



EXTENSION

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Nevada Noxious Weed Field Guide





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A noxious weed is a plant that has been identified by the state of Nevada to be harmful to agriculture, the general public or the environment. The law stipulates that property owners whose land is infested with noxious weeds are required to implement control measures. Noxious weeds can spread rapidly and compete aggressively with other plants for light, nutrients and water. Once noxious weeds inhabit a site, they often reproduce profusely, creating dense stands with extensive roots and soil seedbanks that can persist for many years. Impacts of noxious weeds in Nevada can include: increased soil erosion and salinity, increased flood potential, decreased water quality, decreased forage and crop yield, displaced wildlife and native plants, reduced recreation potential, reduced aesthetic value, injury to humans and animals, and increased fire danger.

The purpose of this booklet is to help agricultural producers, land managers, homeowners, recreationists and others to identify the noxious weeds of Nevada.

All 54 weeds listed in Nevada state law (as of June 2020) are included, each with a brief description, color photographs and recommendations for control. The glossary defines

several technical terms that are used to describe and identify plants.

Correct identification of a weed is important for several reasons. First, it is a critical step in early detection and rapid response to new infestations, a strategy that can save time and money over the long term by eliminating a weed when it first appears as a single plant or small patch, rather than waiting until it covers an entire property. Second, proper weed identification allows a person to understand the harmful characteristics of the weed (i.e., poisonous, fire hazard, etc.) so problems can be avoided. Finally, proper identification is essential to implementing the control tactics that will successfully manage the weed.

We would like to express our gratitude to Joe DiTomaso, Nate Belliston and Steve Dewey for permission to use their photographs. Detailed photo credits can be found on pages 132-135. This update was supported by the USDA National Institute of Food and Agriculture (NIFA) competitive grant award number 2017-70006-27198.

A successful weed management program is based on four fundamental elements: prevention, detection, control and restoration.

Prevention: Weed prevention is accomplished by taking steps to keep weeds from spreading into new areas. Some common prevention tactics include:

- Using weed-free hay, straw, seed or mulch;
- Cleaning contaminated vehicles and equipment;
- Educating employees, neighbors, visitors and recreationists about weeds; and
- Maintaining a healthy, competitive stand of desirable plants that limits the ability of weeds to establish and thrive.

Detection: Even with the best prevention program, some weeds will find a way to slip through your defenses. An early detection/rapid response program can help to locate and eliminate these new invaders. The idea is to find a new weed, whether it is a single plant or a small patch, early in the invasion process and immediately begin control measures – hopefully resulting in eradication.

Control: Weed control can be accomplished using a number of different tactics:

- Cultural control is achieved by manipulating factors that impact weed growth, such as crop rotation, planting date, row spacing, fertilization or irrigation;
- Mechanical control is based on causing physical harm to weeds through tillage, mowing, mulching, burning, flooding or hand-weeding;
- Biological control is when other organisms (livestock, insects or diseases) are used to suppress weeds; and
- Chemical control impacts weed growth through herbicide application.

Restoration: Establishing a healthy, competitive stand of desirable plants (crops, grasses, forbs, shrubs, etc.) is critical to protecting a site from re-invasion by noxious weeds.

Combining several of the above strategies to manage a weed is called integrated weed management; an approach that almost always produces better results than relying on any one tactic alone.

Weed Management Recommendations in this Booklet

Strategies for prevention, detection and restoration are essentially the same for each of Nevada's noxious weeds. Yet, control methods can differ greatly from weed to weed. To minimize the amount of text required in the pages that follow, the specific weed management recommendations for each weed are focused solely on control. Nevertheless, the elements of prevention, detection and restoration are of equal (and often greater) importance as control. Although not specifically mentioned for each weed, all four fundamental elements should be a part of every weed management program.

This booklet also provides herbicide recommendations as a starting point for individuals looking for chemical control options. Due to the large number of trade (brand) named products available and the fact that trade names are constantly changing, common names (active ingredients) of chemicals are presented. To help readers identify the chemical common name, trade names of a few commercial products are provided in the table on pages 127-128. The listed trade names are not an endorsement.



Disclaimer

Chemical weed control recommendations are supplied with the understanding that no discrimination is intended and no endorsement is implied by University of Nevada, Reno Extension. Before using any chemical, ALWAYS read the label. Any person using the products listed in these guidelines assumes full responsibility for their use in accordance with current directions of the manufacturer.

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*Brassica tournefortii***African mustard**

Stem	Up to 3 ft. tall and branched; upper stem lacks hair (glabrous); lower stem covered with stiff, downward-pointing hairs
Leaves	- Rosette leaves up to 12 in. long and pinnate-divided with 6-14 pairs of leaflets; edges (margins) are toothed - Stems have very few leaves; typically small and oval to strap-like (linear) with toothed to lobed edges
Flower	- Small (less than 0.6 in. wide) and yellow with four petals - Seed pods are round, slender and 1.5-2.5 in. long; the end tapers to a point; contain numerous round seeds; pod constricts around seeds (appears beaded)
Root	Deep, slender taproot
Other	- Grows best in sites with dry, sandy soils and sparse vegetation; often infests roadsides, waste areas, washes and desert areas; known to occur in Clark, Lincoln and Nye counties - Annual; reproduces by seed - Also known as Sahara mustard
Control	- Repeated hand-removal can be effective; disturbances such as fire, tillage and grazing often promote mustard growth - Apply 2,4-D, glyphosate or triclopyr post emergence; chlorsulfuron or imazapic pre- or post emergence

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African mustard



*Peganum harmala***African rue**

Stem	Up to 2 ft. tall; highly branched and bushy
Leaves	Alternate, bright green and deeply divided; leaflets strap-like (linear), narrow, 0.75-2 in. long, fleshy, lack hair (glabrous) and have smooth edges (margins)
Flower	5 white petals surround a yellow center; 1 in. diameter; occur at leaf axils along stems 5 strap-like, fleshy, green sepals (0.5 in. long) that resemble leaves are found below flower - Seed pod is a small (less than 0.5 in. diameter), round capsule with 2-4 chambers; can be green orange or brown
Root	Woody, branched taproot with short, creeping roots
Other	- Grows best in dry, disturbed sites; often infests roadsides, waste areas, washes and desert areas; known to occur in Churchill, Mineral, Washoe, and White Pine counties - Perennial; reproduces by both seeds and roots - All plant parts poisonous to livestock and humans
Control	- Repeatedly dig or pull individual plants; remaining roots can produce new plants - Apply glyphosate, imazapyr or metsulfuron to actively growing plants



African rue

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*Rorippa austriaca***Austrian fieldcress**

Stem	Up to 3 ft. tall and branched at the top
Leaves	- Bluish-green, 1-4 in. long and oblong to lance-shaped; edges (margins) are smooth to toothed - Stem leaves are alternate; leaf size decreases up the stem; bases of upper leaves have small lobes that clasp the stem.
Flower	- Small yellow flowers (0.1 in. wide) with 4 petals; clustered at tips of branches - Seed pod is oval, 0.1 in. long and borne on a 0.3-0.6 in. long stalk
Root	Thick, fleshy taproot with creeping roots
Other	- Grows best in moist, disturbed areas; often infests roadsides, waste areas, pastures and crop fields; known to occur in Elko County - Perennial; reproduces by roots; forms dense patches
Control	- Hand removal of individual plants (including roots) can limit spread of small infestations; repeated cultivation and improved drainage of wet areas have also been reported to be effective - Apply 2,4-D to actively growing plants



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Austrian fieldcress

*Aegilops triuncialis***Barbed goatgrass**

Stem	8-16 in. tall
Leaves	Gray green, 1-4 in. long, ridged and sharp; sparsely covered with long white hairs; ligules are membranous and auricles are clasping
Flower	Seedheads are 1-2.5 in. long, reddish or purplish then dry to straw color; each spike has 4 sessile spikelets with 1-2 florets each; 3 long, stiff awns come from each glume; awns and glumes are all minutely barbed
Root	Fibrous; spikelet that led to germination often still attached to base of plant
Other	- Infests rangelands, grasslands, pastures and croplands; known to occur in Washoe county - Winter annual; seeds viable for 2+ years; high silica content produces persistent thatch layer - Livestock avoid mature plants due to awns; seedheads stick to clothing and fur - Can crossbreed with wheat, producing sterile seed and unsaleable wheat
Control	- Hand pulling or hoeing is effective on small infestations; mowing is ineffective as plants will regrow; deep tilling can place seeds below sprouting depth, but repeated tilling can bring buried seeds to the surface; burning of infested fields may be effective, but will not control seedbank - Glyphosate effective on actively growing plants before flowering; chlorsulfuron, imazapic, sulfometuron are effective preemergence and early post emergence



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Barbed goatgrass

*Hyoscyamus niger***Black henbane**

Stem	Up to 3 ft. tall, branched and covered with long, sticky hairs
Leaves	Alternate, lance-shaped to oblong, 2-8 in. long and covered with short, sticky hairs; veins are prominent and pale; edges (margins) are lobed to toothed; lower leaves have a short stem (petiole), upper leaves have NO leaf stem
Flower	- Funnel-shaped with a purple center; 5 fused, greenish-yellow petals with purple veins; arise from leaf axils along upper part of stem - Seed pods are pineapple-shaped, 1 in. long and covered with long, sticky hairs; open end has 5 lobes; contain many small, dark seeds
Root	Thick, fleshy taproot
Other	- Grows best on open sites with well-drained soils; often infests roadsides, waste areas, field borders and pastures; known to occur in Clark, Elko, Eureka, Lincoln, Nye and White Pine counties - Annual or biennial; reproduces by seed - Toxic to humans and livestock but rarely consumed by animals due to foul odor and taste
Control	- Mowing, tillage, digging and hand-pulling prior to seed production are effective; burning dry, mature plants can kill seed - Apply 2,4-D or dicamba post emergence; chlorsulfuron, metasulfuron or picloram pre- or post emergence



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Black henbane

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*Pennisetum ciliare***Buffelgrass**

Stem	Grows in bunches up to 18-36 in. tall and 36 in. wide; stems knotty and branching at the base
Leaves	Flat leaf blades, 3-12 in. long and 0.1-0.3 in. wide with long, soft hairs; sheaths open, keeled and may or may not have long, soft hairs; ligule hairy
Flower	Purplish to reddish, bottlebrush-like seedhead up to 5 in. long; spikelets in clusters of 2 to 4, each with 2 flowers; spikelets tan, beige or slightly orange at maturity; multiple awns arise from each seed
Root	Tough root crown and mass of long, tough roots that can grow to 8 ft. deep
Other	- Grows best on disturbed sites and fields; known to occur in Clark county - Perennial, large and ragged bunchgrass; drought-tolerant but not cold-tolerant - Fire-adapted species that quickly re-sprouts from root crown after a fire - Prolific seed production allows it to form dense colonies that exclude other grass species; rapid growth from seed to flowering in 6 weeks
Control	- Manual pulling, grubbing and hoeing can be effective on young plants, but the whole root crown must be removed; mowing or disking may increase the infestation - Glyphosate and imazapyr effective on actively growing plants (more than 50% green); preemergence herbicides can be used to manage the existing seedbank

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Buffelgrass



*Alhagi maurorum***Camelthorn**

Stem	Highly branched with lengthwise ridges, 1.5-4 ft. tall and lacks hair (glabrous); spines 0.5-1.5 in. long with yellow tips arise from leaf axils
Leaves	Alternate, simple, narrow to oblong and 0.25-0.75 in. long; hairs on lower surface only
Flower	- Pea-like; 0.3-0.4 in. long with pink to purple petals; 2-8 flowers occur alternately along short, spine-tipped branches - Seed pods are reddish-brown, 0.5-1.25 in. long, often curved, tipped with a small spine and contain 5-8 seeds; pods are deeply indented between seeds
Root	Woody, deep, spreading root system; roots often associate with nitrogen-fixing bacteria
Other	- Grows best in areas where it can access additional water during the growing season; often found in field borders, roadsides and along waterways; known to occur in Clark and Humboldt counties - Perennial; reproduces mostly by roots but sometimes seed
Control	- Hand removal of individual plants (including roots) can limit spread of small infestations; grazing, mechanical removal and burning are NOT effective - Apply 2,4-D or dicamba post emergence; aminopyralid, imazapyr, metsulfuron or picloram pre- or post emergence



Camelthorn

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*Cirsium arvense***Canada thistle**

Stem	Up to 4 ft. tall, green to brown, branched at the top and usually lacks hair (glabrous)
Leaves	Alternate, oblong or lance-shaped, 2-8 in. long, shiny and lack hair; NO leaf stems (petioles); leaf edges (margins) are wavy, lobed or toothed with spiny edges
Flower	Pink, purple or white; occur in clusters at the ends of branches; base of flower is vase-shaped, 0.5-0.75 in. wide, lacks prickles and is covered with green to purple bracts with dark tips
Root	Deep, extensive creeping root system
Other	- Grows best in moist areas; often found in pastures, hay fields, waste areas and along waterways; known to occur throughout Nevada - Perennial; reproduces by both roots and seed; plants often appear in patches or colonies due to the spreading root system
Control	- Repeated mowing, tillage, cutting or hand removal prior to seed production can provide suppression - Several biological control agents are available - Apply aminocycloprachlor, aminopyralid, chlorsulfuron, clopyralid or picloram pre- or post emergence; repeated applications of 2,4-D, dicamba or glyphosate to actively growing plants



Canada thistle

*Crupina vulgaris***Common crupina**

Stem	Up to 3 ft. tall and branched with lengthwise ridges along stem
Leaves	- Cotyledons are oblong, fleshy and hairless, often with a purplish midvein; rosette leaves are oval to lance-shaped with smooth, toothed or lobed edges (margins) - Stem leaves are alternate and deeply pinnate-lobed; lower leaves are larger than upper leaves; edges are covered with short, stiff hairs
Flower	Pink or purple; occur in clusters of 1-5 at the tips of branches; base of flower is vase-shaped and narrow, 3 to 4 times longer than wide
Root	Fibrous
Other	- Grows well under a wide range of environmental and soil conditions; often found in rangeland, pastures, waste areas, roadsides and along waterways; no known occurrences in Nevada - Annual; reproduces by seed; - Listed on the Federal Noxious Weed List
Control	- Grazing or mowing can increase branching and seed production and are NOT effective - Apply 2,4-D, dicamba or picloram to actively growing plants prior to flowering; aminocyclopyrachlor, aminopyralid, chlorsulfuron, clopyralid or metsulfuron pre or post-emergence



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Common crupina

*Hypericum perforatum***Common St. Johnswort**

Stem	Up to 4 ft. tall with a woody base; highly branched; lacks hair (glabrous) and often rust colored with 2 ridges that run the length of the stem
Leaves	- Opposite, oval to strap-like (linear), prominent veins, less than 1 in. long, lack hair and no leaf stems (petioles); edges (margins) are smooth with the lower surface lined with small black dots - Surface covered with tiny transparent dots that can be seen by holding the leaf up to the light
Flower	0.75 in. diameter; 5 yellow petals that often have tiny black dots around the edges; many stamens; clustered at tips of branches
Root	Stout taproot with spreading rhizomes
Other	- Grows best on coarse-textured, gravelly, well-drained soils; known to occur in Elko county - Perennial; reproduces by seed and rhizomes - Ingestion causes skin irritation and weight loss in white-haired animals; sometimes cultivated as a crop and used for medicinal purposes (as an antidepressant) - Also known as Klamath weed
Control	- Mowing, grazing and burning are NOT effective - A biological control agent is available - Apply 2,4-D or glyphosate to actively growing plants prior to bloom; aminopyralid, metsulfuron or picloram pre or post-emergence

Common St. Johnswort



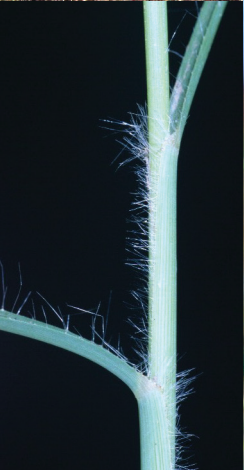
Pennisetum setaceum

Crimson fountaingrass

Stem	Up to 5 ft. tall; round in cross-section; grows in bunches
Leaves	Blades are flat to v-shaped, 0.5-2 ft. long and less than 0.16 in. wide; edges (margins) have long hairs, particularly near the collar
Flower	Spike, 3-12 in. long and 1-2 in. wide; purplish bristles; can be droopy
Root	Fibrous
Other	- Grows best in climates with mild winters; often infests disturbed areas such as roadsides, desert areas, washes and waste areas; known to occur in Clark county - Perennial; reproduces by seed - Can be a fire hazard - Ornamental; cultivars that DO NOT produce viable seed are NOT considered noxious in Nevada.
Control	- Hand removal (including the crown) of individual plants is effective for small infestations; burning is NOT effective and may cause weed density to increase - Apply fluzafop, glyphosate or sethoxydim to actively growing plants; imazapyr pre- or post emergence

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Crimson fountaingrass



*Potamogeton crispus***Curlyleaf pondweed**

Stem	1-15 ft. long, flattened and channeled; branching can increase at the end of the stem, leading to matting
Leaves	Olive green to reddish brown, slightly translucent; alternate, sessile, 1.5-4 in. long, narrow, with toothed margins; leaf margins are wavy with a conspicuous mid-vein; leaf tips are rounded or blunt
Flower	Green inconspicuous flowers; stalk supporting the flower will grow 1 in. above water surface; seeds are nutlet-like structures
Root	Rhizomes, pale yellow or reddish; will root at the nodes.
Other	- Grows in ponds, lakes, streams, rivers, reservoirs, irrigation ditches and marshy areas; known to occur in Churchill, Douglas, Elko and Lyon counties - Perennial; grows as submersed aquatic plant; will grow from shore out to depths of 15 ft. - Spreads aggressively from fragments of roots and stems; produces seed, but seedlings rare
Control	- Mechanical harvesting can reduce plant density, but plants re-sprout from stem fragments; bottom barriers can be used to smother infested areas - Chemical controls must be labeled for water use: diquat, endothall, flumioxazin, fluridone, imazamox and others; check label for rates and water temperature requirements; large infestations should be treated a portion at a time to prevent low oxygen levels as plants decompose

[37]

Curlyleaf pondweed



*Linaria dalmatica***Dalmatian toadflax**

Stem	Up to 4 ft. tall, lacks hair (glabrous), waxy and branched near the top
Leaves	Alternate and dense; lance-shaped to heart-shaped, 1-2.5 in. long, blue-green color, lack hair and waxy; bases clasp the stem; edges (margins) are smooth
Flower	- Snapdragon-like; 1.5-2 in. long; yellow with an orange-bearded throat and a long spur; clustered along upper part of stem - Seed capsules round (less than 0.3 in. diameter) with two chambers, each containing many seeds
Root	Creeping root system
Other	- Grows best in dry, well-drained soils; often infests rangelands, waste areas and roadsides; known to occur in Douglas, Elko, Lincoln, Nye and White Pine counties - Perennial; reproduces by seed and roots - May be toxic to livestock if ingested in large quantities
Control	- Mechanical control (mowing, burning or tillage) is NOT effective - Several biological control agents are available - Apply aminocyclopyrachlor, chlorsulfuron, imazapic or picloram pre-emergence through bloom or to fall rosettes; repeated applications of 2,4-D, dicamba or glyphosate to actively growing plants

Dalmatian toadflax



*Centaurea diffusa***Diffuse knapweed**

Stem	Up to 2 ft. tall; rough-textured; highly branched; bushy; covered with short, stiff hairs; NO wings on upper stems
Leaves	Alternate, lower leaves pinnate-divided, 4-8 in. long; sometimes covered with short grayish hairs; upper leaves strap-like (linear) with smooth edges (margins)
Flower	White to pale purple, located at the tip of a branch; base of flower is vase-shaped, 0.5 in. long, 0.12 in. wide and covered with yellow, comb-like bracts tipped with a narrow spine
Root	Deep, stout taproot
Other	- Grows best in dry, well-drained soils; often infests rangelands, waste areas and roadsides; known to occur in Douglas, Elko, Eureka, Lander, Lincoln, Nye, Washoe and White Pine counties - Biennial, but sometimes annual or perennial; reproduces by seed; dry, mature plants often break off and tumble in the wind to spread seed
Control	- Mowing plants in bud to flower stage can reduce seed production; repeated hand removal can be effective; burning is NOT effective - Several insect biological control agents are available - Apply 2,4-D or dicamba in the rosette stage; apply aminocyclopyrachlor, aminopyralid, chlorsulfuron, clopyralid, imazapyr or picloram pre-emergence to rosette and mid-bolt stages



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Diffuse knapweed

[4]

*Isatis tinctoria***Dyer's woad**

Stem	Up to 4 ft. tall; branched at top; dry plants with attached seed pods remain standing into winter
Leaves	Lance-shaped, 1-7 in. long, bluish-green and lack hair (glabrous) with a distinct whitish mid-vein; edges (margins) are wavy to smooth, stem leaves are alternate with lobed base that clasps the stem
Flower	- Yellow with 4 petals; occur in clusters that give plant a flat-topped appearance - Mature seed pods dark brown to black, oblong, flattened and suspended from a small stalk; each contains a single seed
Root	Deep taproot
Other	- Grows well on a broad range of sites; often infests waste areas, roadsides, rangeland, pastures and crop fields; known to occur in Elko, Humboldt and White Pine counties - Biennial, but sometimes annual or perennial; reproduces by seed - Historically cultivated for use as a blue dye and as a medicine
Control	- Mow in early-flower to reduce seed production; spring tillage or digging individual plants prior to seed production can be effective - Apply 2,4-D to young, actively growing plants; apply aminocyclopyrachlor, chlorsulfuron, imazapic or metsulfuronon pre- and post emergence



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Dyer's woad

*Myriophyllum spicatum***Eurasian watermilfoil**

Stem	▪ Aquatic weed up to 12 ft. long, submersed, branched near water surface, growing points often reddish; breaks into fragments easily
Leaves	▪ Whorled with 4 leaves per node; leaves are green to brown, less than 1.25 in. long and pinnately-divided with more than 14 pairs of narrow, opposite lobes, less than 0.4 in. long
Flower	▪ Pinkish and small, each with a small, bract-like leaf ▪ Occur in clusters on small, pencil-like stalks that emerge from water, 1-3 in. long; stem often bends to become parallel with the water surface after flowering
Root	▪ Creeping rhizomes
Other	▪ Most common in still or slow-moving water but can sometimes be found in fast-moving rivers, streams and irrigation ditches; known to occur in Carson City, Douglas and Washoe counties ▪ Perennial; reproduces by rhizomes, stem fragments and seed
Control	▪ Mechanical removal can be effective but must be done repeatedly; escaped stem fragments can form new plants; draining then allowing an empty water-body to freeze can be effective ▪ Aquatic herbicides such as 2,4-D, copper complexes, diquat, endothall, fluridone, and triclopyr are effective; large infestations should be treated a portion at a time to prevent low oxygen levels as plants decompose



Eurasian watermilfoil

[45]

Butomus umbellatus

Flowering rush

Stem	To 5 ft. tall flower stalks
Leaves	Thin, lance-shaped, triangular in cross-section, up to 40 in. long, may twist towards the leaf tip
Flower	Flowers grow at the end of tall, cylindrical stalks in umbrella-shaped clusters of 20 to 50 flowers; individual flowers have 3 large pink petals and 3 small pink sepals under the flower that look like flower petals, 9 stamens and 6 pink pistils
Root	Fleshy rhizomes that grow trailing below the ground; bulbils (bulb-like plant sprouts) form at base of flower stalks and roots
Other	- Grows along lake shores, slow-moving rivers and streams, irrigation ditches and wetlands; no known occurrences in Nevada - Perennial, spreads by rhizomes, bulbils and seed - Grows upright in shallow water and submerged in deeper water up to 9 ft. deep - Although it resembles a true rush, flowering rush is in its own family and can be distinguished by its pink flowers
Control	- Carefully dig up plants, removing all rhizomes and bulbils - Mid-summer applications of imazamox or imazapyr under calm wind conditions have been reported to be effective; repeat treatment may be required

[47]

Flowering rush



*Arundo donax***Giant reed**

Stem	Up to 25 ft. tall and 1.5 in. thick; semi-woody, inflexible and hollow except at the nodes; branching usually does not occur until the second year of growth
Leaves	- Alternate; blade is flat, less than 3 ft. long and 1-3 in. wide; edges (margins) are rough textured - Leaf base is lobed, clasps the stem and is fringed with long hairs
Flower	Plume-like with numerous fine branches; 1-2 ft. long and light-brown to purple; does NOT produce viable seed
Root	Creeping rhizomes
Other	- Grows best in moist soils; known to occur in Churchill, Clark, Mineral, Nye and Washoe counties - Perennial; reproduces by rhizomes and stem fragments - Resembles bamboo; historically planted to reduce erosion and sometimes planted today as an ornamental
Control	- Hand removal of small populations can be effective; mowing and tillage are NOT recommended as they produce root and stem fragments that generate new plants - Apply glyphosate, imazapyr or triclopyr after seedhead formation in late summer or fall to foliage or cut stump; treat regrowth in spring or summer of the following year

[49]

Giant reed



*Salvinia molesta***Giant salvinia**

Stem	Floating aquatic plant that grows at water surface; often highly branched
Leaves	1 submerged and 2 floating leaves whorled around stem at each node - Floating leaves are oval, flat, 1-2.5 in. wide and covered with short hairs less than 0.12 in. long that are shaped like an egg-beater - Submerged leaves are white to brown, fine, hair-like, up to 1 in. long and resemble roots
Flower	No true flowers; some submerged leaves develop spores, but they are not viable
Root	No true roots, but submerged leaves act as roots
Other	- Grows best in areas that do not experience extended periods of freezing temperatures; not known to occur in Nevada - Perennial; reproduces by stem fragments; can form a mat over 1.5 ft. thick under favorable conditions - Listed on the Federal Noxious Weed List
Control	- Mechanical removal can be effective but must be done repeatedly; escaped stem fragments can form new plants - Aquatic herbicides such as diquat and fluridone are effective

Giant salvinia



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*Galega officinalis***Goatsrue**

Stem	Generally grows 2-5 ft. tall; highly branched with numerous stems that arise from the crown
Leaves	Pinnately-compound with 5-8 pairs of leaflets; leaflets are oval to lance-shaped, 0.5-1.5 in. long and lack hair (glabrous); edges (margins) are smooth
Flower	- Purple to white, less than 0.5 in. long and clustered on stalks at tips of branches - Pods are 1-2 in. long and contain numerous seeds
Root	Non-spreading taproot; roots associate with nitrogen-fixing bacteria
Other	- Grows best in moist areas; often found in fencelines, pastures, roadsides, marshy areas and along waterways; not known to occur in Nevada - Perennial; reproduces by seed - Native to the Middle East; introduced to northern Utah as a potential forage plant but was found to be unpalatable and highly toxic to livestock - Listed on the Federal Noxious Weed List
Control	- Hand removal of individual plants can limit spread of small infestations; mowing and tillage (particularly shallow tillage) are NOT effective - Apply 2,4-D, dicamba or triclopyr to actively growing plants; apply aminocyclopyrachlor, aminopyralid, chlorsulfuron, metsulfuron or picloram pre- or post emergence

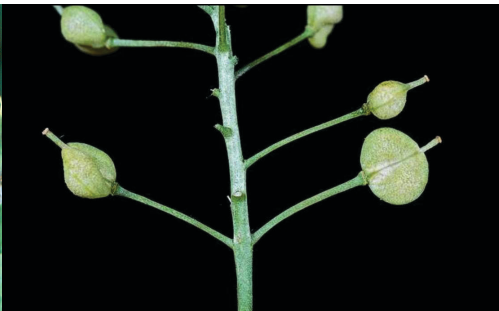


Goatsrue

[53]

Cardaria spp.**Hoary cress**

Stem	0.5-2 ft. tall; branched near top; covered with short hairs
Leaves	- Alternate, 1-4 in. long, blue-green, oblong to lance-shaped and covered with short hairs; edges (margins) are toothed to smooth - Lower leaves have short leaf stems (petioles); bases of upper leaves have lobes that clasp the stem
Flower	- White with 4 petals; occur in clusters that give plant a flat-topped appearance; occur from spring to early-summer - Seed pods are oval to heart-shaped; each contain 2 seeds
Root	Deep, spreading root system
Other	- Grows best in disturbed, alkaline soils; often found in pastures, fields, roadsides, rangelands, waste areas and along waterways; known to occur throughout Nevada - Perennial; reproduces through roots and seeds - Also known as whitetop; 3 species occur in Nevada: hoary cress (<i>C. draba</i>) is most common but lens-podded whitetop (<i>C. chalapensis</i>) and hairy whitetop (<i>C. pubescens</i>) also occur
Control	- Dig or pull individual plants for small infestations; remaining roots can produce new plants; frequent tillage or mowing for several years can reduce plant density - Apply 2,4-D to actively growing plants prior to bud stage; chlorsulfuron or metsulfuron from bud to early bloom; imazapic from full bloom until necrosis



[55]
Hoary cress

*Solanum carolinense***Horsenettle**

Stem	1-3 ft. tall, branched, covered with spines less than 0.2 in. long and short hairs
Leaves	- Alternate, oval to lance-shaped and 3-6 in. long; spines often on veins on undersides of leaves; edges (margins) are wavy to lobed - Leaves covered with tiny yellow hairs; hairs appear star-shaped with magnification
Flower	- Star-shaped with 5 white to pale violet petals; 0.75-1.5 in. diameter; 5-20 flowers clustered on stalks at tips of branches - Berries are round 0.25-0.75 in. diameter, shiny, yellow and resemble tiny tomatoes
Root	Deep, creeping root system
Other	- Grows best in sandy, well-drained soils; often infests crop fields and pastures; no known occurrences in Nevada - Perennial; reproduces by seed and creeping roots - Also known as Carolina horsenettle; native to North America; toxic to livestock and humans; hosts a number of diseases and insects that attack related plants, such as tomato and potato
Control	- Tillage, mowing and grazing are NOT effective; repeated hand-digging of individual plants can be effective for small infestations - Apply 2,4-D or glyphosate to young, actively growing plants; imazapyr to actively growing plants; picloram at full flower



Horsenettle

[57]

Cynoglossum officinale

Houndstongue

Stem	Up to 4 ft. tall and covered with long hairs
Leaves	- Alternate; resemble a hound's tongue; lance-shaped, 1-12 in. long, 1-3 in. wide, rough texture and covered with long hairs; edges (margins) lack teeth and lobes - Leaf stems (petioles) on lower but not upper leaves; leaves decrease in size from bottom to top of plant
Flower	- Purplish-red flowers with 5 petals; occur in clusters 4 nutlets (seeds) per flower, 0.25 in. long and brownish at maturity; covered with short prickles that can attach to clothing or animal fur
Root	Thick, deep taproot
Other	- Grows best in moist areas; often found in pastures, roadsides, fencelines, waste areas and along waterways; known to occur in Elko, Lincoln and White Pine counties - Biennial, but sometimes annual or perennial; reproduces by seed - Toxic to livestock, especially horses; has a distinctive odor that may cause animals to avoid
Control	- Mowing or tillage prior to seed production is effective - Apply 2,4-D or glyphosate to actively growing plants prior to bloom; aminopyralid, chlorsulfuron, imazapic, imazapyr, metsulfuron or picloram pre- to post emergence



Houndstongue

[59]

*Hydrilla verticillata***Hydrilla**

Stem	▪ Aquatic weed up to 25 ft. long, submersed, slender and branched near water surface
Leaves	▪ Strap-like (linear) to lance-shaped, 0.25-0.75 in. long and less than 0.2 in. wide; NO leaf stems (petioles); arranged in whorls of 4-8 around stem; edges (margins) are toothed; midvein on leaf underside often has one or more sharp teeth
Flower	▪ Small, white, attached to threadlike stalks up to 4 in. long and float on water surface
Root	▪ Unbranched, slender and white; yellowish, potato-like tubers 0.25-0.5 in. diameter form at root tips
Other	▪ Often found in still or slow-moving water; not known to occur in Nevada ▪ Perennial; reproduces by stem fragments and tubers; occasionally produces turions at leaf axils; turions are mostly cylindrical, dark green reproductive structures up to 0.5 in. long ▪ Listed on the Federal Noxious Weed List
Control	▪ Mechanical removal can be effective but must be done repeatedly; escaped stem fragments can form new plants ▪ Grass carp can be an effective biological control ▪ Aquatic herbicides such as copper complexes, diquat, endothall, fluridone, and imazamox are effective

[61]

Hydrilla



*Centaurea iberica***Iberian starthistle**

Stem	Up to 4 ft. tall; highly branched, bushy and covered with hairs; NO wings on upper stems
Leaves	Exist as basal rosettes prior to bolting; older rosettes have a circle of straw-colored spines at the center; leaves are alternate, 4-8 in. long, mostly pinnate-divided, covered with short hairs and speckled with resin
Flower	Pink to white; base of flower vase-shaped, 0.25-0.5 in. wide, 0.75-1 in. long and covered with stout, yellow spines 0.4-1 in. long
Root	Stout taproot
Other	- Grows best in moist areas; often found in pastures, roadsides and along waterways; not known to occur in Nevada - Annual or biennial; reproduces by seed - Closely resembles purple starthistle in all ways except seed; seed of Iberian starthistle has plume of bristles extending from one end, purple starthistle does NOT
Control	- Prevent seed production through mowing or pulling - Apply 2,4-D, clopyralid, dicamba or glyphosate in the rosette stage; aminocyclopyrachlor, aminopyralid, picloram or sulfometuron preemergence to rosette stage

[63]

Iberian starthistle



*Sorghum halepense***Johnsongrass**

Stem	Up to 8 ft. tall; many tillers arise from crown; stems slightly flattened with prominent nodes
Leaves	Up to 2 ft. long, 0.25-0.75 in. wide, white midvein and mostly hairless except near collar; ligule is membranous and tipped with fine hairs; NO auricles
Flower	- Seedhead open and pyramid-shaped; purplish-brown at maturity - Seed is narrow, less than 0.25 in. long and reddish-brown to black
Root	Deep, fibrous root system; rhizomes are white and fleshy with brown to purple nodes; roots and new plants often form at nodes
Other	- Grows best in moist soils; often found in crop fields, pastures, fencerows, roadsides, and along waterways; known to occur in Clark, Lincoln, and Lyon counties - Perennial; reproduces by seed and rhizomes; seedlings resemble corn and can best be identified by pulling a plant and examining the roots for an attached seed - Plants can be toxic to livestock after frost or drought
Control	- Frequent mowing or tillage is effective; burning is NOT - Apply fenoxaprop, fluazifop, or sethoxydim to actively growing plants before boot stage; glyphosate, imazapic, or imazapyr between boot and bloom stages

[65]

Johnsongrass



*Aegilops cylindrica***Jointed goatgrass**

Stem	15-30 in. tall with 1 to many stems or tillers; tillers and branching from base of plant can give it a bunchgrass-like appearance
Leaves	Blue-green, 1-6 in. long, 0.125-0.25 in. wide, simple; alternate; auricles, ligules, leaf sheaths and leaf margins near leaf base have evenly spaced fine hairs which distinguish it from other grass weeds
Flower	Seedhead cylindrical, 1-5 in. long; spikelets held close to the spike, resulting in a jointed look
Root	Fibrous; spikelet that led to germination commonly still attached to the base of the plant
Other	- Grows best in grasslands, rangeland, pastures, roadsides, wheat and alfalfa fields; grows well in compacted soils; known to occur in Churchill, Elko and Washoe counties - Winter annual; seeds viable in soil up to 5 years - Infestations in wheat can reduce value of crop; may cross-breed with wheat
Control	- Hand-pull or hoe small infestations; repeated mowing prior to seed production is effective; tilling to 4 in. depth is effective, but subsequent tilling may return seeds to the surface; burning can kill mature plants and remove thatch, but it will not control the seedbank - Apply glyphosate post emergence in late winter or early spring before flowering to actively growing plants; apply imazapic, sulfometuron or sulfometuron + chlorsulfuron preemergence in the fall or post emergence in early spring to young plants after soil thaws

[67]

Jointed goatgrass



*Euphorbia esula***Leafy spurge**

Stem	Up to 3 ft. tall; branched; base of plant often woody; entire plant contains milky white sap
Leaves	Mostly alternate, strap-like (linear), 1-2 in. long, 0.2 in. wide and lack hair (glabrous); NO leaf stem (petiole); smooth edges (margins)
Flower	- Small, showy, green to yellow and clustered at tips of stems; bracts below flowers are heart- to kidney-shaped and have the appearance of flower petals - Produces a spherical capsule with 3 chambers, each containing one seed
Root	Creeping, deep root system; new shoots arise from pinkish buds
Other	- Grows well across a wide range of sites; often found in pastures, waste areas, rangelands, field borders and along waterways; known to occur in Elko, Humboldt, Washoe and White Pine counties - Perennial; reproduces by seed and roots; sap can irritate skin, eyes and the digestive tracts of humans and animals; sheep and goats are immune
Control	- Mechanical control (mowing, burning, tillage and grazing) can reduce seed production but are often NOT effective due to new shoot growth from roots - Several biological control agents are available - Apply 2,4-D, dicamba or glyphosate to actively growing plants through early bloom; picloram throughout the growing season; imazapic in fall after a killing frost but before loss of milky sap



Leafy spurge

[69]

*Centaurea melitensis***Malta starthistle**

Stem	1-3 ft. tall, stiff, wiry and usually branched; wings less than 0.1 in. wide created by leaf bases that extend down the stem
Leaves	Gray-green, 0.75-6 in. long and densely covered with fine hairs; rosette leaves are oval to strap-like (linear) with smooth to deeply lobed edges (margins); stem leaves are alternate, strap-like to oblong with smooth, toothed or wavy edges
Flower	Yellow, located at branch tips or axils in groups of 1-3; base of flower is vase-shaped, 0.3-0.6 in. diameter and covered with cotton-like hairs and stout, purple-to-brown colored spines 0.2-0.6 in. long
Root	Shallow taproot
Other	- Often infests rangeland, pastures, crop fields, waste areas and roadsides; known to occur in Clark, Lincoln and Nye counties - Annual; reproduces by seed - Also known as tocalote
Control	- Grazing, mowing, burning and cultivation can be effective if done prior to seed production - Apply 2,4-D, dicamba or triclopyr to actively growing plants; aminocyclopyrachlor, aminopyralid, clopyralid or picloram pre- or post emergence

[71]

Malta starthistle



*Anthemis cotula***Mayweed chamomile**

Stem	0.5-2 ft. tall, highly branched and bushy
Leaves	Alternate, finely and deeply divided, up to 2.5 inches long and sometimes hairy
Flower	Daisy-like; 0.5-1 in. diameter; yellow center with 10-15 white petals
Root	Short, thick taproot
Other	- Grows best on disturbed sites; often infests roadsides, waste areas, landscaped areas and crop fields; known to occur in Carson City, Douglas, Lyon and Washoe counties - Annual; reproduces by seed - Foliage has a foul odor when crushed; reported to irritate the skin of livestock and change the milk flavor of lactating animals - Also known as dog fennel
Control	- Cultivation or mowing prior to seed set can be effective - Apply clopyralid, dicamba, metsulfuron, picloram or tribenuron to actively growing plants

[73]

Mayweed chamomile



Voluntaria tubuliflora

Mediterranean desert knapweed

Stem	To 5 ft. tall; forms basal rosette, then rapid growth forms flower stems; lower parts of flowering stems are winged
Leaves	Fuzzy leaves with deep, rounded lobes; leaves decrease in size higher on the plant
Flower	White to pink to purple petals, 0.5 in. tall and 0.5 in. wide with fuzzy hairs at their base; flowers often appear to have no petals; bracts at the base of the flower have light brown, pointed spines; seeds are tiny, barrel-shaped and have a crown of fine hairs that aid in wind dispersal
Root	Stout, deep taproot and many fine, water-absorbing, surface roots
Other	- Grows best on disturbed ground and seasonally flooded sites; no known occurrences in Nevada - Winter annual; each plant can produce several thousand seeds; seed remains viable in soil for several years - Can outcompete native vegetation by rapid growth which shades out other plants
Control	- Mechanical removal by pulling, digging or hoeing is effective; if plant is flowering, bag up plant and dispose of properly - Apply aminocyclopyrachlor + chlorsulfuron, aminopyralid or clopyralid preemergence or post emergence in the seedling to rosette stage; apply 2,4-D or dicamba post emergence during rosette to early bolting stage

[75]

Mediterranean desert knapweed



*Salvia aethiopsis***Mediterranean sage**

Stem	▪ 1-3 ft. tall, highly branched and densely covered with hairs
Leaves	▪ Gray-green; densely covered with white hairs, particularly on new leaves and underside of older leaves; wider at base (triangle-shaped); 2-12 in. long; edges (margins) with rounded, irregular teeth; leaves have an aroma when crushed ▪ Lower leaves have leaf stems (petioles); upper leaves are smaller and lack leaf stems
Flower	▪ Yellow to white, 0.5 in. wide, arranged in clusters of 5-10, ; 2 lips, the upper lip is arch- or hook-shaped, the lower lip is smaller and has 3 lobes ▪ 4 nutlets produced per flower, 0.16 in. long
Root	▪ Stout, deep taproot
Other	▪ Often infests rangeland, roadsides and waste areas; not known to occur in Nevada ▪ Biennial; reproduces by seed; dried plants detach and tumble, which disperses seeds. ▪ Also known as African sage
Control	▪ Hand removal of individual plants, including the crown, can limit spread of small infestations ▪ An insect biological control agent is available ▪ Apply 2,4-D, chlorsulfuron, clopyralid, dicamba, glyphosate, or metsulfuron to actively growing plants prior to seed production; aminocyclopyrachlor, aminopyralid, or picloram pre- or post emergence



Mediterranean sage

[77]

*Taeniatherum caput-medusae***Medusahead**

Stem	0.5-2 ft. tall; slender; round in cross-section
Leaves	4-12 in. long, less than 0.12 in. wide; sometimes covered with short hairs; collar region usually has long hairs, auricles and a membranous ligule
Flower	Seedhead is a spike, 0.5-2 in. long; awns are stiff, straight or twisted, barbed and up to 3 in. long; spikes often remain intact on dry plants through winter
Root	Fibrous
Other	- Grows best on clay soils; primarily infests rangeland; known to occur in Churchill, Elko, Humboldt, Lyon, Pershing, and Washoe counties - Annual; reproduces by seed; matures 2-4 weeks later than other annual grasses - Unpalatable to grazing animals due to high levels of silica in the foliage and long, stiff awns
Control	- Tillage, mowing or grazing prior to seed set can reduce stands; burning has had mixed results; most effective with a hot, slow fire prior to seed maturity but after other species have dried-down; burning can also be used to reduce the thatch layer, which can increase the performance of soil-applied herbicides - Apply imazapic, indaziflam, or sulfometuron preemergence or to small, actively growing plants; glyphosate to actively growing plants



[79]

Medusahead

*Carduus nutans***Musk thistle**

Stem	2-6 ft. tall and sometimes wooly and branched; spiny wings caused by leaf bases that extend down the stem
Leaves	Dark green with a light-green midvein, 4-15 in. long, alternate and sometimes hairy; edges (margins) are deeply lobed and spiny
Flower	- Pink to purple (occasionally white), up to 3 in. wide, each located at the tip of a stem; head often nods or droops; stem below head usually spineless - Base of flower is covered with green, purple- or straw-colored, spine-tipped bracts; bracts are 0.1-0.3 in. wide, lance-shaped and sometimes hairy
Root	Deep, fleshy taproot
Other	- Often infests roadsides, pastures and waste areas; known to occur throughout Nevada - Biennial; reproduces by seed; also known as nodding thistle
Control	- Mowing, tilling or hand removal after bolting but prior to flowering is effective; remove the top 2 in. of crown by digging before seed production - Several biological controls are available - Apply 2,4-D, chlorsulfuron, clopyralid, dicamba, glyphosate, picloram, or triclopyr to young actively growing plants; aminopyralid, imazapic, imazapyr, metsulfuron, or sulfometuron preemergence or post emergence on young plants



[8]

Musk thistle

*Lepidium latifolium***Perennial pepperweed**

Stem	Up to 6 ft. tall, semi-woody, waxy and lacks hair (glabrous); many stems can arise from each crown; often branched near top; branches arise from leaf axils
Leaves	Alternate, oval to lance-shaped, mostly 3-12 in. long, 1-3 in. wide, green to gray-green, lack hair and waxy; edges (margins) smooth to toothed and can also be curled; leaf bases DO NOT clasp stem; lower leaves larger than upper leaves
Flower	- Small and white with 4 petals; arranged in dense clusters at the tips of stems - Seed pods are round, flattened, less than 0.1 in. diameter, usually covered with hairs; each seed pod has 2 chambers, each with 1 seed
Root	Creeping root system
Other	- Grows best on moist sites; often found in floodplains, pastures, meadows, hay fields and along waterways; known to occur throughout Nevada - Perennial; reproduces by roots and seed - Also known as tall whitetop
Control	- Mowing, digging, tillage, burning and grazing established stands is NOT effective - Apply chlorsulfuron, imazapic, imazapyr, or metsulfuron to actively growing plants through early-bloom; 2,4-D and glyphosate at bud to flower can be effective if repeated for several years



Perennial pepperweed

*Sonchus arvensis***Perennial sowthistle**

Stem	Up to 6 ft. tall, mostly unbranched except near the top where several flower stems form; exudes white, milky sap when broken
Leaves	- Alternate; upper leaves are smaller and fewer than lower leaves; leaf bases clasp the stem; exude white, milky sap when broken - Edges (margins) smooth to deeply lobed and spiny
Flower	Yellow; less than 2 in. wide; base of flower is vase shaped; flower base and stalk usually covered with stiff, sticky hairs
Root	Creeping root system
Other	- Grows best in moist, fertile soils; often infests crop fields, gardens, waste areas and ditch banks; known to occur in Washoe and White Pine counties - Perennial; reproduces by seed and roots; seed is wind-dispersed
Control	- Tilling and mowing not effective; pulling can be effective, but the entire root must be removed. Preventing seed production is essential for control - Apply 2,4-D, aminopyralid, clopyralid, MCPA, or picloram to actively growing plants before bud stage



Perennial sowthistle

[85]

*Conium maculatum***Poison-hemlock**

Stem	Up to 10 ft. tall, green with purple spots, stout, hollow except at nodes and highly branched with lengthwise ridges
Leaves	Triangular, 4-12 in. long, finely pinnate-divided (fern-like) and lack hair (glabrous); leaflets have toothed edges; foliage has a musty odor
Flower	Small and white; arranged in umbrella-like clusters at end of a stalk
Root	Thick, deep taproot
Other	- Grows best in moist sites; often infests crop fields, waterways, roadsides and waste areas; known to occur in Carson City, Douglas, Elko, Lander, Lincoln, Lyon, Nye, Storey, Washoe, and White Pine counties - Biennial; reproduces by seed - Highly toxic to animals and humans when consumed
Control	- Repeated mowing or tillage prior to seed production is effective; hand-removal by cutting the taproot below the crown can also eliminate plants, avoid contact with skin - An insect biological control agent is available - Apply 2,4-D, chlorsulfuron, glyphosate, metsulfuron or triclopyr to actively growing young plants; aminopyralid, imazapic, or imazapyr preemergence or on young plants

[87]

Poison-hemlock



*Tribulus terrestris***Puncturevine**

Stem	Prostrate; multiple stems that spread radially from crown; up to 3 ft. long (sometimes longer); highly branched, green to reddish-brown and often hairy
Leaves	Opposite, usually hairy, pinnate-compound, 1-2 in. long, with 3-7 pairs of leaflets; leaflets oval and 0.2-0.6 in. long; edges (margins) are smooth
Flower	- Yellow, 0.2-0.6 in. diameter, with 5 petals; arise from leaf axils - Fruit is a woody bur that breaks into 5 sections (nutlets) at maturity; each nutlet has 2 stout, spines and contains 3-5 seeds
Root	Slender, deep taproot; can associate with nitrogen-fixing bacteria
Other	- Grows best in dry, sandy soils; often infests roadsides, crop fields and waste areas; known to occur throughout Nevada - Annual; reproduces by seed - Also known as goathead, Mexican sandbur, Texas sandbur and tackweed; spines on fruit can cause injury to livestock and humans and can also puncture tires; foliage can be toxic to livestock
Control	- Frequent hand-removal or tillage prior to seed production - Two insect biological control agents are available - Apply 2,4-D, dicamba, glyphosate, imazapic or picloram to young, actively growing plants; chlorsulfuron or imazapyr preemergence or early post emergence

[89]

Puncturevine



Lythrum salicaria

Purple loosestrife

Stem	Up to 6 ft. tall, 4-5 sided, covered with short hairs and often branched; multiple stems arise from root crown
Leaves	Mostly opposite or whorled, narrow to lance-shaped, 2-6 in. long, smooth edges (margins), lack hair (glabrous) to hairy; NO leaf stems (petioles)
Flower	Showy; clustered on stalks at the tips of branches; 5-7 pink to purple petals surrounding a yellow center; petals are less than 0.5 in. long, each have a dark midvein and appear wrinkled or crushed
Root	Taproot with some spreading roots; can associate with nitrogen-fixing bacteria
Other	- Grows best in wet areas; often found in marshes and along the edges of pond and waterways; known to occur in Storey and Washoe counties - Perennial; reproduces by seed and stem fragments - Historically used as an ornamental plant but has escaped cultivation
Control	- Repeated hand-removal of individual plants including roots can be effective; DO NOT mow - Several biological control agents are available - Apply metsulfuron to actively growing plants; glyphosate or triclopyr at bloom; imazapyr from bloom until killing frost

[9]

Purple loosestrife



*Centaurea calcitrapa***Purple starthistle**

Stem	Up to 4 ft. tall, stiff, highly branched, bushy and covered with hairs; NO wings on upper stems
Leaves	Alternate; 4-8 in. long, mostly pinnate-divided, covered with short grayish hairs and dotted with resin
Flower	Pink to purple, each located at the tip of a branch; base of flower is vase-shaped, 0.75-1 in. long, 0.25 in. wide and covered with stout, straw-colored spines 0.4-1 in. long
Root	Deep, stout taproot
Other	- Grows best in sites with heavy, fertile soils; often infests rangelands, waste areas and roadsides; not known to occur in Nevada - Annual, biennial or perennial; reproduces by seed; older rosettes have a circle of straw-colored spines at the center - Closely resembles Iberian starthistle in everything except seed; seed of Iberian starthistle has plume of bristles extending from one end, purple starthistle does NOT
Control	- Mowing plants in bud to flower stage can reduce seed production; repeated hand removal can be effective; DO NOT burn - Apply 2,4-D, clopyralid, dicamba, or glyphosate in the rosette stage; aminocyclopyrachlor, aminoyralid, picloram or sulfometuron preemergence to rosette stage

[93]

Purple starthistle



1 mm

*Chondrilla juncea***Rush skeletonweed**

Stem	- Multiple, up to 4 ft. tall and highly branched; contains white, milky sap - Lacks hair (glabrous) except lower 4-6 in. which is covered with coarse, downward-pointing, reddish-brown hairs
Leaves	- Rosette leaves resemble dandelion; 2-5 in. long, 0.5-2 in. wide and lack hair; edges (margins) are irregular with shallow lobes and are often purplish; rosette leaves usually wither at bolting - Stems have very few leaves; typically narrow with smooth edges; inconspicuous
Flower	- Yellow; 0.75 in. wide; 7-15 linear petals with toothed tips; can be alone or in small clusters scattered along branches - Seed tipped with a white, parachute-like pappus that allows it to be spread by wind
Root	Deep taproot and short creeping lateral roots
Other	- Grows best in well-drained soils; often infests roadsides, rangelands and waste areas; not known to occur in Nevada - Perennial; reproduce by seed and roots
Control	- Repeated hand-removal of individual plants (including roots) and frequent tillage are effective - Several biological control agents are available - Apply 2,4-D, clopyralid, dicamba, glyphosate, or picloram to actively growing plants; apply aminopyralid or imazapyr pre- or post emergence



Rush skeletonweed

[95]

*Acroptilon repens***Russian knapweed**

Stem	Numerous; highly branched, stiff, 1-3 ft. tall and covered with wooly gray hair; NO wings
Leaves	- Alternate; mostly covered with wooly gray hair - Lower leaves 2-4 in. long with lobed to wavy edges (margins); upper leaves strap-like (linear) or lance-shaped and less than 1.2 in. long with smooth or toothed edges
Flower	Purple, pink or white, each located at the tip of a branch; base of flower is vase-shaped, 0.25-0.5 in. wide and covered with green bracts with papery or whitish edges
Root	Creeping root system; upper roots often dark brown to black
Other	- Grows well on a broad range of sites; often found in rangeland, waste areas, roadsides and along waterways; known to occur throughout Nevada - Perennial; reproduces by roots and seed - Causes "chewing disease" in horses by damaging the area of the brain that controls fine motor movements, particularly of the mouth; results in starvation or dehydration
Control	- Mowing and tillage are NOT effective - Apply aminocyclopyrachlor, chlorsulfuron or clopyralid from the bud to flower stage; aminopyralid or picloram from bud through dormancy; imazapic to dormant plants in fall



Russian knapweed

[97]

*Tamarix spp.***Saltcedar**

Stem	Shrub or small tree; multiple large stems arise from root crown; up to 20 ft. tall, highly branched with reddish-brown bark; leaves turn yellow to red in autumn
Leaves	Alternate; deciduous; green to blue-green, small (0.06-0.14 in. long), oval to lance-shaped, overlapping and scale-like
Flower	Tiny with 5 white to pink petals; arranged in finger-like clusters at the tips of branches
Root	Deep taproot with creeping roots
Other	- Often found along edges of waterways, lakes and ponds; known to occur throughout Nevada - Perennial; reproduces by seed, roots and stem fragments - High concentration of salt in fallen leaves can impact growth of other plants - Also known as tamarisk
Control	- Cutting, digging or burning MUST be combined with a chemical application to be effective - An insect biological control agent is available - Apply imazapyr to actively growing foliage during flowering; glyphosate, imazapyr or triclopyr as a cut stump or basal bark treatment

Saltcedar

[99]



*Onopordum acanthium***Scotch thistle**

Stem	Up to 12 ft. tall and branched, with spiny wings along smooth stem; covered with wooly, gray hairs
Leaves	Alternate; oblong, 4-20 in. long, covered with wooly, gray hairs giving plant a gray-green appearance; edges (margins) are lobed or toothed with stiff spines
Flower	White to purple flowers, each located at the tip of a branch; base of flower is round and resembles a squashed globe, 1-2 in. wide and covered with green, purple or yellow bracts less than 0.2 in. long, each tipped with a spine; often covered with wooly, gray hairs
Root	Fleshy taproot
Other	- Often infests pastures, rangeland, roadsides and waste areas; known to occur throughout Nevada - Biennial; reproduces by seed - Forms dense stands that are difficult for humans and animals to penetrate
Control	- Hand-removal, digging or mowing prior to flowering can be effective - Apply 2,4-D, chlorsulfuron, dicamba, metsulfuron or picloram to actively growing rosettes; aminopyralid, chlorsulfuron, clopyralid or dicamba + 2,4-D between rosette and late-bolt stage; aminocyclopyrachlor pre- and post emergence

[101]

Scotch thistle



*Solanum elaeagnifolium***Silverleaf nightshade**

Stem	1-3 ft. tall, branched and densely covered with short hairs; sometimes covered with red to yellow spines less than 0.2 in. long
Leaves	Alternate; oval to lance-shaped and 3-6 in. long with wavy or lobed edges (margins); usually NO spines on leaf veins; covered with tiny hairs that are star-shaped with magnification; gives the plant a gray or silvery appearance
Flower	- Star-shaped, 0.75-1.5 in. diameter, purple to blue with 5 petals and yellow stamens; usually 3-5 flowers clustered on stalks at tips of branches - Berries are round, shiny, yellow, 0.25-0.5 in. diameter and resemble tiny tomatoes
Root	Deep, creeping root system
Other	- Often infests rangeland, roadsides, waste areas and crop fields; native to North America; known to occur in Clark, Elko and Nye counties - Perennial; reproduces by seeds and roots - Toxic to livestock and humans - Also known as white horsenettle
Control	- Repeated hand-digging can be effective; DO NOT use tillage, mowing or grazing - Apply 2,4-D, aminopyralid, dicamba, or glyphosate to young, actively growing plants; imazapyr to actively growing plants; picloram at full flower



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Silverleaf nightshade

[103]

*Centaurea biebersteinii***Spotted knapweed**

Stem	Up to 4 ft. tall, rough-textured, branched and bushy; NO wings on upper stems
Leaves	Alternate, gray-green, up to 8 in. long; most are pinnate-divided, dotted with resin and sometimes covered with small grayish hairs; upper leaves smaller and narrower with few to no lobes
Flower	White to purple, each located at the tip of a branch; base of flower is vase-shaped, 0.5 in. long, 0.3-0.5 in. wide and covered with bracts with dark, comb-like tips that give the appearance of spots (after which the weed is named)
Root	Deep, stout taproot
Other	- Grows best on dry, well-drained soils; often infests rangelands, waste areas and roadsides; known to occur throughout Nevada - Biennial; reproduces by seed and lateral roots
Control	- Mowing plants in bud to flower stage can reduce seed production; repeated hand removal can be effective; DO NOT burn - Several insect biological control agents are available - Apply 2,4-D or glyphosate rosette to bolt stage; aminocyclopyrachlor, aminopyralid, clopyralid, or picloram preemergence to bolt stage



[105]

Spotted Knapweed

Centaurea virgata var. *squarrosa***Squarrose knapweed**

Stem	Up to 2 ft. tall, highly branched and rough-textured; multiple stems can arise from woody crown; NO wings on upper stems
Leaves	Exist as a basal rosette prior to bolting; alternate; lower leaves pinnate-divided and 4-8 in. long; sometimes covered with short grayish hairs; upper leaves strap-like (linear) with smooth edges (margins)
Flower	Pink to purple, each located at the tip of a branch; base of flower is narrow vase-shaped, 0.3 in. long, 0.12 in. wide and covered with comb-like bracts; bracts tipped with a spine less than 0.12 in. long that curves outward
Root	Deep, stout taproot
Other	- Often infests rangelands, waste areas and roadsides; known to occur in Elko and Humboldt counties - Perennial; reproduces by seed
Control	- Mowing plants in bud to flower stage can reduce seed production; repeated hand removal can be effective; DO NOT burn - Several insect biological control agents are available - Apply 2,4-D, dicamba, or glyphosate in the rosette stage; aminocyclopyrachlor, aminopyralid, clopyralid, or picloram preemergence to mid-bolt stages



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Squarrose Knapweed

[107]

*Potentilla recta***Sulfur cinquefoil**

Stem	1-2 ft. tall, stout, covered with hairs and usually unbranched below flowers; sometimes many stems arise from crown
Leaves	Alternate; palmate-compound with 5-7 leaflets; rough, hairy, 1-4 in. long with toothed edges (margins)
Flower	0.5-1 in. wide, each on a short stalk; 5 pale-yellow petals with a notch at tip surround a yellow center
Root	Woody taproot with short branch roots
Other	- Often infests rangeland, pastures, roadsides and waste areas; not known to occur in Nevada - Perennial; reproduces by seed
Control	- Hand-digging individual plants can be effective for small infestations; cultivation can also be effective; mowing does NOT control established plants - Apply 2,4-D, aminocyclopyrachlor, aminopyralid, chlorsulfuron, metsulfuron, picloram, or triclopyr rosette to pre-bud stage



[109]

Sulfur cinquefoil

*Sphaerophysa salsula***Swainsonpea**

Stem	Up to 5 ft. tall and covered with short hairs
Leaves	Pinnate-compound; leaflets are oval, opposite, 0.2-0.8 in. long, lack leaf stems (petioles) and covered with short hairs on lower surface
Flower	- Pea-like, reddish-orange and 0.5 in. long - Pods are oval, bladder-like, translucent and contain many seeds; seeds remain in pods during dispersal
Root	Woody, creeping root system; roots associate with nitrogen-fixing bacteria
Other	- Often infests roadsides, fencerows and irrigation ditches; not known to occur in Nevada - Perennial; reproduces by seed and creeping roots - Potential contaminant of alfalfa seed due to similar size, shape and weight - Also known as Austrian peaweed
Control	- Hand removal of individual plants, including roots, can limit spread of small infestations - Apply 2,4-D, aminopyralid, clopyralid, dicamba, glyphosate, picloram, or triclopyr at bloom stage



[]]

Swainsonpea

*Zygophyllum fabago***Syrian beancaper**

Stem	Up to 3 ft. tall; multiple stems from crown; branched; lacks hair (glabrous)
Leaves	Opposite; compound with 2 opposite leaflets; leaflets oblong, 0.5-1.5 in. long, thick, waxy and lack hair (glabrous) with smooth edges (margins)
Flower	5 petals, white to cream colored with a pink or orange tinge; each on short stalks at upper leaf axils - Pods cylindrical, 1-1.5 in. long and 5-sided with small wings; thread-like projection extends from tip; 5 chambers, each containing 1 seed
Root	Deep, woody taproot with creeping roots
Other	- Often infests rangeland, roadsides and desert areas; not known to occur in Nevada - Perennial; reproduces by seed and creeping roots
Control	- Cultivation and hand-removal often unsuccessful due to remaining root fragments that can generate new plants - Apply glyphosate, imazapic, metsulfuron or picloram from bud stage until fall



[113]

Syrian beancaper

*Ventenata dubia***Ventenata**

Stem	Wirelike, 6-28 in. tall, erect and slender
Leaves	Flat, narrow leaves, 0.6-2 in. long; leaves at base of plant; ligules are membranous and 0.04-0.15 in. long
Flower	Relaxed, open panicle, 8-10 in. long with spikelets at the end of spreading branches holding 3 florets 0.6 in. long; at least 1 floret will have a twisted awn 0.75-1 in. long attached to the lemma
Root	Shallow fibrous roots
Other	- Grows in open, disturbed areas and along roadsides; can establish on bare, dry soils; known to occur in Elko, Eureka and Washoe counties - Winter annual; high in silica, litter builds up on soil surface, similar to medusahead - Can be grazed early in the season, unpalatable to livestock as seedhead develops
Control	- Hand-pulling effective for small infestations; mowing can prevent seed production, repeated mowing may be required; burning can remove thatch, but it does not control the seedbank - Indaziflam or imazapic preemergence herbicides can be applied in the fall, preferably after the thatch layer is removed; glyphosate or rimsulfuron can be applied to actively growing plants



[115]
Ventenata

Cicuta spp.

Waterhemlock

Stem	Up to 5 ft. tall, stout, lacks hair (glabrous) and hollow except at nodes; usually with purple streaks; often branched
Leaves	Pinnate-compound; leaflets are lance-shaped, 1-4 in. long and lack hair; edges (margins) are toothed
Flower	Small, white and arranged in umbrella-like clusters at end of a stalk
Root	Swollen taproot at stem base that can be cut open to reveal multiple narrow, hollow, horizontal chambers; fluid released from cut stem bases is orange-yellow or brown, has the odor of parsnip and is highly toxic
Other	- Grows best in moist soils; often found in crop fields, roadsides, waste areas and along waterways; known to occur in Douglas and Lyon counties; native to North America - Perennial; reproduces by seed - Highly toxic to animals and humans, even in small quantities
Control	- Repeated cultivation or hand-removal can be effective; avoid contact with skin - Apply 2,4-D, glyphosate, or MCPA to actively growing plants

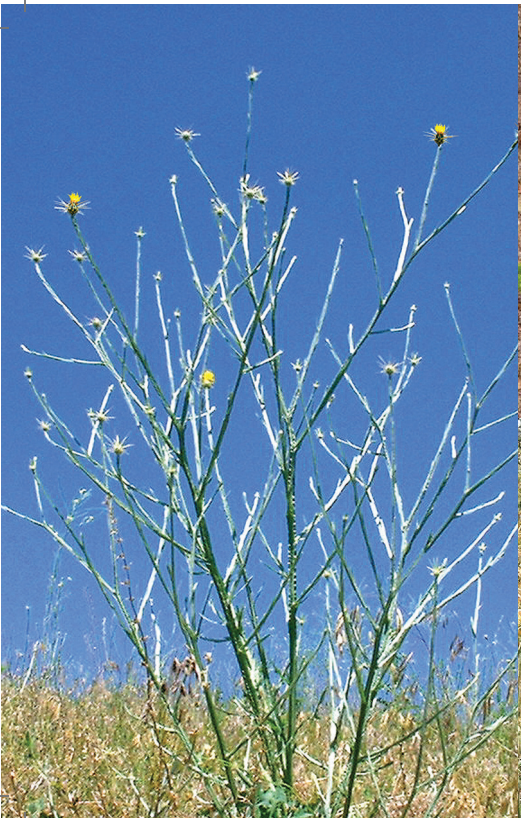


[117]

Waterhemlock

*Centaurea solstitialis***Yellow starthistle**

Stem	Stiff, wiry, 1-6 ft. tall and usually branched; wings less than 0.2 in. wide extend down stem
Leaves	- Blue- to gray-green, 1.5-6 in. long and densely covered with fine hairs - Rosette leaves are oval to strap-like (linear) with deeply lobed edges (margins); stem leaves are alternate, strap-like to oblong with smooth to wavy edges
Flower	Yellow, located singly at branch tips or axils; base of flower is vase-shaped, 0.5-0.75 in. diameter and covered with cotton-like hairs and stout, straw-colored spines 0.5-1 in. long
Root	Deep taproot
Other	- Infests rangeland, pastures, croplands, waste areas and roadsides; known to occur in Carson City, Douglas, Elko, Humboldt, Lander, Lyon, Storey, Washoe, and White Pine counties - Annual; reproduces by seed - Causes "chewing disease" in horses by damaging the area of the brain that controls fine motor movements, particularly of the mouth, resulting in starvation or dehydration
Control	- Grazing, mowing, burning, pulling, digging and cultivation can be effective if done prior to seed production - Several biological control agents are available - Apply 2,4-D, dicamba, or triclopyr rosette to bolt; glyphosate bolt to flowering; aminocyclopyrachlor, aminopyralid, clopyralid or picloram preemergence to rosette; chlorsulfuron preemergence



[119]

Yellow starthistle

*Linaria vulgaris***Yellow toadflax**

Stem	Multiple stems up to 3 ft. tall; woody base; often branched near top; sometimes hairy
Leaves	Alternate; strap-like (linear), 1-2.5 in. long, 0.1-0.2 in wide and lack hair (glabrous) to sparsely hairy; NO leaf stems (petioles); DO NOT clasp the stem; edges (margins) are smooth
Flower	- Snapdragon-like; 0.5-1.5 in. long, bright yellow to white with an orange bearded throat and a yellow spur; clustered along upper part of stem - Seed capsules round with two chambers, 0.3-0.5 in. diameter, contain many seeds
Root	Creeping root system
Other	- Grows best in coarse soils; often infests rangelands, waste areas and roadsides; known to occur in Elko, and Storey counties - Perennial; reproduces by seed and creeping roots - Toxic to livestock if ingested in large quantities; historically used as a medicine, a dye and an ornamental - Also known as “butter and eggs”
Control	- Mechanical control (mowing, burning or tillage) is NOT effective - Several biological control agents are available - Apply 2,4-D, aminocyclopyrachlor, chlorsulfuron, glyphosate, imazapyr, metsulfuron or picloram to actively growing plants; imazapic shortly after first killing frost



[121]

Yellow toadflax

alternate: leaves that grow singly along a stem at the node and are not opposite or whorled

annual: plant that completes its lifecycle in one growing season

auricle: small, finger-like appendage found where the blade meets the sheath in grasses

awn: slender bristle that extends beyond the seedheads of grasses

axil: point where a leaf attaches to the stem

biennial: plant that completes its lifecycle in two years

blade: the leaf of a grass

boot or boot stage: in grasses, the stage at which the seedhead has formed, causing the stem to swell, but prior to emergence from the sheath

bract: small, leaf-like structure found at the base of a flower

broadleaf: flowering plant that has flat leaves with net-like veins; not grasses

bud: a plant structure found on stems or roots from which leaves, flowers, tillers, stems or roots may grow

clasp: occurs when the lobes at the base of a leaf wrap partially or entirely around the stem

collar: the junction of the sheath and blade in grasses

compound: leaf composed of two or more leaflets

cotyledons: seed leaves that appear at germination

creeping: stems or roots that grow horizontally above or below the soil surface, and from which new plants may arise

crown: part of a plant where the stem(s) meet the roots

decumbent: growing prostrate with tips curving upwards, similar to an upside down umbrella

fibrous: root system composed of many densely packed roots that appear similar in length and thickness

glabrous: lacking hairs, smooth

inflorescence: a flowering structure consisting of two to many flowers

keel: on a grass leaf, prominent longitudinal ridge, shaped like the keel of a boat

lance-shaped: lanceolate; a leaf that is much longer than wide, with the widest point below the middle and is tapered toward both ends

leaflet: small, leaf-like part of a compound leaf

ligule: on a grass, the thin membranous or hair-like appendage at the point where the blade meets the sheath

linear: long, narrow leaf with parallel edges

lobed: leaf edge that cuts deeply toward the base or midvein

margin: the edge of a leaf

midrib: the central rib or vein of a leaf

midvein: the central vein of a leaf

node: point of attachment on a plant where bud(s) form

nonselective herbicide: herbicide that can kill both broadleaf and grass plants

oblong: leaf that is longer than it is wide with edges that are nearly parallel in the middle

opposite: pair of leaves that grow from the same node, directly across from one another

palmate: a leaf whose lobes spread like fingers from the palm

pappus: hairs, bristles, scale or awns that arise from one end of the seed of plants in the sunflower family (Asteraceae)

pedicel: stalk of a single flower or of a grass spikelet

perennial: plant that persists for three or more years or growing seasons

petiole: stalk that supports the blade of a leaf

pinnate: compound leaf with leaflets arranged on opposite sides of a common stalk, featherlike

preemergence herbicide: herbicide that kills a plant seed just as it starts to germinate, before the

plant emerges from the soil

prostrate: growth habit in which the plant lies flat to the ground

pubescent: covered with short, soft hairs; hairy

raceme: unbranched, elongated inflorescence; flowers generally mature from the bottom upwards

rhizome: creeping underground stem with nodes, at which new roots and shoots may emerge

rosette: flattened, circular cluster of leaves around a single central stem

seedbank: viable seeds stored in the soil

selective herbicide: herbicide that targets a specific group of plants; most common are broadleaf-selective herbicides or grass-selective herbicides

sessile: attached directly, without a supporting stalk

sheath: on a grass, the base of the grass blade that encloses the stem

simple leaf: a single leaf not lobed or divided

spike: seedhead or inflorescence of a grass where the flowers or seed-bearing structures are attached directly to a central, long, unbranched stalk

spikelet: the basic unit of a grass flower; a single element of a spike

spine: stiff, slender, sharp-pointed structure, representing a modified leaf

stamen: stalk-like appendage(s) on a flower that rise above the petals and produce pollen

stolon: a horizontal, aboveground, creeping stem that may form roots and new stems at its tip and at its nodes

submersed: growing below the water surface

surfactant: wetting agent added to an herbicide to increase its ability to penetrate plant surfaces

taproot: prominent root with few branches, sometimes swollen to store sugars

tiller: an aboveground branch on a grass plant

toothed: leaf edge that has jagged or notched projections

trifoliate: three leaves or three leaflets

wings: thin, flat margins (projections of leaves) that extend outward along a stem, fruit or seed

whorled: three or more leaves arranged in a circle at a node

This booklet provides herbicide recommendations as a starting point for individuals looking for chemical control options. Due to the large number of trade (brand) named products available and the fact that trade names are constantly changing, common names (active ingredients) of chemicals are presented. To help readers identify the chemical common name, trade names of a few commercial products are provided. The listed trade names are not an endorsement.

Post emergence, non-selective

Glyphosate: Roundup, Rodeo, (Touchdown, Accord XRT II – both of these don't mention glyphosate specifically but Glycine instead which is the chemical family)

Glyphosate + 2,4-D: Landmaster

Post emergence, broadleaf plant selective

2,4-D: Navigate, Weedar, Weedone

Dicamba: Banvel, Vanquish, Clarity

Dicamba + 2,4-D: Weedmaster

MCPA: MCPA, MCP, Shredder MCPA (most products with MCPA are mixed with other chemicals)

Tribenuron: Express

Triclopyr: Garlon, Renovate, Remedy, Pathfinder

Triclopyr + 2,4-D: Crossbow

Post emergence, grass plant selective

Fenoxaprop: Acclaim (annual grasses)

Fluazifop: Fusilade

Sethoxydim: Poast

Post emergence, aquatic plants

Copper complexes: Cutrine, Komeen, Harpoon, Nautique, K-Tea, Captain, Clearigate

Diquat: Reward, Diquat, Weedtrine

Endothall: Aquathol, Hydrothol, Cascade

Fluridone: Sonar, Avast!, Sonarone

Imazamox: Clearcast

Preemergence, non-selective

Indaziflam: Esplanade, Specticle, Alion (annual grasses and broadleaf weeds)

Sulfometuron: Oust (safe for labelled grasses)

Pre and Post Emergence, non-selective

Imazapic: Plateau (many tolerant grasses)

Imazapyr: Arsenal, Habitat, Stalker, Polaris

Preemergence, non-selective and Post emergence, broadleaf selective

Aminocyclopyrachlor + Chlorsulfuron: Perspective

Aminopyralid: Milestone

Chlorsulfuron: Telar

Clopyralid: Stinger, Transline

Clopyralid + 2,4-D: Curtail

Clopyralid + Triclopyr: Confront, Prescott

Metsulfuron: Escort, Ally

Metsulfuron + Dicamba + 2,4-D: Cimarron Max

Picloram: Tordon

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Cover photos (left to right) top: Sulfur cinquefoil, Joe DiTomaso; camelthorn, Ross O'Connell; horsenettle, Joe DiTomaso. Bottom: purple starthistle, Joe DiTomaso; African rue, Charles Hart; musk thistle, Joe DiTomaso.

African mustard: All photos, Joe DiTomaso.

African rue: Flower, Charles Hart; plant and seed pod, Joe DiTomaso; young plant, Earl Creech, University of Nevada Cooperative Extension.

Austrian fieldcress: Plant, Joe DiTomaso; flowering plant and rosette, Jack Kelly Clark; flower, Elizabeth Bella, USDA-USFS, bugwood.org.

Barbed goatgrass: Plant, Jean Pawek; root, Aaron Arthur; seed and stem, Joe DiTomaso.

Black henbane: Seed pod, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Buffelgrass: All photos © Keir Morse.

Camelthorn: Whole plant, J.P. Clark; plant and seed pod, Ross O'Connell; flower closeup, Richard Old, XID Services, bugwood.org; Leaves and stems, Steve Dewey, Utah State University, bugwood.org.

Canada thistle: Roots, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Common crupina: All photos, Joe DiTomaso.

Common St. Johnswort: Whole plant, Richard Old, XID Services, bugwood.org; leaf, Nathan Belliston, Uintah County Weed Department; all other photos, Joe DiTomaso.

Crimson fountaingrass: All photos, Joe DiTomaso.

Curlyleaf pondweed: Leaves in palm, Leslie J. Mehrhoff, University of Connecticut, Bugwood.org; all other photos, Chris Evans, University of Illinois, Bugwood.org.

Dalmation toadflax: Flower close up and seedling, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Diffuse knapweed: Rosette, Nathan Belliston, Uintah County Weed Department; all other photos, Joe DiTomaso.

Dyer's woad: Flowering plant, Steve Orloff; all other photos, Nathan Belliston, Uintah County Weed Department.

Eurasian watermilfoil: Whole plant photo, Richard Old, XID Services, bugwood.org; all other photos, Joe DiTomaso.

Flowering rush: Rhizomes and stems, Sean Gephart, CCA; flowers, Louis-M. Landry.

Giant reed: Upright stems, James H. Miller, USDA-USFS, bugwood.org; all other photos, Joe DiTomaso.

Giant salvinia: Plants, Troy Evans, Eastern Kentucky University, bugwood.org; all other photos, Joe DiTomaso.

Goatsrue: Plant with rootstalks, Steve Dewey, Utah State University, bugwood.org; all other photos, Nathan Belliston, Uintah County Weed Department.

Hoary cress: Infestation and seedling, Nathan Belliston, Uintah County Weed Department; all other photos, Joe DiTomaso.

Horsenettle: All photos, Joe DiTomaso.

Houndstongue: Seedling and flowers with seeds, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Hydrilla: Cross section and plant, Jack Kelly Clark; tuber and infestation, Joe DiTomaso.

Iberian starthistle: Whole plant and flower head, Ross O'Connell; seeds, Jim O'Brien; rosette, Western Society of Weed Science: "Weeds of the West".

Johnsongrass: Whole plant and leaf close up, Joe DiTomaso; all other photos, Jack Kelly Clark.

Jointed goatgrass: Plant, Nate Weber; white background photos, © Al Keuter; all other photos, CFDA, 2001.

Leafy spurge: Whole plant and flowers, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Malta starthistle: All photos, Joe DiTomaso.

Mayweed chamomile: Whole plant photo, Richard Old, XID Services, bugwood.org; all other photos, Joe DiTomaso.

Mediterranean desert knapweed: All photos, Ron Vanderhoff.

Mediterranean sage: Infestation, Ross O'Connell; all other photos, Joe DiTomaso.

Medusahead: Leaf collar and sheath, Joe DiTomaso; whole plant, Steve Dewey, Utah State University, bugwood.org; all other photos, Nathan Belliston, Uintah County Weed Department.

Musk thistle: Plant and patch, Nathan Belliston, Uintah County Weed Department; all other photos, Joe DiTomaso.

Perennial pepperweed: Inflorescence, Nathan Belliston, Uintah County Weed Department; all other photos, Joe DiTomaso.

Perennial sowthistle: Whole plant, J. Neal; plant with rhizomes, Steve Dewey, Utah State University, bugwood.org; all other photos, Nathan Belliston, Uintah County Weed Department.

Poison-hemlock: Flower close up, Nathan Belliston, Uintah County Weed Department; all other photos, Joe DiTomaso.

Puncturevine: Seeds, Nathan Belliston, Uintah County Weed Department; seedling, Jack Kelly Clark; patch and flowers and seeds, Joe DiTomaso.

Purple loosestrife: Whorled leaf arrangement, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Purple starthistle: Seeds, Jim O'Brien; all other photos, Joe DiTomaso.

Rush skeletonweed: All photos, Joe DiTomaso.

Russian knapweed: Rosette, Joe DiTomaso; flower heads, Steve Dewey, Utah State University, bugwood.org; all other photos, Nathan Belliston, Uintah County Weed Department.

Saltcedar: All photos, Nathan Belliston, Uintah County Weed Department.

Scotch thistle: All photos, Nathan Belliston, Uintah County Weed Department.

Silverleaf nightshade: Seedling, Jack Kelly Clark; all other photos, Joe DiTomaso.

Spotted knapweed: Rosette and leaves and stems, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Squarrose knapweed: Rosette and leaves and stems, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

Sulfur cinquefoil: Seedling and leaf and stem hairs, Joe DiTomaso; all other photos, Steve Dewey, Utah State University.

Swainsonpea: All photos, Utah State University Archives, bugwood.org.

Syrian beancaper: Flower and seed pod, Dell O'Clark; whole plant, Joe DiTomaso.

Ventenata: Plant against sky, Sean Gephart, CCA; stem and leaf, Zoya Akulova; all other photos, R. L. Carr.

Waterhemlock: All photos, Joe DiTomaso.

Yellow starthistle: Patch and plant, Nathan Belliston, Uintah County Weed Department; winged leaves, Steve Dewey, Utah State University, bugwood.org; flower head, Jack Kelly Clark; rosette, Joe DiTomaso.

Yellow toadflax: Flowering stem and plants with rootstalk, Joe DiTomaso; all other photos, Nathan Belliston, Uintah County Weed Department.

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