

Weed Management Reference Guide Larimer County, Colorado

**Information compiled and edited by Chad Clark
and the Land Stewardship Team
Larimer County Department of Natural Resources**

5th edition



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Conservation District

'To educate, promote, and provide information on the wise and proper management of our natural resources'.

The printing and distribution of this reference guide is supported by the Ft. Collins Conservation District. They promote conservation of natural resources on private land by identifying and addressing issues related to water quality and quantity, noxious weeds, range & pasture management, soil erosion, and wildlife habitat enhancements. The District is actively involved in organizing educational workshops on water usage, innovative farm practices, and pasture management for small acreage landowners. They have purchased a Dew Drop Drill that is available for hire through the Weed District office to help landowners with revegetation projects. Northern Colorado Conservation Districts website is: www.nococd.org

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If you would like to contribute to future editions of this guide please contact the Weed District office at 970-498-5768.

About This Book

The purpose of this guide is to provide information helpful to livestock producers, land managers, small acreage landowners and others interested in rangeland & pasture weed management. The information provided is concise but hardly complete. For more detailed information check the references section on page 81.

Behind-the-scenes efforts that make this guide possible go largely unnoticed. We want to thank everyone who helped us out. A very special thanks goes out to Jim Sebastian for his research, photos and expertise that helped make all of this possible.

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Did you know?

We have added these boxes throughout the book to add anecdotal information to each section. For instance, this book was written, edited, compiled and designed by Chad Clark, Tim D'Amato (author of the original document), Maxine Guill, Bobby Goeman, Casey Cisneros and Steve Priest. This book would not be possible without all their effort and hard work.

Larimer County Weed District

For questions, concerns, sprayer loans or retail sales:

970-498-5768 (phone)

970-498-5776 (fax)

Or visit our website at:

www.larimer.org/weeds

Office address (Please call ahead for appointment):

2649 East Mulberry #6, Fort Collins, CO 80524

Shop yard address (Please call ahead for appointment):

614 East Vine Drive, Ft. Collins, CO 80524

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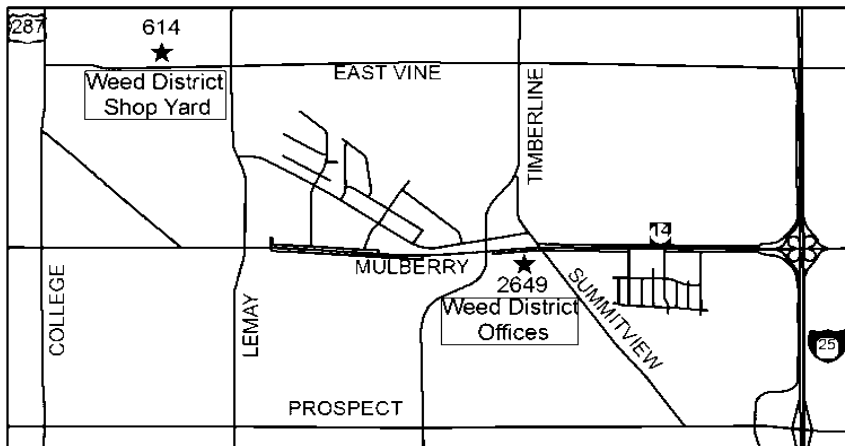
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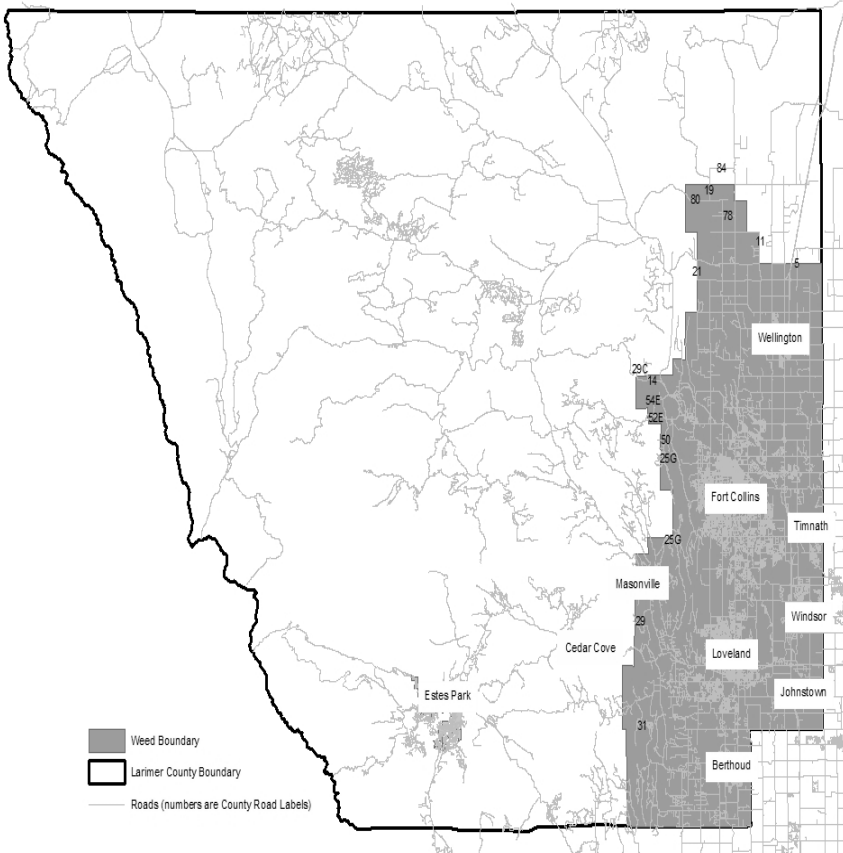
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Weed District Functions

1. Assist landowners with noxious weed problems through plant identification, weed control recommendations, and development of vegetation management plans.
2. Promote noxious weed education and awareness by way of community presentations, site visits, and tours of collaborative field research plots demonstrating best management practices.
3. Manage noxious weeds on county property and roadside rights-of-way.
4. Enforce the Colorado Noxious Weed Act on non-compliant property owners.

Larimer County Weed District Boundary



Cost-Share Programs - For residents within the Weed District boundary, our cost share program offers partial reimbursement for herbicides and/or mowing. Call 970-498-5768 for a pre-approval site visit or more information.

Herbicide Sales - All Larimer County residents may now purchase herbicide through the Larimer County Weed District. Please call for products and prices.

Sprayers for Loan - There are 25 gallon, 65 gallon, and 100 gallon sprayers available for residents of Larimer County. Please call 970-498-5768 to reserve a sprayer. Sprayers are picked up and dropped off at the shop yard at 614 East Vine Drive.

Free Site Visits - A weed specialist will identify weeds, give management recommendations, approve cost share and offer estimates for spraying, seeding, hydro-mulching and/or mowing.

Do Not Spray Requests - A request that the Larimer County Weed District refrain from spraying the roadside adjacent to your property with pesticides. **Property owners requesting NO SPRAY are responsible for noxious weed management within that zone. Requests need to be submitted annually.**

Did you know?

The Larimer County Weed District was originally created in 1960 to address Canada thistle on irrigated farmland and only encompasses about 1/6 of the eastern portion of Larimer County (see map on page 6.) In order for the weed district to provide site visits, management recommendations, and compliance with the State Noxious Weed Act, personnel must charge time against an 'enterprise fund', money raised through contract work. The necessity of raising funds to be active outside the district is burdensome on the weed program and would be unnecessary if all constituents paid a mill levy to support the district. The district hopes to introduce a ballot initiative sometime in the future, proposing expansion of the district to include all of Larimer County.

Weed Law

Colorado Noxious Weed Act (C.R.S. 35-5.5): 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.

Larimer County Weed Management Plan Summary

The Larimer County Weed Management Plan follows the guidelines of the Colorado State Noxious Weed Act which went into effect in 1992. The Act prioritizes 71 noxious weed species into 3 lists: A, B, and C.

- List A species are not well established in Colorado, are potentially a large problem to this state, and require mandatory eradication by local governing agencies. Prescribed techniques for management of List A species are hand pulling, digging, or herbicide application. Mowing, grazing, and insect bio-control are not acceptable forms of management for these species.
- List B species are common enough in parts of the state that eradication is not feasible, though the species are still recommended for eradication, suppression, or containment depending on distribution and densities around the state. Prevention of seed dispersal may be accomplished by mowing, hand pulling, tillage, grazing, or herbicide application.

- List C species are widespread and well established. Control of List B and C species is recommended but not required by the state. However, local governing bodies, such as Larimer County, may require management.

All local governing agencies (cities and counties) are required to have a weed management plan, and that plan must contain, at a minimum, the List A species. Agencies can then choose weed species of local concern to add to management plans.

- The Larimer County Weed Management Plan requires eradication of all List A species, as mandated by the state, and containment or suppression measures for 16 species identified as significantly troublesome in Larimer County. County outreach programs emphasize identification and management of 16 species. **The County reserves the right to enforce on any state-listed noxious weed if the infestation size and density deems it necessary.**
- The Larimer County Weed Management Plan cannot be enforced on private or public property without first applying the same measures to any land or rights-of-way owned or administered by the County that are adjacent to such properties.
- The Larimer County Weed Management Plan can be accessed at: www.larimer.org/weeds

Enforcement Procedures

The Colorado Noxious Weed Act mandates that every local governing agency manage noxious weeds within their jurisdiction. It is the obligation of the Larimer County Weed District to conduct enforcement procedures to ensure the detrimental effects of noxious weeds are not imposed on the environment and/or economy of the county. The weed district will make every effort to assist landowners in compliance prior to carrying out

enforcement action. The weeds that will be enforced upon are on the Larimer County Noxious Weed List and Weeds Mandated for Eradication by the State of Colorado. Enforcement procedures are:

- When a noxious weed problem is brought to the attention of the weed district and confirmed by a weed specialist, a notice to enforce will be sent by certified mail.
- A courtesy notice is sent prior to the enforcement notice, at the discretion of the district office, if time allows for subsequent effective management.
- County weed management personnel will be available for site visits and management recommendations free of charge.
- Upon receiving the enforcement notice, the land owner has ten days to:
 - Manage the weed in the prescribed manner.
 - Present a weed management plan.
 - Option for waiver.
- After 10 days via legal Right of Entry, Larimer County can enter upon the property of non-compliant landowners and conduct appropriate management action (mowing, spraying, etc).
- The land owner is responsible for all costs of management action.

Management Methods

This guide contains a short summarization of the most troublesome weed species in the Larimer County area and management options. Weed management decisions vary according to plant life cycles, infestation size, environmental conditions and management objectives. For more detailed information, consult the Larimer County Weed District website at www.larimer.org/weeds.

General Information

- Early control of new weed infestations through proper identification and eradication, early detection and rapid response (EDRR) saves substantial time and expense.
- An established stand of a perennial weed such as leafy spurge or Canada thistle cannot be completely controlled in one season, persistence is necessary.
- Understanding plant life cycles and growth stages is necessary to effectively manage weeds.
- The best management practice is using an integrated method of two or more of the following controls.

Biological Control

- Insects are available through Colorado Dept of Agriculture, Toll Free 866-324-2963.
- Insect bio-control is best used on large weed infestations or in areas of rugged terrain where other management options are not practical.
- Eradication of a weed species will not be attained strictly through insect bio-control.
- Expect 3-5 years following release for establishment and impact on a target weed.
- Livestock grazing can provide suppression of some weed species, but results are no greater than what mowing would accomplish.
- Repeated and intense grazing constitutes a disturbance itself, which is often the initial cause of weed infestations.

Chemical Control (see more detailed information – pg 57)

- Herbicide application can provide the most effective and time-efficient method of managing weeds.
- Most recommendations in this guide are for ‘selective’ herbicides, or products that can be broadcast applied and not injure most grass species.

- Spot-spray applications of non-selective herbicides (Roundup and others) should generally be effective for controlling any of the weeds listed in this guide, however, it is important to note that because it is non-selective it may injure or kill adjacent desirable vegetation.
- **Always consult the product label for specific rates and uses (pasture, non-cropland, riparian, etc.)**
- Proper surfactant choice is critical for effective use of many herbicides (see label).
- Herbicide rates are given in amounts of product per acre. Spray equipment calibration is necessary for accurate measuring and mixing of an herbicide prior to application. Refer to instructions on page 79-80 of this guide for simple calibration steps.
- The herbicide ‘Tordon’ is frequently cited as a product that provides effective control for many noxious weed species. Tordon is a “Restricted Use Pesticide,” a classification that restricts the purchase and use to a certified pesticide applicator or to usage by anyone under the direct supervision of a certified applicator (see page 59 for instructions on how to become certified).

Cultural Control (see more detailed information – pg 14)

- Cultural control, the establishment of desirable and competitive vegetation, prevents or slows down invasion by non-native species and is essential for effective weed management.
- Establishment of desirable vegetation can often be attained by controlling weed populations and shifting dominance to desirable existing vegetation.
- Without desirable existing vegetation, re-seeding becomes necessary.
- Moisture levels or areas prone to erosion may warrant the use of a hydro-mulch to help seed germination and soil stability.

Mechanical Control

- Mowing a weed infestation may prevent seed dispersal and provide suppression, but plants typically re-grow and often set seed from a reduced height.
- When digging or hand pulling any biennial species always sever the root at least 2-4 inches below soil surface or re-growth may occur.

Grass Grazing

Long ago, successful cattlemen coined the phrase, "Take half and leave half." A grazing study by Crider tested the effects of leaf removal on root development. Taking 50% of the leaves and the roots continue to grow normally. Harvest another 10% and half the root growth stops, and at 80% root growth stops completely for 12 days. A large actively growing root system is vital to supply the leaves with moisture and minerals needed for pasture production. With Larimer County being a semi arid climate re-growth may take from three weeks to four months during dry periods. Not given the time for growth, weeds will take hold and the pasture will become less productive.

Restoration/Re-vegetation of Range or Pasture

The first thing one should know and realize is that a restoration/re-vegetation project is a process and can take several years for the desired results. A project intending to restore the land to desired vegetation requires diligence and persistence. It is never a simple solution. The purpose of this section is to establish a base or checklist of factors to help the landowner determine if restoration/re-vegetation are viable options and to emphasize the

time, scope and costs involved. Range or pasture disturbed by excessive grazing, drought, weed invasion and other factors, should first be evaluated for recovery potential before making a decision to re-seed. Often times a change in grazing schedule or duration, or control of weeds allows existing, though suppressed, desirable grasses to recover without re-seeding.

If a site is so highly disturbed that recovery is not possible through management, then re-vegetation becomes necessary. Successful re-vegetation requires several years and proper soil preparation, seed placement and timing. Often, after seeding a good way to lock in moisture is by hydro-mulching the seeded area. Many other factors need to be considered prior to seeding:

- Existing Vegetation - One of the greatest barriers to successful re-vegetation is weed competition. It is essential to minimize weeds prior to planting grasses.
- Cost - Are you prepared to absorb the costs associated with this type of project? Not only are there several steps that are costly just to prepare the land but the time required may be the most costly endeavor of the project.
- Soil composition - Different soils require different seed mixes and fertilization. If you are unsure of your soil type, be sure to consult the NRCS or a soil scientist to get an idea about what type of vegetation the soils on your property can support.
- Soil compaction - This can impede moisture penetration and grass root establishment. If severe enough, mechanical tillage such as deep chiseling or ripping becomes necessary prior to seeding.
- Cover crop - The establishment of residual plant stalks helps to protect grass seedlings from wind and capture snow for increased soil moisture. This is accomplished by planting sterile hybrid forage sorghum or sudangrass in the spring prior to planting grass seed the following winter. The cover crop has completed its life cycle by fall, but the

decaying stalks and leaves serve as seedling protection, ground cover and contribute organic matter to the soil.

- Species selection - Based on landowner objectives of grazing, haying, wildlife habitat, etc., a landowner must decide on native or non-native grasses, and which species and varieties are best suited to a particular soil type and moisture availability.
- Grass seeding - Referred to as ‘drilling,’ requires the right planting equipment, proper depth of seed placement (0.25 – 0.5 inches) and correct seeding rate.
- Timing - The Natural Resource Conservation Service (NRCS) recommends various optimum times for grass seeding based on elevation and availability of water.
- Unforeseen factors - Drought, flood, excessive heat, excessive cold, new plant invasions, wildlife movement, drainage, fire, natural disaster, or any other event that is not planned for can cause a project to be unsuccessful. It is always important to have an alternative plan or to be ready to change direction with a project if any event affects its course.

Site visits and recommendations on species selection and planting techniques are provided by the Larimer County Weed District and the Ft. Collins NRCS office – 970-295-5655. Several seed companies serve the Larimer County area and can blend seed mixes according to local needs and refer landowners to commercial seeders. For a brief list of companies please refer to our website at www.larimer.org/weeds.

Plant Identification & Management Guide

Proper identification of the plant(s) on your property is essential for creating a management scheme and for a successful project. Please call the weed district for a free site visit.

The plants in this guide are split into the following groupings:

List A species found in Larimer County (Pages 18 to 23)

<u>Common name (<i>Genus species</i>)</u>	<u>Pages</u>
Cypress spurge (<i>Euphorbia cyparissias</i>)	20

Mediterranean sage (<i>Salvia aethiopsis</i>)	18-19
Myrtle spurge (<i>Euphorbia myrsinites</i>)	20
Orange hawkweed (<i>Hieracium aurantiacum</i>)	21
Purple loosestrife (<i>Lythrum salicaria</i>)	22
Yellow starthistle (<i>Centaurea solstitialis</i>)	23

Larimer County Weed List (Pages 24 to 36)

<u>Common name (<i>Genus species</i>)</u>	<u>Pages</u>
Bull thistle (<i>Cirsium vulgare</i>)	24-25
Canada thistle (<i>Cirsium arvense</i>)	26-27
Common teasel (<i>Dipsacus fullonum</i>)	27
Dalmatian toadflax (<i>Linaria dalmatica</i> , <i>Linaria genistifolia</i>)	35-36
Diffuse knapweed (<i>Centaurea diffusa</i>)	30
Hoary alyssum (<i>Berteroa incana</i>)	28
Hoary cress (<i>Cardaria draba</i>)	29
Houndstongue (<i>Cynoglossum officinale</i>)	29
Leafy spurge (<i>Euphorbia esula</i>)	32
Musk thistle (<i>Carduus nutans</i>)	24-25
Perennial pepperweed (<i>Lepidium latifolium</i>)	33
Russian knapweed (<i>Acroptilon repens</i>)	31
Scotch thistle (<i>Onopordum acanthium</i>)	24-25
Spotted knapweed (<i>Centaurea maculosa</i>)	30
Tamarisk or saltcedar (<i>Tamarix ramosissima</i>)	34-35
Yellow toadflax (<i>Linaria vulgaris</i>)	35-36

Troublesome Weeds are asked about quite often, though they are not currently on the County Weed List (**Pages 37 to 45**)

Poisonous Plant species in Larimer County (Pages 46 to 56)

Following are written descriptions organized with the following bullet points designating what information are relayed in them:

- Lifecycle, history, plant characteristics, and location
- ☠ Toxic properties
- ❖ Pasture management tip
- 🐛 Biological control recommendation
- ⚒ Mechanical control recommendation
- 🧴 Chemical control recommendation

- Recommended Control - **Highlighted** text is the recommended control for the species determined from research conducted by the Weed District, Colorado State University and others. Herbicide recommendations are generally given as the original brand name, although other brand names may exist, see index on page 60-61 or the individual herbicide page for a listing of all names. The exception, 2,4-D and dicamba, are referred by chemical names because the brand names are too numerous to list.

Pictures of plants can be found after page 56 with Figure numbers that correspond to the Figure numbers in the text.

Did you know?

Beginning in January of 2012, a permit called the National Pollutant Discharge Elimination System (NPDES) has been set up as per the Clean Water Act. The permit is available through the Colorado Department of Public Health and Environment (CDPHE) and is specific to applications in or near water. Check with the CDPHE or the Weed District before making any applications in or near water to insure compliance.

Li

st A Species – Found in Larimer County

Mediterranean sage (*Salvia aethiopis*) (Figure 3)

- A biennial member of the mint family that reproduces only by seed. Mediterranean sage germinates in the spring, summer or fall. The plant initially appears as a rosette with large velvety leaves that are very similar in appearance to common mullein. The distinguishing feature between the two plants is the foul

aroma of Mediterranean sage, easily detected from pinching a leaf. The plants bolt (send up a flowering shoot) in May, flower and set seed in June-July. A square stem, common to most plants in the mint family, is another useful identification characteristic of Mediterranean sage. The flowers are white, arranged on a globe-shaped inflorescence that comes to a point. Soon after setting seed, the plants dry, break off at the base and tumble with the wind, spreading seed.

- Mediterranean sage is a prolific seed producer that can spread rapidly if not controlled. The plant is a problem in rangeland and pasture areas of Idaho, Washington and Oregon. Small populations occur in Boulder, Garfield, Larimer and Montezuma Counties in Colorado. It is believed that the spread of seed in Colorado has come from contaminated hay. In Larimer County, the Mediterranean sage population is located near Berthoud, Champion and in the Blue Mountain area both just north of the Boulder County line. Intense eradication efforts are being conducted in Larimer County with hopes of eliminating Mediterranean sage from the county in the next few years. **Report any suspected sightings in Larimer County immediately to the Weed District office!**

- ☠ The plant is not palatable to livestock or wildlife.
- 🐛 An insect bio-control agent that feeds on Mediterranean sage has been tested on sites in Colorado but has not been effective.
- ✂ Mowing Mediterranean sage is not an effective means of control, as the plants readily re-grow. Digging or hand pulling is effective if enough of the root (3-4 inches) is removed to prevent re-growth. If flowering plants are manually removed, bagging and disposal is necessary to prevent seed dispersal.

🧴 Dicamba, 2,4-D, Escort, Telar, Milestone and Tordon provide effective control of Mediterranean sage. Good coverage of the leaf surface area as well as a non-ionic surfactant in the spray mix is critical to ensure adequate uptake of the herbicide through the wooly leaves of Mediterranean sage.

- **The most common recommendation for control of scattered plants in small areas is hand pulling or digging.**

Flowering plants must be bagged. When manual removal is not feasible on larger areas, an herbicide application of Escort + 2,4-D + non-ionic surfactant in a tank mix is most effective at rosette stage.

Invasive Plant Species in Larimer County

Invasive plants are a threat to the economy and environment of Larimer County. These invaders, better known as noxious weeds, originated in other parts of the world and when introduced into this country, have flourished. Infestations of noxious weeds threaten our native plant communities, reduce species diversity and in doing so, reduce wildlife habitat. Noxious weeds on rangeland and farmland are extremely costly to agricultural producers, either reducing yields or imposing a management expense.

The Larimer County Weed District is working to minimize existing weed problems in the County, and eliminate new invaders before they take hold. The District assists residents with site visits, plant identification, management recommendations, provides educational information on invasive species, and works with residents to be compliant with the Colorado State Noxious Weed Act.

Myrtle spurge (*Euphorbia myrsinites*) (Figure 6),
Cypress spurge (*Euphorbia cyparissias*) (Figure 4)

- These two spurge species have simple perennial life cycles and reproduce only by seed. Both were formerly sold as ornamental plants until placed on the prohibited sales list by Colorado Department of Agriculture in 2003. These drought-

hardy ornamental plants have escaped into natural areas and become an invasive species problem in the foothills and Estes Park.

- Myrtle spurge tends to have a decumbent (flattened) growth structure, with very waxy, succulent leaves. Flowering occurs in April and May. A very caustic latex sap is present throughout the leaves and stems that may cause a rash on skin, or permanent damage if in contact with the eye. Seed longevity is estimated to be 8 years in the soil.
 - Cypress spurge grows 4-30 inches tall and produces yellow-green flowers in the spring that continue into autumn. The plant has numerous leaves that are very narrow. Like myrtle spurge, the stems and leaves of cypress spurge contain caustic latex that is irritating to skin and eyes.
 - ☠ Myrtle spurge produces diarrhea in cattle although they tend to avoid eating it. People who get the milky sap on their skin can develop dermatitis.
 - 🐛 There are no insect bio-control agents available for either of these spurge species.
 - ✂ Mowing is not practical because of the plants' decumbent growth structure. **The most common recommendation for control of myrtle spurge and cypress spurge is hand pulling or digging, with proper caution to prevent skin or eye contact with the caustic latex present throughout the plant.**
- 🧴 Excellent control can also be attained from application of 2,4-D, with adequate surfactant to penetrate the waxy leaf surface.




Orange hawkweed (*Hieracium aurantiacum*) (Figure 1)

- A perennial forb of the sunflower family that reproduces by seed, underground rhizomes or above ground stolons (runners similar to those on strawberries). Orange hawkweed grows to

12 inches tall and produces showy flowers from mid-June through August. The flowers are arranged in clumps at the end of the stems. Leaves are at the base of the plant in a dense mat, with occasional 1-2 leaves on the stem. The stems are bristly or hairy, and when broke apart produce a milky juice. As the plants mature, seed heads are formed that are very similar to dandelion seed heads, readily blowing in the wind.

- Orange hawkweed thrives in moist meadow sites and is a widespread problem in wildland areas of the Pacific Northwest. Infestations are more limited in Colorado with sites reported in mountain counties. In Larimer County, very small patches have been found and recently eradicated (or nearly so) in Rocky Mountain National Park, in the Waltonia neighborhood and on adjacent US Forest Service lands.

Report any sightings or suspected sightings in Larimer County immediately to the Weed District office!


-  Grazing and insect bio-control are not viable management options for this List A species.
-  Hand pulling or digging can reduce seed production and stress plants, but this perennial will readily grow back.
-  Milestone, Transline, Tordon, and 2,4-D provide excellent control of orange hawkweed.
- **The most common recommendation is an application of Milestone prior to seed production.**


Purple loosestrife (*Lythrum salicaria*) (Figure 2)


- Purple loosestrife was formerly sold as an ornamental garden plant, and is now listed as a noxious weed due to invasive tendencies in riparian areas. Purple loosestrife is a rhizomatous perennial that reproduces by rootstalks and seed. Showy purple/lavender flowers appear mid-summer, arranged along a spike at the tops of the plants. Stalks are distinctively

square shaped and leaves are lance shaped with smooth edges. Plants grow 6-8 feet tall and can produce 2.5 million seeds that can remain viable for 20 years.

- Infestations in Colorado are often found inter-mixed with cattails along streams, ponds, and sloughs. Purple loosestrife is most problematic in New England states and the upper Midwestern U.S. where solid stands occur over hundreds of acres, displacing native wetland plants and diminishing wildlife habitat. Few infestations are known to exist in Larimer County, and hopefully those found will be eradicated before becoming large scale problems similar to those found in other states. **Report any sightings or suspected sightings in Larimer County immediately to the Weed District office!**

 Insect bio-control agents are available for use on purple loosestrife but are not a feasible management choice in Colorado where eradication is possible.

 Hand pulling or digging is only effective if all the rootstalk is removed. Purple loosestrife infestations are difficult to spot before flowering occurs in July.

 Most infestations occur in standing water, and herbicide use is limited to those that have an aquatic label. Rodeo, Garlon 3A, Habitat, Clearcast and several formulations of 2,4-D effectively control purple loosestrife and are registered for use in and around water.

- **A common management practice is to wait till the flowering stage when plants are most visible, then cut and bag seed heads and spot-spray the remaining portion of the plant with an herbicide.**

Yellow starthistle (*Centaurea solstitialis*) (Figure 11)

- A member of the knapweed genus, this annual forb is extremely invasive and could become Colorado's worst weed problem if infestations are left uncontrolled. Yellow starthistle germinates in spring, summer or fall, depending on rainfall. Plants first emerge as a bluish-green rosette with deeply lobed leaves. Plants grow 2-4 feet tall with stems that

are distinctively winged. Bright yellow flowers, similar in color to dandelion flowers, occur singly on the ends of branches. Below the flowers are sharp laterally extending thorns, ½ - 1 inch long.

- Yellow starthistle infests 15-20 million acres in California and millions more in other western states with climate and elevation similar to Colorado. Several small infestations have been discovered in Colorado, including one in Larimer County west of Berthoud. Seed introduction occurs when construction equipment, livestock feed, bedding straw, and other carriers are brought in from other states. Aggressive action is being taken to eradicate yellow starthistle by the Colorado Department of Agriculture and Larimer County Weed District. **Report any sightings or suspected sightings in Larimer County immediately to the Weed District office!**

- ☠ Yellow starthistle, like Russian knapweed, if eaten over a period of months by horses will cause an incurable disease called “Chewing Disease”. Affected horses are unable to bite-off and chew their food and will subsequently starve to death.
- 🐜 Insect bio-control agents are available but not recommended for management on Colorado’s limited infestations.
- ☠ Grazing and mowing are ineffective for managing this very resilient noxious weed. **Hand-pulling or digging any annual plant is effective. If in the seed stage, or even late flower stage, plants must be bagged and properly disposed.**



Herbicide applications need to occur prior to seed production. Milestone, Transline, and Tordon all provide excellent control of yellow starthistle.

Species on the Larimer County Weed List

Biennial Thistles

Bull thistle (*Cirsium vulgare*) (Figure 17)

Musk thistle (*Carduus nutans*) (Figure 15)

Scotch thistle (*Onopordum acanthium*) (Figure 16)

- These three thistle species are found in Larimer County from the plains to 9,000 feet. The plants are tap-rooted biennials

that reproduce only by seed. Germination occurs in early spring, late summer or early fall. Newly emerged plants overwinter in a rosette stage, bolt, then flower in the spring or early summer of the following season. From mid-summer into fall, these thistles begin producing seed which is attached to a white cotton-like material, referred to as pappus, which carries seed in the wind. Seed longevity is variable but can last up to 10 years.

- **Bull thistle** grows 2-5 feet tall and has a more branched growth form than musk or Scotch thistle. The leaves are deeply lobed and tipped with a yellow-tan colored thorn. Flowers are deep purple and with very spiny bracts below.
- **Musk thistle** grows to 8 feet tall. Leaves are somewhat lobed with wavy margins and a prominent, light green mid-vein. Flowers appear singly, on the end of stalks, are rose colored and with by broad, pinecone-like bracts below which is a good identification characteristic.
- **Scotch thistle** can grow to 12 feet tall. Leaves, particularly at the rosette stage, are covered with white hair giving them a gray-blue color. Flowers are purple with spiny bracts below, much like those of bull thistle.
- Musk thistle is the most common of these three species, and found throughout Larimer County. Bull thistle and Scotch thistle are less common and should be aggressively controlled where found to prevent further spread in this area.
- Management of these species, or any biennial weed species, is a matter of depleting the seed bank in the soil. Effective control measures must be applied for several consecutive years without further seed production.
- ☞ An insect agent, *Rhinocyllus conicus*, was released in 1969 for suppression of musk thistle. The seedhead-feeding weevil had unintended impacts on native thistle species and is no longer released but is present throughout the western United States. This insect appears to provide suppression of musk thistle populations cyclically but does not provide long term control.
- ☞ Mowing and grazing can provide suppression but plants often re-grow and set seed from a reduced height. **Manual removal by pulling or digging is effective if carried out prior to**

seed production. With matured plants, it is important to properly bag and dispose of them to prevent seed spread.

Herbicides must be applied prior to the late flowering stage or seed may still be produced. A number of products provide excellent control: Milestone, Perspective, Transline, Telar, and Tordon.

Colorado Thistles

Fifteen native and five non-native thistle species are found in Colorado. Four of the five non-native thistles are listed in this book, (only plumeless thistle is not found in Larimer County). Native thistles are an important part of many ecosystems ranging from 3,500 feet in elevation to the tundra. Native thistles are valuable to pollinators, browsing animals and contribute to the beauty and diversity of native plant communities. It is important that land managers discriminate between native and non-native species when managing weeds. For more information, check out the Thistles of Colorado guide available at the Larimer County Weed District office.

Canada thistle (*Breca arvense*) (Figure 18)

- A deep-rooted perennial plant that reproduces by seed or extensive underground rootstalks. Seeds can remain viable in soil for up to 20 years. Canada thistle plants first appear in early spring in a rosette growth stage, soon producing stalks that grow to 4 feet tall. Leaves have shallow lobes with wavy margins. Pink or purple flowers (sometimes white) appear from June – August. Seed is produced in late summer attached to pappus, a cotton-like material, and dispersed by wind.

- Canada thistle is the most common noxious weed problem in Colorado. This aggressive invader is costly to agricultural producers as well as managers of roadsides and natural areas.

☠ Canada thistle may accumulate high levels of sulfates which can result in blindness and death.

☠ Canada thistle can accumulate nitrates which cause respiratory difficulty, brownish discoloration of mucous membranes, drowsiness, weakness, tremors, and staggering gait. High doses of nitrate will cause sudden death.

- Controlling Canada thistle, as with any deep-rooted perennial plant, requires several years of management and monitoring.

🐛 Insect agents are available but have not been effective in Larimer County.

✂ Livestock grazing and mowing effectively suppress Canada thistle through the summer and can prevent or slow down seed production and dispersal, but plants will quickly re-grow with no further management action. Hand pulling a deep-rooted perennial is futile. Shallow tillage such as disking or sweeping has shown to be counter-productive. Re-growth is quick and the spread of root stalk results in more dense and uniform stands of Canada thistle than before.



Herbicides are effective and should be applied in spring prior to seed set or in the fall before a hard frost. Milestone, Perspective, Transline and Tordon all provide excellent control of Canada thistle. Dicamba, Telar, 2,4-D and

combinations of these products provide suppression but not long term control.

- **Best management of Canada thistle is mowing in the summer followed by an application of Milestone in the fall. Spot treating escaped plants in subsequent years is critical if eradication is desired.**

Common teasel (*Dipsacus fullonum*) (Figure 10)

- A tap-rooted biennial plant that reproduces only by seed. Plants germinate in late summer or early fall, over-winter in a rosette stage, bolt and flower in the spring or early summer. The rosette leaves are dark green with a wrinkled surface. Stem leaves are narrow, up to ten inches long, and cup-shaped at the base to catch rainfall. Plants grow to six feet tall producing purple flowers on dense, prickly heads. Below the flower heads are spiny bracts which grow longer than the head.
- Common teasel thrives on moist sites and is widespread along ditch banks, streams, river bottoms and ponds in Boulder and Jefferson Counties. Though not yet common in Larimer County, this escaped ornamental plant potentially threatens our wetland plant communities.
- 🐞 There are no insect bio-control agents available for teasel control.
- ✂ Effective management requires prevention of seed production, which can be accomplished by hand pulling or digging where feasible. Mowing can reduce seed production but plants will re-grow and set seed from a reduced height.
- 🧴 A number of herbicides selectively control common teasel: Milestone, Transline, 2,4-D, dicamba, Escort, Telar, and Plateau. Proximity to water needs to be considered when selecting an herbicide. Be sure to read labels carefully.
- **The most effective treatment for infestations at water's edge is Milestone. If plants are in standing water apply Rodeo (glyphosate approved for aquatic infestations).**

Hoary alyssum (*Berteroa incana*) (Figure 21)

- Hoary alyssum is an annual, biennial or short-lived perennial plant found along roadsides and disturbed areas of range and pasture. Plants grow 1-3 feet tall, with rosette leaves, 2-3 inches long and lance shaped, appearing at the base of the plant. Smaller upwardly pointing leaves, alternately arranged, are present along the stalks. Plants produce small white 4-petaled flowers, notched at the center, and arranged in tight clusters. Flowering occurs spring through summer.
- This non-native invasive plant was added to the Larimer County weed list in 2011 and is becoming increasingly common in some areas of Larimer County, particularly in the Estes Valley and Red Feather Lakes area. It has also been confirmed near Pinewood Springs and Loveland.
- While hoary alyssum is not currently on the State of Colorado's weed list, it has been added to the Larimer County Noxious Weed list.
- ☠ Hoary alyssum is toxic to horses, causing laminitis, limb edema, diarrhea, dehydration, intravascular haemolysis, and hypovolemic shock, and abortion in pregnant mares. Mortality in horses has been observed when horses consumed a diet of hay containing 30-70 percent hoary alyssum. When mixed with alfalfa hay, hoary alyssum can remain toxic for up to nine months.
- 🐛 No insect bio-control agents are available.
- ⚒ Hand pulling or digging is effective but persistence is necessary.
- **Escort, Plateau/Panoramic, and Telar provide excellent control of this mustard species.**

Hoary cress (*Cardaria draba*) (Figure 19)

- Also known as white top, hoary cress is a perennial plant that grows from a rosette stage to flowering plant in the very early spring. Plants grow to 2 feet tall with white flowers. Leaves are lance-shaped and blue-green in color. Plants thrive along roadsides and in alkaline soils.
- Hoary cress is a List B species on the state weed list and was added to the Larimer County weed list in 2011.
- ☞ No insect bio-control agents are available for this species.
- ☞ Mowing and grazing can provide suppression but plants often re-grow and set seed from a reduced height.
- **Escort, Plateau/Panoramic, (Clearcast inside ditches-see label) and Telar provide excellent control of hoary cress. Applications should be made in the spring at the flowering stage.**

Houndstongue (*Cynoglossum officinale*) (Figure 9)

- Houndstongue is a tap-rooted biennial plant that reproduces by seed only. Plants germinate in summer/fall, and over-winter as rosettes. Leaves are light green, 4-12 inches long with smooth edges. Houndstongue bolts in the spring, growing 1-4 feet tall and produces red-purple flowers in mid-summer and seed by fall. Seeds are Velcro-like, attaching to clothing and animals. There is no data available on seed longevity in the soil.
- Scattered infestations of houndstongue can be found throughout Larimer County. The plants appear to do best in areas of high moisture. The seeds are a nuisance to people and animals.
- ☞ Houndstongue contains alkaloids that can lead to permanent liver disease and photosensitization when consumed in hay.
- ☞ No insect bio-control agents are currently available but may be in the near future.
- ☞ **Digging or hand pulling scattered plants is effective.**

- **The most effective herbicides for controlling houndstongue are dicamba, Escort, Telar, 2,4-D, Plateau, and Tordon.**

Knapweeds

Diffuse knapweed (*Centaurea diffusa*) (Figure 13)

Spotted knapweed (*Centaurea maculosa*) (Figure 14)

These two species are similar in appearance and frequently found together, along with hybrids of the two.

- Diffuse knapweed is primarily a biennial that germinates in summer/fall and over-winters as a rosette. The plants grow 1-2 feet tall with finely divided leaves and produce mostly white, sometimes lavender flowers in spring/summer. Below the flowers are spiny bracts. By late summer seed is produced, plants begin to dry, and by winter break off at the base and become tumbleweeds.
 - Spotted knapweed is a short-lived perennial that grows to 3 feet tall. Unlike diffuse knapweed, spotted knapweed does not become tumbleweed. Rosette leaves appear at the base of the previous year's growth in fall or spring. Spotted knapweed produces pink-purple flowers from June through October. The bracts beneath the flowers appear as black spots, which distinguish spotted from diffuse knapweed.
 - Diffuse and spotted knapweeds are prolific seed producers that can spread very rapidly and remain viable in the soil for 15 years. Infestations are found from Estes Park to Pinewood Springs, along Hwy 287 from Livermore to Wyoming, and in the Red Feather Lakes area.
- ☞ Numerous insects have shown fair to good results for both knapweed species. Most effective have been a seed head weevil *Larinus minutus* and root weevils *Cyphocleonus achates* and *Sphenoptera jugoslavica*.
- ☞ Mowing can reduce seed production and prevent plants from blowing and dispersing seed, but serves only to suppress infestations. **Hand pulling either of these tap-rooted plants is effective as long as plants that have produced seed are bagged.**



Herbicide applications of Transline and Tordon provide best control when applied prior to the late flower stage to prevent seed production.

Russian knapweed (*Acroptilon repens*) (Figure 12)

- A perennial weed that reproduces from seed and vegetative root buds. Seeds remain viable for 2-3 years. Russian knapweed emerges in the spring, bolts in early summer, and flowers by mid-summer. The plants grow to 3 feet tall with blue-green leaves. Russian knapweed has black roots, evident upon pulling a plant, and is a useful identification characteristic. The flowers are pink-purple with papery bracts beneath. This weed is allelopathic, meaning it exudes a chemical that inhibits the growth of other plants, often resulting in solid stands of Russian knapweed.
- Russian knapweed is a widespread problem in Colorado, and becoming more common in Larimer County.
- ☠ If it is eaten over a period of months by horses it can cause an incurable disease called “Chewing Disease”. Affected horses are unable to bite-off and chew their food and will subsequently starve to death.
- 🦋 There are currently no insect bio-control agents available for Russian knapweed though some may become available for releases in the near future.
- ✂ Mowing reduces seed production and stresses the plant, but is not an effective management tool.
- 🧴 Milestone, Perspective, Telar, Tordon, Transline, and Plateau all provide excellent control of Russian knapweed.
- **The most effective recommendation is an application of 7 oz/acre Milestone + 1 oz/acre Telar; or 4-5 oz Perspective (in areas with no livestock grazing – see label).**

Leafy spurge (*Euphorbia esula*) (Figure 5)

- Leafy spurge is a deep-rooted perennial that reproduces by rootstalks and seed. Seed can remain viable for 8 years. Plants emerge in early spring, grow 2-3 feet tall and produce yellow-green flowers in April - May. The leaves are narrow, 1-2 inches long. The entire plant contains milky latex, which is an identification characteristic for leafy spurge. The latex can easily be seen after tearing a leaf or breaking a stem.
- Leafy spurge infests millions of acres in Montana, North Dakota, and Wyoming. It is the worst noxious weed problem in Ft. Collins and much of Larimer County. This perennial invader has taken over many acres along the Poudre River from the middle section of the Poudre Canyon to the Weld County line, along the North Fork of the Poudre from Livermore to Seaman Reservoir, Bellvue, Rist Canyon, LaPorte, and north of Ft. Collins, however, small infestations found throughout the County and can easily be managed.
- ☠ Leafy spurge can produce salivation and diarrhea in cattle although they avoid eating it. The latex is also irritating and damaging to skin and eyes of humans.
- 🪲 Several species of flea beetle (*Aphthona spp.*) have been effective in significantly reducing stands of leafy spurge. Effectiveness is site-dependant and varies from year to year.
- 🪲 Mowing, grazing, and herbicide application can be compatible with insect bio-control, but these management efforts should occur in late summer or fall.
- 🐐 Sheep and goats can be trained to browse leafy spurge. Mowing and grazing are effective in depleting root reserves. Hand pulling or digging can reduce seed production and stress plants, but this perennial will readily grow back.
- 📱 2,4-D and dicamba provide suppression of leafy spurge, but not long term control. Tordon and Plateau are fairly effective but can injure cool season grasses such as smooth brome.
- **Paramount and Perspective tankmixes with Overdrive provide best control with little or no grass injury (rate**

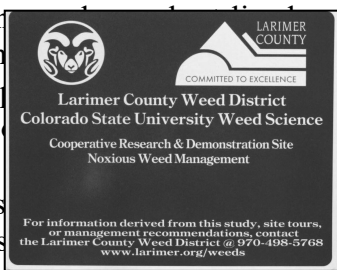
dependant). Management efforts require several years for effective control.

Perennial pepperweed (*Lepidium latifolium*) (Figure 20)

- Perennial pepperweed, or tall whitetop, is a perennial forb with rhizomes, that grows to 5 feet tall. Flowering occurs early in the spring or summer with white flowers arranged in dense clusters at branch tips. This plant is tolerant of saline soils and typically found in wetland areas.
- Perennial pepperweed is a List B species on the state weed list and was added to the Larimer County weed list in 2011.
- 🐛 No insect bio-control agents are available for this species.
- ✂ Mowing and grazing can provide suppression but plants often re-grow and set seed from a reduced height.
- **Escort, Plateau/Panoramic, (Clearcast inside ditches-see label) and Telar provide excellent control. Applications should be made in the spring at the flowering stage.**

Tamarisk/saltcedar (*Tamarix ramosissima*) (Figure 31)

- A deciduous shrub or small tree introduced into this country for erosion control, windbreaks and as an ornamental. Tamarisk is often referred to as saltcedar, due to the presence of cedar-like leaves that exude salt creating saline soils that exclude other vegetation. These plants thrive on wet soils, growing to 30 feet tall and often forming solid stands. Tamarisk flowers are pink and bloom from April until September, resulting in as many as 600,000 seeds produced from a single tree. Fortunately the remaining viable for just a few months. Tamarisk seedlings grow very rapidly within a season, and are capable of germination.
- This highly invasive plant infests acres along waterways in the west. Arkansas and Colorado River corridors are heavily infested



Did you know?

Many weed management recommendations in this guide are a result of collaborative field research studies conducted by Larimer County Weed District and the Colorado State University Weed Science program, composed of Jim Sebastian, Dr. Phil Westra, Dr. Scott Nissen, Dr. George Beck, Dr. Andrew Norton, as well as Dr. Rich Hansen (APHIS) and all of their graduate students. Field tours can be arranged by contacting the Weed District office.

and demonstrate what can result if tamarisk is not managed. In Larimer County tamarisk can be found around ponds, lakes, reservoirs and gravel pits. Residents here are in the enviable position of eliminating tamarisk at an early stage of infestation, as opposed to facing extensive stands such as those along the Arkansas or Colorado River.

- 🐛 A defoliating insect that feeds on tamarisk, *Diorhabda elongata*, was released in western Colorado in 2005 and has had promising results. In Larimer County, sparse stands of tamarisk are not extensive enough to justify insect releases when other management methods can result in eradication.
- ✂️ Mechanical treatments, such as cutting, bulldozing and fire are temporarily effective, though an herbicide application is necessary to prevent subsequent sprouting. Smaller trees are pulled out of the ground with a weed wrench.

🪛 The most common method of controlling tamarisk, referred to as a cut-stump treatment, consists of cutting a tree at the base and applying an herbicide to the stump to prevent re-sprouting. The application must be immediate or the sap can dry and prevent herbicide movement to the roots.

- **The most effective herbicides are Habitat and Garlon, which must be applied with a crop oil concentrate. Smaller trees can be controlled by a foliar application of these products.**

Toadflaxes

Dalmatian toadflax (*Linaria genistifolia*) (Figure 7)

Yellow toadflax (*Linaria vulgaris*) (Figure 8)

- These two closely related plants are perennials that reproduce from seed or rootstalks. The plants are members of the snap dragon family, and were introduced into this country as ornamental garden flowers. Generally, Dalmatian toadflax is found on dry, rocky foothill sites and yellow toadflax is found on cooler, wetter sites along streams or in mountain meadows.
- Dalmatian toadflax produces multiple stems at the base that grow to 3 feet tall. The leaves are oval, blue-green, waxy, and clasp the stem. The flowers are yellow with orange throats

and a long spur on the upper ends of the stems. The plants produce flowers throughout the summer before taking on a dry, wilted appearance in the fall.

- Yellow toadflax, commonly referred to as butter-n-eggs, grows 1-2 feet tall. The leaves are narrow and very similar in appearance to leafy spurge, but lack the milky latex. Flowers of yellow toadflax are similar to those of Dalmatian toadflax, but more clustered toward the top of the plant.
- Both species have escaped from backyard gardens to become invasive problems in rangeland, shrublands and forests. The United States Forest Service estimates 10,000-20,000 acres of yellow toadflax infest the Flattops Wilderness near Steamboat Springs, Colorado, significantly impacting wildlife habitat. Isolated infestations have been confirmed in the Loveland and Berthoud areas but the majority have been found in and around Estes Park.
- 🐛 Several insect bio-control species have been introduced to attack these toadflax plants. The most promising has been *Mecinus janthinus*, a stem-boring weevil that readily attacks Dalmatian toadflax, but unfortunately, not yellow toadflax. Numerous releases of this weevil have been made in Larimer County with hopes of suppressing populations and slowing the spread of Dalmatian toadflax.
- ✂ Mowing and grazing are not effective methods for controlling either species. Persistent hand pulling (over 2-3 seasons) can be effective on smaller patches.
- **A fall application (when new growth appears at the plant base) of Telar, or Plateau with a surfactant of methylated seed oil and silicone, provides effective control of Dalmatian toadflax. Yellow toadflax is more difficult to control. Research results show a tank mix of Tordon, Telar, and Overdrive is most effective.**

Ornamental Weeds?

Many of the weed problems confronting Colorado natural areas originated from backyard flower gardens. How did this come about? Over the course of decades, the plant nursery industry selected showy ornamental plants from all over the world for characteristics desirable in the western U.S. such as

Troublesome Weeds of Larimer County

Cheatgrass

Downy brome (*Bromus tectorum*)

Japanese brome (*Bromus japonicus*) (Figure 27)

- ‘Cheatgrass’ is generally considered a collective term for winter annual brome species. In Larimer County, and most of Colorado, the term describes downy brome, and to a lesser extent, Japanese brome. These grasses typically germinate in late summer or early fall, though some germination also occurs in spring. The leaves are covered with soft hairs from seedling stage through all growth stages. The plants go into a semi-dormant state through winter, often turning purple, and are usually the first plants to green-up in early spring and finish its life-cycle with seed set by June. The thin, dense stems of the dry grass become a fine-fuel and a wildfire hazard. Seed survival is 2-3 years.

- Downy brome is a List C weed species on the Colorado noxious weed list. Due to its ubiquitous presence, cheatgrass is not on the Larimer County Weed list. This weedy grass was probably introduced into this country as a contaminant in wheat seed from Asia over 100 years ago. It is now estimated that 60 million acres of rangeland are infested with cheatgrass across the western United States.

☠ At maturity, the abundant and very prickly seed heads become a nuisance to livestock, pets and hikers.

🐛 There are no insect agents available for cheatgrass control. Grazing in the spring, prior to seed set, can provide suppression, but this grass will readily re-grow and set seed from a reduced height. Hand pulling or tillage, if feasible, provides effective control if conducted prior to seed set. Mowing, like grazing, can provide suppression but not effective control.

🧴 Herbicides can effectively control cheatgrass but attention to timing and application rate is important so as not to injure desired perennial grasses. Low rates of Roundup applied in winter or early spring when perennial grasses are dormant, can control cheatgrass with little or no injury to desirable grasses. Matrix and Landmark provide excellent control of cheatgrass, but grazing or haying must be restricted for one year after application.

➤ **The most common selective herbicide treatment for control of cheatgrass is Plateau/Panoramic, applied in the fall prior to emergence, or at early post-emergent stage (pre-tillering - prior to development of secondary stems). Plateau/Panoramic applied in the spring is ineffective.**

Common mullein (*Verbascum thapsus*) (Figure 29)

- Common mullein is a biennial plant, which reproduces by seed only. Plants first emerge as a fuzzy rosette in the fall or

spring, then bolt in the second season, sending up a single thick stem 2-6 feet tall. Small yellow flowers appear along long spikes at the top of the stem. In late summer the spikes turn brown as seeds mature. Seed may remain viable for 80+ years.

- Common mullein is a List C weed species on the state weed list, but not on the Larimer County weed list. Often considered a native species, common mullein was actually introduced from Asia and is now common across North America. This plant often appears to have invasive characteristics on disturbed sites such as intensively grazed pastures, densely established prairie dog colonies, or following wildfire.
- ☞ No insect bio-control is available for common mullein.
- ✂ Hand pulling or digging is effective on this or any biennial/annual species.
- **The herbicides Escort, Telar and Milestone all provide excellent control of common mullein. The addition of methylated seed oil to the spray mix is essential for herbicide to penetrate the hairy leaf surface.**

Feral rye (*Secale cereale*) (Figure 28)

- Feral rye is an extremely competitive grass that has become a nuisance to landowners across the western United States including Larimer County. Like other winter annual species, this grass germinates primarily in the late summer or early fall (some spring germination as well), over-winters in a rosette stage, resumes growth very early in the spring and reaches maturity by mid-July. These robust plants grow 2-5 feet tall and, and can be competitive enough to eliminate desirable vegetation. Seed survival is about 3 years.
- Feral rye, once referred to as volunteer rye, is seldom grown as a crop in the western United States, but has been planted as livestock forage and as a reclamation species. This prolific grass did not effectively serve those purposes, and the escaped cultivar has become a major weed problem in winter wheat, roadside rights-of-ways, rangeland and pasture. Examples of

invasiveness are very evident in the Lower Poudre Canyon, along Glade Road, and many other sites in Larimer County.

- ☛ There are no insect bio-control agents available for control of feral rye. Grazing in the spring, prior to seed-set, can provide suppression but the grass will re-grow and set seed from a reduced height.
- ☛ Hand pulling or tillage, when practical, provides effective control if conducted prior to seed production. Mowing, like grazing, can provide suppression but not effective control.
- Herbicides can effectively control feral rye but attention to timing and application rate is important so as not to injure desired perennial grasses. **Low rates of Roundup applied in winter or early spring when perennial grasses are dormant, can control rye with little or no injury to desirable grasses.** Matrix and Landmark applied in the fall provide excellent control of feral rye, but careful attention to rates and sprayer calibration is necessary or injury to perennial grasses can occur. Also, grazing or haying must be restricted for one year after application of these two products.

Field bindweed (*Convolvulus arvensis*) (Figure 33)

- Field bindweed is a deep-rooted perennial plant that reproduces by seed or underground rootstalks. Plants emerge in late spring producing vines that grow 1-4 feet long with arrowhead-shaped leaves. White or pinkish, trumpet-shaped flowers appear by mid-summer that are often confused with morning glory. Soon after flowering, seed capsules develop with seeds that can remain viable in the soil for 50+ years.
- Field bindweed is a List C weed species on the state weed list, but not on the Larimer County weed list. It is a widespread weed problem in the western United States and Colorado, especially in farmland and along roadsides. This weed is difficult to eradicate because of its extensive underground root system, but is not particularly competitive in well-maintained grassland or pasture.

- ☠ Field bindweed can accumulate toxic levels of nitrates which cause acute respiratory difficulty, brownish discoloration of mucous membranes, drowsiness, weakness, tremors, and staggering gait. High enough doses of nitrate will cause sudden death. Field bindweed also contains tropane alkaloids, especially in the seeds, that act on the nervous system to stop intestinal movement and cause colic.
- 🐞 Insect bio-control can be an effective method of suppressing field bindweed. A gall mite, *Aceria malherbae*, and to a lesser extent a defoliating moth, *Tyta luctuosa* are becoming well established in Colorado and having a significant effect on field bindweed infestations.
- ✂ Shallow tillage (disk, sweep) is not an effective control method, in fact, can be counter-productive, spreading root propagules and creating a denser, more uniform stand. Deeper tillage such as moldboard plowing, if practical, can provide 1-2 years control.



The most effective herbicides for control of field bindweed are Perspective, Tordon, Habitat, Plateau, Paramount, dicamba and 2,4-D.

Kochia (*Kochia scoparia*) (Figure 26)

- An annual of the goosefoot family. Kochia typically germinates in March, and produces flowers from July to October. The plants are very branched with stems that are often red. Kochia grows 1 – 6 feet tall depending on available moisture. In fall/winter the plants break loose and become tumbleweeds. Seed remains viable 2-3 years.
- Kochia can be a difficult plant to identify as it looks similar to Russian thistle and can develop in many forms. Initially, kochia will form a mat with tiny plants that appear blue-green because of hairs covering the leaves. As it develops, it can become quite tall and thin or quite round and bushy.
- Kochia is not listed on the state noxious weed list or Larimer County's Weed list. This common weed is a problem in dryland and irrigated agriculture, rangeland and roadsides.

Kochia readily invades disturbed sites and areas of high soil nitrates such as abandoned corrals and barnyard areas.

- ☠ Kochia can accumulate toxic levels of nitrates which cause acute respiratory difficulty, brownish discoloration of mucous membranes, drowsiness, weakness, tremors, and staggering gait. High enough doses of nitrate will cause sudden death. It may also cause liver disease and photosensitization in cattle and sheep when enough of mature kochia is consumed.

Kochia can accumulate high levels of sulfates that will cause poor weight gains, depression, weakness in coordination and blindness may be seen in affected animals.

- 🐛 There are no insect agents available for kochia control.

- ✂ Small, young plants are browsed by livestock up to maturity. Tillage or hand pulling, when feasible, is an effective method of controlling any annual plant. Mowing is only a temporary solution as kochia will quickly re-sprout, often creating a stand more dense and uniform than prior to mowing.

- 📱 Because of this plant's high degree of genetic variability, a great deal of herbicide resistance has been selected for over the years. A long list of herbicides are not effective for controlling kochia including 2,4-D, Escort, Telar, Tordon, Transline, Milestone, Plateau/Panoramic and others.

- **Most effective method for control of kochia is an application of an effective herbicide when plants are 6 inches tall or less. Dicamba, Vista, or any of the many pre-mixes of these products with 2,4-D provide excellent control (2,4-D alone will not control kochia). Proper surfactant is essential to control of kochia as the young plants are covered in fine hairs.**

Mustards

Numerous mustard species are found in Larimer County, 3 of which were added to the County Weed List in 2011 – **hoary alyssum, hoary cress and perennial pepperweed**. A number of other mustard species, all winter annuals, are not listed but considered troublesome in some areas.

blue mustard (Figure 24), **flixweed** (Figure 22),

tumble mustard (Figure 23), and yellow alyssum

- Mustard species are winter-hardy plants of the cruciferae family. The plant family name, cruciferae, implies a cross shape, referring to the flower petal structure of 4 petals, a distinctive characteristic of the mustard family. The species listed above follow a winter annual life cycle – germination in the fall or early spring and flowering and seed set in April and May. Flowering mustards are often quite pungent, the odor is irritating to people with allergies.
- These mustards are problematic in winter wheat, pastures and through the first cutting of alfalfa, though inconspicuous by mid-summer after completing the life cycle.
- ☠ Tansy mustard and flixweed may cause photosensitization in cattle if it is the predominant forage in early spring.
- 🐞 No insect bio-control agents are available for any of these plants.
- ✂ Hand pulling or digging is effective for controlling annual species.
- **Escort, Matrix, Plateau/Panoramic, and Telar provide excellent control of mustard species.**

Puncturevine (*Tribulus terrestris*) (Figure 30)

- Puncturevine is an annual, low-growing forb that first germinates in the spring and continues to appear with multiple flushes following rainfall throughout the summer. The plants form mats with trailing stems 1-5 feet long. Leaflets are light green, hairy and arranged in pairs. Small, yellow 5-petaled flowers appear as plants mature. The flowers develop into sharp, spiny burs containing 2-4 seeds. Seeds remain viable for 5 years. Puncturevine is also known as ‘goathead’ because of the sharp, menacing burs.
- ☠ Puncturevine has steroidal sapogenins that forms crystals in the bile ducts which can cause photosensitivity. The spiny

burs can be a major contaminant in hay, cause damage to wool, injure livestock, puncture bicycle tires and make life miserable for a pet's paws and human bare feet.

- ☛ Insect bio-control agents are available that feed on the seedheads and stems of puncturevine, and provide effective management in some areas. Unfortunately, these weevils are not effective in Colorado's cold climate.
- ✂ Digging and pulling provide effective control of any annual weed such as puncturevine. If plants have set seed, plant material should be bagged and disposed of to prevent seed dispersal. **A handy trick to pick up multiple seeds safely is to press a slab of Styrofoam on the ground of the infested area.**
- ☞ Numerous selective herbicides (won't injure grasses) are effective for controlling puncturevine, the problem with managing this persistent weed is staying after multiple flushes that occur during the growing season. Dicamba, 2,4-D, and Vista effectively control emerged puncturevine, but do not provide residual control.
- **For soil residual activity, Telar, Perspective and Tordon provide season-long control.**

Russian olive (*Elaeagnus angustifolia*) (Figure 32)

- A deciduous shrub or small tree introduced into this country for erosion control, windbreaks and as an ornamental. Russian olives grow to 40 feet tall, producing small yellow-green flowers in the spring and white-brown, olive-like berries by late summer. The stems are reddish-brown with sharp thorns 1-2 inches long. Leaves are narrow and silver-green in color.
- Russian olives were placed on the state noxious weed list and prohibited sales list for Colorado nurseries in 2004. Larimer County encourages residents to remove Russian olives, but because of the widespread occurrence, the trees are not on the

county weed list. Russian olives have become a major invasive plant problem along stream corridors and around lakes and ponds. Invading trees establish dense thickets that reduce or eliminate native trees and shrubs. Russian olive seeds are readily spread by birds traveling between suburban areas and river bottoms.

- ☞ There are no insect bio-control agents available for Russian olive control.
- ✂ Mechanical treatments, such as cutting, bulldozing and fire are temporarily effective, though an herbicide application is necessary to prevent subsequent sprouting. Smaller trees are pulled out of the ground with a weed wrench.
- **The most common management practice is a cut-stump treatment, which consists of cutting the tree down near the base and applying an herbicide on the stump to prevent re-growth. The most effective herbicides used for this purpose are Garlon or Habitat, applied in a mix with a crop oil concentrate.** The cut portion of the tree is typically put through a mechanical chipper.

Russian thistle (*Salsola iberica*) (Figure 25)

- Russian thistle is an annual forb of the chenopodiaceae, or goosefoot family. Russian thistle germinates in April or May, grows 0.5 – 3 feet tall, and produces flowers mid to late summer. The flowers are located at the base of the long, pointed leaves. Considered the classic tumbleweed plant, Russian thistle is very similar to kochia, where the mature plants break loose and tumble with the wind in the winter. Seed remains viable 2-3 years.
- Russian thistle is a common weed problem in dry land and irrigated agriculture, rangeland and roadsides. Like kochia, this plant readily invades disturbed sites and areas of high soil

nitrates such as abandoned corrals and barnyard areas. Russian thistle is not listed on the state noxious weed list or Larimer County's Weed list.

- ☠ Russian thistle can accumulate toxic levels of nitrates which cause acute respiratory difficulty, brownish discoloration of mucous membranes, drowsiness, weakness, tremors, and staggering gait. High enough doses of nitrate will cause sudden death. It also contains oxalates which can result in kidney failure in sheep and cattle.
- 🐛 There are no insect agents available for Russian thistle control.
- ✂ Small, young plants are browsed by livestock up to maturity. Tillage or hand pulling, when feasible, is an effective method of controlling any annual plant. Mowing is only a temporary solution as Russian thistle will quickly re-sprout, often creating a stand more dense and uniform than prior to mowing.
- **Most effective method for control of Russian thistle is an application of an herbicide when plants are 6 inches tall or less. Any brand of 2,4-D, or pre-mixes of 2,4-D with dicamba provide excellent control. Dicamba alone will not control Russian thistle.**

☠ Poisonous Plants

Plant poisoning of animals is dependent upon the quantity of plant consumed, relative toxicity of the plant, growing conditions, time of year, and animal species, age, health, stress level and size of the animal. Animals grazing well managed pastures with abundant forage, or fed inspected hay will for the most part not find these plants palatable and therefore not become poisoned. Hay should be inspected or weed-free hay purchased to ensure no poisonous plants are contained in the bales.

If poisonous plants are suspected as the cause of an animal's symptoms a veterinarian should be consulted for appropriate treatment recommendations.

The information found in this section is concise but hardly complete. The purpose of this section is to inform landowners of the possible dangers in and around their properties and to offer options for the landowner to manage their land. ALWAYS consult a professional for proper identification and before making changes to the land as harm can be done without proper due diligence.

The following lists are some of the most important plants poisonous to livestock in Larimer County. These lists are by no means comprehensive. Plant names underlined are part of our top ten poisonous plants of Larimer County and are further discussed in the following pages. Names **bolded** are noxious weeds that have poisonous qualities and are covered elsewhere in this guide. Those ***bolded and italicized*** are troublesome weeds with poisonous properties and are covered elsewhere in this guide.

Plants causing sudden death:

Death camas

Dogbane

Geyer larkspur

Low larkspur

Milkweeds

Poison hemlock

Water hemlock

Cyanide poisoning:

Arrow grass

Blue flax

Elderberry

Mountain mahogany

Poison suckleya

Western chokecherry

Western serviceberry

Nitrate poisoning:

Barleygrass

Canada thistle

Curly Dock

Field bindweed

Goldenrod

Kochia

Lambsquarter

Mallow

Nightshades

Pigweed

Ragweed

Russian thistle

Smartweed

Sorghum

Sunflower

Sweetclover

Wild oat grass

Plants causing kidney failure (Oxalates):

Curly dock	Pigweed
Greasewood	Purslane
<i>Kochia</i>	<i>Russian thistle</i>
Lambsquarter	Wood sorrel

Plants affecting the digestive system:

Any plants with sharp awns, burs, thorns, or spines (eg: cocklebur, burdock, ***cheatgrass***, foxtail)

Baneberry	Colorado rubberweed
Bitterweed	<i>Field bindweed</i>
Bouncingbet	Leafy spurge
Buttercup	Nightshades
Corn cockle	

Plants causing liver disease and photosensitization of the white skinned areas:

Blue-green algae	Knotweed
Buckwheat	<i>Kochia</i>
Common cocklebur	<i>Puncturevine</i>
<i>Flixweed</i>	St. Johnswort
Groundsel, Senecio	Tansy mustard
Houndstongue	Wild carrot

Plants affecting the nervous system:

Crown vetch	<u>Purple locoweed</u>
Fringed sage	Russian knapweed
<u>Geyer larkspur</u>	Sand sage
Horsetail	<u>Water hemlock</u>
<u>Low larkspur</u>	<u>White locoweed</u>
Peas (perennial species)	Yellow starthistle
<u>Poison hemlock</u>	

Plants associated with congenital defects and reproductive failure:

Broom snakeweed	Lupine
Groundsel	Milk vetch
<u>Locoweeds</u>	Mountain thermopsis

Poison hemlock

Ponderosa pine

Plants affecting the blood:

Bracken fern

Moldy yellow sweetclover

Western false hellebore

Wild pea

Onion

Plants affecting the *musculoskeletal* system:

Flatweed

Golden banner

Hoary alyssum

Selenium poisoning:

Beard tongue

Goldenweed

Gumweed

Indian paintbrush

Milk vetch

Prince's plume

Saltbush

White fall aster

Plants that effect milk production:

Bracken fern

Fringed sage

Groundsel (Senecio)

Houndstongue

Locoweeds

Lupine

Mustards

Onion

Poison hemlock

Sand sage

Plants affecting the skin:

Poison ivy (not toxic to livestock)

Poisonous Plant Quick Reference

The vertical axis are toxic plants and the horizontal axis are animals the plants can affect. There are varying degrees of harm from minor irritation to death. Consult this guide for *management*, consult an expert immediately if you suspect poisoning.

	Alpaca	Bison	Cat	Cattle	Dog	Goat	Human	Horse	Llama	Poultry	Sheep	Swine
Canada thistle	x			x								
Cheatgrass	x	x		x	x	x		x	x		x	x
Death camas	x	x	x	x	x	x	x	x	x	x	x	x
Field bindweed	x			x				x	x			
Geyer larkspur	x			x					x			
Hoary alyssum								x				
Houndstongue	x			x				x	x		x	
Kochia	x			x					x		x	
Leafy spurge	x			x								
Low larkspur	x			x					x	x		
Myrtle spurge	x			x			x			x		
Poison hemlock	x	x	x	x	x	x	x	x	x	x	x	x
Poison ivy							x					
Ponderosa pine		x		x								
Puncturevine	x	x	x	x	x	x	x	x	x	x	x	x
Purple locoweed	x			x		x		x	x		x	
Russian knapweed								x				
Russian thistle	x			x								
Water hemlock	x	x	x	x	x	x	x	x	x	x	x	x
Western chokecherry	x	x		x		x			x		x	
White locoweed	x			x		x		x	x		x	
Yellow								x				

Death camas (*Zigadenus venenosus*) (Figure 36)

- An herbaceous native perennial in the lily family. It can grow to 2 feet tall with long, basal, grass-like leaves. The bulbs are oval and look like onions but does not smell like onion or garlic. The flowers are cream colored and grow in clusters between April and July. Death camas tends to grow in dry meadows and on dry hillsides as well as sagebrush slopes and montane forests.
- Can be easily confused with native garlic or onions which have a white flowers and hollow leaves.
- ☠ Contains zygacine alkaloids that decrease blood pressure and slow heart rate. All parts of the plant are poisonous for humans as well as livestock. First symptoms are salivation, vomiting, weakness, staggering gait, convulsions, then coma and death.
- ❖ Pasture management tip: **Keep animals out of pastures with death camas in the early spring** when other green growing forage is unavailable.
- ✂ Digging and bagging scattered plants to avoid seed dispersal is effective during and after flower.
- 📱 Herbicide treatments of 2,4-D, dicamba or Roundup applied before flowering using a spot spray technique will control death camas without harming desirable vegetation.

Did you know?

Milkweed species are toxic to all types of livestock. Though not commonly ingested in pasture, milkweed harvested with hay can be a major problem. In 2012, nineteen horses died in Canon City, CO from consuming hay contaminated with whorled milkweed.

Larkspur

Geyer or foothills larkspur (*Delphinium geyeri*) (Figure 42)

Low larkspur (*Delphinium nuttallianum*) (Figure 43)

- Both species are native perennials in the buttercup family. These plants grow to 2 to 3 feet tall. Leaves are lobed into 3-5 divisions, which are lobed again and are hairy. Flowers are purple in geyer larkspur, low larkspur may have white sepals with a distinct spur pointing backwards in the months of April through July. The stems are hollow and the roots are tuberous and woody. These plants are found from moist mountain meadows and open forests to dry sandy sagebrush plains.
- ☠ Contain various alkaloids causing muscle weakness and paralysis. The first symptoms are uneasiness, stiffness, staggering, a wide stance, kneeling, lack of coordination, sudden collapse, bloating. Cattle are most susceptible to larkspur poisoning, while sheep and goats are only mildly affected.
- ❖ **An effective pasture management technique is to keep livestock out of the pasture when larkspur is flowering and until seeding has occurred.**
- ☒ Sheep and goats can be used as biological controls to graze larkspur prior to cattle entering a pasture.
- The most effective herbicides are Escort or Tordon mixed with a good surfactant. Apply when plants are approaching maximum vegetative growth, but before flowers open.

Locoweed

White locoweed (*Oxytropis sericea*) (Figure 40)

Purple locoweed (*Oxytropis lambertii*) (Figure 41)

- Otherwise known as “crazy weed” locoweeds are native perennials 2 to 12 inches tall in the legume family. Locoweeds are found on rocky prairies, plains, hillsides, gravelly banks, and open wooded hillsides. Leaves are basal, with leaflets on each side and one at the tip, all covered with silky hairs. White or purple pea-like flowers, depending on the species, in a raceme on a leafless stem in April through August.

- ☒ Locoweeds contain the alkaloid swainsonine that is produced by a fungus growing within the plant . Poisonous and palatable to all livestock, especially prior to and during flowering stages, locoweeds cause abnormal nervous behavior referred to as “locoism”. Horses show signs of “locoism” resulting in circling, staggering gait, lack of coordination, and falling over backwards, making them unpredictable and unsafe to ride. Cattle become aggressive and difficult to work. They may have heart irregularities and lose weight. Pregnant cows and sheep may abort or develop a condition called “water belly”, where the uterus becomes distended with fluid. Bulls and rams develop abnormal sperm and infertility. Pregnant animals grazing locoweeds may produce calves or foals that are born weak and have deformities of the limbs. Sheep develop heart irregularities and demonstrate a loss of their flocking instinct. The poisonous alkaloid is passed through the milk to the suckling young. Horses with “locoism” do not recover due to permanent effects on the brain, but cows and sheep will recover from the reproductive effects if taken off the locoweed.
- ☒ Some locoweeds can also accumulate selenium which causes the hair of the mane and tail to break off, and the hoof wall to develop ridges and cracks that result in lameness.
- ❖ Pasture management tip: **Create “safe” pastures that have no locoweed** to move the animals into after possible consumption of locoweed. Try not to graze pastures with locoweed during the summer months when palatability is high. Overgrazing will increase the density of this plant in pastures.
- **Herbicide treatments with Transline, Escort, Garlon or Tordon with MSO will control locoweeds but re-treatment will be necessary as the locoweed seeds stay viable for 50 years in the soil.**

Poison or spotted hemlock (*Conium maculatum*) (Figure 39)

- A non- native biennial plant of the parsley family. Poison hemlock grows 2 to 10 feet tall and most commonly found in moist areas. It is an invasive weed that spreads only by seed. Poison hemlock stems are erect, branched, ribbed, waxy, and usually marked with purple spots near the base. Leaves are fern-like with long-stalks below and short-stalks above, 3-4 times odd pinnately compound. The flowers are a white umbel. Poison hemlock is commonly mistaken for wild carrot or parsley.
- ✖ Poison hemlock contains piperidine alkaloids in all parts of the plant. This toxin blocks the spinal cord reflexes, and causes death within hours from respiratory failure. Young plants and the tap root of more mature plants are most toxic. Symptoms of poisoning include: excessive salivation, urination, and defecation; tremors and lack of coordination; difficulty breathing, dilated pupils, and a weak pulse. If pregnant cows and sows eat small quantities of the plant in the first trimester of pregnancy the newborn may have skeletal defects (crooked calf disease) or be aborted. Goats may eat the plant without problem as long as they have other forage available.
- ✖ Piperidine alkaloids can be passed into the milk and may be harmful if pregnant women drink it.
- ✖ **Mowing hemlock plants to keep them short** will decrease the chance of poisoning. Do not hay areas with standing plants as they are still toxic when dried.
- **Herbicide treatment of 2,4-D, Escort, Telar, Garlon 3A, or Rodeo provide effective control of early growth.**

Did you know?

Socrates was reportedly executed by being forced to drink poison hemlock tea.

Poison ivy (*Toxicodendron radicans*) (Figure 37)

- A native vine in the sumac family. Poison ivy has oval, shiny leaves that are alternate and in groups of three. There are no thorns on the stem. The flowers are yellowish- or greenish-white, and present from May to July. The berry-like grayish-white fruits mature in August. Poison ivy is common in the foothills and canyons.
- ☠ Contains an oily resin (urushiol) that is a highly allergenic phenolic compound that binds to the skin causing an intense allergic reaction in people. It is not toxic to livestock, but animal fur with the oil on it will affect humans handling the animal. Smoke from burning poison ivy can also contain the toxin that affect a person's eyes and lungs. Don't forget: Leaves of three, let it be!
- ✂ **Mechanical removal of the plant will ensure that the oils will not be in the area. Full body covering is recommended while removing plants.**
- **Herbicide treatments of Garlon, Tordon, Roundup, or Milestone will control poison ivy, but it may take a year to dry up the oils.**

Ponderosa pine (*Pinus ponderosa*) (Figure 35)

- A native tree with a very distinct orange bark with black lining the splits. It can often be identified by its characteristic long needles that grow in bundles of three.
- ☠ The isocupressic acid in the needles causes abortions in cattle and bison. Affected cows will have swelling of the vulva and udder, and there will be a vaginal discharge before and after abortion. Weak contractions and poor dilation result in difficult delivery and retention of the placenta which could lead to secondary infection and future fertility problems. If a calf is born alive the mother's milk production may low or non-existent. Rocky Mountain junipers are toxic to cattle in the same way ponderosa pines are.

- ❖ **Pasture management tip: Move pregnant cows during their last trimester to a pasture without ponderosa pine nearby, especially if there is inadequate forage for the cattle to feed on. Cattle will eat pine needles if they are hungry. Snow storms may cause cattle to seek shelter in the trees and if there is nothing else accessible to them the cows will browse on pine needles. Ensure the cattle have access to hay in such winter conditions.**
- ✂ Create a “safe” pasture by cutting down and removing trees.

Water hemlock (*Cicuta maculata*) (Figure 38)

- Water hemlock is a native perennial in the parsley family. Plants grow to 4 to 6 feet tall and are commonly found on wet sites. Plants produce tiny white flowers with 5 petals produced in an umbel at the ends of branches, present from June through August. Stems are erect, stout, branched at top, often waxy, with hollow stems; base of stem enlarged, chambered and has a yellow, pungent fluid. Leaves are alternate, with 2 to 3 leaflets longer than wide. The leaves have toothed margins, uppermost leaves sometimes simple. Unlike poison hemlock that has a taproot, water hemlock has multiple tuberous roots.
- ✂ All parts of water hemlock are highly poisonous, especially the tuberous roots. Symptoms of poisoning include: excessive salivation, urination, and defecation; teeth grinding and chewing motion; seizures and violent convulsions. Livestock will eat water hemlock especially in the spring or when other forages are depleted. Only a mouthful or two of the young plants or roots can be fatal.
- ❖ **Pasture management tip: Remove livestock from the pasture in the spring when the plant is often most palatable.**
- ✂ Digging and disposing of large plants is the best way to prevent seed production and dispersal.
- **Spot treating with herbicide treatments of 2,4-D, Escort, Telar, Garlon 3A, or Rodeo is effective for control of early growth.**

Western chokecherry (*Prunus virginiana*) (Figure 34)

- A large native shrub in the rose family. The bark of western chokecherry is smooth to scaly, and dull red to gray. Leaves are ovate to broadly elliptical, rounded at the base or slightly heart shaped, smooth or only slightly hairy, with finely toothed margins. Flowers are white, showy, and clustered in 2 to 5 inch long racemes at the ends of leafy shoots in spring. The fruit matures in the fall to an edible dark purple/black berry.
- The edible berries are bitter tasting and are best in jams and jellies.
- ☠ The leaves, stems, and seeds contain cyanogenic glycosides that when eaten by cattle, sheep and goats in particular, are converted to highly toxic cyanide (the ripe fruits do not contain cyanide). Be aware that droughted or frosted chokecherry leaves are especially toxic. Cyanide blocks oxygen from reaching cells and therefore prevents cellular respiration. Sudden death occurs within 1 to 2 hours. Poisoned animals will have labored breathing, frothing at the mouth, dilated pupils, tremors, and convulsions. Mucous membranes will be bright red.
- ❖ Do not plant chokecherry near animal enclosures. Animals suspected of being poisoned by chokecherry should be seen by a veterinarian as quickly as possible if the **antidote** (Sodium thiosulfate) is to be administered in time!
- ✂ Mechanical removal of the shrub needs to include the root ball otherwise suckering will occur.
- A foliar herbicide treatment of Garlon or Tordon will provide effective control of chokecherry though **mechanical removal of the limbs followed by a cut stump treatment with triclopyr or Tordon will decrease the amount of herbicide needed for control**. Drought-stricken, dying, or frosted chokecherry leaves are especially toxic, and broken or pruned chokecherry **branches should not be left in pastures or animal pens**.

Herbicide Reference Guide For Landowners

The purpose of this guide is to provide information helpful in deciding which herbicide may be most appropriate for a small acreage landowner. There is no intended endorsement of the products listed, nor is discrimination intended towards any product that may have been omitted. This guide is not intended to substitute for a product label. **Always read the label and keep in mind “the label is the law.”** Colorado now requires a permit called the National Pollutant Discharge Elimination System (NPDES) through the Clean Water Act for applications in or near water. Check with Colorado Department of Public Health and Environment (CDPHE) or the Weed District before making any applications in or near water to insure compliance. This book references instances where aquatic herbicides are recommended, be sure of compliance with NPDES before proceeding with these applications. The user of any pesticide is liable for all aspects of handling the product, including but not limited to mixing, loading, application, spill control and disposal of pesticides or containers.

It is a violation of federal law to use any pesticide in a manner inconsistent with its labeling, with the following four exemptions:

- Application at a rate or frequency less than specified on the label.
- Application on a target species not specified on the label as long as application is to the site or use specified on the label, unless the label specifically prohibits use on that specific pest.
- Employing any method of application not prohibited on the label.
- Mixing with a fertilizer, as long as such a mixture is not prohibited on the labeling.

Acronyms and Definitions for Herbicide Reference

Surfactants - Surfactants are additives to a post emergent herbicide spray solution that enhance activity and effectiveness of the herbicide. Surfactants increase spray coverage and penetration on leaf surfaces, and reduce evaporation rate, thereby increasing the amount of an herbicide that translocates into a target plant.

A common question is whether a detergent soap will suffice as a surfactant or not. The best answer is to use the recommended surfactant designed to enhance the activity of a specific herbicide. When a user is investing time and money into a weed management project, why jeopardize success over such a minor cost.

Surfactants recommended for the herbicides listed in this guide:

- **COC** - Crop oil concentrate is a petroleum oil based product, typically applied at a rate of 1 quart/acre, recommended for use with imazapyr and triclopyr on cut-stump treatments.
- **MSO** - Methylated seed oil is a plant oil derivative, typically applied at a rate of 1 quart/acre, for use with imazapic and quinclorac. Often used with other herbicides when applied over weed species with very waxy or hairy leaves such as common mullein or Dalmatian toadflax.
- **NIS** - Nonionic surfactant is an organic compound usually mixed in at 0.25 – 0.50 % volume per volume ratio for example .25% v/v = 1oz per 3 gal, for use with all other herbicides listed in this guide. This surfactant is absolutely essential for chlorsulfuron, metsulfuron methyl, and rimsulfuron to be effective.

GUP – General Use Pesticide. Are products which are available to the general public. **All herbicides listed in this guide are general use unless otherwise specified.**

MSDS – Material Safety Data Sheet. A technical bulletin that supplements information found on the product label. This bulletin provides detailed descriptions of a product's physical properties and toxicity, and provides users and emergency personnel with the proper procedures for handling and working with that substance.

Pesticide Label – A legal document located on the pesticide container that provides information concerning the safe and effective use of the pesticide. It is a violation of federal pesticide laws to use any pesticide in a manner inconsistent with its labeling.

PPE – Personal Protective Equipment (gloves, apron, eye safety glasses, etc.). The required PPE for a specific compound is listed under the “Hazards to Humans” section on the label. Always use protective equipment specified on the label. The most serious risk of exposure from chemicals is during handling and mixing operations with the concentrated product.


Re-entry interval - Period of time immediately after a pesticide application when agricultural employees may not enter a pesticide treated area without protective clothing.

RUP – Restricted Use Pesticide. The "Restricted Use" classification restricts the purchase of a product, and its uses, to a licensed commercial, private, or public applicator.

Landowners wishing to purchase and apply restricted use pesticides can obtain a Private Applicator’s License through the Colorado Department of Agriculture. Information is available at 303-239-4186 or at:

<http://www.colorado.gov/cs/Satellite/Agriculture-Main/CDAG/1178305424099>

Signal Words – Indicate the toxicity and/or hazards associated with the use of the pesticide. Pre-mix herbicides will always have the highest toxicity level of the mixed active ingredients.

- **Caution** – Category 3 or 4, least toxic. 1 ounce to 1 pint swallowed lethal to an adult.
- **Warning** – Category 2. 1 –3 teaspoons swallowed lethal to an adult.
- **Danger/Poison** –  Category 1, most toxic. 1-3 drops swallowed lethal to an adult.

Toxicity – Measured by LD₅₀ (lethal dose, 50%), describes the dose of a pesticide that will kill ½ of a group of test animals from a single dose. A pesticide with a lower LD₅₀ is more toxic than one with a higher number because it takes less of the pesticide to kill half of the test animals.

To obtain more comprehensive information regarding Colorado and Federal pesticide laws and regulation, and an overview of the CSU Pesticide Safety Education Program, see:
www.colostate.edu/Depts/SoilCrop/extension/CEPEP

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Rodeo	Glyphosate	Aquatic	69
Roundup	Glyphosate		69
Sahara	Imazapyr + diuron	Restricted	72
Starane	Fluroxypyr		68
Sterling	Dicamba		66
Telar	Chlorsulfuron		64
Topsite	Imazapyr + diuron	Restricted	72
Tordon	Picloram	Restricted	74
Transline	Clopyralid		65
Vanquish	Dicamba		66
Veteran 720	Dicamba + 2,4-D		66, 78
Vista	Fluroxypyr		68
Weedar	2,4-D		78
Weed B Gon	Triclopyr		77
Weedmaster	Dicamba + 2,4-D		66, 78
Weedone	2,4-D		78

Aminocyclopyrachlor

Brand Name:

Perspective with Chlorsulfuron

Other Pre-mixes:

Streamline with metsulfuron methyl

Viewpoint with metsulfuron methyl and imazapyr

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	4 hours	NA	NA	NA

Dry formulation for use in:

- Non-cropland sites such as rights-of-way, industrial sites and fence rows.
- **Range & pasture label pending – current label restricts livestock grazing and haying for 1 year following application.**

Environmental characteristics:

- Can be applied to water's edge, do not apply directly to water. Not for use on irrigation ditchbanks.
- Active on target plants through foliar and root uptake.
- **Applications to newly seeded grasses or under desirable trees and shrubs may cause injury.**
- The use of a nonionic surfactant, at a minimum rate of .25% volume/volume (1oz/3 gal), is essential.
- Perspective is a dry formulation that requires vigorous agitation to go into solution. For sprayer tanks that do not provide agitation it is best to fill halfway with water, create slurry in a separate container (mix enough water and granules to agitate until granules are totally dissolved) of the measured herbicide, then add to tank to ensure the product goes into solution.

Primary target species:

- Perspective provides excellent control of the noxious weed species listed in this reference guide, with the exception of any grass species.
- **CSU / Larimer County Weed District field trials have shown Perspective to be the most effective treatment for control of leafy spurge and field bindweed.**

Aminopyralid

Brand Name:

Milestone

Pre-mixes:

Opensight with metsulfuron methyl

Forefront with 2,4-D

Capstone with triclopyr

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	2 hours	12 hours	0	0

Liquid formulation, used in:

- Range & pasture, non-cropland sites such as rights-of-way.

Environmental characteristics :

- Can be applied to water's edge; do not apply directly to water.
- Active on target plants through foliar and root uptake.
- Not for use on irrigation ditchbanks.
- Caution under certain tree species. See Label.

Primary target species :

- Canada thistle, biennial thistles, knapweeds, common mullein, common teasel, oxeye daisy, sunflowers, cinquefoil, absinth wormwood, hawkweeds. (Plants of composite, legume, and polygonum families).
- Not effective for controlling grass species, kochia, bindweed, leafy spurge, toadflax, houndstongue, or most mustard species.
- **Milestone is the most frequently recommended product for control of Canada thistle and biennial thistles in range and pasture.**

Chlorsulfuron

Brand Name:

Telar, Glean

Pre-mixes:

Cimarron X-tra with metsulfuron methyl, **Perspective** with aminocyclopyrachlor, **Landmark** with sulfometuron methyl

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	4 hours	4 hours	0*	0*

Dry formulation used in:

- Range & pasture, non-crop and industrial sites.

Environmental characteristics:

- Can be applied to water's edge; not directly to water.
- Chlorsulfuron has soil residual activity and is active on weeds through foliar and root uptake.
- The use of a nonionic surfactant, at a minimum rate of .25% volume/volume (1oz/3 gal), is essential.
- Chlorsulfuron is a dry formulation that requires vigorous agitation to go into solution. For sprayer tanks that do not provide agitation it is best to fill halfway with water, create slurry in a separate container (mix enough water and granules to agitate until granules are totally dissolved) of the measured herbicide, then add to tank to ensure the product goes into solution.

Primary target species:

- Mustard, biennial thistles, houndstongue, common mullein, common teasel, puncturevine (pre and post emergence), Dalmatian and yellow toadflax.
- Not effective for controlling most grass species, kochia, knapweed species, or bindweed.
- The pre-mix 'Landmark' provides excellent pre and post emergent control of cheatgrass and feral rye. Landmark does not have a range & pasture label, treated areas cannot be grazed or hayed for 1 year after application.
- **Telar, applied at 2.0 oz product/acre with MSO, provides very effective control of Dalmatian toadflax.**

*Restriction dependant on rate of application

Clopyralid

Brand Name:

Transline, Lontrel, Stinger

Pre-mixes:

Curtail, Cody with 2,4-D

Redeem, Confront, Prescott with triclopyr

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	2 hours	12 hours	0	0

Liquid formulation used in:

- Range & pasture, forest land, and rights-of-way.
- Cropland and turf.

Environmental characteristics:

- Water soluble, should not be applied near water.
- Some soil activity but not as persistent as Tordon.
- Transline can be safely applied near trees and shrubs.
- Active on target plants primarily through foliar uptake, with root uptake to a lesser degree.

Primary target species :

- Canada thistle, biennial thistles, knapweeds, common teasel, oxeye daisy, sunflowers.
- Not effective for controlling grass species, kochia, bindweed, leafy spurge, toadflax, houndstongue, or most mustard species.
- **Safe to use over seedling grasses to control Canada thistle and other listed weed species on re-vegetation sites.**

Dicamba

Brand Name:

Banvel, Clarity, Rifle, Sterling, Vanquish

Pre-mixes:

Brash, Outlaw, Rangestar, Veteran 720, Weedmaster with 2,4-D
Fallowmaster with glyphosate

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	4 hours	24 hours	37-70*	0

Liquid formulation used in:

- Range & pasture, crops, rights-of-way, and turf.

Environmental characteristics:

- Water soluble, should not be applied near water.
- Active on target plants primarily through foliar uptake, with root uptake to a lesser degree.
- Do not apply near desirable trees and shrubs.
- Higher rates can cause injury to buffalograss.
- Dicamba is a volatile product that can damage off-target vegetation through vapor drift. Do not use when temperatures are expected to exceed 85 degrees Fahrenheit within 24 hours of application.

Primary target species :

- Kochia and many other annual broadleaf species. At higher rates can be used for suppression of Canada thistle, field bindweed and biennial thistles.
- Not effective for controlling grass species.
- **Dicamba is the most frequently recommended product used to selectively control kochia in established grassland.**

*Restriction dependant on rate of application

Diflufenzopyr

Brand Name:

Overdrive, Distinct – premixes with dicamba
(Diflufenzopyr is not sold alone, available in a premix only)

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	4 hours	12 hours	0	0

Dry formulation used in:

- Range & pasture, rights-of-way, corn and fallow

Environmental characteristics:

- Primarily absorbed through foliar applications, soil uptake to a lesser degree.
- Use of surfactant recommended – nonionic or crop oil concentrate
- Diflufenzopyr is a dry formulation that requires vigorous agitation to go into solution. For sprayer tanks that do not provide agitation it is best to fill halfway with water, create slurry in a separate container (mix enough water and granules to agitate until granules are totally dissolved) of the measured herbicide, then add to tank to ensure the product goes into solution.

Primary target species:

- Kochia and many other annual broadleaf species. At higher rates can be used for suppression of Canada thistle, field bindweed and biennial thistles.
- Not effective for controlling grass species.
- Overdrive is most often used in range and pasture to complement the activity of other herbicides such as aminocyclopyrachlor, clopyralid, picloram, quinclorac and triclopyr.
- **Overdrive + Paramount or Overdrive + Perspective tank mix provides very effective control of leafy spurge.**

Fluroxypyr

Brand Name:

Vista, Starane

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Warning	1 hour	12 hours	7	0

Liquid formulation used in:

- Non-cropland areas such as non-irrigation ditch banks, rights-of-way, industrial sites including grazed areas within sites, small grains, corn and fallow.

Environmental characteristics:

- Active on target plants through foliar uptake, no soil residual activity.
- Not for use on irrigation ditchbanks.

Primary target species :

- Kochia, prickly lettuce, puncturevine, sunflower and plants of the nightshade family.
- Not effective for controlling grass species, Canada thistle or field bindweed.
- **Safe to use over newly seeded grasses to control kochia and other listed weed species on re-vegetation sites.**

Glyphosate

Brand Name:

Roundup, current brand names too numerous to list

Pre-mixes:

Too numerous to list.

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	1-4 hours*	4 hours	NA	NA

Liquid formulation used in:

- Crop, non-crop, fallow.

Environmental characteristics

- ****Non-selective herbicide** (active on grasses and broadleaf plants) that controls most annuals and perennials.
- Active through foliar uptake, has no soil activity.
- Usually surfactant is part of mix. Do not need to add extra.
- Labeled for use up to water's edge. At least one formulation, Rodeo, labeled for use in and around water. An aquatic non-ionic surfactant is needed.

Primary target species:

- Effective for control of most grasses and broadleaf species.
- Selective control of winter annuals when applied at low rates in the late winter or early spring when desirable perennial grasses are dormant.

*Check product label.

** Not approved for the Weed District cost-share program.

Imazamox

Brand Name:

Clearcast,

Raptor — for use in alfalfa, dry bean, soybeans and other legume crops

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	2 hours	4 hours	NA	NA

Labeled uses (sites):

- Clearcast is labeled for control of undesirable emergent and floating aquatic vegetation in and around standing and flowing water. Applications may be made to control undesirable wetland, riparian, and terrestrial vegetation growing in and around surface water including irrigation ditchbanks, though some limitations and restrictions exist – **SEE LABEL.**

Environmental characteristics :

- Can be applied in and around standing and flowing water including irrigation ditchbanks.
- Active on target plants through foliar and root uptake.
- Choose a surfactant that is approved for aquatic use when applying in or near water.
- For terrestrial uses choose a non-ionic surfactant, MSO or crop oil concentrate for best results.

Primary target species :

- Cattails, purple loosestrife, ragweed species, whitetop and other mustard species.
- Perennial grasses and other desirable species such as sedges and rushes may be suppressed. Degree of injury is rate dependant.
- **Clearcast is very effective on cattails.**

Imazapic

Brand Name:

Plateau, Panoramic

Pre-mixes:

Journey with glyphosate

Oasis with 2,4-D

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	1 hour	12 hours	7	0

Liquid formulation used in:

- Range and pasture and rights-of-way.

Environmental characteristics :

- Imazapic has soil residual activity, and is taken up in plants through foliage and roots.
- This product has runoff potential and should not be used on hillsides sloping toward water.
- Do not apply to water or inside irrigation ditches.
- Application timing, use rate and choice of surfactant can be critical, read the label carefully.
- **High rates can be injurious to cool season grasses such as smooth brome.**

Primary target species:

- Leafy spurge, cheatgrass, mustard species, Dalmatian toadflax, field bindweed, common teasel, houndstongue, Russian knapweed, suppression of thistle species at higher rates.
- Not effective on kochia or diffuse and spotted knapweed.
- **Imazapic is the most commonly used herbicide for selective control of cheatgrass in newly seeded and established grass.**

Imazapyr

Brand Name:

Arsenal, Ecomazapyr 2, Habitat, Powerline

Pre-mixes:

Sahara, Topsite with diuron.

Chopper – ready to use pre-mix with adjuvants for cut-stump or basal bark treatments.

Clearstand with metsulfuron methyl

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	1 hour	NA	NA	NA

Liquid formulation used in:

- **Arsenal** – Range and pasture (spot treatments), non-crop areas such as industrial sites, and rights-of-way.
- **Habitat** – Aquatic use - for control of undesirable emergent and floating aquatic vegetation in and around standing and flowing water. Applications may be made to control undesirable wetland, riparian, and terrestrial vegetation growing in and around surface water.

Environmental characteristics :

- ****Non-selective herbicide** (controls grasses broadleaf plants and brush).
- Persistent in soil, breaks down rapidly in water, uptake in plants through foliage and roots.
- Arsenal can be applied up to water's edge. Habitat has an aquatic label – can be used in and around water. Not for use on irrigation ditch banks.

Primary target species:

- Often used in mixes for total vegetative control (parking lots, industrial sites, etc.).
- **Imazapyr is very effective for control of tamarisk, Russian olive and other woody species by foliar application or cut-stump treatments.**

Metsulfuron methyl

Brand Name:

Ally, Cimarron, Escort, Pro 60 EG, MSM 60DF

Pre-mixes:

Cimarron Max with dicamba and 2,4-D

Cimarron X-tra with chlorsulfuron

Opensight with aminopyralid

Clearstand with imazapyr

Viewpoint with aminocyclopyrachlor and imazapyr

Streamline with aminocyclopyrachlor

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	4 hours	4 hours	0-3*	0-3*

Dry formulation used in:

- Range and pasture, rights-of-way, wheat, barley, and fallow.

Environmental characteristics:

- Can be applied to water's edge; do not apply directly to water or under desirable trees and shrubs.
- The use of a nonionic surfactant, at a minimum rate of .25% vol/vol (1 oz/3 gal), is essential effectiveness.
- Metsulfuron methyl is a dry formulation that requires vigorous agitation to go into solution. For sprayer tanks that do not provide agitation it is best to fill halfway with water, create slurry in a separate container (mix enough water and granules to agitate until granules are totally dissolved) of the measured herbicide, then add to tank to ensure the product goes into solution.

Primary target species :

- **Mustards such as hoary alyssum, hoary cress, perennial pepperweed, blue mustard, flixweed and tumble mustard.**
- Effective for control of houndstongue, common mullein, common teasel, some brush species and assorted annual broadleaf species.
- Not effective for controlling grass species, kochia, knapweed species or Canada thistle.

*Restriction dependant on rate of application

Picloram – *Restricted Use Product

Brand Name:

Tordon, Outpost

Pre-mixes:

Grazon, Pathway with 2,4-D

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	2 hours	12 hours	14	0

Liquid formulation used in:

- Range and pasture, fallow cropland, and non-cropland areas.

Environmental characteristics:

- This product is soluble in water and persistent in soil.
- Do not apply on ditchbanks or bottoms, near water, or under desirable trees and shrubs.
- Tordon is residually active in the soil, and taken into a plant through foliar absorption and/or root uptake.

Primary target species:

- Field bindweed, Canada thistle, biennial thistles, knapweeds, toadflax, leafy spurge, houndstongue, woody species.
- Not effective for controlling kochia or most mustard species.
- Not effective for grass control, though will suppress certain established pasture grasses such as smooth brome.

* Restricted Use Products for retail sale to and use only by Certified Applicators or persons under their direct supervision. See criteria in the preceding 'definitions' section page 59.

Quinclorac

Brand Name:

Paramount, Facet, Drive

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	6 hrs	12 hours	7	0

Dry or liquid formulation used in:

- Range & pasture, rice, sorghum, fallow and turf.

Environmental characteristics:

- Can be applied to water's edge. Do not apply directly to water or in areas where surface water is present.
- Quinclorac is active on target plants through foliar and root uptake.
- Add methylated seed oil to tank mix at rate of 1 quart/acre
- Do not apply more than 16 oz/acre per calendar year.
- Quinclorac is a dry formulation that requires vigorous agitation to go into solution. For sprayer tanks that do not provide agitation it is best to fill halfway with water, create slurry in a separate container (mix enough water and granules to agitate until granules are totally dissolved) of the measured herbicide, then add to tank to ensure the product goes into solution.

Primary target species:

- Leafy spurge, field bindweed, annual grasses such as barnyardgrass, crabgrass, and green and yellow foxtail.
- **Overdrive + Paramount tankmix is one of the most effective treatments for control of leafy spurge.**

Rimsulfuron

Brand Name:

Matrix, Resolve

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution	4 hours	4 hours	NA	NA

Dry formulation used in:

- Agronomic crops and control of certain invasive species, such as cheatgrass and feral rye, in areas undergoing restoration or re-vegetation.
- **No range & pasture label – no livestock grazing or haying for one year following application on rangeland or pasture.**

Environmental characteristics:

- Rimsulfuron is primarily active through foliar uptake, short soil residual activity for weed control.
- The use of a nonionic surfactant, at a minimum rate of .25% volume/volume (1oz/3 gal), is essential for this product to be effective.
- Rimsulfuron is a dry formulation that requires vigorous agitation to go into solution. For sprayer tanks that do not provide agitation it is best to fill halfway with water, create slurry in a separate container (mix enough water and granules to agitate until granules are totally dissolved) of the measured herbicide, then add to tank to ensure the product goes into solution.

Primary target species:

- Annual grasses such as cheatgrass and feral rye, puncturevine and plants of the mustard family.
- Rimsulfuron may be injurious to certain cool season perennial grasses such as western wheatgrass.

Triclopyr

Brand Name:

Element 4, Element 3A, Garlon 4, Garlon 3A, Weed B Gon, Capstone

Pre-mixes:

Redeem, Prescott with clopyralid

Crossbow with 2,4-D.

Capstone with aminopyralid

Pathfinder II – ready to use pre-mix with adjuvants necessary for effective cut-stump or basal bark treatments.

Many other pre-mix products are available.

Signal word (toxicity)	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Caution – Danger*	12 hours	14	0

Liquid formulation used in:

- Range and pasture, aquatic use (in and around water), non-cropland, rights-of-way and turf.

Environmental characteristics :

- Ester formulation can be volatile, and is best used when temperature is not expected to exceed 85 degrees.
- Triclopyr has some soil activity but is primarily taken up by plants through foliage and/or vascular tissue (cut-stump or basal bark treatment).
- Restrictions near water vary with formulation – Garlon 4 – up to water's edge. Garlon 3A has an aquatic label, can be used to control target vegetation in standing water.
- Not for use on irrigation ditch banks.

Primary target species:

- Used for controlling broadleaf weeds and woody vegetation. Has little or no effect on grasses.
- **Used as a cut-stump or basal bark treatment for control of Russian olives, tamarisk, and other woody species.**

*Signal word varies with differing triclopyr formulations

2,4-D

Brand Name:

Amine 4, Formula 40, Hi-Dep, Weedar, Weedone, Hardball, and many others too numerous to list.

Pre-mixes:

Too numerous to list.

Signal word (toxicity)	Rainfast period	Re-entry interval	Hay harvest (days)	Grazing interval (days)
Danger – Caution*	1 hour	48 hours	30	0

Liquid formulation used in:

- A wide range of applications including range and pasture, crops, and non-cropland.

Environmental characteristics :

- 2,4-D is the active ingredient in many compounds, and is available in ester, amine and acid formulations.
- Ester formulations are volatile and may injure non-target plants through vapor drift. Low volatility (LV) esters are less susceptible to vapor drift, but may still volatilize at temperatures above 85 degrees. Amine formulations typically do not volatilize, and should be used during warmer weather.
- Ester formulations penetrate foliage more readily, and are usually used at lower rates than amine formulations.
- An acid formulation, brand name – Hardball, is nonvolatile and labeled for aquatic and rangeland use.
- 2,4-D has little to no soil activity, uptake in plants is through foliage.

Primary target species:

- Used for control of most broadleaf weeds. Higher rates for control or suppression of perennials.
- Not effective for control of grasses, kochia or knapweed species.

*Signal word varies with differing 2,4-D formulations

Sprayer Calibration

It is critical to know the output of a sprayer in order to be accurate in adding an herbicide to the tank.

Handgun

1. Measure a calibration plot that is exactly 18.5 ft X 18.5 ft (128th of an acre).
2. Spray the plot uniformly with water, keeping the sprayer pressure constant. Note the number of seconds required.
3. Spray into a bucket for the same number of seconds, again keeping the sprayer pressure constant.
4. Measure the number of ounces of water in the bucket.
5. Number of ounces of water measured from the bucket is equal to the number of gallons per acre (GPA) the sprayer is delivering.

Spray Volume (GPA)	Amount of Herbicide to Add to Each Gallon of Water in Ounces				
	Recommended Herbicide Rate/Acre (from label)				
	1 oz	4 oz	7 oz	1 Pint	1 Quart
15	.067	.268	.469	1	2
20	.05	.2	.35	0.83	1.67
30	.033	.132	.231	0.5	1
40	.025	.1	.175	0.42	0.83
50	.02	.08	.14	0.33	0.63

2 tablespoons = 6 teaspoons = 1 fluid ounce = 29.57 milliliters

8 fluid ounces = 1 cup; 2 cups = 1 pint; 2 pints = 1 quart;

4 quarts = 1 gallon; 1 gallon = 128 fluid ounces

1 ounce (dry) = 28.35 grams; 16 ounces = 1 pound

1 acre = 43,560 square feet; 1 meter = 3.281 feet

1 gallon of water = 8.3453 pounds of water

Boom or Boomless Sprayer Calibration

Volume method

1. On level ground, fill sprayer tank to a known level with water and drift agent (if using).
2. Turn on sprayer till all nozzles have output, shut off and refill tank to desired level.
3. Measure off $\frac{1}{4}$ of an acre, marking the start and end with a flag.

Width of boom swath in feet

Linear feet to cover $\frac{1}{4}$ acres

2	5445
4	2723
6	1815
8	1362
10	1090
20	545
30	363

4. Drive the measured $\frac{1}{4}$ acre with the speed that you will be using to spray, turning on the sprayer at the starting mark and off at the ending flag.
5. Return to the level ground that you filled the sprayer at and carefully measure the amount of water it takes to refill to the known level from step 1.
6. Multiply the amount from above step by 4. This is GPA (Gallons Per Acre).

Stationary method

1. On level ground, fill sprayer tank with water and drift agent (if using).
2. Turn on sprayer and measure spray pattern width in feet.
3. Collect liquid from each nozzle for 1 minute. Measure in ounces.
4. Divide ounces by 128 to determine GPM (Gallons Per Minute).
5. Determine speed (MPH) you will be using during spraying.
6. With the below formula calculate GPA (Gallons Per Acre).

$$\text{GPA} = \frac{\text{GPM} \times 495}{\text{MPH} \times \text{swath width (feet)}}$$

References

More extensive information can be obtained from:

Plant identification and control:

- Larimer County Weed District - www.larimer.org/weeds
- Colorado Dept. of Agriculture Noxious Weed Program - www.colorado.gov/ag/weeds
- Colorado Weed Management Association - www.cwma.org
- Colorado State University Extension small acreage management- www.ext.colostate.edu/sam
- Plant identification
 - www.easterncoloradowildflowers.com
 - **Weeds of the West**
 - **Aquatic and Riparian Weeds of the West**
 - **Thistles of Colorado**
- Poisonous plants
 - **‘A Guide to Plant Poisoning of Animals in North America’**
 - Dr. Knight’s website
http://southcampus.colostate.edu/poisonous_plants
 - or e-mail Dr. Knight at Anthony.Knight@colostate.edu
- Seeding and soil recommendations
 - NRCS office – 970-295-5655

Noxious weed awareness organizations in Larimer County:

- North Fork Weed Coop - www.northforkweedcoop.org/
- Estes Park Land Stewardship Association - www.elsainfo.org

Weed law:

- The Colorado State Noxious Weed Act - www.colorado.gov/ag/weeds
- Applicator education and continuing education information - www.colostate.edu/Depts/SoilCrop/extension/CEPEP

Pesticide labels and safety information:

- Information on pesticide toxicity, environmental fate, or mode of action 1-800-858-7378
- Rocky Mountain Poison and Drug Center 1-800-222-1222
- Chemtrec 1-800-424-9300 (Use for chemical spills.)
- www.cdms.net (Use for complete labels and MSDS)

Glossary

Alien plant – A plant species not native to the United States.

Annuals – A plant which completes its life cycle in one season, spring through fall.

Biennials – Plants that require 2 seasons to complete life cycle. They typically germinate in late summer, over-winter, flower, and set seed by mid-summer of the following year.

Bolt – The initial stem arising from rosette leaves as a plant matures. The term ‘bolting’ is often used to describe the growth stage between rosette and flowering.

Bracts – A small leaf-like structure below the flower.

Calibration - To check, adjust, or determine spray equipment output. (ex. Gallons Per Acre)

Containment – Defined in the Colorado Noxious Weed Act, maintaining an intensively managed buffer zone that separates infested regions, where suppression activities prevail, from largely un-infested regions where eradication activities prevail.

Eradication - Defined in the Colorado Noxious Weed Act, reducing the reproductive success of a noxious weed species or specified noxious weed population in largely un-infested regions to zero and permanently elimination the species or population within a specified period of time. Once all specified weed populations are eliminated or prevented from reproducing, intensive efforts continue until the existing seed bank is exhausted.

Forb - A broad-leaved herb other than a grass.

Inflorescence – The flowering part of the plant.

Invasive plants – Plant species that are competitive enough to become dominant in a particular area.

Lifecycle – A description of a plant’s duration - annuals, biennials, perennials, simple perennials, winter annuals.

Lobed – To cut into shallow segments.

Native plant – A plant that is indigenous to Colorado.

Noxious weed - Defined in the Colorado Noxious Weed Act, as an alien plant that have been designated by rule as being noxious, and meets one or more of the following criteria:

- (a) Aggressively invades or is detrimental to economic crops or native plant communities;
- (b) Is poisonous to livestock;
- (c) Is a carrier of detrimental insects, diseases, or parasites;
- (d) The direct or indirect effect of the presence of the plant is detrimental to the environmentally sound management of natural or agricultural ecosystems.

Ornamental – A plant grown by nurseries with traits desirable for landscaping, such as flower color, drought tolerance, shading, etc.

Perennials – Plants that live 3 or more years.

Raceme – An arrangement of flowers along a stem on individual stalks about equal in length.

Restoration – A management action that results in range or pasture improvement without re-seeding.

Re-vegetation – A management action that results in range or pasture improvement including seeding.

Rhizomes – An underground stem, usually lateral, sending out shoots above ground and roots below.

Rosette – A somewhat round, flattened cluster of leaves typical of the early growth stage of many biennial plant species.

Seedling – A newly germinated plant, not yet mature.

Sessile – A plant without a stalk.

Simple perennials – Perennial plants that reproduce by seed only.

Spikes – A usually long inflorescence with sessile flowers.

Succulent – Fleshy.

Suppression - Defined in the Colorado Noxious Weed Act as reducing the vigor of noxious weed populations within an infested region, decreasing the propensity of noxious weed species to spread to surrounding lands, and mitigation the negative effects of noxious weed populations on infested lands. Suppression efforts may employ a wide variety of integrated management techniques.

Tiller - A shoot, often one that sprouts from the base of a grass.

Winter annuals – Plants which germinate in late summer or fall, over-winter and complete life cycle by the following spring or summer (ex. cheatgrass, tumble mustard).

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