

MONTEZUMA COUNTY NOXIOUS WEED GUIDE 2023



Eddy Lewis looking at musk thistle.

Herbicide Label

No matter what chemical is recommended to you it is your responsibility to read the label of the herbicide before applying. There are many different factors with each chemical that must be understood before using. There can be grazing restrictions, planting restrictions, land type restrictions, re-entry restrictions, etc...

Some herbicides will kill trees while others will not. Some are broad leaf selective where as some others are kill-all herbicides. It is your responsibility to do your research about the herbicide to make sure you are using it appropriately in the appropriate area.

The herbicides listed in this booklet for each noxious weed species are not limited to just those listed herbicides. There are many other herbicides that have these species on their labels. Also, no endorsement of products named in this booklet is intended nor criticism implied of products not mentioned. Always follow the label instructions, the label is the law.

Surfactants are not included in recommended herbicides because of space restrictions. However, we 100% recommend using a surfactant with all herbicides.

Montezuma County Noxious Weed Guide

2023 Edition

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<http://montezumacounty.org/web/departments/weeds/>

References:

Colorado Weed Management Association

Colorado Department of Agriculture

Colorado State University Extension

“Preventing Water Contamination and Pesticide Drift” by Oregon State University Extension

“Weed Management Handbook” by Cooperative Extension Services

Southwest Seed

Southwest Weed Control

Helena Chemical (Rick Roehm)

Bayer Chemical (Derek Sebastian)

TITLE 35 AGRICULTURE ARTICLE 5.5 Colorado Noxious Weed Act

Wikipedia

Noxious Weeds

The Colorado noxious weeds listed in the A, B, or C lists are **non-native / invasive** plants that have been designated, by the Colorado Department of Agriculture, as one that is injurious to agricultural or horticultural crops, natural habitats or ecosystems, or humans or livestock. Most noxious weeds have been introduced into an ecosystem by ignorance, mismanagement, or accident. Typically these plants grow aggressively, multiply quickly without natural controls, and display adverse effects through contact or ingestion.

These designated noxious weeds are typically agricultural pests, though they may also have impacts on natural areas. Many noxious weeds have come to new regions and countries through contaminated shipments of feed and crop seeds or intentional introductions such as ornamental plants for horticultural use.

Open fields and grazing pastures with disturbed soils and open sunlight are often more susceptible. Protecting grazing animals from toxic weeds in their primary feeding areas is therefore important.

*Note these lists have been modified to fit Montezuma County's species management priorities.

List A (designated for eradication)

- Black henbane
(*State B*)
- Common tansy
(*State B*)
- Common teasel
(*State B*)
- Cutleaf teasel
(*State B*)
- Diffuse knapweed
(*State B*)
- Leafy spurge
(*State B*)
- Mayweed chamomile
(*State B*)
- Mediterranean sage
- Myrtle spurge
- Scentless chamomile
(*State B*)
- Spotted knapweed
(*State B*)
- Yellow starthistle
- Yellow toadflax
(*State B*)

List B (designated for control and suppression)

- Bull thistle
- Canada thistle
- Dalmatian toadflax
- Eurasian watermilfoil
- Halogeton
(*State C*)
- Hoary cress
- Houndstongue
- Jointed goatgrass
- Musk thistle
- Oxeye daisy
- Perennial pepperweed
- Plumeless thistle
- Russian knapweed
- Russian olive
- Salt cedar
- Scotch thistle
- Sulfur cinquefoil

List C (designated for recommending control and suppression)

- Chicory
- Common burdock
- Common mullein
- Downy brome
- Field bindweed
- Kochia
- Perennial sowthistle
- Poison hemlock
- Puncturevine
- Quackgrass
- Redstem filaree
- Russian thistle

Colorado Noxious Weed Act

Federal Noxious Weed Act -- Public Law 93-629 ([7 U.S.C. 2801 et seq.](#); 88 Stat. 2148), enacted January 3, 1975, established a Federal program to control the spread of noxious weeds.

Colorado Noxious Weed Act – 35-5.5-102. In enacting this article the general assembly finds and declares that there is a need to ensure that all the lands of the state of Colorado, whether in private or public ownership, are protected by and subject to the jurisdiction of a local government empowered to manage undesirable plants as designated by the state of Colorado and the local governing body. In making such determination the general assembly hereby finds and declares that certain undesirable plants constitute a present threat to the continued economic and environmental value of the lands of the state and if present in any area of the state must be managed. It is the intent of the general assembly that the advisory commissions appointed by counties and municipalities under this article, in developing undesirable plant management plans, consider the elements of integrated management as defined in this article, as well as all appropriate and available control and management methods, seeking those methods which are least environmentally damaging and which are practical and economically reasonable.

Key Points:

The Colorado Department of Agriculture designated certain non-native vegetative species that were deemed injurious to agricultural or horticultural crops, natural habitats or ecosystems, or humans or livestock. Those species were then categorized into three different lists depending on the required management.

List A Species: Designated for Eradication

List B Species: Designated for Control and Suppression

List C Species: Recommended to Control and Suppression

The Colorado Noxious Weed Act requires that all lands of Colorado be managed of the noxious weeds in accordance to their designation by the CDA and local governing bodies. The local governing bodies have the authority to move species to a higher designation than the state designation.

Through this Act the counties and municipalities develop noxious weed management plans geared around integrated management including, but not limited to: education, land stewardship practices, biological control, mechanical control, chemical control, and cultural control.

Colorado Noxious Weed Act can be found on our website at
<http://montezumacounty.org/web/departments/weeds/>.

Herbicide Application

Every year, train applicators and decision makers to read and understand labels of pesticides used on the farm. Include these points in the training:

- Train applicators to correctly identify and monitor for pests (weeds, diseases, insects, etc) and beneficial organisms (ladybugs, hoverflies, lacewings, etc) to make sure that a pesticide application is even necessary.
- Is the crop or site to be treated on the pesticide label?
- Is the pesticide you are going to use the least likely to leach, runoff, or move with soil?
- Know your soil type and water-holding capacity. Some herbicides have different application rates depending on soil type and organic matter content, and this will be noted on the label.
- Know the product-specific information about particle drift, vapor drift, buffers, solubility, runoff prevention, soil type, toxicity or other hazards identified on the product label or Material Safety Data Sheet (MSDS).
- Are you using the proper application rate?
- Note the restricted-entry interval (REI), pre-harvest interval, and plant back restrictions.
- Are there endangered species (plant or animal) that may need protection from your application?
- Consider the information in the Precautionary Statement of the pesticide label to protect bees, beneficial organisms or other sensitive sites.
- Consider if the pesticide will harm beneficial organisms and cause possible secondary pest outbreaks.
- Consider weather conditions. Do not apply if wind is over 10mph. If there is no wind you may have a temperature inversion; if so, do not apply. Stay within temperature range. Do not apply in rain or fog.
- Identify dwellings, schools, buildings, commercial areas, parks, playgrounds, jogging / exercise trails, roads, crops and waterways that are near the application site. Establish buffer zones for sensitive areas. Draw a map, and review it with applicators.
- Note that pesticides should never be applied to water-saturated or frozen ground. No applications are legal on top of snow.
- Use cover crops and crop residues to minimize runoff from storms and irrigation.
- Use grassed waterways, sediment ponds, and filter strips to control sediments carried by runoff.
- Construct sumps to settle out sediment from irrigation or storm runoff. Combine these with sediment ponds.
- Ask your neighbors about activities (picnics, workers in fields, etc) or events that may affect your pesticide application. Consider setting up a neighbor notification program.



Photos by Bonnie Loving

Pre-application check of equipment:

- Check pumps, hoses, hose connections, valves and seals for splits, cracks, or leaks.
- Check for missing filter elements and seals. Check for blocked or damaged filters.
- Check tank for damage. Make sure tank sits firmly in its mount. Make sure the agitator works properly.
- Check the control circuitry for correct operation.
- Check the pump lubrication levels. Check to see that the pump rotates freely without friction or noise.
- Check for drive gearbox oil level.
- Check rotary atomizers for damage and lubrication.
- Check nozzle output and spray patterns and replace all nozzles at least once per season.
- If using an airblast sprayer, adjust nozzles to target the trees.
- Install and check deflector shield if using a tower sprayer.
- Make sure the application equipment is properly calibrated. Calibrate at least twice per season.

Mixing and Loading

- Make sure you have the proper Personal Protective Equipment (PPE).
- Obtain clean water for mixing. Test pH when applying pesticides that require a specific pH range.
- Make sure you have the necessary measuring and mixing equipment.
- Make sure you have suitable application equipment for this job (tank capacity, pressure range, volume of output, nozzle size, and pump compatible with formulation type).
- When filling the tank, use a 6-inch air gap, closed system, or anti-siphon device to prevent backflow.
- Use a drift reduction agent if appropriate.
- Locate the mixing / loading site more than 100 feet from wells and surface water sources or as directed by the label.
- Construct a berm around low-lying wellheads to prevent surface water from contaminating the wells.
- Make sure the mixing / loading site has a non-porous surface.
- Have your emergency response plan ready and posted, including water and first aid supplies. Make sure applicators are trained to follow the plan.
- Make sure you have the necessary supplies to contain spills (absorbent materials, shovel and broom, cleaning supplies, holding containers).

Application:

- Before application, notify all workers and neighbors orally if possible.
- Before application, post restricted-entry interval (REI) signs around the treated area as required by the Worker Protection Standard and or OSHA.
- Turn off fans and sprayers at corners when making row turns.
- Use wind gauge and stop spraying if wind speed goes over 10mph.
- For airblast sprayers, spray the outside rows of orchards from outside in, directing the spray into the orchard and shutting off nozzles on the side of the sprayer away from the orchard.
- For airblast sprayers, nozzles must be directed so spray is not projected above the canopies.
- Stop application if wind is blowing towards waterways.
- Have an extra person monitor the application in appropriate PPE.

Cleanup

- Any leftover mix? Spray it onto any legal site.
- Locate the cleanup site more than 100 feet from wells or other direct channels if possible.
- Use proper PPE according to label.
- Use proper equipment to clean up.
- Use neutralizer when rinsing tank if needed (read the label).
- Triple rinse containers.
- Apply rinsates from cleaned mix/application tank and from triple rinsing containers to sites allowed by the label.

Post-application

- Ensure notification of REI. If label says “Must Post”, ensure that site is posted at all entry/exit points. If label does not require posting, employer may post or provide oral warnings.
- Keep all records required by ODA, the EPA, and the USDA. Make sure all employees know where the records are and that they understand them.
- Recycle clean empty containers.
- Monitor treatment areas after application to see that target pests were controlled, and non-target organisms, sensitive structures, crops, etc were not affected.

Storage

- Order only enough pesticide for each season so no pesticides are stored during the winter.
- Do not store pesticides near fertilizer, animal feed, or livestock bedding.
- Do not store damaged containers.
- Make sure storage site is more than 300 feet from the nearest well.
- Make sure storage site has an impermeable floor, adequate lighting, proper ventilation, and temperature controls.
- Make sure storage facilities are securely locked and posted with correct hazard signs.
- Make sure a major leak could be contained. Construct a berm around the outside perimeter of the floor and / or install a sump.
- Keep records of what is in storage facility. This will be useful in case of theft or fire.



Small Sprayer / Hand Gun Calibration

1. Mark off an area 18.5 feet by 18.5 feet.
2. Adjust the pressure and spray pattern to be what you would use in the field.
3. With water, spray the marked off area while timing yourself.
4. Spray into a container for the same amount of time it took you to spray the marked area.
5. Measure that volume of water in ounces.
6. That number of ounces will be equivalent to the gallons per acre your sprayer is delivering (calibrated rate).

Note:

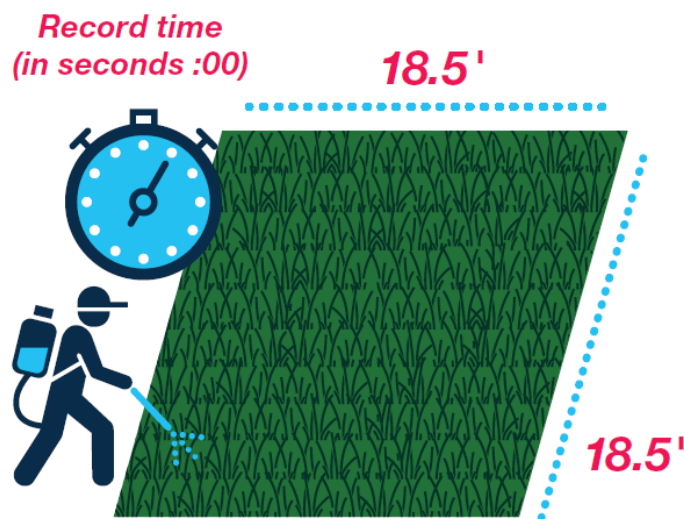
- 18.5 X 18.5 Feet is equivalent to 1/128th acre. There are 128 fluid ounces in one gallon; therefore, every ounce applied to 1/128th of an acre is equivalent to one gallon per acre.
- To determine the amount of chemical to put in your sprayer, use the following formula:

$$\frac{(\text{gallons of solution})}{\text{calibrated rate}} \times (\text{rate of chemical}) = \text{amount of chemical needed}$$

i.e. One 10 gallon backpack sprayer is calibrated at 50 gallons per acre (gpa) and you want to apply Roundup at 2 quarts per acre.

$$\frac{10 \text{ gal}}{50 \text{ gpa}} \times 2 \text{ quarts} = .4 \text{ quarts of Roundup needed}$$

$$32 \text{ fluid ounces per quart} \times .4 \text{ quarts} = 12.8 \text{ fluid ounces needed}$$



Black Henbane (*Hyoscyamus niger*)

Black henbane is a poisonous plant in the nightshade family. Henbane was historically used in combination with other plants to make “magic brews” that have psychoactive properties which include visual hallucinations and a sensation of flight. The plant was also purportedly used as a fumigant for magical purposes, folks would use henbane to invoke the souls of the dead as well as demons. It was also used for witches’ ointments and was used for making weather and conjuring spirits.

Henbane is toxic to grazing animals, deer, fish, many birds, and so forth. Interestingly, pigs are immune to the effects of the toxins and appear to appreciate the inebriating effects of consuming the plant.

Key ID Points

- 1) Shallow lobed leaves that have sticky hairs
- 2) Flowers have purple centers and veins.



<https://upload.wikimedia.org/wikipedia/commons/5/54/Henbane2.jpg>

Black Henbane

Integrated Weed Management:

Controlling plants in the spring or early summer prior to seed production is most effective, follow-up treatments are recommended to pick up missed or late bolting plants. Constant monitoring of site after last adult flowering plant is removed is suggested since seed viability can be up to 5 years.

Cultural:

Cultural controls are possible in theory, but are very time consuming and expensive. Complete removal of any seedlings or newly established plants by continual hand pulling is also possible.

Mechanical:

Hand pull or dig from moist soil, so the entire tap root system can be removed. Tillage will control henbane, but it is not usually recommended due to the land it occupies: rangeland, roadsides, and pastures. Be sure to bag specimens carefully if removed during or after flowering.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Picloram (Tordon) + Surfactant	1 qt/acre+ 1 pt/acre	Apply late bolt to early flower.	No
Aminopyralid (Milestone) + Surfactant	7 oz/acre + 1 pt/acre	Apply late bolt to early flower.	No
Aminopyralid + Rinzcor (Highnoon) + Surfactant	20 oz/acre + 1 pt/acre	Apply late bolt to early flower.	No



Cnet1.cbsistatic.com



nwcb.wa.gov

Common Tansy (*Tanacetum vulgare*)

Common tansy displaces desirable grasses and forbs, affecting livestock grazing and wildlife habitat. The leaves and flowers are toxic if consumed in large quantities; the volatile oil contains toxic compounds including thujone, which can cause convulsions and liver and brain damage. Some insects, notably the tansy beetle *Chrysolina graminis*, have resistance to the toxins and subsist almost exclusively on the plant.

Key ID Points

- 3) Button shaped flower-heads lack petals.
- 4) Foliage is strong smelling when crushed.
- 5) Slender leaflets.



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Common Tansy

Integrated Weed Management:

Preventing the establishment and seed production of the plant is the most effective control method. Combining control methods, mechanical and chemical, will help deplete the storage of essential carbohydrates in the root system and control the plants.

Cultural:

Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing.

Mechanical:

Controls such as hand cutting are most effective in combination with other methods. Tansy regenerates from root fragments, so cultivation could expand the size of an infestation. Common tansy can be mowed just before flowering and seed set to decrease seed production. This method may have to be repeated to eliminate re-growth from the rootstocks.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Chlorsulfuron (Telar) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply to when in the flower bud to flowering growth stages. (late spring to mid-summer)	No
Aminopyralid + Metsulfuron (Opensight) + surfactant	3.3 oz/acre + 1 pt/acre	Apply to when in the flower bud to flowering growth stages.	No



Photos by Bonnie Loving

Common Teasel (*Dipsacus fullonum*)

Common teasel is a highly invasive plant that can choke out desirable native growth and agricultural crops. The plants have stout, 2-foot taproots that anchor them firmly into the soil. A single plant can produce as many as 40 blooms, each of which can produce more than 2,000 seeds. The seeds are easily dispersed by water, birds, animals and humans.

Key ID Points

- 1) Long slender floral bracts extend beyond the top of the flower head.
- 2) Leaves are crinkled and have prickles.
- 3) Stems are stiff and have rows of prickles.



Common Teasel

Integrated Weed Management:

Effective integrated management means using a variety of eradication methods along with restoration, prevention of seed production and dispersal, and monitoring. Maintain robust healthy native landscapes. Restore degraded sites. Avoid soil disturbance. Prevent seed production in the first and second year. Prevent seed from dispersing. Rest sites until restored. Change land use practices.

Cultural:

Maintain or restore a competitive assemblage of forbs, cool and warm season grasses. Implement whole site restoration of soils, plants, and water regimes where stands of Common teasel exist. Use locally adapted species that are ecologically appropriate for the site to improve competitiveness. Incorporate soil amendments, soil microbes and mycorrhizal fungi in restoration efforts. Minimize soil compaction and disturbance, especially in wetlands and moist soil.

Mechanical:

Mechanical methods are best for infestations smaller than 0.5 acres; weigh this against other plants present, ecology and site condition. Sever roots below the soil surface during the first year before the plant stores energy, and in the second year before seed production. Mowing, chopping and deadheading stimulates more flower production; these methods require consecutive years of season-long treatments. Flower heads must be collected, bagged, and disposed of or destroyed; seeds will mature and germinate if left on the ground.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Chlorsulfuron (Telar) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply when in rosette or bolting growth stage. Best choice of herbicide to use in riparian areas.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aquatic Triclopyr (Element 3A or Garlon 3A) + surfactant	1.5 qt/acre + 1 pt/acre	Apply when in rosette or bolting growth stage. Good choice of herbicide to use in riparian areas.	As long as you do not directly spray them.



Cutleaf Teasel (*Dipsacus fullonum*)

Native to Europe, teasel was introduced as early as the 1700s, for both industrial and ornamental purposes. The fabric industry placed teasel on spindles, spinning fabrics across them to raise the nap of fibers. Gardeners planted Cutleaf teasel for its stately form. Flowers and seedheads are used in dried floral arrangements. Cutleaf teasel escaped cultivation and now displaces desirable vegetation. This species can reduce forage, wildlife habitat, and species diversity.

Key ID Points

- 1) Grows over 6 feet tall.
- 2) Leaves at the base are dark green and appear rippled.
- 3) Flowers are purple or white.



Photo Source bloximages.chicago2.vip.townnews.com

Cutleaf Teasel

Integrated Weed Management:

The key to controlling Common teasel is to eliminate seed production and exhaust the seed bank in the soil. Common teasel does not reproduce vegetatively and dies after seed production. Mechanical and chemical control methods can be effective.

Cultural:

Maintain or restore a competitive assemblage of forbs, cool and warm season grasses. Implement whole site restoration of soils, plants, and water regimes where stands of cutleaf teasel exist. Use locally adapted species that are ecologically appropriate for the site to improve competitiveness. Include annual as well as perennial species. Incorporate soil amendments, soil microbes, and mycorrhizal fungi in restoration efforts. Minimize soil compaction and disturbance, especially in wetlands and moist soils.

Mechanical:

Mechanical methods are best for infestations smaller than .5 acres; weigh this against other plants present, ecology, and site condition. Sever roots below the soil surface during the first year before the plant stores energy and in the second year before seed production. Mowing, chopping, and deadheading stimulates more flower production; these methods require consecutive years of season-long treatments. Flower heads must be collected, bagged, and disposed of or destroyed; seeds will mature and germinate if left on the ground. Fire effects are unknown.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Chlorsulfuron (Telar) + surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply when in rosette or bolting growth stage. Best choice of herbicide to use in riparian areas.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aquatic Triclopyr (Element 3A or Garlon 3A) + aquatic labeled surfactant (Induce)	1.5 qt/acre + 1 pt/acre	Apply when in rosette or bolting growth stage. Good choice of herbicide to use in riparian areas.	As long as you do not directly spray them.



Steve Dewey, Utah State University, Bugwood.org

UGA1459703



Joe Boggs, OSU Extension©

Diffuse Knapweed (*Centaurea diffusa*)

Diffuse Knapweed was brought in from Europe (Mediterranean region). It produces toxic chemicals that can inhibit the growth of desired plants and is a highly competitive plant. It has little value as feed for livestock, as its thistles can damage the mouth and digestive tract of animals that attempt to feed on it. A study in 1973 concluded that ranches lost approximately US\$20/km² (8 cents per acre) of diffuse knapweed due to decreased grazing area. In an agricultural setting, it can greatly reduce crop yield and purity.

Key ID Points

- 4) Floral bracts have yellow spines with teeth appearing as a comb and a distinct terminal spine.
- 5) Flowers are white or lavender.
- 6) Seedlings have finely divided leaves.



Diffuse Knapweed

Integrated Weed Management:

Diffuse knapweed is best controlled in the rosette stage. It is imperative to prevent seed production. Do not allow diffuse knapweed flowers to appear. Management must be persistent in order to deplete the seed bank in the soil.

Cultural:

Establishment of selected grasses can be an effective cultural control of diffuse knapweed. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

Mechanical:

Any mechanical or physical method that severs the root below the soil surface will kill diffuse knapweed. Mowing or chopping is most effective when diffuse knapweed plants are at full-bloom. Be sure to properly dispose of the flowering cut plants, since seeds can mature and become viable after the plant has been cut down.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Spring at rosette to early bolt stage and/or in the fall to rosettes.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Clopyralid (Transline or Curtail) + Surfactant	Refer to label	Apply to spring / fall rosettes before flowering stalk lengthens.	Yes
Picloram (Tordon) *Restricted + Surfactant	1 qt / acre + 1 pt/acre	Spring just after full-bloom and / or fall. (Add 1 pint of 2,4-d for added control.	No



UGA1350078



UGA1350046

Leafy Spurge (*Euphorbia esula*)

Leafy spurge displaces native vegetation in prairie habitats and fields through shading and by usurping available water and nutrients and through plant toxins that prevent the growth of other plants underneath it. Leafy spurge is an aggressive invader and, once present, can completely overtake large areas of open land.

Leafy spurge's seed capsules open explosively, dispersing seed up to 15 feet from the parent plant and may be carried further by water and wildlife. Leafy spurge also spreads vegetatively at a rate of several feet per year. The root system is complex, can reach 15 or more feet into the ground, and may have numerous buds.

Leafy spurge produces a milky latex that is poisonous to some animals and can cause blistering and irritation on skin. The digestive tract is similarly affected when this plant is eaten by humans and some animals. In cattle it causes scours and weakness. When ingested in larger amounts it can cause death. Cattle usually refuse to eat leafy spurge unless it is given to them in dry, weedy hay or when better forage is not available.

Key ID Points

- 1) Flowers are yellowish-green and have a pair of heart shaped bracts below each inconspicuous flower.
- 2) The entire plant contains white, milky latex.



Photo by Bonnie Loving

Leafy Spurge

Integrated Weed Management

Persistent monitoring of areas with known or potential infestations is crucial to managing Leafy spurge. A combination of management methods in a long-term management plan is imperative. The management objective is to exhaust the root system and deplete the soil seed bank.

Cultural

Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

Mechanical

Due to the extensive root system, hand-pulling this plant is not a viable option. Mowing will reduce seed production if repeated every 2-4 weeks during the growing season, but will provide little long-term control.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Quinclorac (Paramount) + sodium salt (Overdrive) + Dichlorophenoxyacetic acid (2,4-D) + Surfactant	8-16 oz/acre + 4-8 oz/acre + 2-4 pt/acre + 1 pt/acre	Spring just after full-bloom and / or fall.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aminopyralid + Rinzcor (Highnoon) + Surfactant	20 oz/acre + 1 pt/acre	Spring just after full-bloom and / or fall.	No
Picloram (Tordon) *Restricted + Surfactant	1 qt / acre + 1 pt/acre	Spring just after full-bloom and / or fall.	No



Photos by Bonnie Loving

Mayweed Chamomile (*Anthemis cotula*)

Mayweed chamomile is able to invade cultivated fields and prevent the harvest of small grains. Its spread can go unnoticed due to its similarity to *Anthemis arvensis* (corn chamomile, dog fennel or mayweed) another common weed. It may also spread as a seed contaminant.

Key ID Points:

- 1.) Bushy mature plants are .5 to 2 feet tall.
- 2.) Leaves have foul smell and are divided several times into narrow segments.
- 3.) White ray flowers.



Mayweed Chamomile

Integrated Weed Management:

Prevent new infestations by minimizing disturbance and seed dispersal. The key is to eliminate seed production to decrease the spread and continue to deplete the seed bank for 4 to 6 years. To help reduce an infestation reseed with perennial grasses for several years.

Cultural:

Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing.

Mechanical:

Frequent, shallow tillage can help exhaust the seed bank in non-native areas. Mowing is not an effective long-term control method due to the fact the plant will prostrate, in the short-term mowing will assist with limiting seed production. Hand pulling can prevent spread into new areas and is effective on small infestations.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Application Timing	Safe around trees?
Aminopyralid (Milestone) + Chlorsulfuron (Telar) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply when plant is in rosette to bolting growth stage. (Early spring to early summer, sometimes fall rosettes.)	No
Aminopyralid (Milestone) + Metsulfuron (Escort) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply when plant is in rosette to bolting growth stage. (Early spring to early summer, sometimes fall rosettes.)	No



Photo by wildflowerfinder.org.uk



© George F. Russell

Mediterranean Sage (*Salvia aethiopis*)

Mediterranean sage has spread over 1.3 million acres in the western United States with new infestations occurring each year. It is unpalatable to livestock, but is not considered toxic. This plant is native to Europe and may have been introduced in contaminated alfalfa seed.

Key ID Points:

- 4.) Leaves have a pungent odor when crushed.
- 5.) Leaves are very hairy.
- 6.) White to yellowish-white flower clusters.



Mediterranean Sage

Integrated Weed Management:

Since Mediterranean sage reproduces solely by seed, it is imperative to prevent seeds from producing as well as depleting the soil seed bank. Combining mechanical and herbicide treatments to rosettes or bolting plants can be very effective. If flowering, mechanically remove plants and bag them. Survey properties on the perimeter of known infestations to detect new infestations early.

Cultural:

Preventing overgrazing and promoting healthy plant communities is crucial. Disturbed, bare ground areas are prime habitat for weed invasions. Contact your local Natural Resource Conservation District for seed mix recommendations for your area.

Mechanical:

Hand pull or shovel when soil is moist. Make certain to pull up all the roots or sever at least 2 to 3 inches of taproot with a shovel. Shake excess soil from specimens and turn over to dry out. Bag specimens carefully so as to not scatter seeds if flowering.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Application Timing	Safe around trees?
Aminopyralid (Milestone) + Metsulfuron (Escort) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply in spring during rosette to bolting growth stages.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Picloram (Tordon) + Chlorsulfuron (Telar) + Surfactant	1 qt/acre + 1 oz/acre + 1 pt/acre	Apply in spring during rosette to bolting growth stages	No



Photo by Bonnie Loving



Myrtle Spurge (*Euphorbia myrsinites*)

Myrtle spurge is an escaped ornamental that quickly crowds out native plants. It is also known as donkeytail, blue, or creeping spurge. All parts of the plant contain a poisonous milky sap that can cause serious skin irritation.

Key ID Points

- 1) Low growing plant with blue-green waxy leaves.
- 2) Flowers are yellow-green petal like bracts that appear from March to May.



Photo by Bonnie Loving

Myrtle Spurge

Integrated Weed Management

Since Myrtle spurge spreads mainly by seed, it is very important to prevent seed production and deplete the seed bank. Remove mature plants prior to setting seed and seedlings whenever present.

Cultural

Keeping desirable vegetation healthy and thick will help keep invaders out. Prevent the establishment of new infestations by minimizing disturbance and seed dispersal. Survey your land regularly to detect new invaders and eradicate any new populations quickly.

Mechanical

Hand pull or dig when soil is moist. Make certain to pull all the roots and wear rubber gloves and eye protection to protect yourself from the toxic milky sap. Treatment follow up is important to check root fragment resprouts that will occur when the tap root is severed too shallow.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Application Timing	Safe around trees?
Dicamba + Dichlorophenoxyacetic acid (2,4-D amine) + Surfactant	1 pt/acre + 2-3 pt/acre + 1 pt/acre	Apply during spring or during fall regrowth.	No
Picloram (Tordon) *Restricted + Dichlorophenoxyacetic acid (2,4-D amine) + Surfactant	20 oz/acre + 2-3 pt/acre + 1 pt/acre	Apply at flowering growth stage during spring or to fall regrowth.	No
Dichlorophenoxyacetic acid (Hardball) + Surfactant	4-8 pt/acre+ 1 pt/acre	Apply at flowering growth stage during spring or to fall regrowth.	yes



Photo Source: worldofsucculents.com

Scentless Chamomile (*Matricaria perfoata*)

The plant is native to Europe and was likely introduced to North America in the 1930's as an ornamental or crop-seed contaminate. Scentless Chamomile is not competitive in healthy perennial plant communities. However, it quickly colonizes disturbed sites and can reduce establishment of desirable native vegetation. Although most grazing animals avoid the plant, it has been observed to cause blistering on livestock muzzles and irritation to mucous membranes.

Key ID Points

- 1) Flowers have a yellow centered disk surrounded by white petals.
- 2) Leaves are alternate, finely divided, and odorless when crushed.



Photo by Bonnie Loving

Scentless Chamomile

Integrated Management:

A combination of tillage, herbicide and competitive cropping can be very effective in managing Scentless chamomile. The goal is to prevent seed production and crowd out infestations through crop competition.

Cultural:

Any practice that aids in the establishment of the forage, such as seeding good forage seed shallowly into a firm, moist seedbed, will help in reducing Scentless chamomile growth. Contact your local Natural Resources Conservation Service for seed mix recommendations. Bareground is prime habitat for weed invasions, so maintain healthy pastures and prevent bare spots caused by overgrazing.

Mechanical:

Frequent, shallow tillage can help exhaust the seed bank in non-native areas. Mowing is not an effective long-term control method due to the fact the plant will prostrate, in the short-term mowing will assist with limiting seed production. Hand pulling can prevent spread into new areas and is effective on small infestations.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Chlorsulfuron (Telar) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply when plant is in rosette to bolting growth stage. (Early spring to early summer, sometimes fall rosettes)	No
Aminopyralid (Milestone) + Metsulfuron (Escort XP) + Surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply when plant is in rosette growth stage. (Early spring to early summer, sometimes fall rosettes).	No



Photo property of the Government of Manitoba



Photo Source: newfs.s3.amazonaws.com

Spotted Knapweed (*Centaurea maculosa*)

This invasive plant prefers sunny, well-drained soils. It is often found in heavily disturbed sites, such as roadsides, gravel pits, and edges of agricultural fields, but it moves from those areas into undisturbed pastures, dry prairies, oak and pine woodlands, and rangeland. In a few years it can overtake and replace pasture grasses, native plants, and even other aggressive weeds. When spotted knapweed replaces native grasses, soil erosion and surface runoff are increased depleting precious soil resources. A 1996 study estimated the direct plus secondary economic impact of spotted knapweed in Montana to be approximately \$42 million annually.

Key ID Points

- 3) Floral bracts have black tips, with comb-like spines of equal length.
- 4) Flowers are pink to purple, rarely white.
- 5) Basal and stem leaves are deeply lobed, but become simple and oblong towards the tips of the stem.



Photo by Bonnie Loving

Spotted Knapweed

Integrated Management:

Spotted knapweed is best controlled at the rosette stage with mechanical or chemical techniques in the spring and fall. A key goal is to prevent seed production. Management must be intense and persistent in order to deplete the seed bank in the soil

Cultural:

Bareground is prime habitat for weed invasions. Maintaining healthy pastures and forests, while minimizing disturbance and overgrazing, is crucial. Contact your local Natural Resources Conservation Service for seed mix recommendations.

Mechanical:

Dig when the soil is moist; remove the root crown, 2-4 inches of taproot, and lateral roots. Digging alone requires several years of multiple treatments within a growing season. Mowing spotted knapweed when flower buds or early flowers are present will stress the plant, but not kill it. Do not mow after seed-set because it can disperse the seeds. Annual cultivation can eliminate spotted knapweed.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Spring at rosette to early bolt stage and/or in the fall to rosettes.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Clopyralid (Transline) + Surfactant	1 pt/acre + 1 pt/acre	Apply to spring / fall rosettes before flowering stalk lengthens.	Yes
Picloram (Tordon) *Restricted + Surfactant	1 qt / acre + 1 pt/acre	Spring just after full-bloom and / or fall. (Add 1 pint of 2,4-d for added control.	No



Yellow Starthistle (*Centaurea solstitialis*)

The Yellow star-thistle plant has the ability to create monotypic stands and habitats in the cultivated soil of fields, graded dirt sites, and disturbed natural ecosystem lands. Its colonization eliminates and prevents other plant species from growing, terminating the habitat's biodiversity. Extensive spreading monotypic fields of yellow starthistle are not uncommon. Its growth plasticity, competitiveness, preference for the Mediterranean climate, and a lack of natural herbivore enemies and co-evolved species, make it a very successful invader. The plant is an invasive pest in field crops, degrades native plant habitats and natural ecosystems, prevents the grazing of domestic animals in rangelands, and is a physical barrier to indigenous animal movement in wildlands.

Grazing of the plant by horses can cause nigropallidal encephalomalacia or "chewing disease", a neurological condition. The disease generally follows consumption of 60-200% of the horse's body weight over an extended period of a month or more, or 2.3-2.6 kg of starthistle per 100 kg body weight per day. Though starthistle is most dangerous when it is the only plant available or is delivered as a contaminant in dried hay, horses may develop a taste for it and seek it out. Many other species of grazers, including mules and burros, are not affected.

Key ID Points:

- 1) Bright yellow ray and disk flowers.
- 2) Winged stems.
- 3) Stiff spines at flower base.
- 4) Plant has a unique blue-green color.



Yellow Starthistle

Integrated Weed Management:

The sheer number of seeds, high seed viability, and fast growth of Yellow starthistle requires a persistent control program. Using herbicides and mechanical techniques to control the invasion followed by establishing a desirable plant community can be effective.

Cultural:

Following initial control, establishment of select grasses can be an effective cultural control of Yellow starthistle. Contact your local Natural Resources Conservation Service for seed mix recommendations. Bareground is prime habitat for weed invasions, so maintain healthy pastures and prevent bare spots caused by overgrazing.

Mechanical:

Hand pull when soil is moist and make certain to pull all the roots. Bag specimens carefully so as to not scatter seeds if lowering. Plants vary greatly in size so be sure to look for plants that are only a few inches tall, as well as plants that are several feet tall. Include dried skeletons that may still contain seed. Mowing is not advisable and may extend life of the plant and stimulate additional flowering.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Apply during rosette growth and bolting growth stages. (Early spring to early summer).	No
Clopyralid (Transline) + Surfactant	20 oz/acre + 1 pt/acre	Apply during rosette growth and bolting growth stages. (Early spring to early summer).	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aminocyclopyrachlor (Method) + Surfactant	4-8 oz/acre + 1 pt/acre	Apply during rosette growth and bolting growth stage; most effective at the seedling to the rosette stages.	No
Chlorsulfuron (Telar) + Picloram (Tordon) + Surfactant	1 oz/acre + 1 qt/acre + 1 pt/acre	Apply during rosette growth and bolting growth stages. (Early spring to early summer).	No



Yellow Toadflax (*Linaria vularis*)

Yellow toadflax is an escaped ornamental brought to this country in the mid-1800's. It was used as a yellow dye for centuries in Germany, so immigrants, especially the Mennonites, cultivated it for use in dyeing. Yellow toadflax contains a poisonous glucoside that may be mildly toxic to livestock, it is a particular problem in rangeland (although it is also unpalatable, so reports of livestock poisoning are rare). It is typically found in open, disturbed sites such as roadsides and waste areas or in fields, pastures, edges of forests and rangeland, where it can displace desirable grasses.

Key ID Points:

- 5) Yellow flowers that are like snapdragons with deep orange centers.
- 6) Stems are woody at the base and smooth to the top.



Photo by Bonnie Loving

Yellow Toadflax

Integrated Weed Management:

Because of the high genetic variability of the toadflax species it is critical to integrate as many management strategies as possible into the control program. Two local populations may respond differently to the same herbicides.

Cultural:

Establish select grasses and forbs as an effective cultural control of Yellow toadflax. Bareground is prime habitat for weed invasions, so maintain healthy pastures and prevent bare spots caused by overgrazing.

Biological:

Calophasia lunula, a predatory noctuid moth, feeds on leaves and flowers of Yellow toadflax. Eteobalea intermediella, a root boring moth and Mecinus janthinus a stem boring weevil are also available. For more information contact the Colorado Department of Agriculture's Insectary in Palisade, Colorado at 970-464-7916.

Mechanical:

Hand pulling or digging is not recommended for eradication of Yellow toadflax because it's unlikely that the entire root will be excavated and a new plant is likely to occur. A single new plant might be an exception. Tillage is not recommended due to the creeping root system.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Picloram (Tordon) *Restricted + Metsulfuron (Escort XP) + Surfactant	1 qt/acre + 1 oz/acre + 1 pt/acre	Apply during pre-bloom to flower stage in spring.	no
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aminocyclopyrachlor (Method) + Surfactant	4-8 oz/acre + 1 pt/acre	Apply during rosette growth and bolting growth stage; most effective at the seedling to the rosette stages.	No
Picloram (Tordon) *Restricted + Chlorsulfuron (Telar) + Surfactant	1 qt/acre + 1 oz/acre + 1 pt/acre	Apply at flower stage in spring and / or in the fall.	No



Bull Thistle (*Cirsium vulgare*)

Bull thistle is a biennial forb that was introduced to North America as a seed contaminant and is now widespread. Heavy infestations reduce livestock forage. The presence of bull thistle in hay decreases the forage value and lowers the market price. It is an aggressive weed, but it will not withstand cultivation. Bull thistle is often a transient species, appearing in recently disturbed areas and becoming a dominant species for several years if left untreated. It can cause hay fever in some individuals.

Key ID Points

- 1) Leaves are prickly-hairy above and cottony below.
- 2) Heads are cobwebby-pubescent.
- 3) Flowers are composite and purple.



Photo Source: nswilds.weebly.com

Bull Thistle

Integrated Weed Management:

Prevention is the most effective control with Bull thistle, maintaining healthy pastures and rangeland and continually monitor your property for new infestations.

As with most biennials, limiting seed production is another key to controlling plant populations. Chemical and mechanical options to control Bull thistle are also effective.

Cultural:

Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing.

Biological:

Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

Mechanical:

Because biennial thistles do not reproduce from their roots, any mechanical or physical method that severs the root below the soil surface will kill the weed. It is necessary to revegetate the site with desirable plants. Tillage, hoeing, or even hand-pulling should be successful, providing it is done before the reproductive growth stages.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Spring and/or fall to rosette stage	No
Clopyralid (Curtail) + Surfactant	2 qts / acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Clopyralid (Transline) + Surfactant	2/3 – 1 1/3 pt/acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes



Photo by Bonnie Loving

Canada Thistle (*Cirsium arvense*)

Canada thistle is one of the most troublesome noxious weeds in the U.S. It can infest diverse land types, ranging from roadsides, ditch banks, riparian zones, meadows, pastures, irrigated cropland, to the most productive dryland cropland. Large infestations significantly reduce crop and cattle forage production and native plant species. It is a host plant to several agricultural pests and diseases. Canada thistle prefers moist soils, but it can be found in a variety of soil types. It has been found at elevations up to 12,000 feet.

Key ID Points

- 1) Cluster of 1-5 white to purple flowers on a stem.
- 2) Floral bracts are spineless.
- 3) Small flowers that are 1 cm in diameter.
- 4) Perennial, rhizomatous plant with spiny, oblong, green leaves.



Photo by Bonnie Loving

Canada Thistle

Integrated Weed Management

Integrated weed management is imperative for effective Canada thistle control. This weed needs to be continually stressed, forcing it to exhaust root nutrient stores, and eventually die. Mowing or grazing can be followed up with herbicide application. Avoid hand-pulling and tilling which can stimulate the growth of new plants.

Cultural:

Prevention is the best control strategy. Maintain healthy pastures, riparian areas, and rangelands. Prevent bare ground caused by overgrazing, and continually monitor your property for new infestations. Establishment of select grasses can be an effective control.

Biological:

Cattle, goats, and sheep will graze on Canada thistle when plants are young and succulent in the spring. Follow up grazing with a fall herbicide application. Insects are available, and provide limited control. Currently, collection and distribution methods for Canada thistle rust (*Puccinia punctiformis*) are being refined. For more information on Canada thistle biocontrol, contact the Colorado Department of Agriculture – Palisade Insectary at (970)464-7916.

Mechanical:

Due to Canada thistle's extensive root system, hand-pulling and tilling create root fragments and stimulate the growth of new plants. Mowing can be effective if done every 10-21 days throughout the growing season. Combining mowing with herbicides will further enhance Canada thistle control.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Apply in spring until flowering and/or to fall regrowth.	No
Chlorsulfuron (Telar) + Dichlorophenoxyacetic acid (2,4-D amine) + surfactant	1-1.5 oz/acre + 2-3 pt/acre + 1 pt/acre	Apply in spring until flowering and/or to fall regrowth.	Yes
Clopyralid (Curtail) + Surfactant	2 qts / acre + 1 pt/acre	Apply in spring until flowering and/or to fall regrowth.	Yes
Clopyralid (Transline) + Surfactant	2/3 – 1 1/3 pt/acre + 1 pt/acre	Apply in spring until flowering and/or to fall regrowth.	Yes



Photos by Bonnie Loving

Dalmatian Toadflax (*Linaria dalmatica*)

Dalmatian toadflax is a highly aggressive plant that can genetically adapt to varied environmental conditions and herbicide controls. Its extreme competitiveness is due to early spring regeneration from vegetative buds on roots that are not dependent on soil moisture or native plant competition. Once established, toadflax quickly overruns native plants and becomes a monoculture that severely reduces forage, productivity, biodiversity and wildlife habitat. A single plant produces 500,000 seeds.

Key ID Points:

- 1) Showy yellow snapdragon-like flowers with an orange throat on elongated racemes.
- 2) Thick, waxy, blueish heart-shaped leaves that wrap the stem.



Photo by Bonnie Loving

Dalmatian Toadflax

Integrated Weed Management:

Because of the high genetic variability of the toadflax species, it is critical to integrate as many management strategies as possible into the control program. Two local populations may respond differently to the same herbicides.

Cultural:

It is imperative to seed managed areas with competitive grasses such as thick spike wheatgrass and streambank wheatgrass. The combination of herbicide spraying and seeding competitive grasses controls Dalmatian toadflax better than spraying alone.

Biological:

Calophasia lunula, a predatory noctuid moth, feeds on leaves and flowers of Dalmatian toadflax. Eteobalea intermediella, a root boring moth, and Mecinus janthinus, a stem boring weevil, are also available. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

Mechanical:

For small infestations, pulling toadflax by hand can be effective. Pull every year for 5 to 6 years to deplete the reserves of the root system. Monitor the site for 10-15 years to remove seedlings produced from dormant seeds.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aminocyclopyrachlor (Method) + Surfactant	4-8 oz/acre + 1 pt/acre	Apply during rosette growth and bolting growth stage; most effective at the seedling to the rosette stages.	No
Picloram (Tordon) *Restricted + Chlorsulfuron (Telar) + Surfactant	1 qt/acre + 1 oz/acre + 1 pt/acre	Apply at flower stage in spring and / or in the fall.	No



Photos by Bonnie Loving

Eurasian Watermilfoil (*Myriophyllum spicatum*)

Eurasian watermilfoil, *Myriophyllum spicatum* L., is a perennial highly invasive aquatic species. This species is native to Northern Europe and Asia, it is cold-water adapted and over-winters in Colorado. It also has the advantage of green-up and growth in the spring earlier than native aquatic species, allowing it to outcompete natives for sun and space.

Key ID Points

- 1) 12 or more leaflet pairs are present.
- 2) Turions are absent.
- 3) Male flower bracts are entire.
- 4) Delicate stems, leaves, and leaflets.



Eurasian Watermilfoil

Integrated Weed Management:

Effective integrated management means using a variety of eradication methods along with restoration, prevention of dispersal, and monitoring. Maintain healthy native waters. Prevent vegetative fragmentation and dispersal, such as on boats, swimming attire, equipment, etc. Infested water bodies can become very dangerous to humans, clog water infrastructure and equipment. Use methods appropriate for the site and with a full understanding of the species' biology.

Cultural:

Cultural methods, such as seeding, revegetation, fertilization, and irrigation are not applicable to aquatic environments such as lakes, rivers, and streams. There are no known cultural control methods that would be effective against Eurasian watermilfoil, especially since this species hybridizes with native watermilfoil species.

Biological:

There are known biological control agents for Eurasian watermilfoil that were considered elsewhere in the USA, but issues preclude their use. For instance, grass carp, is not host specific and feeds on native watermilfoils. The fungus, *Mycoleptodiscus terrestris*, is difficult to obtain. A weevil, *Euhrychiopsis lecontei*, is a native species that is not host specific and feeds on native watermilfoils. There are no known host specific biological control agents available or authorized in Colorado.

Mechanical:

Use of mechanical methods such as cutting, hand pulling, raking, harvesting come with a high risk of spreading infestations since Eurasian watermilfoil fragments and roots easily. Such methods should be used only in closed systems, such as ponds, with no outlet, or in limited situations. If this method is used, all plant fragments need to be removed and dried. Equipment needs to be thoroughly cleaned and dried before its used in another water body. Physical water level manipulation that allow roots to freeze or plants to dry out for several weeks can be effective. Burn, compost, or bag and throw away plants.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing
2,4-D (aqua-kleen, navigate, DMA 4 IVM)	Determined by herbicide concentration within the water column	Actively growing plants or manufactures specified recommendations.
Fluridone (sonar or Avast)	Determined by herbicide concentration within the water column.	Actively growing plants or manufactures specified recommendations.



Photo Source: www.outdooralabama.com



Photo Source: 2bp.blogspot.com

Halogeton (*Halogeton glomeratus*)

Halogeton is an annual forb native to Asia. Habitats for Halogeton include roadsides, trails, areas where animals congregate, overgrazed sites, and is ideally adapted to the high desert/alkaline soils. The plant can be toxic to grazing animals and at times it is readily grazed by animals. Sheep seem to be most affected by the toxic oxalates, cows can also be affected.

Key ID Points

- 5) Blueish-green color in the spring and reddish-yellow in late summer.
- 6) Fleshy tubular leaves.



Halogeton

Integrated Weed Management:

Using cultural and herbicide treatments in combination can help control Halogeton populations. Halogeton does not outcompete native vegetation, so maintaining healthy plant populations and revegetating areas that have been disturbed, proves to be the most economical method of treatment.

Cultural:

Outcompeting Halogeton proves to be the most economical treatment method. Planting desirable grasses and forbs on disturbed sites, and where Halogeton populations are established, will help control populations. Contact your local Natural Resources Conservation Service for seed mix recommendations.

Biological:

There is no biological control available for Halogeton.

Mechanical:

Hand pull or dig when soil is moist, but make sure to wear gloves. Bag specimens carefully so as not to scatter seeds. The key to effective control is to prevent seed production and/or spread.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Chlorsulfuron (Telar) + Surfactant	1 oz / acre + 1 pt/acre	Apply pre-emergence to post-emergence stages in spring.	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Aminocyclopyrachlor (Method) + Surfactant	3.3 oz/acre + 1 pt/acre	Apply pre-emergence to post-emergence stages in spring.	No



Photo Source Unknown

Hoary Cress – Whitetop (*Cardaria draba*)

Hoary cress was introduced from southwestern Asia. Introductions likely occurred multiple times in shipments of contaminated alfalfa seed from Turkistan into North America over a period of 40-50 years. Hoary cress is a highly competitive plant forming a monoculture, and once established, it easily displaces native vegetation. It has the potential to reduce the value of high-price wheat lands.

Key ID Points

- 7) White flowers.
- 8) Grows erect 10- 24 inches in height.
- 9) Leaf is $\frac{3}{4}$ - 4 inches long with blunt end and fine white hairs.



Photo by Bonnie Loving

Hoary Cress

Integrated Weed Management:

No single treatment provides effective, long term control. The best and first defense is always prevention. Once established, integrate a variety of combinations of competitive planting, crop rotations, and herbicides. This can reduce Hoary cress to manageable levels.

Cultural:

Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Planting competitive legumes, such as alfalfa, can reduce Hoary cress in crop rotations.

Biological:

There is no biological control available for Hoary cress.

Mechanical:

Mowing several times before the plants bolt stresses the Hoary cress and forces the plant to use nutrient reserves stored in the root system. Combining mowing with herbicides will further enhance control of this weed. Mow repeatedly during the summer, then apply a herbicide in the fall.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Metsulfuron (Escort XP) + Surfactant	1 oz/acre 1 pt/acre	Apply at early bud growth stage.	yes
Chlorsulfuron (Telar) + Surfactant	2 oz/acre 1 pt/acre	Apply at early bud growth stage.	yes
Fluroxypyr (Trumpcard) + Metsulfuron (Escort XP) + Surfactant	1 qt / acre 1 oz/acre 1 pt/acre	Apply at early bud growth stage.	Yes as long as you do not spray the trees directly.



Photo by Bonnie Loving

Houndstongue (*Cynoglossum officinale*)

Houndstongue is a toxic biennial plant introduced from Europe, likely as a contaminant in cereal seed. Like other members of the Borage family, houndstongue is rough in texture and produces flowers in long, coiled stalks. In addition to poisoning animals who ingest it, houndstongue also produces prolific amounts of irritating bur-like seeds that cling to animals and clothing like Velcro. Houndstongue contains toxic pyrrolizidine alkaloids, which cause liver cells to stop reproducing. Animals may survive for six months or longer after they have consumed a lethal amount before succumbing. Sheep are more resistant to houndstongue poisoning than are cattle and horses. Horses may be especially affected when confined in a small infested area lacking good forage. Houndstongue remains toxic when dry, and cattle and horses have died in the U.S. from eating hay contaminated with houndstongue.

Key ID Points

- 1) Panicles of reddish-purple flowers with 5 petals and 5 soft, hairy sepals.
- 2) Velcro-like seeds with 4 nutlets.



Photo by Bonnie Loving

Houndstongue

Integrated Weed Management:

Prevention is the best option when dealing with Houndstongue. Use only certified weed-free hay. If an infestation does occur, reducing the seed production is key in controlling Houndstongue. Chemical, mechanical, and the developing biological controls can also be effective management techniques.

Cultural:

Prevent the establishment of new infestations by minimizing disturbance and seed dispersal, eliminating seed production and maintaining healthy native communities. Contact your local Natural Resources Conservation Service for seed mix recommendations. Planting competitive legumes, such as alfalfa, can reduce Hoary cress in crop rotations

Biological:

A root weevil, *Mogulones cruciger*, has been successful in Canada and introduced in Montana, but has not yet been approved for use in Colorado. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

Mechanical:

Cut or pull plants, and remove entire root crown when plants are in the rosette stage. Remove dense litter layer to stimulate germination of desired plants. To reduce seed production, mow or cut flowering stems before seed nutlets develop, this can significantly reduce seed production.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Metsulfuron (Escort XP) + surfactant	7 oz/acre + 1 oz/acre + 1 pt/acre	Apply in spring rosette to early bud growth stages.	No
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Apply in the fall. Controls seeds only. Recommended to add to your post emergent herbicide.	Yes
Picloram (Tordon) *Restricted + Surfactant	1 qt/acre + 1 pt/acre	Apply in spring rosette to early bud growth stages.	No



Photos by Bonnie Loving

Jointed Goatgrass (*Aegilops cylindrical*)

Jointed goatgrass is a winter annual grass seed native to Southern Europe and Russia. Jointed goatgrass can reduce the yield of winter wheat by 25 – 50% which can cost US farmers up to \$145 million. Another problem is that winter wheat provides an overwinter home for winter wheat attacking pests such as Russian wheat aphid, leaf spot, pink mold, foot rot, dwarf bunt, froon, root browning, damping off, and kernel bunt. When the spikes shatter, the disjointed spikelets are cylindrical in shape and are easily mistaken for small pieces of winter wheat straw. Since the spikelets are similar in shape and size to winter wheat seeds, it is difficult to separate them from the wheat using conventional methods.

Key ID Points

- 1) Stiff short hairs evenly spaced on the margins of leaf blades.
- 2) Evenly spaced hairs are on auricles, leaf sheath and ligules.
- 3) Spikelets fit in a zig-zag pattern in a cylindrical shape.



Photo by Bonnie Loving

Jointed Goatgrass

Integrated Weed Management:

Preventing the establishment and the spread of existing plant populations. Depending where infestations of Jointed goatgrass are found an integrated management approach can be an effective control option. Combining cultural, chemical, and mechanical control methods will provide effective control.

Cultural:

Depending on where it is found, there are ways to control infestations using cultural methods. If found in pastures or CRP, plant competitive native grasses or forbs. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes. If found in crops, rotate fields to spring grown crops.

Biological:

Currently there is not any biocontrol available for jointed goatgrass.

Mechanical:

Tillage can be effective, when plants are in the seedling stage, and crops have not been planted. Otherwise, the main goal of preventing the establishment of large infestations is to prevent seed production and/or spread.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Glyphosate (Roundup) + Surfactant	22 oz/acre + 1 pt/acre	Apply before first spikelets begin to emerge from the boot.	Yes
Imazapic (Plateau) + Surfactant	4 – 6 oz/acre + 1 pt/acre	Apply pre-emergence, late summer in this case, and in early stages of growth before spikelets.	Yes
Indaziflam (Esplanade or Rejuvra)	7oz/acre	Controls seeds only. Use with your post emergent herbicide.	Yes



Musk Thistle (*Carduus nutans*)

Musk thistle *Carduus nutans* L. is a non-native biennial forb that reproduces solely by seed. During the first year of growth, a rosette forms in spring or fall. During the second year in mid to late spring, the stem bolts, flowers, sets seed, and the plant dies.

Key ID Points

- 1) Broad, spine-tipped bracts located under the flower.
- 2) Flowering heads are terminal, solitary, and usually nodding.
- 3) Grows up to 6 feet tall



Photo by Bonnie Loving

Musk Thistle

Integrated Weed Management

The key to managing Musk thistle is to prevent seed production. Dense Musk thistle stands can be treated by spot use of herbicides and by a persistent mechanical program. Due to the long seed viability of Musk thistle, up to 10 years, control methods may have to be repeated for many years to completely eliminate an infestation.

Cultural:

Establishment of selected grasses can be an effective cultural control of Musk thistle. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

Biological:

Livestock tend to avoid grazing on Musk thistle, although horses and cattle have been known to eat the flowerheads. Biological control insects, such as the seed head weevil and the crown weevil are effective on large infestations. When used together these insects provide fair to good control. Contact the Insectary, Colorado Department of Agriculture to get complete information at 970-464-7016.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Spring and/or fall to rosette stage	No
Clpyralid (Curtail) + Surfactant	2 qts / acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Clpyralid (Transline) + Surfactant	2/3 – 1 1/3 pt/acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Controls seeds only. Use with your post emergent herbicide.	yes



Photos by Bonnie Loving

Oxeye Daisy (*Chrysanthemum leucanthemum*)

Oxeye daisy was introduced from Europe as a seed contaminant and as an ornamental. Oxeye daisy is a strong competitor. It forms dense stands that reduce native plant diversity. It degrades pastures and natural areas because cattle and wildlife avoid feeding on oxeye daisy. Heavy infestations may reduce nutrient cycling due to a shallow root system and create areas of bare soil, thus increasing soil erosion.

Key ID Points:

- 1) 15-30 white ray flowers on flowerheads that are 1-3 inches in diameter.
- 2) Rosette and lower leaves are spoon-shaped and toothed.
- 3) Upper leaves on the stem are narrow, toothed, and clasp the stem.



Photo by Bonnie Loving

Oxeye Daisy

Integrated Weed Management:

Oxeye daisy has been included in many different seed mixes, thus consumers should carefully read the label prior to planting so-called “native wildflower” mixes. Repeated hand pulling can eliminate small infestations. Mowing or grazing by sheep or goats can be effective, in addition with a chemical approach.

Cultural:

Generate awareness for this noxious weed. Carefully inspect “wildflower” seed mixes; do not plant mixes that include *Leucanthemum vulgare*. Avoid overgrazing, disturbance, and seed dispersal. Bare ground is prime habitat for weed invasions. Tall perennial grasses that shade oxeye daisy are good competitors.

Mechanical:

Repeated hand pulling or digging when soil is moist and infestations are small. Oxeye daisy is fairly shallow rooted; pull up as much of the root as possible. If removed during or after flowering, bag specimens carefully as to not scatter seeds. Mowing before flowering or when flower buds are present can limit dispersal; do not mow during or after flowering. Tilling at 6 inches or deeper, and repeated shallowly as necessary, can control patches.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Chlorsulfuron (Telar) + 2,4-D amine + Surfactant	2 oz/acre + 2-3 pt/acre + 1 pt/acre	Apply at flowering growth stage.	Yes
Clpyralid (Transline) + 2,4-D amine + Metsulfuron (Escort XP) + Surfactant	1 pt/acre + 2-3 pt/acre + 1 qt/acre + 1 pt/acre	Apply at flowering growth stage.	Yes
Aminopyralid (Milestone) + 2,4-D amine + Metsulfuron (Escort XP) + Surfactant	7 oz/acre + 2-3 pt/acre + 1 qt/acre + 1 pt/acre	Apply at flowering growth stage	No



Perennial Pepperweed (*Lepidium latifolium*)

Perennial pepperweed is an extremely invasive perennial forb introduced from Europe and Asia in 1900 as a containment in sugar beet seed. Pepperweed reproduces both by seed and vegetatively by roots and shoots. Root fragments as small as 0.5 inches can grow into new plants. A serious threat, pepperweed alters ecosystems by acting as a “salt pump” absorbing salts from deep in the soil. The plant then excretes the salt through the leaves and deposits it on the surface soil. Since most desirable plants do not tolerate high saline concentrated soils, the entire plant composition, and diversity of the area changes.

Key ID Points

- 1) White flowers in dense round clusters at branch tips.
- 2) Leaves are waxy with a white midrib.



Photo by Bonnie Loving

Perennial Pepperweed

Integrated Weed Management:

Because of the deep roots and persistence of pepperweed, it is critical to combine repeated herbicide application with monitoring and revegetation of the area. Control of Perennial pepperweed can be difficult, so prevention is the best option. Early detection, eradication and containment of small populations and their source are vital.

Cultural:

Prolonged spring flooding of new growth will kill pepperweed. Grazing is not recommended because the plant may be toxic. Reestablishing the native or desired plants can take years, so repeat plantings. Contact your local Natural Resources Conservation Service for seed mix recommendations.

Biological:

Biological control is not a viable option because 11 other species of native *Lepidium* are on the endangered species list, and the risk to these species as well as agricultural species is too great.

Mechanical:

Due to the deep, brittle root, most mechanical methods are not recommended, and can actually propagate, spread and increase the density of pepperweed. Hand pulling can also bring seeds to the soil surface, and spread pieces of root, which will sprout. However, spring mowing combined with chemical treatments can be effective.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Chlorsulfuron (Telar) + Fluroxypyr (Trumpcard) + Dichlorophenoxyacetic acid (2,4-D amine) + Surfactant	2 oz/acre + 1 qt/acre + 2-3 pt/acre 1 pt/acre	Apply when plant is in bolting to early flower growth stages.	Yes
Metsulfuron (Escort XP) + Aminopyralid (Milestone) + Dichlorophenoxyacetic acid (2,4-D amine)+ Surfactant	2 oz/acre + 7 oz/acre + 2-3 pt/acre + 1 pt/acre	Apply when plant is in bolting growth stage.	Yes



Plumeless Thistle (*Carduus acanthoides*)

Plumeless thistle (*Carduus acanthoides*) is a winter annual or biennial that is native to Europe and Asia. Plumeless thistle out competes native species and forage crops. It is one of the most aggressive thistles, due to its high seed production. Plumeless thistle is unpalatable to livestock and it may accumulate nitrates.

Key ID Points

- 3) Flower heads cluster 2-5 and are purple to dark red in color.
- 4) Leaves are alternate, stalk less, and hairy underneath.



Plumeless Thistle

Integrated Weed Management:

The key to managing Plumeless thistle is to prevent seed production. Dense Plumeless thistle stands can be treated by spot use of herbicide programs. Due to the unknown seed viability of Plumeless thistle, monitoring up to 10 years, and repeating control methods may need to occur for many years to completely eliminate an infestation.

Cultural:

Establishment of selected grasses can be an effective cultural control of Musk thistle. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

Biological:

Biological control insects, such as the seed head weevil and the crown weevil are effective on large infestations. When used together, these insects provide fair to good control. These insects have been known to threaten native thistle populations. Contact the Insectary of Colorado Department of Agriculture to get complete information at 970-464-7916. Or visit www.colorado.gov/ag/csd.

Mechanical:

Any mechanical or physical method that severs the root below the soil surface will kill Plumeless thistle. Mowing or chopping is most effective when Plumeless thistle plants are at full bloom. Be sure to properly dispose of the flowering cut plants since seeds can mature and become viable after the plant has been cut down.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Spring and/or fall to rosette stage	No
Clopyralid (Curtail) + Surfactant	2 qts / acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Clopyralid (Transline) + Surfactant	2/3 – 1 1/3 pt/acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre + 1 pt/acre	Controls seeds only. Use with your post emergent herbicide.	yes



Russian Knapweed (*Acroptilon repens*)

Russian knapweed is a non-native, deep-rooted perennial that spreads by aggressive, creeping, horizontal roots (rhizomes) and seeds. Russian knapweed is allelopathic, which means it contains a toxic substance that inhibits the growth of competing plants. This weed may also be toxic to horses resulting in serious injury or possibly death of the animal. Russian knapweed displaces native vegetation and reduces forage values on range and pasturelands.

Key ID Points

- 6) Distinguished from other knapweeds by the flower's smooth, papery bracts.
- 7) Roots are brown to black with scaly appearance.
- 8) Rosettes and lower leaves deeply lobed.
- 9) Upper leaves are smaller, smooth margined, and not lobed.



Photo by Bonnie Loving

Russian Knapweed

Integrated Management:

The most effective control for Russian knapweed is to prevent its establishment through proper land management. An integrated weed management approach can be effective when dealing with Russian knapweed. It can be managed with herbicides or insects, but long-term control must include planting competitive plant species to occupy bare ground once infested by the weed.

Cultural:

Maintaining healthy pastures and preventing bare spots caused by overgrazing. Bare ground is prime habitat for weed invasions. Establishing sod-forming grasses or vegetation with dense shade can be an effective cultural control of Russian knapweed. Contact your local Natural Resources Conservation Service for seed mix recommendations.

Biological:

The gall midge, *Jaapiella ivannikovi*, is a fly that lays eggs in the shoot tips of Russian knapweed. It forms galls that reduce flowering, seed production, and stunts the plants' growth. This biocontrol will stress the stand of Russian knapweed but will not likely eliminate it. The Colorado Department of Agriculture, Palisade Insectary, 970-464-7916, is currently establishing this biocontrol.

Mechanical:

Mowing several times before the plants bolt, stresses Russian knapweed and forces it to use nutrient reserves stored in the root system. However, mowing alone will not eliminate the infestation and it can stimulate shoot sprouting the following year. Mowing combined with a fall herbicide application will enhance control. Tilling and disking can create root fragments that can sprout.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Apply at bud stage (June) or/and late fall.	No
Clopyralid (Curtail or Transline) + Surfactant	See label + 1 pt/acre	Apply at bud stage (June).	Yes
Picloram (Tordon) + Surfactant	1 qt / acre + 1 pt/acre	Apply at bud stage (June) or/and late fall.	No



Photos by Bonnie Loving

Russian Olive (*Elaeagnus angustifolia*)

Russian olive is a perennial tree or shrub that is native to Europe and Asia. Russian olive is considered a phreatophyte meaning it has a deep root system that draws its water supply from near the water table. Russian olives have taken over thousands of acres along waterways and wetlands. They displace native and desirable species, rob water, pollutes water with its debris which also increases nitrogen levels in water, and it promotes non-native carp populations.

Key ID Points:

- 1) Leaves are silvery white
- 2) Branches have 1 to 2 inch thorns.
- 3) Yellow – red fruits on mature plants.
- 4) Mature trees have shedding, reddish-brown bark.



Photo by Bonnie Loving

Russian Olive

Integrated Weed Management:

Integrated weed management offers the most effective combination of control efforts through the “cut stump” treatment. Trees are cut down with a hatchet or chainsaw, then immediately treated with an approved herbicide on the surface of the cut stump. The most effective timing is late summer / early fall for herbicide transfer into the roots.

Cultural:

Replace Russian olives with native trees. Prevent establishment of new trees by removing seedlings and saplings before they mature. Contact your local Natural Resources Conservation Service for recommendations of other possible trees or shrubs.

Mechanical:

Saplings can be pulled with a weed-wrench or cut with brush-cutters. Trees can be girdled or cut with chainsaws. However, stump sprouting commonly occurs after cutting down the tree; and the stump excavation without removing all parts of the roots can result in root sprouting. Treating cut-stumps with an herbicide can eliminate sprouting. Stump burning is practical when conditions support a long, hot fire and most effective in summer or early fall. Saplings are most sensitive to mechanical treatment.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing
Triclopyr (Garlon 4 or Element 4) + Crop oil	3 qt/acre + 1 pt/acre	Broadcast spray individual trees.
Triclopyr (Garlon 3A or Element 3A) + Aquatic Surfactant (Induce)	3 qt/acre + 1 pt/acre	Broadcast spray individual trees.
Glyphosate + Aminopyralid + Rinzcor (Highnoon) + Penetrant (Impel)	Read Labels	Apply to the cambial layer of the tree immediately after the cut-stump treatment.



Photo by Bonnie Loving

Saltcedar (*Tamarix chinensis*)

Saltcedar, or Tamarisk, is a non-native deciduous evergreen shrub or small tree that grows from 5 to 20 feet tall. Saltcedar crowds out native stands of riparian and wetland vegetation. Saltcedar increases salinity of surface soil, rendering the soil inhospitable to native plant species. It's heavy use of water has contributed to the intensity of the drought.

Key ID Points:

- 1) Saltcedar is a tall shrub or small tree that has white to pink flowers in clusters called racemes.
- 2) Leaves are small and scaly.



Photo by Bonnie Loving

Saltcedar

Integrated Weed Management:

Select the appropriate control method based on the size of the area and other environmental or cultural considerations. Re-seed controlled areas with desirable species to protect the soil resource and to prevent or slow Saltcedar reinvasion. Follow up control efforts the same growing season and for several years afterwards.

Cultural:

After a Saltcedar infestation is managed, revegetation is necessary in order to protect the soil resource and reduce the threat of reinvasion. Seeded grasses, willow stakes, and cottonwood cuttings can reduce the chances of Saltcedar reinvading managed sites.

Biological:

The Saltcedar leaf beetle (*Diorhabda elongate*) larvae and adults feed on foliage. This causes stem dieback and potential death of the plant if defoliation is consistent. The leaf beetle should be available for limited distribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture, 970-464-7916.

Mechanical:

A bulldozer or prescribed fire can be used to open up large stands of Saltcedar. These methods must be followed up with a herbicide treatment of the resprouts when they are 1 to 2 meters tall. Chainsaws, or loppers for smaller plants, are effective for cut-stump treatments to smaller infestations or in environmentally-sensitive management areas.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing
Triclopyr (Garlon 4 or Element 4) + Crop oil	3 qt/acre + 1 pt/acre	Broadcast spray individual trees.
Triclopyr (Garlon 3A or Element 3A) + Aquatic Surfactant (Induce)	3 qt/acre + 1 pt/acre	Broadcast spray individual trees.
Glyphosate + Aminopyralid + Rinzcor (Highnoon) + Penetrant (Impel)	Read Labels	Apply to the cambial layer of the tree immediately after the cut-stump treatment.



Scotch Thistle (*Onopordum acanthium*)

Scotch thistle is a non-native biennial forb that reproduces solely by seed. As with most biennials, once established, limiting seed production is critical to effective control. Due to the robust, spiny nature of Scotch thistle, this plant can act as a living barbed wire fence, making areas impassible for wild- life, livestock, and people and unpalatable to cattle.

Key ID Points

- 1) Flower heads cluster 2-5 and are purple to dark red in color.
- 2) Leaves are alternate, stalk-less and hairy underneath.



Photo by Bonnie Loving

Scotch Thistle

Integrated Weed Management:

Scotch thistle is best controlled in the rosette stage. For small infestations, Scotch thistle can be controlled by severing its taproot 1-2 inches below the ground. Control can be enhanced by a follow-up application of herbicides to the surviving rosettes. It is imperative to prevent seed production. Do not allow Scotch thistle flowers to appear.

Cultural:

Establishment of selected grasses can be an effective cultural control of Scotch thistle. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

Biological:

Urophora stylata, a fly predator, is used to help control this thistle. The female fly lays eggs in the seed head of the thistle. The maggot then consumes the seed in the flower. This species has overwintered in Colorado but the limited numbers will not allow for general redistribution. For more information, contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

Mechanical:

Any mechanical or physical method that severs the root below the soil surface will kill Scotch thistle. Mowing or chopping is most effective when Scotch thistle plants are at full-bloom. Be sure to properly dispose of the flowering cut plants since seeds can mature and become viable after the plant has been cut down.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz / acre + 1 pt/acre	Spring and/or fall to rosette stage	No
Clopyralid (Curtail) + Surfactant	2 qts / acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Clopyralid (Transline) + Surfactant	2/3 – 1 1/3 pt/acre + 1 pt/acre	Spring and/or fall to rosette stage	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre + 1 pt/acre	Controls seeds only. Use with your post emergent herbicide.	yes



Photo Source: emmitsburg.net



Photo Source: growyourownnevada.com

Sulfur Cinquefoil (*Potentilla recta*)

Sulfur cinquefoil is a perennial forb that is native to Eurasia. Sulfur cinquefoil has the potential to spread from disturbed and undisturbed soils. It has shown itself to be extremely aggressive in some areas, often establishing in dense monocultures.

Key ID Points

- 1) Seeds coated with net-like pattern.
- 2) Light yellow flowers with 5 petals.
- 3) Long, right-angled hairs on the leafstalks and stems.



Photo Source: newfs.s3.amazonaws.com

Sulfur Cinquefoil

Integrated Weed Management

Sulfur cinquefoil is a competitive weed that uses its early emergence to establish itself and push out desirable vegetation. It is not a serious problem in cropland because it does not tolerate frequent plowing. Small infestations can be controlled by hand pulling, but larger stands are commonly controlled with herbicide. Management programs for Sulfur cinquefoil should focus on improving the competitiveness of other more desirable species, and preventing the spread of this weed.

Cultural:

Increasing the competitiveness of native species can assist in preventing establishment of Sulfur cinquefoil. Contact your local Natural Resources Conservation Service for seed mix recommendations. Bareground is prime habitat for weed invasions.

Biological:

Biocontrol species have been used in trials, since Sulfur cinquefoil is similar to strawberries though, the insects used are considered pests. For more information, contact the Colorado Department of Agriculture's Insectary in Palisade, Colorado at 970-464-7916.

Mechanical:

Mowing is not effective, as new shoots will replace the cut stems. Hand dig or pull when soil is moist is effective on small infestations. Be sure to dig up as much of the root system as possible, especially since root fragments can produce new plants.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid + Rinzcor (Highnoon) + Surfactant	20 oz/acre + 1 pt/acre	Anytime during growing season summer or to fall regrowth	No
Aminopyralid (Milestone) + Metsulfuron (Escort XP) + Surfactant	7 oz/acre + 2 oz/acre + 1 pt/acre	Anytime during growing season summer or to fall regrowth	No
Clopyralid + 2,4-D (Curtail) + Surfactant	2 pt/acre + 1 pt/acre	Anytime during growing season summer or to fall regrowth	yes



Photo Source: snowbirdpix.com



Photo Source: c1.staticflickr.com

Chicory (*Cichorium intybus*)

Chicory is native to Mediterranean areas in Europe, Africa, and Middle East. It has a long cultivation history for pharmacology dating back to ancient Egypt, Greek and Roman eras, 2000 BC. (Bahmani et al. 2015). Modern cultivation is for coffee substitution (roots) and salad (leaves). Chicory does out-compete native/desirable species possibly affecting habitat of wildlife.

Key ID Points:

- 1) The flowers are purple to blue to white, and are in clusters of 1 to 3, individual flowers are about 1 inch in diameter with toothed petals.
- 2) The taproot will produce a milky sap if broken.



Photo by Bonnie Loving

Chicory

Integrated Weed Management:

Identifying and preventing the establishment of Chicory on disturbed sites proves to be the most effective control. Plants can also be controlled using a combination of chemical and mechanical treatments.

Cultural:

Planting desirable grasses and forbs to outcompete chicory is an effective management tool. Reestablishing a healthy plant community where disturbed or Bareground is present helps with management. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Biological:

Currently there is not any biocontrol available for Chicory.

Mechanical:

Hand pull or dig when soil is moist, but make sure to wear gloves. Bag specimens carefully so as not to scatter seeds. The key to effective control is to prevent seed production and/or spread. Mowing can also be an effective management option.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	7 oz/acre + 1 pt/acre	Spring at actively growing stage.	No
Picloram (Tordon) * Restricted + Surfactant	1 qt / acre + 1 pt/acre	Spring at actively growing stage.	No
Clopyralid + 2,4-D (Curtail)+ Metsulfuron (Escort) + Surfactant	3 pt/acre + 1 oz/acre + 1 pt/acre	Spring at actively growing stage.	Yes



Photo Source: farm8.staticflickr.com



Photo Source: 2.bp.blogspot.com

Common Burdock (*Arctium minus*)

Common burdock is a biennial forb that is native to Europe. Habitats for Common burdock include roadsides, ditch banks, waste places, pastures, and fencerows. Animals will avoid eating the plant in both years of growth, the first year due to the hairy leaves and the second year due to the spines and burs. The burs can easily get entangled into livestock fur, make distribution easy over large areas.

Key ID Points:

- 1) Large, dark green leaves are alternate and appear to have toothed or wavy margins.
- 2) The flowers appear at the end of the branches, numerous, clustered and are pink to purple in color.
- 3) The flower and the spines dry and becomes an easily dispersible bur.



Common Burdock

Integrated Weed Management:

Preventing the establishment and minimizing soil disturbance is an effective way to control Common burdock. Combining treatment methods of cultural, mechanical and chemical assist with controlling these plants.

Cultural:

Minimizing soil disturbance and encouraging the establishment of desirable grasses and forbs, can assist in controlling Common burdock. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Mechanical:

Hand pull or dig when soil is moist, but make sure to wear gloves. Bag specimens carefully so as not to scatter seeds. Mowing is also effective, cutting the top growth of the plant. The key to effective control is to prevent seed production and / or spread.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Dichlorophenoxyacetic acid (2,4-D amine) + Surfactant	4-7 oz / acre + 2-3 pt/acre + 1 pt/acre	Apply in rosette stage in spring or fall.	No
Clopyralid (Curtail) + Dichlorophenoxyacetic acid (2,4-D amine) + Surfactant	1-2 pints / acre + 2-3 pt/acre + 1 pt/acre	Apply in rosette stage in spring or fall.	Yes
Picloram (Tordon) *Restricted + Dichlorophenoxyacetic acid (2,4-D amine) + Surfactant	1 qt / acre + 2-3 pt/acre + 1 pt/acre	Spring just after full-bloom and / or fall.	No



Photo by Bonnie Loving



lcroswell.files.wordpress.com

Common Mullein (*Verbascum thapsus*)

Common mullein is a biennial forb native to Europe and Asia. Each plant produces about 100,000-250,000 seeds. The plants can grow up to 10 feet tall and have a base of 30". Livestock will avoid eating Common mullein, due to the hairy leaves of the plants.

Key ID Points:

- 1) Large, dark green leaves are alternate and appear to have toothed or wavy margins.
- 2) The flowers appear at the end of the branches, numerous, clustered and are pink to purple in color.
- 3) The flower and the spines dry and becomes an easily dispersible bur.



Photo By Bonnie Loving

Common Mullein

Integrated Weed Management:

Preventing the establishment and the seed production of Common mullein is key to controlling populations. If the population is established, using a combination of cultural, chemical, biological and mechanical treatments can aid in suppressing population size. Since plants produce thousands of seeds, treatments need to occur over an extended period of time.

Cultural:

Cultural control can be effective in assistance with other treatment options. Once the parent plants have been removed, cultivating the area with desirable grasses and forbs may out-compete Common mullein seedlings. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Biological:

Gymnetron tetrum, a seed eating weevil, biological control has been found in eastern Washington State and is currently working on populations there. The weevil has not yet been approved for use in Colorado.

Mechanical:

Hand pull or dig when soil is moist, prior to flowering and seed production can be effective. If flowers are present, bag specimens carefully so as not to scatter any potential seeds. The key to effective control is to prevent seed production and/or spread.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Indaziflam (Esplanade or Rejuvra)	7 oz / acre	Fall – to control seed only	yes
Aminopyralid (Milestone) + Surfactant	7 oz/acre + 1 pt/acre	Rosette or bolting stage.	No
Picloram (Tordon) *Restricted + Surfactant	1 qt / acre + 1 pt/acre	Rosette or bolting stage.	No
Aminopyralid + Rinzcor (Highnoon) + Surfactant	20 oz/acre + 1 pt/acre	Rosette or bolting stage.	No



Photo by Bonnie Loving



Photo Source: trailhiker.files.wordpress.com



Photo Source: i.pinimg.com

Downy Brome – Cheatgrass (*Bromus tectorum*)

Cheatgrass is one of the most competitive non-natives in the Western US. It thrives in arid, semi arid, and cold environments. Colorado's high elevation range is not an issue for cheatgrass; plants were recently detected as high as 9,500 feet. It exhibits phenotypic plasticity and genetic diversity, making it highly adaptable to a variety of conditions, likely due to multiple introductions. Its presence has significant negative impacts throughout the West. Most notably, it alters fire regimes and thus engineers a positive fire feedback loop that favors its growth over other plants. This feedback loop is why cheatgrass forms monocultures throughout the West.

Key ID Points:

- 1) Downy leaf blades, sheaths, ligules.
- 2) One-sided panicle that droops, red-purple during seed set & senescence.
- 3) Fibrous roots.



Photo by Bonnie Loving

Downy Brome

Integrated Weed Management:

Preventing the establishment of Cheatgrass through proper grazing management techniques proves to be the most effective control method. If infestations are already established using a combination of mechanical and chemical control methods proves to be effective control options, following these treatments with cultural control methods will reduce the size of infestations.

Cultural:

Preventing the establishment of Cheatgrass by planting desirable grasses and forbs can prove to be an effective control method. Properly maintaining grazing lands will also reduce the risk of infestations. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Biological:

Research is currently being conducted on certain molds to be used as a biocontrol. But currently there is not any approved biological control agents approved for the use on Cheatgrass.

Mechanical:

Fire, tillage, mowing and grazing have been proven to help reduce plant populations once established. The key to effective control is to prevent seed production and/or spread.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Glyphosate (Roundup) + Surfactant	Depends on growth stage. Read Label	Apply in fall or early spring.	Yes
Imazapic (Plateau) + Surfactant	8-12 oz / acre + 1 pt/acre	Apply in fall or early spring.	Yes
Indaziflam (Esplanade or Rejuvra)	7oz/acre	Apply in fall or early spring.	Yes

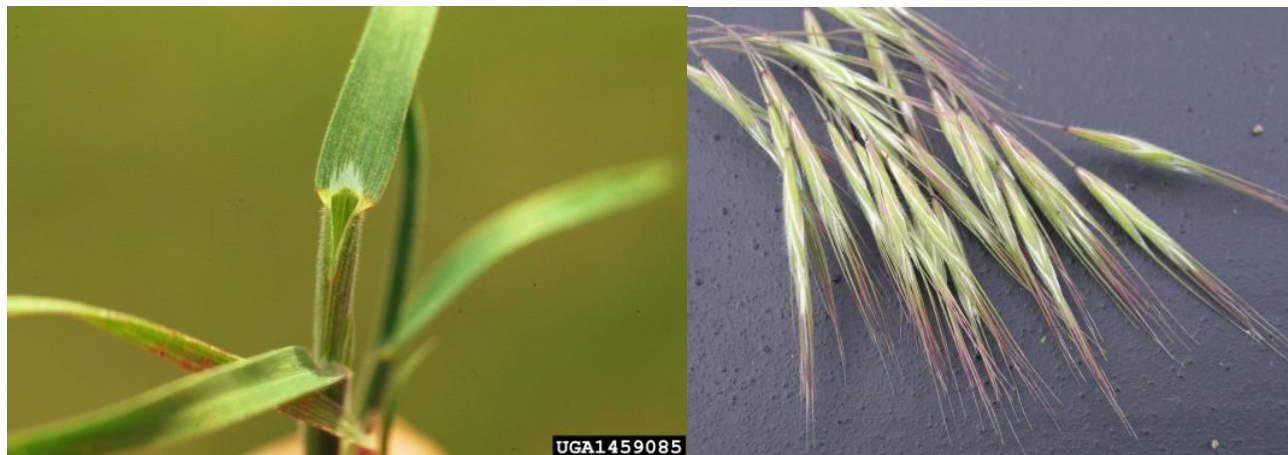


Photo Source: courses.missouristate.edu

Field Bindweed (*Convolvulus arvensis*)

Field bindweed is a non-native deep-rooted perennial that reproduces from seed and creeping, horizontal roots (rhizomes). Field bindweed stems are prostrate (grows low to the ground) and twining, and grow up to 6 feet long. Leaves are distinguishable by their arrowhead shape. The flowers are bell or trumpet-shaped, white to pink in color, and are about 1 inch long. Field Bindweed seeds can remain viable in the soil for up to 40 years.

Key ID Points:

- 1) Leaves are shaped like arrowheads.
- 2) Flowers are funnel-shaped white to pink, and have two small bracts one inch below the flower base.



Field Bindweed

Integrated Weed Management:

Field bindweed requires active management once it is established because of its potential to regenerate rapidly. Even small infestations should be viewed as a serious threat and managed aggressively.

Contain and persistently control infestations in order to exhaust the root system and deplete the soil seed bank.

Cultural:

Establishment of selected grasses can be an effective cultural control of field bindweed. Contact your local Natural Resources Conservation Service for seed mix recommendations. Maintain healthy pastures and prevent bare spots caused by overgrazing. Bareground is prime habitat for weed invasions.

Biological:

The bindweed gall mite, *Aceria mahlerbae*, has proven to be effective in reducing Field bindweed infestations. This is an option for large infestations. To obtain a mite release, contact the Colorado Department of Agriculture, 970-464-7916.

Mechanical:

Cutting, mowing, or pulling has a negligible effect unless the plants are cut below the surface in the early seedling stage. Well established populations have a large seed bank in the soil that can remain viable for over 40 years.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing
Dimethylamine salt (Quinclorac) + Surfactant	22-32 oz / acre + 1 pt/acre	Fall, just before killing frost.
Triclopyr (Garlon 4 or Element 4) + Surfactant	2 qts / acre + 1 pt/acre	Apply at full-bloom and/or fall
Picloram (Tordon) *Restricted + Surfactant	1 qt / acre + 1 pt/acre	Spring just after full-bloom and / or fall.



Kochia (Bassia scoparia)

Kochia (*Kochia scoparia*) is one of the most troublesome weeds across the Great Plains and western United States. It can be found in crop fields, pastures, rangeland, roadsides, ditch banks, and wastelands. It can be a major problem weed in chemical fallow, and cause severe yield reductions in crops. Understanding the biology of kochia helps in developing management strategies for the weed.

Key ID Points:

- 1) Leaves are lance-shaped, pale green, and covered with hairs.
- 2) When the plant matures the stem breaks off at the base; the plant then becomes a tumbleweed.



Photo by Bonnie Loving (kochia was sprayed – blue dye included)

Kochia

Integrated Weed Management:

Preventing the establishment of Kochia through proper grazing management techniques proves to be the most effective control method. If infestations are already established using a combination of mechanical and chemical control methods proves to be effective control options, following these treatments with cultural control methods will reduce the size of infestations.

Cultural:

Preventing the establishment of Kochia by planting desirable grasses and forbs can prove to be an effective control method. Properly maintaining grazing lands will also reduce the risk of infestations. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Mechanical:

One of the most effective Kochia control options is tillage when the plant is young.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing
2,4-D, Dicamba, Fluroxypyr (E2) + Surfactant	2 qts / acre + 1 pt/acre	Early growth stages
Fluroxypyr (Trumpcard) + Surfactant	48 oz/acre + 1 pt/acre	Early growth stages
Sulfentrazone (Antares Pro) + Fluroxypyr (Trumpcard) + Surfactant	10 oz/acre + 48 oz/acre + 1 pt/acre	Early growth stages
Indaziflam (Esplanade or Rejuvra)	7oz/acre	Late Fall



Photo By Bonnie Loving



Photo Source: nwcb.wa.gov

Perennial Sowthistle (*Sonchus arvensis*)

Perennial sowthistle is a deep-rooted perennial that native to Europe, Asia, and Northern Africa. It is a problem in several crops where it causes economic losses due to reduced crop yields, increased cultivation and herbicide expenses and land depreciation.

Key ID Points:

- 1) Hollow stems with milky juice.
- 2) Leaves are alternate with prickly edges and pointed lobes.
- 3) Flower heads are bright yellow and 1.5 inches wide.



Photo by Bonnie Loving

Perennial Sowthistle

Integrated Weed Management:

Locate and remove plants immediately before plants set seed to prevent the spread of perennial sow thistle. Since the plant reproduces solely by seed, an integrated management effort must include the elimination of seed production and depletion of seed bank. Combining control methods of herbicide and mechanical can be effective.

Cultural:

Prevent the establishment of perennial sowthistle, in rangeland or pastureland by planting native grasses and forbs. Contact your local Natural Resources Conservation Service for seed mix recommendations that may help. Bareground is prime habitat for weed invasions.

Mechanical:

Tilling plant populations where possible can assist with controlling Perennial sowthistle. Smaller root fragments have a harder time producing viable rosettes. The optimum time to treat mechanically is in the leaf rosette stage. Mowing can assist with control in depleting the root reserves for the plants.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Aminopyralid (Milestone) + Surfactant	4-7 oz / acre + 1 pt/acre	Apply in rosette stage in spring or fall.	No
Clopyralid (Curtail) + Surfactant	1-2 pints / acre + 1 pt/acre	Apply in rosette stage in spring or fall.	Yes
Picloram (Tordon) *Restricted + Surfactant	1 qt / acre + 1 pt/acre	Spring just after full-bloom and / or fall.	No



Photos by Bonnie Loving

Poison Hemlock (*Conium maculatum*)

Poison hemlock is an erect biennial weed that is native to Europe. The plant typically grows 4 to 8 feet tall. All parts of the plant are poisonous, they contain alkaloids. Animals do not eat the plant, unless food is scarce. Ingestion of .25-.3% of an animals body weight is lethal. Poisoning of humans has occurred. Athenian law used to sentence people to death by Poison hemlock tea, that is how Socrates died.

Key ID Points:

- 1) Fern-like shiny green leaves.
- 2) Smooth, hollow stems that are rigid and have purple spots.



Photo by Bonnie Loving

Poison Hemlock

Integrated Weed Management:

Integrated management approaches have not been an approved method of control concerning Poison hemlock. Even though it has not been a proven method, does not mean that it is ineffective. Using a combination of biological and herbicide treatments may be successful in combating Poison hemlock. Adding promotion of desirable plants to help out compete the infestation of Poison hemlock may assist with control as well.

Cultural:

Broadcast seeding or “no-till” drill seeding can be effective by helping out compete hemlock. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Biological:

The hemlock moth (*Agonopterix alstroemeriana*) larvae feed on leaves, young stem tissue, flowers, and seeds causing severe defoliation and death of the plant. Contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

Mechanical:

Hand pull or dig when soil is moist, but make sure to wear gloves. Bag specimens carefully so as not to scatter seeds.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Metsulfuron (Escort XP) + Aminopyralid (Milestone) + Surfactant	2 oz/acre + 7 oz/acre + 1 pt/acre	Apply when plant is in rosette to early bolting growth stages (36 inches tall or less).	No
Chlorsulfuron (Telar) + Fluroxypyr (Trumpcard) + Surfactant	2 oz/acre + 1 qt/acre + 1 pt/acre	Apply when plant is in rosette to early bolting growth stages (36 inches tall or less).	Yes
Triclopyr (Garlon 3A or Element 3A) + Aquatic Surfactant (Induce)	2 qt/acre + 1 pt/acre	Apply when plant is in rosette to early bolting growth stages (36 inches tall or less).	Yes as long as you do not spray the trees directly



Photos by Bonnie Loving

Puncturevine (*Tribulus terrestris*)

Puncturevine is a summer annual forb that is native to Europe. The plant is prostrate, spreading into a mat forming cover. The shape of the seed capsules have been referred to as “goathead”, they are very sharp and can cause injury to humans, animals, and tires. Seeds can be found in hay, which may cause injury to animals. The capsules can also become entangled in wool, and decrease the quality.

Key ID Points:

- 1) Leaves are formed into leaflets, with each leaflet containing 5 to 8 oval leaves. The leaves are hairy and opposite.
- 2) Each seed capsule is hard and contains many spines, almost tack like.



Photo by Unknown Source

Puncturevine

Integrated Weed Management:

Using a combination of control options can be effective in the control of Puncturevine. The plants are hard to eradicate, due to the seed viability of 4 to 5 years in the soil. Constant monitoring and management can be helpful.

Cultural:

Cultural control for Puncturevine is a difficult task, since seed reserves can stay viable for 4-5 years. Preventing the plants from establishing, by eliminating Bareground can assist in the process. For specific seed recommendations contact your local Natural Resources Conservation Services for seed mixes.

Biological:

There are two biological controls available for control of Puncturevine; *Microlarinus lareynii*, a seed feeding weevil, and *Microlarinus lypriformis*, a stem boring weevil. Contact the Palisade Insectary of the Colorado Department of Agriculture at 970-464-7916.

Mechanical:

Hand pull or dig when soil is moist, but make sure to wear gloves. Bag specimens carefully so as not to scatter seeds. This is helpful unless the infestations are too large. The key to effective control is to prevent seed production and/or spread.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Fluroxypyr (Trumpcard) + Surfactant	1 qt/acre + 1 pt/acre	Apply in early plant growth stages, emergence and rosettes.	Yes
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Only impacts seeds. Apply late fall.	Yes
Aminopyralid (Milestone) + Surfactant	7 oz/acre + 1 pt/acre	Apply in early plant growth stages, emergence and rosettes.	No



Photo Source: www.opb.org



Photo by Bonnie Loving



Eileen Sande,
Ferry County
NWCB

Quackgrass (*Elymus repens*)

Quackgrass inhabits moist meadows and disturbed sites. Found abundantly in mountain meadows, it thrives on different soil types, in gravel and peat, and also under saline and alkaline conditions. It is a highly competitive agricultural weed and can significantly reduce crop yields and contaminate seed grain crops.

Key ID Points:

- Has yellowish-white rhizomes (root system).
- The leaves have ear-like appendages at the sheath node.



Photo Source: www.thespruce.com

Quackgrass

Integrated Weed Management:

Using a combination of control methods proves to be the most effective method when dealing with Quackgrass. Using a mechanical and chemical approach seems to be most effective. Always revegetate with desirable grasses and forbs after treatments. Once infestations of Quackgrass become established control and containment become more difficult.

Cultural:

Cultural methods for Quackgrass include outcompeting when in crop fields, but preventing the establishment of new infestations by minimizing disturbance, and maintaining healthy native communities proves to be successful. Contact your local Natural Resources Conservation Service for seed mix recommendations.

Mechanical:

Mechanical treatments are tricky when dealing with Quackgrass. Tilling proves to be the best method, but it can also aid in the spread of the rhizomatous nature of the plant. If tilling is the only option till towards the center of the infestation, so spreading doesn't occur outward and till when the roots can be exposed to high or freezing temperatures. This will kill the roots and minimize regrowth.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Glyphosate (Roundup) + Surfactant	Depends on growth stage. Read Label	Apply in fall or early spring.	Yes
Imazapic (Plateau) + Surfactant	8-12 oz / acre + 1 pt/acre	Apply in fall or early spring.	Yes



Photo Source: <https://1.bp.blogspot.co>



Photo Source: www.eternallygreen.com

Redstem Filaree (*Erodium cicutarium*)

Redstem filaree is a winter annual or biennial forb that has a spreading or erect profile and is native to the Mediterranean or Asia. This plant can easily outcompete desirable vegetation once established. Redstem filaree is drought tolerant and can withstand a heavy stocking rate.

Key ID Points:

- The hairy red colored stems.
- The opposite leaf pattern in the rosette stage.
- The long-beak like fruit and seed.



Photo Source: bloomingatacademyvillage.org

Redstem Filaree

Integrated Weed Management:

Locate and remove plants immediately before plants set seed to prevent the spread of Redstem filaree. Since the plant reproduces solely by seed, an integrated management effort must include the elimination of seed production and depletion of seed bank. Combining control methods of herbicide and mechanical can be effective.

Cultural:

Prevent the establishment of Redstem filaree, in rangeland or pastureland by planting native grasses and forbs. Contact your local Natural Resources Conservation Service for seed mix recommendations that may help. Bareground is prime habitat for weed invasions.

Biological:

Currently there is not any biocontrol available for Redstem filaree.

Mechanical:

Hand pulling or digging when soil is moist, making sure to get the roots to prevent resprouting is effective. Removing flowers before the plant sets seed will also be effective. Be sure to bag specimens carefully so as not to spread seeds. Any kind of tillage to the area can also be effective.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe around trees?
Fluroxypyr (Trumpcard) + Surfactant	1 qt/acre + 1 pt/acre	Apply in early plant growth stages, emergence and rosettes.	Yes, as long as you don't directly spray them
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Only impacts seeds. Apply late fall.	Yes
Aminopyralid (Milestone) + Surfactant	7 oz/acre + 1 pt/acre	Apply in early plant growth stages, emergence and rosettes.	No



Photo Source: kaweahoaks.com



Photo Source: oregonstate.edu

Russian Thistle

Russian thistle is a large and bushy noxious annual broadleaf plant. It occurs throughout the western states, more often in drier areas. When consumed in moderate amounts, immature plants are nutritious for livestock. However, with maturity and under particular conditions, some *Salsola* species accumulate levels of oxalates toxic to livestock, especially sheep. Most often toxicity occurs when sheep feed almost exclusively on these species for many weeks. Russian thistle also can create a fire hazard or hinder traffic when it breaks off from its main stem and dries up. At this stage, it is commonly called tumbleweed. It is also an alternate host for the beet leafhopper, *Ciculifer tenellus*, which vectors the virus that causes curly top disease in melons, tomatoes, sugar beets, and other crops.

Key ID Points:

- Stems are slender and flexible and often have reddish purple streaks.
- Mature plants are large and bushy with rigid, purple-streaked or green stems.



Photo Source: www.bing.com

Russian Thistle

Integrated Weed Management:

Locate and remove plants immediately before plants set seed to prevent the spread of Russian thistle. Since the plant reproduces solely by seed, an integrated management effort must include the elimination of seed production and depletion of seed bank. Combining control methods of herbicide and mechanical can be effective.

Cultural:

Cultural control practices such as mowing or destroying young plants by other means can prevent seed production. While this may eliminate the accumulated organic debris and some seed, much of the seed will already have been disseminated. Planting competitive, more desirable species can be an effective method of preventing Russian thistle establishment in most non-crop environments. Russian thistle competes poorly in situations with firm, regularly irrigated soil, and it is rarely a problem in managed gardens, turfgrass, or landscapes.

Mechanical:

Avoid tilling the soil in abandoned areas because loose soil is necessary for Russian thistle germination and is therefore likely to aggravate the situation. Burning is sometimes used to destroy accumulated Russian thistle plants.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate	Timing	Safe Around Trees?
Indaziflam (Esplanade or Rejuvra)	7 oz/acre	Pre-Emergence only, apply late fall.	Yes
Aminopyralid (Milestone) + Surfactant	7 oz/acre + 1 pt/acre	Apply in early growth stages.	No
Fluroxypyr (Trumpcard) + Surfactant	1 qt/acre + 1 pt/acre	Apply in early growth stages.	Yes, as long as you do not directly spray them.



Photo Source: extension.unr.edu



Photo Source: 4.bp.blogspot.com

Willow (Salix spp.)

- Native perennial that reproduces both by seed and vegetatively by twigs breaking off and taking root, and from root suckers.
- Most species have leaves shaped like a lance.
- Willows are deciduous and the male and female plants produce catkins in the spring.
- The leaves are usually serrate, rounded at base, and acute or acuminate.

Control and Management:

- Foliar spray willows, trying to cover at least 75% of the entire plant. If the willows are too tall/too thick to successfully do a foliar application, you may want to mow the trees down. Once the sprouts start coming up do a foliar treatment.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate
Triclopyr (Garlon 4 or Element 4) + Surfactant	3 qts/acre + 1 pt/acre
Fluroxypyr (Trumpcard) + Aminopyralid (Milestone) + Surfactant	1 qt / acre + 7 oz/acre + 1 pt/acre
Aquatic Triclopyr (Garlon 3A or Element 3A) + Aquatic Surfactant (Induce)	3 qt / acre + 1 pt/acre



Rubber Rabbitbrush (*Ericameria nauseosa*)

- Native perennial that reproduces by seeds and root sprouts
- Flowers from June to September.
- Flowers are yellowish green, arranged in an umbrella shaped head.
- Leaves are alternate, linear to spatula shaped blades with entire margins.
- Stems are erect, flexible, yellowish-green, and covered with a dense felt-like covering.

Herbicide:

- To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate
Triclopyr (Garlon 4 or Element 4) + Surfactant	3 qts/acre + 1 pt/acre
Fluroxypyr (Trumpcard) + Aminopyralid (Milestone) + Surfactant	1 qt / acre + 7 oz/acre + 1 pt/acre



Photo Source: www.fs.fed.us

Cattails

- Native perennial.
- Cattails are wetland plants with a unique flowering spike, flat blade like leaves that reach heights from 3 to 10 feet.
- Reproduce both by seeds and rhizomes.

Mechanical/Cultural Control Options

Cattails can be mechanically removed by digging up the rhizomes and removing them from the pond. Cutting off the tops of the plant will not kill them. The rhizomes are under the soil and care must be taken to remove all of it. This option usually only works when cattails first invade an area. Once established they are difficult to control mechanically. Although frequent mowing has been effective in some cases.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Chemical	Rate
Aquatic labeled Glyphosate (Rodeo)	5% solution



Photo Source: shelled.mesa.k12.co.us

Not listed as a noxious weed, therefore no management required

Western Whorled and Showy Milkweed

- Native perennial herbs.
- Milky sap exudes from the stem if broken.
- Plant is toxic to livestock

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate
Picloram (Tordon)	1 qt / acre
Dicamba (Weed Master)	3 pints / acre
Dicamba (Banvel)	2 pints / acre
Dicamba (Vanquish)	2 – 4 pints / acre



Western whorled milkweed

(Photo Source: i1.wp.com)



Showy milkweed

Not listed as a noxious weed, therefore no management required

Foxtail Barley

- Native perennial grass that reproduces by seed.
- Plants grow 1 to 2 feet tall and produce a pale green, bushy spike.
- Commonly found in wet or alkaline soils.
- Mature awns of plants can cause serious injury to animals' eye, nose, throat, and ears.

Herbicide:

To simplify technical terminology, trade names of products will be used. No endorsement of products named is intended nor criticism implied of products not mentioned. ALWAYS follow the labels instructions, the label is the LAW.

Herbicide	Rate
Glyphosate (Roundup)	1.5-4 quarts / acre
Matrix (Rimsulfuron)	1 oz / acre
Imazapic (Plateau)	Split treatment 6 oz/acre in spring and 6 oz/acre in fall



Chemical Resistance / Herbicide Mode of Action

Herbicide-resistant weeds have become a significant challenge for U.S. crop production. One way to help manage and fight herbicide resistance is to vary herbicide modes of action used on the same acre. The mode-of-action is the overall manner in which an herbicide affects a plant at the tissue or cellular level. Herbicides with the same mode-of-action will have the same translocation (movement) pattern and produce similar injury symptoms.

The section in this guide where I gave some detailed information about each herbicide, that I recommended for each species, I bolded the group number. The group number refers to its mode of action, which is defined by the active ingredient in the herbicide. A majority of the herbicides I listed are group 4. Group 4 herbicides disrupt plant cell growth in the newly forming stems and leaves; they affect protein synthesis and normal cell division, leading to malformed growth and tumors.

I also recommended some Group 5's which photosynthetic inhibitors are. These chemicals interfere with photosynthesis and disrupt plant growth, ultimately leading to plant death. There are some Group 9's which inhibit the amino-acid synthesis in plants. The Group 2's block the normal function of an enzyme called acetolactate synthase. This enzyme is essential in amino acid (protein) synthesis. Without proteins, plants start to die.

Some herbicide labels and / or containers tell you which group the herbicide is, and hopefully in the future they all will. If you aren't sure which mode of action your herbicide is, look at the herbicide label and write down the active ingredient. Then do a google search of a table that shows different modes of actions and look up your active ingredient in that table.

It is important to switch up your group number or mode of action to prevent chemical resistant plants. A good method to do is to mix multiple herbicides with different modes of actions into on tank mix. Mixing the same mode of action or group in one tank mix is not recommended.



Photo of chemical resistant, same herbicide used on species, only one plant dying. The plant that survives will reproduce the resistant gene to future plants increasing the resistance of this species to the herbicide used. Photo source: [s3-wp-lyleprintinganddp.netdna-ssl.com](https://www.s3-wp-lyleprintinganddp.netdna-ssl.com).

Small Grain Crops – Wheat, Barley, Oats, and Fallow

Small grain crops account for the largest acreage of farmland across Montana, Utah, and Wyoming. Cereal grains are very competitive crops, especially when seeded in narrow rows, at high seeding rates and in diverse crop rotations. However, semi-dwarf wheat varieties are usually not as competitive as normal height ones.

Unfortunately, many of the cereal crops in the Intermountain West are grown almost continuously with very little rotation. The predictability of monoculture cereal production favors the development of annual grass weed problems such as wild oats, downy brome, jointed goatgrass, and green foxtail. Problem broadleaf weed species include kochia, Russian thistle, wild buckwheat, mustard species, and perennial weeds like Canada thistle and field bindweed.

Effective weed management programs in cereal crops integrate mechanical, cultural, and chemical methods of control.

1. Mechanical weed control

- a) Pre-plant seedbed tillage just prior to seeding ensures that crop plants are the first ones to emerge.
- b) Post-emergence tillage can be used in cereals for weed control. Use harrows and wait at least until the 3-leaf stage of the crop when it is firmly anchored. Wheat can be harrowed between one and three times during the summer, barley should be harrowed no more than once, and oats can be severely damaged by harrowing. Harrowing will control many weed species if it is done just when the nutrients in the weed seeds or cotyledons are approaching exhaustion, generally the weakest point in a plant's life cycle.
- c) Postharvest tillage prevents many weed species from producing seed, or from disseminating seed after small grain harvest.

2. Cultural control

- a) Crop rotation is perhaps one of the most effective approaches to manage weeds. The different environments created by each crop expose weeds to different sources of mortality. For example:
 - i) If winter annual weeds such as downy brome, jointed goatgrass, or feral rye are troublesome, rotate to a spring-sown cereal crop. Many of the winter annual broadleaf and grass weeds will not be a problem in a spring-sown crop.
 - ii) In areas where diversified cropping systems are possible, plant alternative crops such as dry beans. These alternative crops are even more helpful than spring cereals in controlling certain winter annual weed problems. Rotational crops such as beans or corn, which are seeded late in the spring into warm soil, permit control of many weed species that are troublesome in cereal production.
- b) Altering seeding date, either earlier or later than usual, will permit control of some weed species.

3. Other suggested weed management practices:

- a) Plant certified seed to prevent invasion by new weeds or spread of herbicide resistance.
- b) Reduce weed seed populations in the soil.
 - i) Encourage weed seed germination by using shallow cultivation or any other method that will bring weed seed into moisture in the top half inch of soil.
 - ii) Control weeds before they set seed. Weeds that disperse seed into the seed bank in the soil perpetuate the problem.
- c) Eradicate patches of perennial weeds before they spread. Use cultural, mechanical, and chemical methods as appropriate.

- d) Control weeds as soon after germination as possible and do not use herbicides if the grain crop is under stress.
- e) Control weeds along the edges of small grain fields.
 - i) Keep weeds along the edges of fields and other idle areas from maturing and shedding seed. Some of these weed seeds are likely to move into the field. Any number of methods, including mowing, spraying with herbicides, or cultivating can be effective.
 - ii) Establishment of a perennial grass on field edges is very effective in controlling most weeds. After establishment, weed control is virtually cost-free. These habitats may, in turn, enhance the abundance and diversity of beneficial insects such as carabid beetles and parasitoids that could help you manage different pests.

4. Chemical control

Herbicides should be used in conjunction with other management practices as herbicides are usually more effective in competitive and vigorous crops. Chemical weed control in small grain production is no longer routine because of weed shifts and development of herbicide resistance. The practice of using just 2,4-D, the foundation herbicide for cereal grain production for almost 45 years is no longer effective for many farms. Today, the weed problems found in many small grain fields require TANK MIX combinations of herbicide treatments for adequate weed control. Clarity and sulfonyleurea products such as Amber, Ally, Harmony GT, Express, Harmony Extra and Peak are frequently combined with 2,4-D in order to provide effective, broad spectrum weed control.

Small grain producers in several areas have been faced with problems of HERBICIDE RESISTANT weed species. Kochia, wild mustard, Russian thistle, green foxtail, wild oat, and common chickweed are just a few of the weed species which have herbicide-resistant biotypes. The problem is expanding regionally, nationally, and internationally, and no herbicides, including 2,4-D and glyphosate, are immune to the potential of resistance

WEED SHIFTS continue to occur due to heavy, continuous use of herbicides, reductions in tillage, and lack of crop rotation. Field bindweed, Canada thistle, foxtail barley, quackgrass, and milkweed species are just a few of the perennial species which are spreading in some small grain production areas as tillage frequency declines. To combat these problems, small grain producers should identify their weed spectrum and carefully match their weed problems with the most effective herbicides. Correct application can only be made if the crop and weeds are carefully monitored to permit timely application.



Pasture and Rangeland Weed

Pastures and rangelands provide a significant component of the forage base for domestic grazing animals, including cattle, sheep, goats, and horses and many species of wildlife throughout Montana, Utah, and Wyoming. Additionally, range and pasture lands are often rich sources of native species biodiversity. Unfortunately, many weed species have strong negative impacts on range and pasture lands. These include reducing forage availability, decreasing wildlife habitat quality, outcompeting native plants, and changing the structure and function of entire ecosystems. For example, cheatgrass or downy brome, has invaded large areas of the Great Basin and has increased fire frequency to a level that has eliminated many shrubs. In Montana, elk have been observed to avoid areas heavily infested with spotted knapweed.

In Wyoming, forage availability for cattle is greatly reduced when biennial thistles invade an area. Weed Extension Specialists are frequently asked, “How do I control this weed and get my range or pasture back?” The reality is that there are no silver bullets to weed control and “occasional” weed management rarely provides long-term success. The key to success is found in developing an integrated weed management or IWM program. IWM includes many facets of good range and pasture management. These include implementation of good range and pasture management strategies, inventory to know what weeds are present and where they are located, prevention of new weed introductions, early detection and rapid response to new infestations, containment of existing weed problems, large scale control where possible, and revegetation if necessary. For success, these components require assessment, flexibility, and potential adjustment over time.

Good Range and Pasture Management:

One of the keys factors that favor weeds in range and pastures is overutilization. This is especially obvious for small acreage pastures. Overutilization weakens perennial grasses and decreases desirable plant cover. This sets up an ideal scenario for weeds to invade. Following invasion, many weeds are unpalatable to grazing animals, which results in increased use of already weakened perennial grasses and subsequent increased competitive suppression of perennial grasses by ungrazed weeds. These factors create a downward spiral that results in degraded range and pastures dominated by highly undesirable weeds that will require serious investment to restore. If you begin to see weeds such as cheatgrass and mustards appear in the spring and kochia and curlycup gumweed taking over in the summer, the pasture is likely being over utilized. On small pastures, supplemental feeding is almost always necessary. However, supplemental feeding alone is generally not enough to prevent overutilization and animals must be moved to allow perennial grasses to recover.

Prevention:

While many land managers often feel like they are already overrun with weeds, prevention is one of the most useful, cost effective strategies for eliminating future weed problems. Prevention is recognizing the ways in which weeds disperse into new areas and taking steps to prevent that from occurring. Prevention often includes:

- Using certified weed free seed, hay, straw, or mulch.
- Cleaning the undercarriage of trucks or equipment driving through or working in weed infested areas.
- Maintaining competitive perennial grass, forb, and shrub cover, which reduces available niches for weeds to invade.
- Increasing awareness of weed issues among neighbors, campers, hikers, hunters, and off road vehicle enthusiasts.

Early Detection and Rapid Response to New Introductions:

Some weeds may slip by even the most aggressive preventative strategies. Early detection and rapid response is critical to stopping new infestations before they become overwhelming. Weeds often first appear along disturbed areas, including roadsides, construction sites, hiking or animal trails, waterways, and railroad tracks before moving out into lesser disturbed range areas. Weeds may also first invade around winter hay feeding areas, livestock water developments and trails leading out from these areas. Scouting these areas for “plants out of place” is a good practice. The identification of newly found plants should be confirmed by a local Extension or University Specialist if possible. Aggressive action should then be taken to prevent the new weeds from going to seed or spreading vegetatively. If the plant is an annual or biennial and the infestation is very small, hand pulling or digging the plant to remove all of the topgrowth and a few inches of the root will be effective. If the plant is blooming or has already bloomed, be careful to bag and remove all seedheads so that no seed may escape. For larger infestations or for perennials, repeated annual applications of herbicides are generally necessary. The goal is to completely eradicate the new infestation, so grazing, mowing, and biological control should be secondary options following hand pulling, digging, and herbicides.

Containment of large infestations:

Since many weeds often spread in an advancing front with small patches colonizing beyond the main infestations, managing the edges of the patch to contain the infestation is a good idea. This protects neighboring areas from becoming infested as the patch expands. Frequently herbicides are the most effective tool for containment. A common mistake that has been made is to initiate weed control in the middle of the patch. This often results in short term success as weeds reinvade from the uncontrolled periphery of the patch.

Large-scale control and revegetation:

Where it is possible and economically viable, large-scale weed control can be effective in reclaiming extensive areas dominated by weeds. The most important thing to remember is that large scale operations require a significant commitment of time and resources to be successful. It is often best to divide large areas into smaller, more manageable units, working from the outside edges towards the interior of the infestation. Follow-up management in the years after the initial treatment is very important. Without it, gains made in the first year may be rapidly lost as weeds emerge from the seedbank or from perennial roots. Spot treatments will likely be required for several years where infestations appear to flare up. If possible, also pay attention to areas that have an understory of suppressed perennial grasses. These areas may rapidly respond to weed control and quickly regain perennial grass dominance. Areas with little perennial grass understory may require revegetation for long-term weed suppression. Previous versions of this Weed Management Handbook have included information on range and pasture reseeding. However there are two excellent publications that comprehensively address this subject for Montana, Utah, and Wyoming. Rather than repeating that information here, we recommend these publications which are listed at the end of this section.

Weed Control in Alfalfa



Photo Source: i.ytimg.com

Introduction:

Weeds compete with alfalfa for water, nutrients, and sunlight, reducing crop yields and shortening stand life. A stand severely thinned by weed competition in its first growing season may never achieve its full yield potential. Hay quality, price, and marketability are also influenced by weeds. Nutritive value of alfalfa hay can be diminished by most weeds, and toxic weeds pose a serious threat to livestock.

Alfalfa weed control should be viewed as a three-phase program. Each control phase represents a unique opportunity to address specific weed problems. Attention to all three phases is the key to successful weed management in alfalfa.

Phase 1: Pre-Crop

Perennial weeds are usually more difficult to manage in the perennial broadleaf crop. Therefore, every effort should be made to reduce or eliminate perennial weeds prior to planting alfalfa. Never plant a field to alfalfa before a perennial weed problem has been made manageable. Choose rotation crops preceding alfalfa which allow use of effective cultural and/or chemical weed control techniques. For example, small grains are compatible with numerous selective herbicides which are effective against perennial broadleaf weeds, but which are not tolerated by alfalfa. The nonselective herbicides Roundup or Landmaster can be very effective against both perennial grasses and broadleaf weeds when applied in the early fall after harvest of any annual crop. Be mindful of time intervals required between the application of some herbicides and planting of alfalfa.

Phase 2: Seedling Year

Alfalfa seedlings, freed from weed competition during their first few weeks of growth, will produce higher yielding and longer-lived stands. There is no more critical time to control weeds in alfalfa. Both pre-emergence and post-emergence herbicides exist which effectively eliminate weed competition without harming young alfalfa seedlings. Examples include Buctril, Butyrac, Eptam, Kerb, Poast, Pursuit, Select and Raptor. Clipping young stands of alfalfa also can reduce competition and shading from certain annual weeds.

All management practices during the first season should focus on optimizing alfalfa establishment and survival. Select varieties resistant to disease and capable of high forage production under local growing conditions. Always plant weed-free seed of the highest possible quality. Consult with local agronomists to confirm the ideal planting rate, seeding depth, fertilizer rate, and irrigation program for your situation. The goal is to eliminate as much stress on young alfalfa seedlings as possible, so they can develop into a thick and vigorous stand of established alfalfa. Once established, a healthy, dense stand of alfalfa is very effective by itself in keeping out many weeds.

Planting small grains with alfalfa as a companion or nurse crop is discouraged, except in cases where severe soil crusting or wind/water erosion can make alfalfa establishment nearly impossible. Oats, barley, or wheat seedlings can compete with alfalfa for moisture, sunlight, and nutrients, much the same as grass weeds.

Phase 3: Established Stand

Waiting until a stand is several years old and full of weeds is not the time to start a weed control program in alfalfa. Weed control operations in this phase should be preemptive in nature, intended to preserve or improve the level of control achieved in phases 1 and 2. Begin well before a weed problem becomes serious. Any of several selective soil-residual herbicides can be applied in the late fall or very early spring to dormant established alfalfa for control of annual grasses and/or broadleaf weeds. Examples include Karmex, Kerb, Prowl, Sencor, Treflan, Velpar and Zorial. Some can be helpful in managing certain perennial weeds.

Cultural practices in established alfalfa can influence weed populations. For example, research has shown that cutting frequency and irrigation timing can affect yellow foxtail densities. Shorter cutting cycles favor this grass, as does irrigation immediately after harvest. The same may be true for some other annual weeds.

Herbicide application accuracy and proper timing are always essential. Make sure spray equipment is correctly calibrated and maintained. Read and follow all label instructions.

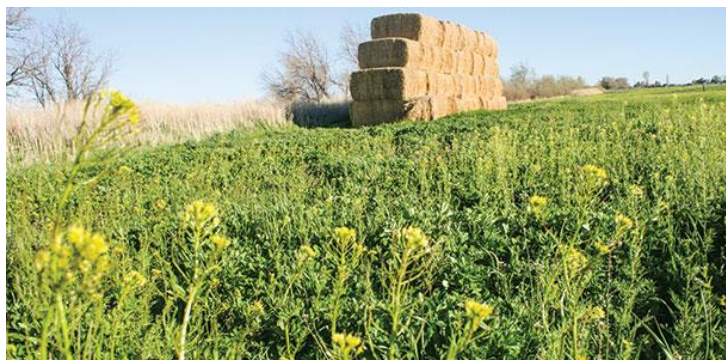


Photo Source: progressiveforage.com

Noncrop Sites / Rights-of-Way

Weed control on noncrop sites and rights-of-way often means total vegetation control with soil-residual herbicides, a process where herbicides render the soil unfit for plant growth without killing soil animals or microbiological organisms.

Several considerations when using soil-residual herbicides are:

1. Know which weeds you want to control so you can determine exactly which herbicide(s) to use.
2. Study the area where the herbicides will be used. Carefully note the location and proximity of adjacent non-target vegetation and surface water. The slope of the terrain to be treated, soil texture, and depth to the water table can also be very important.
3. Follow an integrated control program, including elements of weed prevention, cultural and physical control methods, as well as herbicides. Where appropriate, biological controls should be included. Remember, no single herbicide or other weed control practice will solve all weed problems.

Precautions to be followed when using soil-residual herbicides:

1. Do not move soil from treated area until herbicide is completely gone.
2. Avoid spray drift during application.
3. Do not apply residual herbicides where wind or water might move treated soils.
4. Some herbicides vaporize or volatilize easily. Reduce this hazard by applying herbicides at lower temperatures and use low-volatile herbicide formulations.
5. Do not apply where the roots of desired woody species may extend into the treated area.
6. If allowed on the label, apply soil-residual herbicides during late fall to allow winter precipitation to move the herbicide into the soil. Apply such soil-residual herbicides 4 to 6 weeks before soils are frozen in the fall.

Herbicides are categorized according to their mode of action, which is the method by which they interfere with vital processes of the plant. Repeated use of herbicides having the same mode of action can result in the development of herbicide resistance in some weeds. To avoid this problem rotate between herbicides of different modes of action.

The information provided in this section is intended to serve only as a preliminary guide to herbicide use. Before applying any herbicide product, you must thoroughly read the entire label and follow all label directions. Complete labels and MSDS information for most of the products listed in this section can be viewed on the web at:

<http://www.greenbook.net>



Photo by Unknown Source

Poisonous Plant Quick Reference

*Not all invasive noxious weeds on this list, there are some natives.

*The vertical axis are toxic plants and the horizontal axis are animals that plants can affect.

*There are varying degrees of harm for minor irritation do death.

	Alpaca	Bison	Cat	Cattle	Dog	Goat	Human	Horse	Llama	Poultry	Sheep
Avocado					X			X			
Buffalo bur				X		X	X	X			X
Canada thistle	X			X							
Cheatgrass	X	X		X	X	X		X	X		X
Cocklebur				X			X				
Curly dock								X			
Dalmatian toadflax				X							
Field bindweed	X			X				X	X		
Flixweed				X							
Foxglove			X	X	X	X	X	X			
Halogeton				X							X
Houndstongue	X			X					X		
Hoary cress											
Horsetail				x				x			x
Irises				X			X				
Kochia	X			X					X		X
Lambs quarter				X			X	X			X
Leafy spurge	X			X			X	X			X
Low larkspur	X			X		X	X				
Lupine				X		X					
Common mallow										X	
Marijuana					X						
Myrtle spurge	X			X			X			X	
Nightshade				X		X	X	X			X
Oak leaves				X							
Perennial pepperweed				X				X			
Pigweed				X		X	X				X
Poison hemlock	X	X	X	X	X	X	X		X	X	
Ponderosa pine		X		X							
Puncturevine	X	X	X	X	X	X	X	X	X	X	X
Purple locoweed	X			X		X		X	X		X
Ragweed	X	X	X	X		X	X				X
Russian knapweed								X			
Russian thistle	X			X							
Yellow clover				X				X			X
Yellow starthistle								X			
Yellow toadflax				X							
Western choke cherry				X		X		X			X

So, you got rid of the weeds, now what?



Photo by Unknown Source

Some important 'facts' to know:

1. Nature hates a vacuum and your bare land is the perfect vacuum. If you don't plant something that you want in the bare space, it will fill with weeds again.
2. Weeds are weeds for a reason. They are opportunistic plants that often can do better in a given situation than the beneficial plants you want to grow in that space. They are perfectly adapted to the soils, moisture availability etc. that your bare space offers.
3. Even if you have sprayed/tilled/pulled the weeds until there is nothing left to pull, the soil acts as a seed bank. So any seeds that have been deposited in your bare space may still be available to grow for one to many years later. AND when you disturb the soil, ie. rake it, harrow it, chisel it, etc. you may be positioning some of that seed in the perfect location to germinate and grow.

Now that you have the bad news;

Here are some important tips for all the things you can do to get beneficial grasses established on your property and thwart the weeds.

Determine your particular situation before you start making decisions and purchases.

1. How much land do you need to reseed? (Usually calculated in approximate sq. ft. or in acres.)
2. What is your irrigating situation? (No water, limited water for critical plant needs, full water)
3. What is your objective for the land? (Grazing, Lawn, reclamation, aesthetics, natural land etc.)

Your Options:

1. You can choose a multiyear approach and really spend the time getting rid of weeds and preparing your land for the planting of your dreams. If you choose this strategy, you will want to plant inexpensive annual crops for a year or two so that you can continue to manage the weed situation and perhaps improve your soils. Good choices for this would include: grain crops such as oats, rye, wheat etc., cover crops that enhance the soil, annual rye for fast growth and perhaps some grazing.
2. You can choose drought tolerant crops that maximize the use of our natural rain and snowfall and don't rely on added moisture. This is an important option for many landowners who do not have access to any irrigation. Given that our climate does seem to be unpredictable – there is no sure-fire way to assure that a new planting will take. It requires warm temperatures and soil moisture for a long enough period for a seed to germinate and get roots down to the moisture in the lower portions of the soil. We don't always get these conditions. Therefore, the optimal time to plant and hopefully be positioned to take advantage of winter moisture is in the fall, typically the second half of October and into November when snow stops your planting efforts. The second best time to plant is right before a good Monsoon season. (If you can predict the Monsoons, you might want to purchase a lottery ticket also!) You have many options for drought tolerant plantings including: dryland pasture mixes, low growing mixes that don't require mowing and stay lower to the ground, more drought tolerant turf options. Native grasses which are plants that were growing in our region long before it was settled. Native grasses and wildflowers are well adapted to our climate and low moisture regimes – however, they are programmed to grow when conditions are right so, it can take several years to get a good full stand of native grasses.
3. You can choose irrigated options if you have some or plenty of water. Access to water makes establishing a good seeding much easier. In this scenario, you can choose from any of the above options and use your water to get things established and then back off of frequent waterings or you can use irrigated pasture mixes to get thick lush stands. Irrigated turf options are also available for thick, green lawns.

There are many more considerations to a new planting (or overseeding an existing planting) than we can easily write about here. Once you understand the basics, head to the internet for more information or visit with a seeding professional at a nursery or a farm store or a seed company to refine your plan and get the right seed for the job.



Photo Source: diy.sndimg.com

No-Till Seed Drill

No Field Preparation Needed

Brought to you by the Dolores Conservation District

970.565.9045 ext 118

doloresconservation@gmail.com

www.dolorescd.org



A few details:

- 8 ft. width- Towable behind most Pickup trucks to work site.
- Overall weight of 3500#
- Operate with a minimum 40 HP tractor with rear remotes
- 9 coulters on a 7.5" spacing, covering approximately 6' coverage
- Depending on field conditions, approximately 10-12 acres can be seeded in a day
- Very light seed rates can be applied for native grasses
- Use for dry land or irrigated fields, cropping or revegetation
- Rental rates: Daily \$150.00/day



How does it work?

The Great Plains no-till drill is designed to perform several operations in one step. The front “openers” cut a trench. This is followed by the double disc seed drill that places the seed at the proper depth. The following packer wheels cover and pack the soil for good seed-to-soil contact. The secret is in the weight of the drill. It weighs over 3500 lbs and can drill in seed in many variable conditions.

The Great Plains NT seed drill has three seed boxes:

- Main Grain Box
- Native Grass Box for fluffy seed mixes
- Small Seed Box for alfalfa and similar size seeds

All the boxes have agitators to keep the seed well mixed and flowing to the oversized shoots. Regardless of the application, the wide variety of calibration adjustments provides an even seeding.

What types of seed can I use?

- **Native grasses:** fluffy seeds with difficult “beards” that often hang up.
- **Cover crops:** Mixes of several varieties for green manures or over seeding fallow fields.
- **Small grain crops:** wheat, barley, oats
- **Pasture Mixes:** over-seed existing pastures or establish new ones
- **Dryland seed:** for weed management and re-vegetation of disturbed lands.

Why use a no-till drill?

No-till farming is becoming more common as a profitable, sound conservation farm practice. Crop residues are left on the field and incorporated for their nutrient value and soil health. Fewer passes on a field means less compaction, less fuel expense, more time managing your yields. Weed pressure decreases as less soil is disturbed.

The free floating nature of the individual opener assemblies assures even depth control on rough surfaces. Accurate seed planting means less seed can be used; almost 1/2 as much as prescribed for broadcast seeding. As the price of seed rises, using less means more profit.

Noxious Weed Applicator Companies in Four Corners Area

Advantage K-Lawn (Todd Sehnert)

- 970-759-5497
- AdvantageKLawn@gmail.com

Habitat Management, Inc.

- www.habitatmanagementinc.com
- 825 Sullivan Avenue, Farmington, NM 87401
- 505-327-2486

Horizon Environmental Services

- PO BOX 9057 Durango
- 970-259-4346

Intermountain Farmers Association

- 970-739-0261 (Mike Royce)
- Weed Control Service out of Cortez, CO

Premier Weed Control

- Jared Sanders
- 970.903.2835
- jared@premierweedmangement.com

Rocky Draw Weed Control LLC (Jamie Goben)

- Weed Control Service out of Cortez, CO
- Jamesgoben75@gmail.com
- 970-560-1474

Scott's Pro Lawn

- Weed Control Service, Lawn Maintenance
- 53 Misty Ln, Durango
- 970.385.4893

Southwest Weed Control

- Weed Control Service out of Cortez, CO
- 970.759.3399 (Eddy Lewis)

Western Enterprises

- Ag, Rangeland, and ROW spraying
- Lance Meader
- 505-801-8613

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