3" long (8 cm) and deeply lobed. Lobes are themselves secondarily lobed into tiny, rounded-tooth projections. Inflorescences appear at stem tips from spring through early summer. Flower heads are 0.8-2.4" in diameter (2-6 cm) with numerous tiny, yellow florets in the center and 13-21 petal-like florets on the periphery. Petal-like florets are either solid yellow or white with yellow bases. Flower heads produce numerous small brown seeds (achenes) that have no pappus.

REPRODUCTION: By seed only. Seeds remain viable in the soil for 3-4 years.

Crown daisy: a) plant (MathKnight and Zachi Evenor), b) infestation (MathKnight)

Crown daisy: c) foliage (Dalgial), d) yellow inflorescence (Laitche), e) white and yellow inflorescence (Joaquim Alves Gaspar)

HABITAT: Found under a variety of conditions in riparian areas, coastal dunes, prairies, and scrubland.

Look-alike: golden chamomile (Oskar Gran)

LOOK-ALIKES: The daisy-like inflorescence helps differentiate this species from unrelated look-alikes. Several chamomile species (spanning multiple genera) have similar flower heads and similar, deeply-lobed leaves. Many look-alikes can be differentiated by having solid white petal-like florets (rather than yellow or white with yellow). Other look-alikes with all yellow florets have leaves that are less lobed or divided. The exotic golden chamomile (*Cota tinctoria*) has similar leaves and flower heads, however its stems are typically less branched and have fewer leaves below the flower head. Golden chamomile leaves are also typically more jaggedly lobed and symmetrical compared to crown daisy.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. Frequently escapes cultivation to invade disturbed areas.

Globe chamomile

Oncosiphon piluliferum (L. f.) Källersjö

SYNONYMS: stinknet, *Cotula pilulifera* L. f., *Matricaria pilulifera* Druce

ORIGIN: South Africa

GROWTH TRAITS: Herbaceous annual typically growing 1-2' tall (15-60 cm) from a taproot. Stems are multi-branched, have longitudinal grooves, and are often covered in very fine hair. Leaves are alternate, covered in small hairs, and finely divided (appearing somewhat fern-like). Leaves are up to 2" long (5 cm), becoming progressively smaller and less divided up the stem. Flower heads appear singly at branch tips in spring. Flower heads are up to ½" in diameter (1¼ cm) and resemble round, yellow globes. Each is comprised of numerous tiny, tubular, yellow florets. Achenes are up to 0.08" long (2 mm) with a short crown of white pappus scales. All parts of the plant have a very pungent and usually disagreeable odor.

REPRODUCTION: By seed. Seed viability is unknown.

Globe chamomile: a) plant (©2014 Phillip Ruttenbur, plantworlds.org), b) infestation (Liz Makings, swbiodiversity.org)

Globe chamomile: c) leaf and stem, d) flower heads (Max Licher, swbiodiversity.org), e) dried flower head with achenes (c,e ©2014 Thomas Palmer)

HABITAT: Capitalizes on disturbance; frequently found in urban waste places, crops, pastures, coastal scrub, and along roadsides.

Look-alike: pineappleweed (Walter Siegmund)

LOOK-ALIKES: Globe chamomile's inflorescences lack petal-like florets and consist of numerous tiny, tubular florets. This helps differentiate it from all unrelated look-alikes. Within the family, many other native and exotic species have similar flower heads, including the weedy pineappleweed (*Matricaria discoidea*), which very closely resembles globe chamomile. Pineappleweed is typically lower growing (3-12" or 7-30 cm), its flower heads are more cone-shaped, and both the leaves and flower heads give off a distinctive pineapple odor when crushed.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. This ornamental is escaping cultivation to become problematic in Arizona and California.

Rush skeletonweed

Chondrilla juncea L.

SYNONYMS: skeleton weed, hogbite, nakedweed, gum succory

ORIGIN: Eurasia, Mediterranean

GROWTH TRAITS: Herbaceous biennial or perennial growing 1-4' tall (⅓-1.2 m) from a rhizomatous root system. Plants produce multiple stems that are wiry and rigid, giving the plant an overall skeleton appearance. Bottom portions of stems are covered with stiff, golden-reddish, and downward pointing hairs; upper stems are nearly or fully hairless. Rosettes have deeply lobed leaves; stem leaves are alternate and very narrow. Flower heads appear in later summer singly or in small clusters at leaf axils or stem tips. Each flower head is ½" across (1 cm) and consists of ~9-12 yellow florets that produce seeds without fertilization. Seeds are small, brown, and topped by tufts of pappus. All parts of the plant exude a milky latex sap when damaged.

REPRODUCTION: By seed and vegetatively from the rhizomes. Seeds may remain viable in the soil for up to four years.

Rush skeletonweed: a) plant (Rachel Winston, MIA Consulting), b) infestation (Laura Parsons, University of Idaho)

Rush skeletonweed: c) rosette leaves and stem spines (Richard Old, XID Services, Inc, www.xidservices.com, www.bugwood.org) d) flower head (Rachel Winston, MIA Consulting,), e) seeds (Leo Michels)

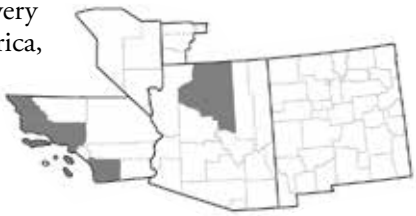
HABITAT: Found on rangeland, abandoned cropland, roadsides, and other disturbed places often in semiarid conditions with cool, moist winters and hot summers.

LOOK-ALIKES: Many weedy species are similar to rush skeletonweed with their lobed rosette leaves, wiry stems with stiff hairs, pappus-tufted seeds, and milky latex sap from damaged tissue, but they differ in a few other features. Chicory (*Cichorium intybus*) produces large blue flower heads. Prickly lettuce (*Lactuca serriola*) has roughly lobed leaves continuing up the stem, each with a line of spines on the undersides of the midvein.

Look-alike: prickly lettuce (Mary Ellen Harte, www.bugwood.org)

NOXIOUS WEED LISTINGS:
AZ (Prohibited), CA, NV (A)

NOTES: This weed is well established and very problematic in northwestern North America, where biological control is actively utilized. Multiple approved agents are available. The weed is becoming an increasing concern in the Southwest.



Sicilian starthistle

Centaurea sulphurea Willd.

SYNONYMS: sulphur knapweed

ORIGIN: Mediterranean

GROWTH TRAITS: Upright, herbaceous winter annual typically growing 1-3' tall (⅓-1 m) from a taproot. Large plants are branched; small plants have a single stem. Stems have wings ~¼" wide (5-6 mm) at their largest. Leaves are alternate, may be lightly toothed or lobed, and become smaller up the plant. Leaves and wings are yellow-green and sparsely covered with stiff hairs. Flowering occurs from May to July when 1" (2½ cm) flower heads develop singly at the ends of stems. Florets are yellow and numerous. Floral bracts are tipped with 3-5 pairs of small spines and a central main spine up to 1" long (2½ cm). Spines are straw-colored at their tips and dark brown at their bases. Seeds are ¼-⅓" long (5-8 mm), glossy, brownish-tan, and with dark brown pappus as long as seeds.

Sicilian starthistle: a) plant with immature capitula, b) senescing infestation (a,b Joseph DiTomaso, University of California - Davis, www.bugwood.org)

Sicilian starthistle: c) leaves and winged stem (Joseph DiTomaso, University of California - Davis, www.bugwood.org), d) flowering capitulum, e) senescing capitulum with seeds, from above (d,e Daniel Montesinos)

REPRODUCTION: By seed. It is unknown how long seeds remain viable in the soil, but seeds of related species are viable for up to three years.

HABITAT: Open, disturbed sites including grasslands, fields, pastures, roadsides, and waste places.

Look-alike: yellow starthistle (Jennifer Andreas, Washington State University Extension)

LOOK-ALIKES: The spiny capitula help differentiate this species from non-starthistle species in the Northwest. Yellow florets separate this species from purple-colored starthistles. Malta and yellow starthistle (*Centaurea melitensis* and *C. solstitialis*, both exotic) have yellow florets, but both have gray-green foliage due to numerous white cottony hairs. Flower heads of Sicilian starthistle are larger than Malta and yellow starthistle, and Sicilian starthistle seeds are twice as large and darker than seeds of the other two.

NOXIOUS WEED LISTINGS: AZ (Prohibited), CA

NOTES: Though not yet documented in the Southwest, Sicilian starthistle is established in neighboring northern areas and is suited to the climate of the Southwest. Where the species co-occur, Sicilian starthistle often out-competes yellow starthistle.

Smooth & Woolly distaff thistle

Carthamus creticus L. & *C. lanatus* L.

Smooth distaff thistle: a) plants (©2001 CDFA), b) capitula, c) seeds (b,c Zoya Akulova)

Woolly distaff thistle: d) plant (Javier Martin), e) capitulum, f) seeds (e,f Philmarin)

SYNONYMS: Smooth distaff thistle (SDT): *Carthamus baeticus* (Boiss. & Reut.) Pérez Lara, *C. lanatus* L. ssp. *baeticus* (Boiss. & Reut.) Nyman, *C. lanatus* L. ssp. *creticus* (L.) Holmboe; Woolly distaff thistle (WDT): downy safflower, saffron thistle, *C. lanatus* L. ssp. *lanatus*

ORIGIN: **SDT**: Mediterranean, **WDT**: Mediterranean, Eurasia

GROWTH TRAITS: Both species are herbaceous winter annuals growing upright to 3.2' tall (1 m) from slender, fibrous taproots. Stems are straw-colored. Stems and leaves are covered in tiny glandular hairs. Stem leaves are alternate, stiff, weakly clasp the stem, and often spread backwards. Leaves have lobes tipped with sharp spines. Basal leaves are larger than stem leaves and are typically absent at flowering. Flower heads appear solitary on stem tips in summer. Each capitulum has several rows of bracts and yellow florets. Outer bracts are stiff, leaf-like, and spread backward; inner bracts are smaller, spiny, and less lobed. Seeds are brown achenes. Outer seeds are rough and lack pappus; inner seeds are smoother with stiff, persistent pappus. **SDT**: Hairs on stems, leaves, and flower heads are only slightly woolly. Seed pappus is 0.3-0.4" long (8-10 mm). **WDT**: Hairs on stems, leaves, and flower heads are very woolly. Seed pappus is 0.4-0.5" long (10-13 mm).

REPRODUCTION: Both species spread by seed only. Most seeds germinate within three years, though some may remain viable in the soil for eight.

HABITAT: Both species are found in disturbed, open sites including agricultural fields (especially grain), grasslands, and pastures.

LOOK-ALIKES: Their spiny nature differentiates these species from non-thistle look-alikes. Most other thistles do not have yellow florets or stiff, thick, backward-spreading leaves. Golden thistle (*Scolymus hispanicus)* is most similar but has milky sap and winged stems.

NOXIOUS WEED LISTINGS: Both species: CA

NOTES: Both weeds are sometimes classified of subspecies of *Carthamus lanatus.* Their gene numbers differ, however, and the species do not hybridize.

Smooth distaff thistle

Woolly distaff thistle

Stinkwort

Dittrichia graveolens (L.) Greuter

SYNONYMS: stinkweed, camphor inula, cape khakiweed, *Erigeron graveolens* L., *Inula graveolens* (L.) Desf.

ORIGIN: Mediterranean

GROWTH TRAITS: Herbaceous annual typically growing 8-30" tall (20-75 cm) from a taproot with extensive, smaller side roots. Stems are multi-branched. The entire plant is sticky to the touch, being covered in small, white, and slightly glandular hairs with a strong camphor-like odor. Stems and branches are covered in alternate, linear leaves 0.4-1½" long (1-4 cm). Flower heads are produced in leaf axils and stem tips throughout fall. Each capitulum is 0.2-0.3" in diameter (5-7 mm). Outer florets are yellow and larger than inner florets which are yellow to red. Seeds are brown, oval achenes with a hairy pappus.

REPRODUCTION: By seed. Seeds remain viable in the soil for up to three years.

Stinkwort: a) plant, b) infestation (a,b Javier Martin)

Stinkwort: c) leaf, bud and stem (Javier Martin), d) flower head, e) mature achenes, still attached (d,e ©2014 Keir Morse)

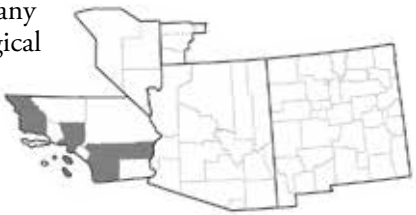
HABITAT: Primarily invades disturbed, open habitats, such as cultivated land, abandoned fields, overgrazed pastures, roadsides, and tidal margins.

LOOK-ALIKES: With its narrow leaves and bushy appearance, stinkwort resembles young Russian thistle (*Salsola tragus*) and kochia (*Bassia scoparia*), though its yellow flower heads and sticky, odorous foliage help differentiate it from these look-alikes. Many tarweeds (*Centromadia*, *Hemizonia* and *Holocarpha* spp.) are sticky, odorous, and have yellow flower heads. However their foliage often appears more spiny than stinkwort, and their flower heads are typically larger. The native mountain tarweed (*Madia glomerata*) has small yellow flower heads, linear leaves, and is sticky and odorous. However, mountain tarweed grows much smaller and less branched, and its flower heads are typically clumped.

Look-alike: mountain tarweed (Matt Lavin, Bozeman, MT, USA)

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. Touching the foliage can cause dermatitis, itchy skin, or blistering. When grazed, this plant can cause milk or meat to be tainted.



Bermuda buttercup

Oxalis pes-caprae L.

SYNONYMS: buttercup oxalis, African wood-sorrel, *Oxalis cernua* Thunb., *Bolboxalis cernua* (Thunb.)

ORIGIN: southern Africa

GROWTH TRAITS: Perennial herb growing from a bulb with a single, short, vertical stem that is largely underground. Leaves form a loose basal rosette. Leaf petioles are less than 4.7" long (12 cm). Each leaf has 3 heart-shaped leaflets arising from the same point, with each leaflet up to 1.4" in diameter (3.5 cm). Leaflets often have tiny purple spots. Flowering occurs from late fall through early spring. Flowering stems are leafless, typically less than 12" long (30 cm), and are topped by clusters of 3-20 flowers that arise from the same point. Each flower is 1-1½" in diameter (2½-4 cm), has 5 bright yellow petals fused at their base, and has 10 stamens. Fruits and seeds have not been observed in North America; the plant instead spreads vegetatively. Small, whitish "bulbils" develop on the stem at the base of the rosette leaves. Bulbs are larger (0.3-1.2" long or 8-30 mm), brown, and produced underground on roots.

Bermuda buttercup: a) plant (MathKnight and Zachi Evenor), b) infestation (Harry Rose)

Bermuda buttercup: c) leaf, d) flower (MathKnight), e) roots with bulbs (c,e Daniel Feliciano)

REPRODUCTION: Vegetatively through bulbs and bulbils. Does not produce seed.

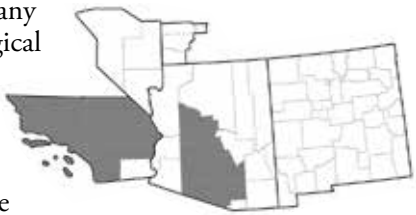
HABITAT: Found in coastal dunes, scrub, oak woodlands, gardens, turf and lawns, urban areas, orchards, agricultural fields, and open or semi-shaded hillsides.

Look-alike: creeping woodsorrel (J.M.Garg)

LOOK-ALIKES: Bermuda buttercup leaves somewhat resemble those of clovers, however clover flowers are very different with their distinctive pea-like appearance (having a banner, wing and keel). Creeping woodsorrel (*Oxalis corniculata*) is a similar exotic species. Creeping woodsorrel has creeping, above-ground stems and does not produce underground bulbs. Creeping woodsorrel also has smaller leaflets and smaller flowers (up to 0.6" in diameter or 1½ cm) borne in smaller clusters on short stalks.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. Introduced as an ornamental, but has escaped cultivation to become problematic in a variety of habitats. Toxic to livestock when consumed in large quantities.



Fennel

Foeniculum vulgare Mill.

SYNONYMS: sweet fennel, common fennel

ORIGIN: Europe, Mediterranean

GROWTH TRAITS: Herbaceous, upright perennial growing 3.2-10' tall (1-3 m) from a deep taproot. Stems (typically 10-20) re-sprout from the root crown each year. Stems are hollow, longitudinally grooved, and branched at nodes. Leaves are alternate, expanded at the base, and clasp the stem. Leaves grow up to 16" long (40 cm) and are finely divided into thread-like leaflets. Flowering typically occurs from August to October. Flowers appear on compound, flat-topped umbels typically 4" in diameter (10 cm). Individual flowers are yellow with 5 petals often curling inwards. Fruits are brown, long and oval-shaped, and have obvious ridges.

REPRODUCTION: By seed, regeneration from the root crown, and root division. Seeds may remain viable in the soil for many years.

HABITAT: Frequently escapes cultivation to invade open waste areas with dry,

Fennel: a) plant (©2010 Steven Thorsted), b) infestation (H. Zell)

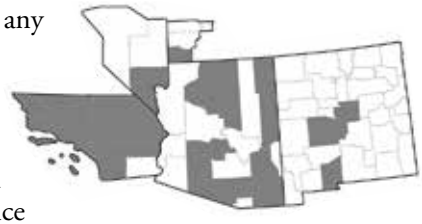
Fennel: c) leaf and stem (©2010 Steven Thorsted), d) inflorescence (H. Zell), e) fruits (Philmarin)

sandy soils including roadsides, vacant lots, abandoned fields, and riverbanks.

Look-alike: dill (ekenitr)

LOOK-ALIKES: Numerous Apiaceae species are present in North America and resemble fennel with their yellow umbel flowers and hollow stems. Most look-alikes don't grow as tall or upright as fennel, or have thicker and less-dissected leaves. Dill (*Anethum graveolens*) also escaped cultivation and is similar with its yellow umbel inflorescences, thread-like leaves, upright growth, and aromatic foliage. However, dill is an annual and grows only 16-24" tall (40-60 cm). Three varieties of fennel are present in the United States. Two are very similar in appearance (var. *vulgare* and var. *dulce*) and have been observed escaping cultivation to become weedy. The third (var. *azoricum*) is cutivated as a vegetable and not invasive. It can be differentiated by its swollen bases which give that part of the plant a bulbous appearance.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.



NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. It is already widely established in California, but is also becoming problematic elsewhere in the Southwest. The plant has been used for medicinal and culinary purposes since Roman times and two varieties have escaped cultivation in the USA. All parts of the plant have a strong anise-like odor.

Dudaim melon

Cucumis melo L. var. *dudaim* (L.) Naudin

SYNONYMS: Queen Anne's melon, smell melon, *Cucumis dudaim* L.

ORIGIN: Africa, southern Asia

GROWTH TRAITS: Vining annual with prostrate stems growing up to 33' long (10 m) from a taproot. Some vines root from leaf nodes that touch the ground, helping the plant form large, extensive mats. Vines have several branches near the base. Each vine is slender, angled in cross-section, and has short stiff hairs that give it a rough feel. Leaves are alternate, covered in short hairs, shallowly lobed (3-7), and approximately 3" long (8 cm). A single, unbranched tendril arises from each leaf node. Flowers appear in leaf nodes from March to November. Flowers are typically 1" in diameter (2½ cm) and have 5 yellow petals fused at their bases to form a shallow cup. Fruits (melons) are oblong to round, 1.2-2.4" wide (3-6 cm), and green when young but turn either mottled/striped yellowish-orange or solid yellowish-orange at maturity. They are produced until the first hard frost. Seeds within are sticky, teardrop-shaped, and 0.2" long (½ cm).

Dudaim melon: a) plant (John D. Byrd, Mississippi State University, www.bugwood.org), b) infestation (©2001 CDFA)

Dudaim melon: c) leaves and flower, d) flowers (Howard F. Schwartz, Colorado State University, www.bugwood.org), e) seed pods (c,e ©2001 CDFA)

REPRODUCTION: By seed. Seeds remain viable in the soil for up to 20 years.

HABITAT: Found in disturbed areas with plenty of moisture, including agricultural fields and margins, roadsides, and ditchbanks.

LOOK-ALIKES: Dudaim melon can be differentiated from related cultivars of *Cucumis melo* by its leaves that are only shallowly lobed, its smaller flowers, and its distinctive fruits which are much smaller, smoother, and colored differently than related species. Wild cucumber (*Echinocystis lobata*) is an annual vine with small but spiny fruits and long clusters of white flowers.

Look-alike: wild cucumber (Barbara Tokarska-Guzik, University of Silesia, www.bugwood.org)

NOXIOUS WEED LISTINGS:
AZ (Prohibited), CA

NOTES: Several subspecies and varieties of muskmelon (*Cucumis melo*) are cultivated, including honeydew, crenshaw, casaba, cantaloupe, Persian melon, Christmas melon, and Armenian cucumber. Dudaim melon can readily hybridize with cultivated varieties, making this weed especially problematic in muskmelon agricultural areas.

Canary Island St. Johnswort

Hypericum canariense L.

SYNONYMS: Canary Island hypericum, *Hypericum canariense* var. *floribundum* (Aiton) Bornm., *Hypericum floribundum* Aiton

ORIGIN: Canary Islands

GROWTH TRAITS: Perennial, multi-stemmed shrub growing up to 10' tall (3 m) from a rhizomatous root system. Leaves are opposite, waxy, lance-shaped, typically 2-2¾" long (5-7 cm), and have a prominent midvein. Leaves are green throughout winter, turning orange in the summer before dropping to the ground. In spring and early summer, clusters of yellow-orange flowers appear at branch tips. Flowers are ~0.6" in diameter (1½ cm) and have 5 petals, 5 sepals, 3 styles, and numerous stamens. Petals are much larger than sepals, and the sepals have tiny hairs along their margins. Fruits are oval-shaped capsules. When mature and dried, fruits shed hundreds of tiny seeds that are brown and 0.04" long (1 mm).

Canary Island St. Johnswort: a) shrub, b) infestation (a,b Forest & Kim Starr)

Canary Island St. Johnswort: c) leaves, d) flower (Eric in SF), e) fruits (c,e Forest & Kim Starr)

REPRODUCTION: By seed and vegetatively through the rhizomes. It is unknown how long seeds remain viable in the soil.

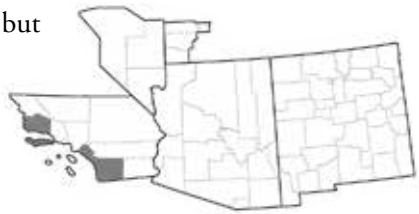
HABITAT: Found in disturbed areas in grasslands, coastal scrub, moist hillsides, and along roadsides, but is expanding inland. Tolerates high elevations.

Look-alike: Hooker's St. Johnswort (H. Zell)

LOOK-ALIKES: The combination of five large yellow petals, numerous stamens, and opposite leaves help differentiate this weed from unrelated look-alikes. Within the genus, several native and exotic species are established in North America. Most *Hypericum* occurring in the Southwest are forbs rather than shrubs. Canary Island St. Johnswort's long, lance-shaped leaves and its small sepals with hairy margins help differentiate young plants from those of non-shrub species. Hooker's St. Johnswort (*Hypericum hookerianum*) is an exotic shrub that is cultivated and also escaped in CA. Its petals and leaves are more rounded, and it grows shorter and bushier than Canary Island St. Johnswort.

NOXIOUS WEED LISTINGS: CA

NOTES: Often grown as an ornamental, but has escaped cultivation in North America and other parts of the world.



Woman's tongue tree

Albizia lebbeck (L.) Benth.

SYNONYMS: lebbeck, *Mimosa lebbeck* L., *Acacia lebbeck* (L.) Willd.

ORIGIN: Indomalaya, New Guinea, northern Australia

GROWTH TRAITS: Deciduous tree typically growing 49-65' tall (15-20 m) from a shallow but extensive root system. The tree is multi-stemmed when growing in the open, but capable of having a single trunk (1.6' or ½ m in diameter) when grown on plantations. The crown is spreading and umbrella-shaped. The bark is grayish-brown and lightly fissured. Each leaf is divided into 2-4 smaller sections which are each divided further into 2-11 pairs of leaflets. Leaflets are oval-shaped, 0.6-2½" long (1½-6½ cm), and close at night when leaflets are young. Raised glands occur on the undersides of leaf stalks at leaf bases and between pairs of leaflets. Fluffy inflorescences appear at branch tips or leaf axils in early spring. Inflorescences are yellow-green, 2-3" in diameter (5-7½ cm), and consist of 15-40 non-showy flowers, each with more than 10 very long stamens fused at their base. Seed pods are 6-12" long (15-30 cm), light brown, papery-leathery, occur in large numbers, and contain 3-12 flat, brown seeds.

Woman's tongue tree: a) tree in fruit (Forest & Kim Starr), bark (Dinesh Valke)

Woman's tongue tree: c) leaves and flowers, d) flowers, e) seed pods (c-e Forest & Kim Starr)

REPRODUCTION: By seed. Seeds remain viable in the soil for up to 30 years.

HABITAT: Tolerates a wide variety of conditions and is frequently found on riverbanks, roadsides, and dry hillsides, as well as in savannahs, forests, and bushy areas.

Look-alike: *Acacia mearnsii* (Forest & Kim Starr, Starr Environmental bugwood.org)

LOOK-ALIKES: Several species in this family (native and exotic) resemble woman's tongue tree with their compound leaves and similar leaflets, fluffy inflorescences, and long seed pods. Many look-alikes do not have yellow inflorescences. The most similar species belong to *Acacia* or *Mimosa.* The stamens of *Acacia* spp. are not fused at their base. *Mimosa* spp. have 10 or fewer stamens per flower while *Acacia* spp. and woman's tongue tree both have more than 10.

NOXIOUS WEED LISTINGS: Not listed as noxious in any southwestern state.

NOTES: Though not listed as noxious in any southwestern state, its potential ecological impact and distribution are both high. The wood is valued for timber in its native range. Throughout the world, the tree is frequently used in erosion control, though it quickly escapes into nearby habitats.

Glossary

achene	A small, one-seeded fruit that does not split at maturity
alternate	Where leaves appear singly at stem nodes, on alternate sides of the stem
annual	A plant that completes its life cycle in one year and then dies
awn	A hair- or bristle-like appendage extending from florets of many grasses
axil	The angle between the upper side of a leaf or stem and the stem or branch that supports it.
basal	Located at the base of a plant or plant part
biennial	A plant that lives two years, typically flowering and fruiting its second year
bolting	Plant stage at which the flower stalk begins to grow
bract	A small, leaf-like structure below a flower
bulbil	Tiny secondary bulb that forms in the angle between a leaf and stem or in place of flowers on certain plants
capitulum (pl. capitula)	Seed head or flower head of a plant in the sunflower family
compound leaf	A leaf consisting of two or more leaflets borne on the same leaf stalk
deciduous	Sheds its leaves annually
density	Number of individuals per unit area
divided	Synonym for compoud leaf
erect	Grows upright and vertical as opposed to prostrate (spreading on the ground)
exotic	Not native

floret	One of the small, closely clustered flowers forming the head of a composite flower in the sunflower family or the flowering unit of a grass spikelet, consisting of the flower and its two enveloping bracts
flower head	A special type of inflorescence consisting of numerous florets that actually look like one flower
forb	Herbaceous plant (does not have woody stems)
herbaceous	Does not have woody stems
hyperaccumulator	A plant capable of growing in soils with very high concentrations of metals, absorbing these metals through their roots, and concentrating extremely high levels of metals in their tissues
inflorescence	The flowering part of a plant
involucre	A circle of bracts under an inflorescence
lag phase	First stage of a typical plant invasion during which populations remain at low levels for several years. Plants ofen become abundant during the next phase
leaflet	A leaf-like part of a compound leaf. Though it resembles an entire leaf, a leaflet is not attached to the main plant stem or branch as a leaf is, but rather on a the leaf stalk
ligule	A thin outgrowth at the junction of leaf and leafstalk of many grasses and sedges
lobed	A leaf with shallow or deep, rounded segments, as in a thistle rosette leaf
native	A plant that originated in the geographic area of discussion
node	Part of the stem of a plant from which a leaf, branch, or root grows
nontarget effect	When control efforts affect a species other than the species they were enacted to control (can be positive or negative)

opposite	Where leaves appear in twos at stem nodes, on opposite sides of the stem
ovate	Shaped like an egg, with the base wider than the tip
pappus	A tuft of hairs, scales, or bristles at the base of an achene in flowers of the sunflower family
perennial	A plant that lives for more than two years
petiole	Leaf stalk that usually attaches it to a plant stem
prostrate	Grows flat along the ground as opposed to growing erect (upright)
receptacle	Part of the stem to which the flower is attached
rhizome	A modified stem of a plant that grows horizontally underground, often sending out roots and shoots from its nodes
rosette	A compact, circular, and normally basal cluster of leaves
scarification	Cutting the seed coat using abrasion, thermal stress, or chemicals to encourage germination
seed head	Synonym for capitulum of a plant in the sunflower family. Consists of a receptacle and florets
senescence	Final stage in a plant's life cycle
sepal	A small, (typically) green petal-like structure beneath petals that protect petals in bud and support petals during open flowering
spadix	Inflorescence with several tiny flowers clustered on a narrow, fleshy stem
spathe	Leaf-like curved bract surrounding a spadix
stamen	The pollen-producing reproductive organ of a flower

stolon	Stem which grows at the soil surface or just below ground that forms adventitious roots at the nodes, and new plants from the buds (also called runner)
style	A stalk structure in female flower parts
succulent	Plants having some parts that are more than normally thickened and fleshy, usually to retain water in arid climates or soil conditions
taxonomy	The classification of organisms in an ordered system that indicates natural relationships. The science, laws, or principles of classification; systematics
tiller	Side shoot that arises from the base of the stem in grasses
toothed	Leaf margin that is regularly incised, such as for a saw
tussock	Tuft or clump of growing bunchgrass
umbel	An inflorescence which consists of a number of short flower stalks which spread from a common point, somewhat like umbrella ribs. They can be simple or compound (the single flowers are replaced by many smaller umbels called umbellets)
variegated	Plant foliage having leaves that are edged or patterned in a second color, especially white as well as green
whorled	Where multiple leaves or flowers radiate outward from a single stem node
winter annual	A plant that germinates in autumn, lives through the winter, and produces seed and dies in the following season

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English to Metric Conversions (Length)				
Symbol	When You Know	Multiply By	To Find	Symbol
in or ”	inches	2.54	centimeters	cm
ft or ’	feet	0.305	meters	m
yd	yards	0.914	meters	m