ROUTT COUNTY

WEED MANAGEMENT GUIDE

ROUTT COUNTY
WEED PROGRAM

ROUTT COUNTY
COLORADO STATE UNIVERSITY
EXTENSION

Prepared by Greg Brown,
Supervisor, Routt County Weed Program,
Retired

In cooperation with Todd Hagenbuch
Director,
Routt County / Colorado State University
Extension

Routt County Weed Program 970-870-5246
tcarlson@co.routt.co.us

CSU/ Routt County Extension 970-879-0825
thagenbuch@co.routt.co.us

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INTRODUCTION

The state of Colorado mandates that each county maintain control of all noxious weeds within county boundaries. The Routt County Weed Program uses chemical, mechanical and biological methods to manage, control, and eradicate noxious weeds.

Identifying weeds is the primary step in control. Until the family of the specimen is determined a weed management plan cannot accurately, nor successfully, be developed and/or implemented. Noxious weed control is an ongoing battle.

Chemical control methods change as the weeds can become resistant to chemicals. Consistency is the best method for long-term and successful eradication of noxious weeds. While noxious weeds must be eradicated, a certain level of knowledge is required before any eradication effort should be made. Integrated Weed Management (IWM), incorporates; cultural, mechanical, chemical and biological weed control methods and should be employed wherever possible to ensure long term effectiveness for managing noxious and nuisance weeds.

Fifteen noxious weeds have been identified and placed on Routt County's Noxious Weed List, all of which are included in this booklet. The information sheets on individual species include tips on identification, different methods of control, recommended herbicides, and impacts the species have on surrounding habitats.

This guide also includes a section on important poisonous plants in Routt County and includes information for selecting and mixing herbicides as well as calibrating spray equipment.

Table of Contents

NOTE: Species listed in RED are Colorado List A noxious weeds and fall under the *mandatory* ***eradication*** management plan.

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GLOSSARY

Annual – is a plant which completes its life cycle in one growing season

Biennial – is a plant which completes its lifecycle in two growing seasons.

Biological control – is the use of biological agents, usually insects, but also plant diseases or targeted grazing with livestock

Broadleaf (or forb) – a non-woody plant other than a grass (like) plant,

Chemical control – is the use of herbicide to disrupt the growth of a plant.

Cultural control – includes the use of timing of grazing or mowing or the change of a class of livestock to minimize the vigor of weed growth and to suppress seed development of weeds

Dicotyledonous plant.-Broadleaved plants, germinating with two cotyledons.

Herbicide – is a chemical affecting plant metabolism to kill or suppress the growth of a plant.

Mechanical control – includes mowing, pulling, digging, or cultivating to disrupt the growth of a plant.

Monocotyledonous plant-Plant first germinating with a single cotyledon. Grass like or liliaceous plants

Noxious weed – is an invasive, non-native plant which adversely impacts native and or desirable vegetation.

Perennial – is a plant which initiates new growth each year for several years, generally flowering and producing seed each year.

Poisonous plant – is a plant which produces tissues or substances which are toxic to livestock, wildlife, pets or humans.

Rhizomes (rhizomatous) – is an underground stem by which a plant can spread laterally and store carbohydrate reserves. Rhizomes are distinct from roots.

Runners – are plant stems which spread horizontally on the surface as stolons or below ground as rhizomes.

Stolon – is a horizontal plant stem on the soil surface, rooting at nodes.

Surfactant – is a chemical additive to spray solutions which improve herbicide solubility in solution, improve the spread of the solution over the plant surface, enhance penetration of the solution into the plant and decrease the rain fast interval.

GLOSSARY (continued)

Tap-rooted – is a plant characterized as having a main enteral root, with varying degrees of branching.

Translocate – is the movement of plant metabolites in the phloem from the leaves to the roots and rhizomes. This process is necessary for herbicides to move from the point of entry into the weed's roots and rhizomes to kill the plant.

Weed – is any plant, native or non-native, which is growing in an unwanted area.

Levels of Weed Control

Suppression

1. Control can be mechanical, management (cultural), herbicide or biological.
2. **Prevent weed from setting seed or maintaining vigor**.
3. Reduce weed stand over time.

Containment

1. **Control all weeds in designated areas.**
2. Eliminate any weeds found outside the designated areas by mechanical removal or herbicide use.
3. Monitor area for escapes.

Eradication

1. **Eliminate all of a weed population.**
2. May be treated mechanically (digging, pulling, etc.)
3. Usually a reliance on herbicide to destroy the weed.
4. All List A weeds in Colorado are targeted for eradication.

Cypress Spurge

CHARACTERISTICS

- Cypress spurge is a perennial plant that reproduces by lateral root buds and seeds.
- Flowers are yellowish-green when plant is young, and becomes reddish green as plant matures.
- Cypress spurge prefers direct sunlight and occurs mostly in dry to moderately moist habitats.
- Soil seed reserve for Cypress spurge is thought to be at least 8 years.

WHY BE CONCERNED?

CAUTION: Cypress spurge plants have a milky sap that may cause dermatitis, skin rashes or eye damage.

WARNING: Animals should not be pastured where spurge plants grow.

This plant was first used as an ornamental and has escaped from garden sites. It is a List A species in Colorado and must be eradicated.

Cypress spurge, *Euphorbia cyparissias* List A

MANAGEMENT

- **Practice** prevention! This is the best way to avoid a spurge infestation.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may re-sprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is not recommended as a way to remove Cypress Spurge due to the extensive root system and the potentially harmful sap.

MOWING is also not recommended due to the longevity of the seed reserve.

BIOLOGICAL CONTROLS are not currently available.

HERBICIDES are effective to control Cypress spurge, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Paramount can be applied at the flowering stage.

2,4-D + dicamba may also be applied at the flowering stage.

RE-SEEDING can be very helpful in the long-term. After treating an area with herbicide, re-seed with a grass seed mix in the fall. Always refer to the herbicide label for time intervals before reseeding.

Leafy spurge

CHARACTERISTICS

- There is a white, milky, sap-like substance inside the entire plant that can damage eyes and skin
- Leafy spurge grows from 1-3ft tall with roots that are up to 30ft deep.
- Leafy spurge is one of the first plants to emerge in the spring
- Rhizomes can spread laterally 30 feet annually.
- Ripe seed can be cast upto 15 feet.
- The plant is toxic to horses.

WHY BE CONCERNED?

- Leafy spurge is non-native, extremely invasive, and spreads by extensive creeping roots and seeds.
- Leafy spurge has adapted to a large variety of habitats across the State of Colorado.
- Western Routt County has a serious infestation along the Yampa River.

Leafy spurge, *Euphorbia esula* List B

MANAGEMENT

PREVENTION is critical!

- **Maintain** healthy pastures and rangeland

Clean equipment that has been used in infested areas.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

- **Monitor** the site for several years, promptly removing new seedlings.

Create a management plan for the area that incorporates several compatible control methods.

HAND PULLING is not recommended due to the extensive length of the root system.

MOWING will reduce seed production if repeated bi-monthly during the growing season.

BIOLOGICAL CONTROL can be accomplished either by allowing sheep and/or goats to graze the impacted area, or through insect activity. The flea beetles *Apthona nigriscutis, A. lacertosa,* and *A. cyparissiae,* are effective.

HERBICIDES are effective to control Leafy spurge, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that will also work. *See the label for proper rates, sites and grazing restrictions.*

Tordon 22K (picloram) should be applied in the spring, following full-bloom and/or fall.

Tordon + 2, 4-D: apply in the spring or fall

Plateau, Panaoramic: (Imazapic) Apply in the fall as long as milky sap is present.

With all herbicides use an appropriate surfactant for the herbicide and for the application site.

When reclaiming sites following successful control efforts use a quality seed mix suitable for the site and for the intended use. Seed only after the recommended post spraying interval has passed or seedlings may fail to establish.

Myrtle spurge

CHARACTERISTICS

- Myrtle spurge is a low growing perennial
- Flowers appear from March to May
- This plantreproduces from seed and plant fragments.
- The plant grows from a taproot and reproduces by seed. Plants are capable of projecting seeds upto 15 feet

This plant has been widely used in ornamental plantings and has escaped from those gardening sites. It should never be planted in Colorado. If you encounter this plant for sale, report it to the Routt County Weed Program. It may also be known as Donkey-tail spurge.

WHY BE CONCERNED?

- **Myrtle spurge contains a toxic milky sap, which is poisonous if digested!**
- **Wearing gloves, long sleeves, and eye protection is recommended when working with or near Myrtle spurge**

Myrtle spurge, *Euphorbia myrsinites* List A

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may re-sprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is recommended, but effort must be made to fully remove all plant parts. Bag and securely dispose of the pulled plants. **CAUTION: always wear gloves, long sleeves and eye protection!**

BIOLOGICAL CONTROLS are not available.

HERBICIDES are effective to control Myrtle spurge, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

2,4-D low-vol ester is moderately effective, but may need more than one application. The ester formulation is more effective than the amine , because of the very waxy cuticle

Roundup (glyphosate) is highly effective, but will harm any surrounding vegetation. Wiping or painting the herbicide directly on to the leaves allows very targeted application.

With any herbicide use an appropriate surfactant. The waxy cuticle may be best penetrated by an oil based surfactant.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall. Be sure to observe the recommended interval before seeding based on the herbicide label. In a garden re-plant with suitable natives.

Meadow knapweed

CHARACTERISTICS

- Meadow knapweed is a perennial and grows from a woody crown produces flowers that are purple or pink in color. Leaves grow up to 6 inches long and 1 inch wide

Plants grow between 20 and 40 inches tall and bloom in late summer (late July thru August in Routt county) and early fall

WHY BE CONCERNED?

- Meadow knapweed is not palatable for livestock
- Meadow knapweed primarily reproduces by seed
- Habitats include moist sites mainly, but also include roadsides and open forest areas
- This plant disturbs wetland habitats by pushing out native seedlings
- Look for it in the lower Mad Creek and Hot Springs Creek area.
- **PLEASE REPORT ANY SIGHTINGS TO THE ROUTT COUNTY WEED PROGRAM IMMEDIATELY (970-870-5246)**

Meadow knapweed,*Centaurea pratensis* List A

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for at least ten years after the last adult plants are eliminated

HAND PULLING and or digging is recommended for small infestations.

BIOLOGICAL CONTROLS are not currently available.

HERBICIDES are effective to control Meadow knapweed, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Milestone should be applied either in spring during bolting or during the fall

Tordon apply either in spring during bolting to bud growth or during the fall.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a recommended grass seed mix in the after October 15.

CURRENT DISTRIBUTION IN COLORADO

BoulderCounty
Broomfield County
Denver County
Ouray County
Pitkin County
Routt county

Spotted knapweed

CHARACTERISTICS

- The plant can grow up to 4 feet tall and has pink/ purple flowers ‘
- The solitary flowers are bourne at the end of branches.
- Flowering occurs from July thru October with seed set usuall in mid-August.
- The plants is a short lived perennial and is highly adaptive.

WHY BE CONCERNED?

- Each plant may produce 40,000 seeds

*This type of knapweed can be distinguished from other types of knapweeds by the black-tipped bracts (phyllaries) at the base of the flower.

Spotted knapweed, *Centaurea maculosa* List B

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HERBICIDES are effective to control spotted knapweed, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Milestone: spring at rosette to early bolt stage and/or in the fall to rosettes

Curtail: apply in the spring and fall to rosettes

Tordon 22K: apply in spring to rosettes through mid-bolt and in fall to rosettes. Do NOT apply near trees/shrubs/high water table.

BIOLOGICAL CONTROLS The Colorado Department of Agriculture has released a number of biocontrol agents against diffuse and spotted knapweed including two root boring beetles, two seed head feeding flies, seed head feeding weevils and seed head feeding moths. Several of these are well established in Colorado and are probably having an impact on the knapweeds.

The root boring weevil **Cyphocleonus achates** weakens plants by destroying the root system. This large weevil has been effective against both diffuse and spotted knapweed and collectible populations have recently been seen on the Front Range.

Russian knapweed

CHARACTERISTICS

- Roots are black in color with a scaly appearance, flowers are purple in color and are solitary at tips of upper branches
- Russian knapweed can grow to be 3 ft tall
- This weed may be **toxic to horses** and can result in the animals injury or death.

WHY BE CONCERNED?

- Russian knapweed is a non-native species in CO.
- Spreads by roots and seeds.
- Displaces native vegetation especially in rangeland pastures.

Russian knapweed, *Acroptilon repens* List B

MANAGEMENT

PREVENTION is critical!

- **Maintain** healthy pastures and rangeland
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

MOWING several times before the plants bolt stresses Russian knapweed and forces them to use nutrient reserves stored in the root system. Mowing needs to be repeated during the summer, followed by an herbicide application in the fall.

BIOLOGICAL CONTROLS are currently limited. A potential insect is currently under investigation. The insect is a gall forming nematode, *Subanguina picridis*.

HERBICIDES are effective to control Russian knapweed, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Milestone can be applied in the spring and summer to plants in the bud and flowering stage

Tordon 22K should be applied during the same time of year as the Milestone

Telar can be applied in the spring from pre-bloom to bloom and to fall rosettes.

Opensight is a dry, flowable granule to be mixed with water and applied pre-bloom or on fall rosettes.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall. Always observe the seeding interval limitations following herbicide use.

Diffuse knapweed

CHARACTERISTICS

- Fowers are usually white, sometimes purple, and bloom July through August.
- Diffuse knapweed is a biennial forb that only reproduces by seed.

WHY BE CONCERNED?

- Diffuse knapweed is a non-native species in the state of Colorado.
- Preventing seed production is the key to management.
- Diffuse knapweed tends to invade disturbed, overgrazed areas.

Diffuse knapweed, *Centaurea diffusa* List B

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.
- Manage livestock movement to avoid bringing seeds in to areas where weed management will be difficult. Consider using a smaller pasture for importing animals before moving them to a larger range.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is recommended as any method of removal which destroys the root below soil surface will kill the plant

MOWING is recommended when plant is in full bloom. BE SURE that cut plants are properly disposed of!

BIOLOGICAL CONTROL the seed head feeding weevil, **Larinus minutus** and the root boring weevil **Cyphocleonus achates**

HERBICIDES are effective to control Diffuse Knapweed, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Milestone: apply in spring at rosette to early bolt stage or in fall to rosettes.

2, 4-D Amine should be applied in spring or fall to rosettes. Add a non-ionic surfactant.

Tordon 22K: apply in spring or fall.

RE-SEEDING can be very helpful in the long-term. After treating, reseed with a grass seed mix in the fall. Seeding should occur before September 10 in Routt County for an active seeding or after October 15 for a dormant seeding.

Dalmatian toadflax

CHARACTERISTICS

- The plant can grow up to 3 feet tall and has bright yellow flowers, often with an orange throat, which resemble snapdragons.
- The leaves alternate and have a waxy surface, blue-green tint, cordate shape and clasp the stem.
- Flowers usually bloom in July.
- Seeds generally fall within 18 inches of the stem.
- The plants first came to the U.S. as an ornamental and folk medicine remedy and a fabric dye.

WHY BE CONCERNED?

- Dalmatian toadflax is a non-native species to the state of CO.
- An individual plant can produce up to 500,000 seeds.
- Prevention is the key to controlling Dalmatian toadflax.
- Dalmatian toadflax is highly aggressive.
- Readily displaces native vegetation.

Dalamatian toadflax, *Linaria dalmatica* List B

MANAGEMENT

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young. Newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or frag ments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is recommended **only** for small infestations. **Be sure the entire root is pulled!**

MOWING will slow, but not stop, the spread of Dalmatian toadflax. Be careful to mow before the plant goes to seed in order to maintain control of seed dispersal.

BIOLOGICAL CONTROLS are available. *Calophasia lunula* feeds on the leaves and flowers of the plant. Other biological controls are available. For more information contact the Colorado Department of Agriculture Insectary, Routt County Extension or the Routt County Weed Program.

HERBICIDES are effective to control Dalmatian toadflax, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Tordon 22K: Apply when flowering or in the fall

Telar: Apply in spring or fall. Add a non-ionic surfactant.

2, 4-D + Dicamba: Apply during pre-bloom or flowering stage. Re-treatment required. Add a non-ionic surfactant.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall. Always follow herbicide guidlenis for replanting interval prior to reseeding.

Yellow toadflax

CHARACTERISTICS

- The leaves of this plant are narrow, linear and 1-2 inches long.
- Yellow toadflax is known to be mildly poisonous to livestock.
- The plant is a non-native, originating in the Mediterranean region and brought to the U.S. as an ornamental.
- It reproduces by seed and vigorous, spreading rhizomes, producing up to 100 new shoots in the first season.

WHY BE CONCERNED?

- Yellow toadflax can inhabit a wide variety of landscapes.
- It can grow at high elevations.
- It now hybridizes with Dalmatian toadflax.

Yellow toadflax, *Linaria vulgaris* List B

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is not recommended due to the extended root system of Yellow toadflax.

MOWING is also not recommended because of the creeping root system.

BIOLOGICAL CONTROL is the Toadflax weevil. For more information contact the Routt County Weed Program or the Colorado Insectary.

HERBICIDES are effective to control Yellow toadflax, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Tordon + 2, 4-D can be effective if applied at the flowering stage (through fall). Re-treatment may be necessary.

Telar is most effective at seed capsule set with crop oil or methylated seed oil surfactant.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall. Observe replanting intervals specific to the herbicides(s) used for control.

Orange hawkweed

CHARACTERISTICS

- Showy red-orange blossoms.
- Leaves are basal. Rosette leaves are 4 to 6 inches in length and have finely toothed margins.
- This plant contains a milky juice, but it is not considered an irritant
- Orange hawkweed grows in temperate and mountain regions and can tolerate a variety of conditions.
- It is an escaped ornamental

WHY BE CONCERNED?

- Orange hawkweed reproduces from runners, rhizomes, sporadic root buds, and seed.
- Orange hawkweed easily escapes gardens and can readily infest lawns and other garden settings.
- Fendler's hawkweed is a native plant similar in appearance.

Orange hawkweed, *Hieracium aurantiacum*

MANAGEMENT List A

PREVENTION is critical!

- **Maintain** a specific garden or yard area and ensure that this species does not escape from the confined area. Better yet, choose a native plant for your garden.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is not recommended.

BIOLOGICAL CONTROLS are not currently available.

HERBICIDES are effective to control Orange hawkweed, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Milestone: Apply when plants are in rosette to bolting stage.

Clopyralid: can be used alone or 2-4-D can be added to it. Either way, it should be applied when plants are in the rosette growth stage. 2-4-D can also be used alone.

Glyphosate (Roundup): can be wiped or brushed on individual plants, avoiding non-target plants in the garden.

This plant has been found in several areas around Steamboat Springs associated with gardens where it was at one time planted. Since it is a List A species in Colorado it must be eliminated. If you know you have it or have questions about a suspicious plant in your garden, please contact the Routt County Weed Program or CSU/Routt Extension.

Purple loosestrife

CHARACTERISTICS

- Flowers bloom from late June through September and are reddish-purple in color.
- The stems can grow between 2 and 8 feet tall.
- The plant is native to Europe
- Seed viablity 5-20 years.
- As a List A species it is designated for eradication at all sites in Colorado.
- Make certain you don't have this plant in your garden or on your property.

WHY BE CONCERNED?

- Purple loosestrife is a serious threat to native wetlands.
- Well establish populations can become a complete monoculture.

Purple loosestrife, *Lythrum salicaria* List A

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- Use weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is recommended only for small infestations and should be performed before seed set.

BIOLOGICAL CONTROLS are not currently available, though a couple of insect species are currently under evaluation.

HERBICIDES are effective to control Purple loosestrife, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Garlon 3A can be applied in summer. If plants are flowering, remove flower heads before applying herbicide.

Rodeo should be applied in summer. Add a non-ionic surfactant. Again, dispose of flower heads before applying herbicide.

Aquatice 2, 4-D Amine can be applied in early spring. Only prevents seed formation. Retreatment is necessary.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall. Always observe the recommended interval between herbicide application and reseeding to optimize seedling germination and survival.

Houndstongue

CHARACTERISTICS

- Each flower produces 4-nutlets, developing into burs upon maturity.
- Leaves are alternating, shaped likes a dog's tongue and hairy.
- The plant is a tap-rooted biennial
- Seeds generally germinate in the first 2 years if just lightly covered with soil.

WHY BE CONCERNED?

- Houndstongue is toxic to horses., causing liver damage.
- Houndstongue grows in disturbed habitats such as roadsides, sand dunes, or open woodlands
- Houndstongue grows a long taproot that can reach up to 1 meter deep.

Houndstongue, *Cynoglossum officinale L.* List B

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is recommended for small infestations. Make sure to pull entire root! If pulling or digging get at least 4 inches of the taproot.

MOWING will slow, but not stop, the spread of Houndstongue. Plants that are periodically mowed continue to flower and produce seed on shorter plants, prolonging the season of growth and flowering.

BIOLOGICAL CONTROLS are not currently available in the U.S. However, two species of insects are currently being used in Canada and have now been reported in the U.S. A native moth has also been reported in the vicinity of Yellowstone to be defoliating Houndstongue.

HERBICIDES are effective to control Houndstongue, but should always be applied with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Telar can be applied in early summer or in the fall. Add a non-ionic surfactant.

2,4-D can also be applied in early summer or in the fall.

Escort can be applied in early summer or in the fall.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall, following an appropriate interval after herbicide application.

Whitetop/Hoary cress

photo courtesy "Weeds of the West"

CHARACTERISTICS

- Whitetop grows up to 2 feet tall and has small, white, 4-petaled flowers at the ends of the stem.
- The upper leaves clasp the stem and leaves have jagged edges.
- Plants usually bloom in May and early June.
- Seeds are formed in a bladder-like pod.
- The plant is highly rhizomatous, and can rapidly invade and displace desirable vegetation in meadows and pastures.

WHY BE CONCERNED?

- The whitetop visible is only a small part of the total biomass.
- Whitetop is unpalatable and displaces grasses and other more valuable forage for wildlife and livestock.

Whitetop/Hoary cress *Cardaria draba* List B

MANAGEMENT

PREVENTION is critical!

- **Practice** good pasture management; avoid overgrazing, irrigate and fertilize as needed, and reseed bare ground. A healthy pasture will help resist weed invasion.
- **Use** weed-free hay and seed and avoid bringing in weed-contaminated soil.

Clean equipment that has been used in infested areas.

Remove seedlings when young - newly established plants can usually be pulled without leaving root fragments in the ground.

Re-plant disturbed areas with desirable grasses as soon as possible.

Dispose of weeds properly; bag or burn seed heads or fragments that may resprout.

Monitor the site for several years, promptly removing new seedlings.

HAND PULLING is recommended **only for new seedlings**.

MOWING will slow, but not stop, the spread of whitetop. Plants that are periodically mowed continue to flower and produce seed on shorter plants, prolonging the season of growth and flowering.

BIOLOGICAL CONTROLS are not currently available but several are currently being evaluated.

HERBICIDES are effective to control whitetop from May to mid June. Always apply with care. **Read and follow all labeled instructions.** Trade names are used here to simplify matters - no endorsement is implied. Other brand names may be available with similar ingredients that also will work. *See the label for proper rates, sites and grazing restrictions.*

Escort and Telar are very effective on whitetop. Application needs to occur when sufficient moisture is available in the soil, and a good non-ionic surfactant must be used.

MCPA is moderately effective, but may need more than one application.

Roundup (glyphosate) if used, must be applied only to the whitetop. It is non-selective and will kill other plants, including grasses. You must re-seed after treatment.

RE-SEEDING can be very helpful in the long-term. After treating, re-seed with a grass seed mix in the fall. Pay attention to the required interval between herbicide use and time of seeding. This will vary according to the herbicide.

Common mullein

LIST C

Verbascum thaspus

- Tap-rooted biennial
- Reproduces by seed only
- May produce up to 90,000 seeds
- Seed longevity up to 110 years
- 1-7’ tall
- Common in roadside and construction disturbances
- Herbicides: Telar®, 2 ,4-D, Milestone®, Overdrive®, Glyphosate, Perspective®
- Timing: Spray rosettes fall or spring and up to flowering in 2nd year
- Dig or pull any time
- Secure seeds when disposing of mature plants

Curly Dock

Rumex crispus

- Robust, tap-rooted perennial
- Reproduces by seed
- 2’-5- tall
- Readily establishes from seeds in hay
- Herbicide: 2,4-D, Escort®, Milestone®, Telar®
- Timing: young, actively growing
- Young plants may be pulled in early season
- Dig older plants with at least 4” of root
- Bag and securely dispose of seeds
- Continue to monitor infested sites.
- Monitor hay sources for seed.

Additional Local Weeds of Concern

NOTES

Canada thistle

Cirsium arvense

- Vigorous, long lived perennial
- Extensive rhizome system
- Mowing may suppress growth and reduce seed production
- Reproduces by seed and shoot
- Herbicides: Milestone®, Banvel®, Vanquish®, Redeem®, Telar®, Tordon®, Curtail®, Round-up® (glyphosate)
- Timing: Pre-bud through early bud and fall

Bull thistle

Cirsium vulgare

- Vigorous, tap-rooted biennial
- Reproduces by seed
- 1.5’ to 6’ tall
- Herbicide: Milestone®; Curtail®; 2,4-D with Tordon®, Telar® or Vanquish®
- Dig scattered plants with at least 4” of the root.
- Timing: Fall rosette, spring rosette (higher rate), pre flower
- Bag flower heads to prevent seed maturity and dispersal

Musk thistle

Carduus nutans

- Vigorous, tap-rooted biennial
- Reproduces by seed (20,000/pl.)
- 2’-6’ tall
- Herbicide: Milestone®; Curtail®; 2,4-D with Tordon®, Telar® or Vanquish®
- Timing: Rosettes, pre-flower
- Dig scattered plants, try to get at least 4” of tap root.
- Bag flower heads to prevent seed maturity and dispersal.
- Insects available for bio-control

Scotch thistle

Onopordum acanthium and
Onopordum tauricum

- Robust, tap-rooted biennial
- Reproduces by seed
- 1.5'- 10' tall
- Herbicide: Milestone®; Curtail®;2,4-D with Tordon®, Telar® or Vanquish®
- Dig with at least 4" of root
- This is a very stout plant with thick, leathery leaves.

Oxeye daisy

Chrysanthemum leucanthemum

- Rhizomatous perennial
- Reproduces by seed and spreads by rhizome
- 10-24" tall
- A very showy plant ,sometimes unfortunately placed in ornamental use
- Herbicides: Milestone®, Tordon®, 2,4-D, Vanquish®, Glyphosate® and others
- This weed is relatively easy to control with herbicides.

Chamomile

Mayweed: *Anthemis cotula*
Scentless: *Tripleurospermum inodorum*

- Annual or short-lived perennial
- Reproduces by seed. One plant may produce a million seeds which are viable for 4-6 years.
- 6”-30” tall
- Leaves resemble fennel
- Herbicide: Herbicide: Aminopyralid (Milestone®), Metsulfuron (Escort XP®) and Chlorsulfuron (Telar XP®)
- Timing: Spring-early summer
- Shallow root system allows for pulling, however, take caution as it can cause skin irritation.

Wild caraway

Carum carvi

- Typically biennial, occasionally perennial
- Reproduces only by seed
- 1’-3’ tall
- Herbicide: 2,4-D, MCPA, Escort®
- Timing: rosettes, fall and spring before bolting
- Taproot
- Leaves like carrot leaves

Tarweed

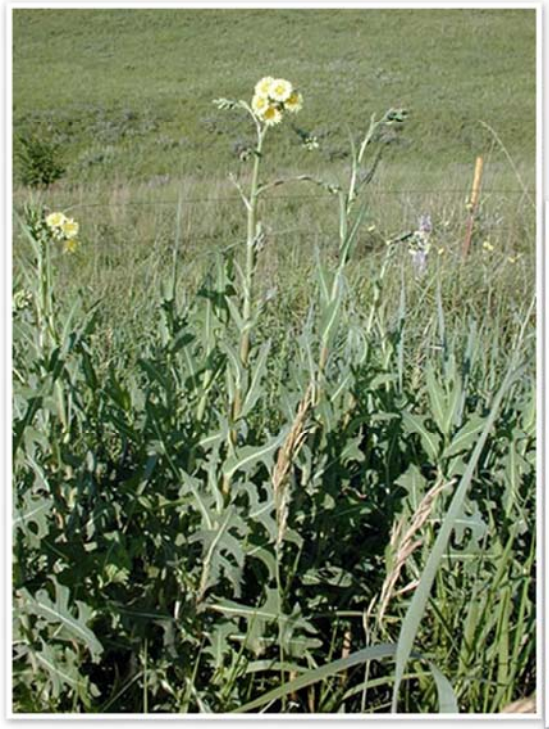
Madia glomerata

- **Warm season** annual, taproot
- Reproduces only by seed
- 6”-24” tall
- Herbicide: 2,4-D amine or ester, Banvel®, Vanquish®, Tordon®
- Timing: Young actively growing plants (before flowering)
- To prevent seed set, double 2,4-D rate to 2 qts. /acre
- Plants can also be pulled. Wear gloves, the stink is hard to get off

Prickly lettuce

Lactuca serriola

- Biennial or winter annual
- Reproduces by seed
- 2’-3’ tall
- Mechanical control is readily accomplished, but pulling needs to be done in early season from moist soil.
- Herbicide: An effective treatment is 2 ounces of 2,4-D plus ½ ounce of dicamba (Banvel® or Vanquish®) per gal. water. Tordon®, MCPA, Glyphosate, Escort®, Milestone® +2,4-D can also be effective.



Common mallow, buttonweed

Malva neglecta

- Annual, winter annual or biennial
- Reproduces by seed
- Low, spreading branches to 20” long
- Pull when young, much tougher with age
- Herbicide: 2,4-D or oryzalin for pre-emergent
- Timing: Apply when young, but herbicide control is very inconsistent
- Grows below mowing height
- Very stout, branched taproot
- This weed requires very diligent effort to remove from yards and gardens





Prostrate pigweed

Amaranthus blitoides

- Annual, tap-root
- Reproduces by seed
- Prostrate, multiple reddish stems to 20”
- Readily pulled when young (in soft soil)
- Herbicide: 2,4-D,Telar®, Glyphosate, Vanquish®, Banvel®
- Common in gardens, parking, gravel driveways
- Will grow under mower height



Prostrate knotweed

Polygonum aviculare

- Annual, prostrate, tap-root
- Reproduces by seed
- Wiry stems to 3’ long in circular flat mats
- Pull when young in soft soil
- Herbicide: Vanquish®, Telar®, Escort®, Glyphosate, Overdrive®
- Will grow under mower height

Kochia

Kochia scoparia

- Annual, taproot
- 1-6’ tall
- Warm season
- Stems are many branched, often with a reddish tinge.
- Flowers are inconspicuous
- Produces abundant seed
- A problem roadside invasive, especially on dry disturbed sites
- Though palatable and relatively nutritious it can present toxicity problems because of high nitrate and nitrite levels
- Herbicides: Vista®, 2,4-D + Vanquish®, Clarity®, or Banvel® according to label.

Grass weeds

Noxious List B

- Cheatgrass or Downy brome

  Bromus tectorum, Bromus secalinus

- Quackgrass

  Elytrigia repens

Nuisance Native Grass:

- Foxtail Barley

  Hordeum jubatum

- Reed canarygrass (Question about possible native status)

  Phalaris arundinacea

- Bulbous bluegrass **(Routt County Weed of *Concern)***

  Poa bulbosa

Cheatgrass and Downy brome

Bromus tectorum and
Bromus secalinus

- Annual or winter annual
- Introduced to U.S. in Denver in packing material
- Reproduces by seed
- Bunch grass with shallow, fibrous root system
- Late season fire hazard
- Treat with glyphosate, Matrix®, Plateau®
- Bioherbicide now available
- Reduces range health, bio-diversity and carrying capacity.

- Capable of two seed crops annually
- Early green-up
- Late season fire hazard
- Intense early season grazing may reduce stand vigor.

Herbicides:
Glyphosate, Plateau®, Esplanade®

Quackgrass

Elytrigia repens

- Perennial, rhizomatous
- Widespread invasive in N. Amer.
- Present in Routt County primarily in irrigated and sub-irrigated meadows
- Often forms dense, rank stands making windrows difficult to dry.
- Control with glyphosate if patches can be isolated. No selective herbicides are available.

Foxtail barley

Hordeum jubatum

- Short lived perennial native
- Shallow rooted bunchgrass
- Can be readily pulled in soft soil
- Common along roadsides
- Large populations difficult to selectively control
- Non-selective control with glyphosate, add imazapyr for season long control
- Can be grazed early, prior to awn development.

Reed Canarygrass
Phalaris arundinacea

- Aggressive, tall, rhizomatous perennial
- Can form dense monocultures, crowding out native species.
- A significant threat to riparian plant communities
- Small stands can be removed by hand
- Be sure to get all of the rhizomes and follow-up.
- Spray the plants with glyphosate and or imazapyr.
- Follow all label directions for site requirements and rate of application.

Bulbous bluegrass *Poa bulbosa*

Routt County Designated Weed of Concern

- Cool season, short lived
- Forms tufts or sod
- Plant base is a bulb over fibrous roots
- Leaves primarily basal, membranous
- Panicle inflorescence, producing small bulblets instead of seeds.
- Bulblets fall to the ground to initiate growth and can be transported in hay or on livestock to invade new sites.
- Control is difficult in established grass meadows or pastures.
- High intensity **very early season** grazing can aid control over a few years
- Herbicides include glyphosate, rimsulfuron and sulfometuron methyl. Use only according to label directions.

GUIDE TO POISONOUS PLANTS

BY DR. A. (TONY) P. KNIGHT

The Routt County Weed Program has compiled this selection of poisonous plants from the work of Dr. A. (Tony) P. Knight, Colorado State University, and the Colorado State University website at www.vth.colostate.edu/poisonous_plants

(Dr. Knight is incredibly knowledgeable and makes a very interesting and informative presentation whenever he presents a workshop or class. The Routt County Weed Program and CSU/ Routt County Extension will provide notice when he speaks in the area.)

General Consideration when managing poisonous plants

- Plan ahead for livestock management
- Herbicide treatment of toxic plants often increases the possibility of livestock poisoning, because interruptions in plant metabolism can make the plants more palatable.
- Move the livestock to safe grazing before spraying poisonous plants.
- Map the locations of poisonous plants so that treatments can begin early in the growth season.
- Wait until plants have fully senesced before returning animals to sprayed areas.
- Monitor treated areas to determine if further treatments are necessary to eradicate the poisonous plant.

Arrowgrass perennial

Triglochin maritima

Habitat: Wet, alkaline soils, irrigated hay or wetland pasture.
Toxic to: Cattle, sheep
Toxin: Cyanogenic glycoside hydrolyzed in rumen by micro-organisms to produce HCN.
Toxic parts: All plant parts
Symptoms: Sudden death is often first sign of trouble. Rapid, difficult breathing, rapid heart rate, red membranes, cherry-red venous blood
Treatment: Sodium thiosulfate and sodium nitrite with veterinary supervision or consultation.
Herbicides: metsulfuron methyl, dicamba, 2,4-D

* Always have a livestock management plan in place before spraying poisonous plants.

Bracken fern perennial

Pteridium aquilinum

Habitat: Moist open woodlands, often forming dense stands in aspen understory
Toxic to: Horses, cattle, sheep, pigs, humans
Toxic principle: Multiple compounds. Carcinogenic, facilitates thiamine deficiency, retinal degenerative blindness.
Toxic parts: new shoots, fronds
Symptoms: Blindness, blood in urine, compromised blood clotting, weakness
Potential treatments: Large doses of thiamine may be beneficial for treating symptoms associated with thiamine deficiency such as blindness. No known treatments for gastrointestinal cancer or bone marrow depression.
Diagnosis: The previously described symptoms with the presence of stands of grazed bracken fern may help to confirm that bracken fern poisoning is responsible.
Precautions: Human consumption of fiddlehead fern in the spring is strongly advised against. It is advisable to manage livestock to have minimum contact with fern infested area.
Herbicides: Dicamba, glyphosate

Buttercup perennial

Ranunculus spp

Habitat: Widely distributed in early spring across irrigated and dryland meadows and pastures.
Toxic to: Cattle, horses
Toxic principle: Ranunculin an oily glycoside. Dried plants appear to be non-toxic.
Toxic parts: All above ground plant parts are toxic.
Treatment: Animals recover once removed from the poisoning source.
Herbicides: Always remove livestock from toxic plant infestations before spraying. Chlorsulfuron, metsulfuron methyl and 2,4-D. Tall buttercup responds to Milestone.
Note: Buttercup species (Ranunculus) tend to be prominent in early spring and generally senesce by summer. Tall buttercup may continue to be green and growing into late June and July.

Chokecherry perennial

Prunus Virginia


Habitat: A very common native shrub in Routt County, occurring on slopes and along seasonal drainages throughout the foothills, lower mountains and in the valleys.
Toxic to: Cattle, sheep and goats
Toxic principle: Cyanogenic glycosides, resulting in cyanide poisoning when the toxin inhibits the release of oxygen from the blood hemoglobin.
Toxic parts: All members of the Prunus genus contain cyanogenic glycosides in their stems, leaves and seeds. The primary threat for poisoning is ingestion of the first green shoots and immature leaves in early spring. Wilted or frosted leaves are especially toxic. Mature fruits are widely harvested in late summer and used for a variety of fruit products. The seeds are discarded.
Potential treatment: Administration of sodium thiosulfate and sodium nitrite. Consult a veterinarian.
Herbicide: 2,4-D, triclopyr, glyphosate, dicamba, picloram, imazapic.
Note: Remove the shrubs from corrals or early spring locations where animals are likely to concentrate.

Cocklebur annual

Xanthium trumarium


Habitat: Waste areas and disturbed sites, including roadside, parking areas, old corrals or livestock loading and unloading sites.
Toxic to: Pigs, less often cattle and sheep
Toxic principle: Carboxyactractyloside, a sulfated glycoside, is present in the burs and in the cotyledons. Acting as a liver toxin it is generally disappears by the 4 -leaf stage and is absent from mature plants. It is fatal when .75% to 3.0% or more of body weight is consumed.
Symptoms: Vomiting, abdominal pain, depression, ataxia, recumbency, convulsions.
Potential treatments: Mineral oil orally to limit absorption of toxin.
Note: The presence of cocklebur in sheep grazing can greatly diminish the value of the wool. Wear gloves when pulling mature plants to minimize injury from the very spiny burs.
Herbicides: 2,4-D, aminopyralid, glyphosate, metsulfuron methyl

Curly dock
Rumex crispus

perennial
robust taproot

Habitat: Especially invasive of disturbed and over-grazed sites, but can invade meadows and pastures from the highly viable seeds present in contaminated hay.
Toxic to: Cattle, sheep and horses
Toxic principle: Soluble oxalates impact serum calcium and magnesium metabolism. 10-20 pounds of green plant would need to be consumed to poison an adult cow.
Symptoms: Muscle tremors, weakness, collapse, kidney failure, death.
Potential treatments: Intravenous calcium gluconate. Animals which recover may develop kidney failure.
Control: Dig plants, cut and dispose of seed heads.
Herbicides: 2,4-D, metsulfuron methyl, chlosulfuron, aminopyralid, glyphosate
Note: Take the time in the late season to remove, bag and dispose of seed heads even if you won't be able to spray the plants until spring.

Dalamatian toadflax
Linaria dalmatica

perennial
rhizomatous

Habitat: Diverse, from roadsides to rangeland
Toxic to: Cattle, horses
Toxic principle: Quinazoline alkaloids
Symptoms: Horse may show nausea, diarrhea, and experience nausea
Treatment: Horses can be given fluids and activated charcoal to prevent further absorption of toxins if a large quantity of Dalmatian toadflax has been ingested.
Risk: Animals will generally avoid grazing this plant, but may consume it in contaminated hay.
Herbicide: Tordon 22K®, Telar®, 2,4-D+Dicamba

Death camas
Zigadenus spp.

perennial
bulb

Habitat: Moist mountain valleys, sagebrush hillsides, sandy plains. About 15 species distributed across the US.
Toxic to: Cattle, sheep, horses, pigs and humans.
Toxic principle: Steroidal alkaloids, very potent. Sheep can be poisoned from eating as little as 1/2 pound of green plant material.
Symptoms: Weakness, tremors, vomiting, excessive salivation, convulsions, death.
Potential treatment: No specific treatments, only palliative care.
Risk: This is one of the first plants to appear in the spring and animals turned out in areas where this plant is present are exposed to the risk of poisoning. The plant is not common in Routt County, but if you spot an unknown grass like plant, with somewhat fleshier leaves, similar to wild onion, it is advisable to use caution when grazing those sites. The flowers are quite different from onion flowers and can help identify.
Control: Dig up suspect plants, handle with gloves.
Herbicide: Glyphosate

False hellebore
(incorrect, skunk cabbage)
Veratrum californicum

perennial
short, stout
rootstocks

Habitat: Moist mountain meadows, moist aspen woodlands.
Toxic to: Sheep especially, cattle, goats, chickens, humans
Toxic principle: Abundant complex alkaloids acting with tetragenic effect on sheep reproduction. The alkaloid cyclopine causes birth defects called monkey-face syndrome in lambs if ewes ingest the plant at 13 to 14 days of gestation. This causes a single eye and lethal facial deformities. Ingestion at 28-30 days causes shortened legs.
Management: Avoid pasturing breeding ewes on false hellebore infested meadows or feeding hay which may contain false hellebore in the first trimester of pregnancy.
Control: Hand dig plants or spray, remove stems and leaves from hay windrows before baling.
Herbicide: 2,4-D amine with an oil based surfactant after leaf expansion and before budding at 1 qt. / acre.

Flixweed annual, biennial

Descurania sophia

Habitat: Waste areas, disturbed sites, roadsides, driveways, parking lots, cultivated fields.
Toxic to: Cattle
Toxic principle: Unknown, symptoms suggest sulfate poisoning. Young, succulent plant growth is most dangerous.
Symptoms: Weight loss, tongue paralysis, difficulty swallowing, head pressing, blindness, photo sensitivity
Potential treatments: Thiamine for blindness, affected animals generally improve once removed from poisoning source, unless the liver has been to severely damaged.
Risks: First cutting alfalfa can be compromised if large quantities of flixweed are present in the field.
Herbicides: Chlorsulfuron, metsulfuron methyl, 2,4-D, dicamba. Treatment is relatively simple in non-crop areas, but must be managed carefully in alfalfa to avoid crop damage.

Halogeton annual

Halogeton glomeratus

Habitat: Arid, alkaline, clay sites
Toxic to: Sheep especially, but all livestock are affected.
Toxic principle: Sodium oxalates present as 30-40% of dry matter. Consumption of as little as .3-.5% of body weight may be lethal to sheep.
Symptoms: Muscle tremors, tetany, weakness, coma and death within 12 hours.
Potential treatment: Prognosis poor. Kidney damage is often too severe. Limewater orally can prevent further absorption of toxins. Calcium gluconate, magnesium sulfate, glucose and balanced electrolytes are the suggested treatments.
Herbicides: Metsulfuron methyl, chlorsulfuron, 2,4-D

Hemlock, poison — biennial, perennial

Conium maculatum — taproot

Habitat: Diverse, roadsides, edges of cultivated fields, along creeks and ditches, dry slopes.
Toxic to: Cattle, sheep, goats, horses, pigs, humans
Toxic principle: All plant parts, dry or fresh. The toxic alkaloids coniine and gamma-coniceine. The toxin initially stimulates the musculoskeletal system, but shortly depresses the nervous system.
Symptoms: Nervousness, lack of coordination, ataxia, salivation, dilation of pupils, weak rapid pulse, respiratory paralysis, coma, death. Death will occur 2-3 hours after consumption. Consumption of non-lethal amounts during gestation can cause birth defects in calves or lambs.
Treatment: None
Control: Mechanical, wearing gloves, pull or dig individual plants, being sure to get all of the tap-root. Herbicide: Treat first year plants in the fall or second year plants in the spring-summer, prior to seed stage. Use 2,4-D, chlorsulfuron , triclopyr or glyphosate. Always follow label guidelines. Move all livestock from areas to be sprayed prior to spraying.

Hemlock, Water — perennial

Cicuta douglasii — tuberous root cluster

Habitat: Marshes, wet meadows, along stream and ditches, surface water is present
Toxic to: Cattle, sheep, goats, horses, dogs, pigs, Humans
Toxic principle: Cicutoxin and cicutol, potent unsaturated alcohols. All plant parts contain the toxins, but they are concentrated in a yellow-brown liquid within chambers at the plant base. The toxin is rapidly absorbed in the mucous membranes and digestive system acting primarily within the brain, inducing severe convulsions. Death may occur within 15 minutes of consumption of as little as 2 ounces of plant crown or root tissue.
Potential treatments are limited, but may include dilute vinegar to neutralize the toxin in cattle, the intravenous administration of sodium pentobarbital to prevent cardiac arrest and degeneration of skeletal muscle and inducing vomiting in dogs and humans.
Control: Hand dig **carefully**, wearing waterproof gloves and eye protection.
Herbicide: Glyphosate (Rodeo®), Imazapyr (Habitat®, Polaris®)

Horsetail, scouring rush
Equisetum arvense

perennial
rhizomatous

Habitat: Moist, sandy soils. Often along roadsides and ditches.
Toxic to: Cattle, sheep, horses
Toxic principle: Thiaminase, aconitic acid, palustrine
Symptoms: weakness, incoordination, weight loss, diarrhea.
Management: Not generally grazed, but may be consumed in contaminated hay. If noticed in hay animals should be removed from that hay source and fed a quality hay. Adding grain to the diet will help counter the effects of thiaminase.
Control: Difficult
Herbicide: Many herbicides list scouring rush/horsetail as a weed they will control, bet few are very effective. Some success can be achieved with a bareground mix of glyphosate +imazapyr.

Houndstongue
Cynoglossum offinale

biennial
taproot

Habitat: Diverse, waste areas, roadsides, pastures, meadows, rangelands, woodlands. Especially common on trails and disturbed sites.
Toxic to: Horses, cattle, sheep, goats
Toxic principle: Pyrrolizidine alkaloids. Causes severe liver damage. Unlikely to be grazed but poses greatest risk in dryland hay. The toxin is cumulative and ingestion of small quantities over several months results in liver fibrosis. Ingestion of 15 mg per kilogram of body weight over a two week period will cause acute liver failure.
Management: Remove plants by digging or pulling from livestock confinement locations (corrals and pens)
Herbicides: 2,4-D, metsulfuron methyl, chlorsulfuron, dicamba.
Note: Houndstongue burs will readily attach to hair, clothing and fur. If when hiking you contact houndstongue burs, immediately remove and secure the burs to avoid transferring these seeds to new locations. The biennial nature of houndstongue makes it possible to have significant positive effects on control with diligent effort.

Jimson weed
Datura stramonium

annual
taproot

Habitat: Waste areas, roadsides, cultivated field edges
Toxic to: Cattle, sheep, goats, horses, pigs, and humans
Toxic principle: Hyoscamine, hyoscine, atropine.
Symptoms and affects: Impaired vision, pupil dilation, Excessive thirst, increased heart rate, convulsions.
Management: Unlikely to be consumed via grazing, but may be a contaminant in grain and consumption of the seeds can cause poisoning.
Control: Young plants can be pulled or dug in corrals and waste areas.
Herbicide: glyphosate spot spraying

Larkspur, low
Delphinium nuttallianum, D. nelsonii

perennial
shallow, clustered,

Habitat: Diverse, meadows, woodlands, sagebrush hillsides. A plant of early spring
Toxic to: Cattle
Toxic principle: Diterpene alkaloids
Symptoms: The toxic alkaloids act at the neuromuscular junction, causing weakness and paralysis. Early symptoms may include bloat and regurgitation of rumen contents.
Treatment: Quietly herd animals from larkspur infested site. Where possible, administer physostigmine intravenously with as little stress as possible. Bloat may be treated with stomach tube into the rumen or trocarizing the rumen.
Control: Map the larkspur infestations, spray in early spring as soon as larkspur foliage has developed based on previous seasons' mapping, using 2,4-D at 1 quart / acre. Follow up yearly as necessary. Do not let animals into sprayed locations until plants are fully senesced. Allow animals into unsprayed areas only after at least 10 days have elapsed from start of flower senescence.

Larkspur, tall
Delphinium barbeyi
Delphnium occidentale

perennial
woody, tuberous
roots

D. occidentale is less toxic in our area, ***D. barbeyi*** has more hairs on stem and is most toxic in our area.
Habitat: Slopes and valleys at higher elevations, especially common in aspen forests
Toxic to: Cattle, rarely horses. Sheep and goats are quite resistant.
Toxic principle: Diterpene alkaloids.- methyllycaconitine, 14-deacetylnudicauline and nudicauline. The plant is extremely toxic to cattle especially at periods of maximum plant growth through flowering.
Symptoms: The toxic alkaloids act at the neuromuscular junction, causing weakness, paralysis and rapid death Early symptoms may include bloat and regurgitation of rumen contents.
Treatment: Quietly move animals off of infested site. Carefully administer intravenous physostigmine.
Management: Graze infested areas with sheep before grazing with cattle. Avoid grazing during most toxic periods, spray with metsulfuron methyl, glyphosate (spot) or picloram **only** when animals can be kept off of treated sites.

Lupine
Lupinus spp.

perennial
rhizomatous

Habitat: Diverse, prairie, sagebrush hillsides, mountain meadows, forest. Clay loam-sandy soils.
Toxic to: Sheep most susceptible, cattle, horses. Goats quite resistant.
Toxic principle: Quinolidizine alkaloids. Tetragenic effects of anagyrine produces skeletal fetal deformities. Sheep consuming 1.5% of body weight of lupine seed pods will experience respiratory failure and die. Cattle consuming lupine during gestation can have calves with crooked calf syndrome.
Treatments: none
Management: Avoid grazing lupine infested areas, especially when the plants are young and when seed pods are present.
Control: The rhizomatous growth makes mechanical control ineffective.
Herbicides: 2,4-D, 2,4-D+dicamba, metsulfuron methyl, picloram, triclopyr. Spray when plants are young, using herbicide with methylated seed oil or crop oil surfactant.

Milkweed, showy perennial
Asclepias speciosas rhizomatous
Western whorled milkweed perennial
Asclepias subverticillata rhizomatous

Habitat: Dry soils of roadsides, waste areas and meadows.
Toxic to: Horses, cattle, sheep, goats
Toxic principle: Cardenolide glycosides, affecting cardiac function, and other glycosides and resinoides affecting neurologic, respiratory and digestive systems. These compounds are most toxic during the peak growth stage of plant growth. Whorled milkweed is deadly toxic to horses even in hay.
Symptoms: Abdominal pain, digestive disorder, colic, tremors, weakness.
Treatment: There is no available specific treatment. Animals which have not consumed a lethal dose should be removed from the toxin source and placed on supportive care, including quality hay, fresh water and shade. Intravenous fluid therapy may be necessary for seriously affected animals.
Control: Hand pulling may be effective for small, scattered populations.
Herbicides: Glyphosate spot spraying, picloram, dicamba, 2,4-D.

Monkshood, wolfbane perennial
thick, tuberous roots
Aconitum spp. may be rhizomatous

Habitat: Woodlands (especially aspen understory, meadows, often with Larkspurs.
Toxic to: Horses, cattle, sheep, goats, humans
Toxic principle: Highly toxic, monobasic diterpenoid alkaloids, similar to the compounds present in Delphinium species (larkspurs). All plant parts are toxic, especially preflowering leaves, roots and seeds. As little as 12 ounces of green plant material can kill a horse.
Symptoms: Excessive salivation, ruminant bloating, muscle weakness, staggering, paralysis, collapse, death.
Treatments: No proven treatment. Non-lethal ingestion includes moving animals away from toxin source very calmly, without stressing animals. Administer supportive therapy, including intravenous fluids and therapy for rumen bloat.
Management and control: Suspected poisoning is often from Tall larkspur which is more common. Avoid turning livestock in to known infestations.
Herbicides: Metsulfuron methyl, glyphosate (spot spray), picloram

Purple locoweed, Lambert's crazyweed

Oxytropis lambertii perennial taproot

Habitat: Decomposing granite soils of foothills
Toxic to: Cattle, sheep, horses, elk
Toxic principle: Swainsonine, an indolizide alkaloid, present in all fresh or dry plant material. Inhibits oligosaccharide sugar metabolism, impairing brain function. Long term exposure can permanently damage brain cells. The compounds are secreted in milk, affecting nursing animals. The swainsonine is actually produced by an endophytic fungus which is present in the plant culls, enabling the plant to better survive drought conditions.
Symptoms: Decreased appetite, staggering, weakness, depression, loss of coordination, weight loss, also can cause congenital birth defects or fetal death.
Treatment: No specific treatment. Animals may improve once removed from toxin source. Neurologic damage may be permanent, as in "locoed horse". Reproductive health should recover.
Management and control: Avoid infested pastures
Herbicides: Picloram, clopyralid, metsulfuron methyl, 2,4-D

Russian knapweed

Acroptilon repens
Centaurea repens

perennial rhizomatous

Habitat: roadsides, cultivated fields, pastures, uplands and riparian sites. A black, scaly root and rhizome system is characteristic.
Toxic to: Horses
Toxic principle: Toxin causes nigropallidal encephalmalacia
Symptoms: The affected horse cannot bite-off or chew, but can still swallow. Pnuemonia may occur as a result of inability to open the mouth to properly eat or drink. starvation is the eventual outcome.
Treatment: No effective treatment is known and euthanasia is indicated to prevent the horse from starving to death.
Management and control: The plant is quite palatable to all classes of livestock. Neither sheep nor goats are affected by Russian knapweed and can be effectively used as biocontrols on infested pastures.
Herbicides: Aminopyralid (very effective), picloram, metsufuron methyl, chlorsulfuron

Senecio, groundsel, ragwort
Senecio spp.

annual or perennial taproot

Habitat: Diverse, ranging from waste places, roadsides, pastures, sagebrush hillsides and meadows
Toxic to: Horses and cattle
Toxic principle: Pyrollizidine alkaloids which cause irreversible liver damage. The toxin accumulates as long as consumption continues.
Symptoms: Photosensitivity, including sunburn and sloughing of tissue on the nose, diarrhea, rectal prolapse, weight loss
Treatment: None available. Keeping the animal in the shade will minimize the effects of photosensitivity, but no recovery from the liver damage can occur.
Management and control: The plant is palatable, so it is advisable to avoid Senecio infested pastures if possible. Individual scattered plants can be dug up. A flea beetle is sometimes available for biocontrol.
Herbicides: 2,4-D, metsulfuron methyl, chlorsulfuron, aminopyralid, picloram

Tansy mustard,
Descurania piñata

annual, winter annual taproot

Habitat: Roadsides, corrals, waste places, disturbed sites, edges of cultivated fields
Toxic to: Cattle
Toxic principle: Toxin is unknown, but suggests sulfate poisoning. Variable toxicity from year to year.
Symptoms: Apparently paralysis of the tongue causes eating difficulty, weight loss, photosensitivity, blindness, head pressing.
Treatment: Animals general recover once removed from source of toxin. Good feed, clean water, thiamine treatment may help blindness.
Management and control: Avoid feeding hay contaminated with tansy mustard.
Herbicides: Control is readily achieved with 2,4-D, metsulfuron methyl, chlorsulfuron or dicamba.

Two grooved milkvetch
Astragulus bisulcatus

perennial
branched crown, rhizomatous

Habitat: Usually dry, clay, alkaline soils and since *A. bisulcatus* is an obligate selenium feeder it is indicative of selenium rich soils.
Toxic to: Cattle, sheep, horses
Toxic principle: Swainsonine the alkaloid responsible for locoism, also concentrated selenium which affects hair and hoof growth by replacing sulfur in keratin. Sheep muscles can also be affected.
Symptoms: Abnormal hoof growth and cracking, lameness, breaking of long hairs of mane and tail. Locoism shows as depression, staring, staggering gait, erratic behavior and complete recovery from the associated brain damage is unlikely. Skeletal congenital defects.
Treatment: Remove the animal from the toxin source and provide forage rich in sulfur and copper (don't over feed copper to sheep).
Management and control: Supply a source of sulfur and copper in pastures where *A. bisulcatus* is present.
Herbicides: Metsulfuron methyl, 2,4-D, picloram

Woolly locoweed
Astragulus mollisimus

perennial
thick, woody

Habitat: Open prairies, foothills, eastern Colorado
Toxic to: Horses, cattle, sheep
Toxic principle: Swainsonine, produced by an endophytic fungus living within the plant, but not affecting it. The toxin is present in all plant parts, fresh or dry. It impairs cell function in the brain and causes locoism.
Symptoms: Nervousness, depression, staring, staggering, falling, abrupt changes in temperament, weight loss. Also, congenital defects or fetal death.
Treatment: No known treatment. Move animals from infested pastures. Recovery depends on the severity of poisoning. Locoed horses should be considered permanently affected.
Management and control: Spray affected pastures early when no animals are present. Rest pasture, do not graze until following season.
Herbicides: 2,4-D, dicamba, metsulfuron methyl, picloram, clopyralid, triclopyr.

Herbicide Purchasing Guide

Note: The most common biennial thistles are bull thistle, musk thistle and scotch thistle. A shovel is also a good tool for these thistles.

Common Weeds	Some Labeled Sites
All thistles, whitetop, knapweeds, toadflax (note: *can kill trees and shrubs* if it gets on them or if used where their roots reach.)	pasture, hay, rangeland
whitetop; houndstongue; biennial thistles; suppress Canada thistle	pasture and rangeland
many annual weeds; good on biennial thistles, houndstongue; okay on Canada thistle; fair on whitetop	non-crop areas, turf, grass pastures, rangeland
many annual weeds; good on biennial thistles, houndstongue; okay to good on Canada thistle and toadflax; fair to good on whitetop	non-crop areas, turf, grass pastures, rangeland
thistles, knapweeds	rangeland
whitetop; houndstongue; biennial thistles whitetop; houndstongue; ; suppress Canada thistle	industrial and rangeland
thistles, knapweeds	rangeland, permanent grass pastures, non- cropland
thistles, knapweeds	rangeland, permanent grass pastures, non-cropland
many weeds when young, including grasses, thistles, whitetop, houndstongue, toadflax	pastures, rangeland, turf *(will kill turf grass!),* pond side weeds, waste areas
thistles, knapweeds	rangeland & grass pastures
general broadleaf weeds (including whitetop, thistles, toadflax)	turf
general broadleaf weeds (including whitetop & thistles)	Pastures, rangeland, cropland, & turf

Surfactants:additives used to make a product penetrate a plant better. Soap is not recommended, as it will bind with many herbicides. Common non-ionic surfactants include Activator 90, Premier 90 and Brewer 90.

Herbicide Purchasing Guide (continued)

Always use the label recommended surfactant and follow label guidelines for rates on specific weeds. Also follow label guidelines for re-entry intervals, personal protective equipment and site use restrictions.

Product	Active Ingredient	Spot Mixing, from label (based on treating 1000 sq ft- unless noted)
Banvel®, Clarity, Vanquish	Dicamba	1 to 4½ teaspoons in 3 gallons of water
Cimarron®	Metsulfuron Methyl	1 oz in 100 gallons; must use surfactant (area not specified)
2,4-D products	2,4-D amine 2,4-D ester	4 oz in 3 gallons of water (area not specified)
MCPA	MCPA amine, MCPA ester	4 oz in 3 gallons of water (area not specified)
Curtail®	Clopyralid+ 2,4-D	3/8 to 1 oz in 1 gallon of water
EscortXP®, MSM 60	Metsulfuron Methyl	1 gram, approximately equal to ¼ tsp., in 1 gallon of water with surfactant
Milestone	Aminopyralid, +	.23 oz. in 1 gallon of water
Opensight	Aminopyralid + Metsulfuron methyl	.1 oz per gallon of water
Roundup, Makaze, Buckaneer, Rodeo (aquatic)	Glyphosate	½ to 10% solution, depending on plant size and site, see label.
Redeem®	Triclopyr, clopyralid	1/3 to 1 oz in 1 gallon of water
Weed B Gone MAX	MCPA, Triclopyr, dicamba	2 fl. oz. per gallon of water for each 500 sq. ft.
Telar®	Clorsulfuron	1 gm in 1 gallons of water

Oil based surfactants include, MSO and Soy-Stik. Use rates vary, but usually 2 oz. in 3 or gallons of solution odo odor 1/2% will work. No endorsement of products mentioned is intended nor do omissions imply criticism.

Signal Words on Labels

1. **CAUTION**: relatively non-toxic to slightly toxic
2. **WARNING**: moderately toxic
   Some skin or eye irritation likely
3. **DANGER**: highly toxic, may cause serious skin or eye irritation
4. **DANGER-POISON**: extremely toxic, severe injury or death if swallowed , inhaled or absorbed

Herbicide Use Guidelines

1. Target the chemical to the weed
2. **Always read and follow the label**
3. Wear appropriate Personal Protective Equipment (as per label)
4. Be patient. Some herbicides take time to work.
5. Monitor the application site.
6. Follow up in accordance to label

Herbicide Label

1. Lists all active ingredients
2. Signal word (relative toxicity)
3. Personal Protective Equipment Requirements (PPE)
3. EPA registration number
4. First Aid
5. Application rates, weeds and sites
6. Disposal and storage requirements

Herbicide Application Practice

1. Calculate the rate of application
2. Use an appropriate surfactant
3. Repair dripping nozzles
4. Record rate of dilution
5. Record rate of application
6. Record date, time and site of application
7. Map application site if possible

Commonly Used Herbicides

1. 2,4-D amine or ester
2. Chlorsulfuron
3. Metsulfuron methyl
4. Dicamba
5. MCPA
6. Picloram
7. Aminopyralid
8. Glyphosate

Restricted Use Herbicides in Colorado (A license is required to purchase or use)

Picloram
Bromacil
Monuron
Sodium Chlorate
Tebuthiuron
Diuron
Prometon
Sodium metaborate

Surfactants

Herbicide label will indicate the surfactant.
Non-ionic surfactants are indicated for most plants. Plant oil based surfactants are generally used for weeds with waxy cuticles (leafy spurge, Dalmatian toadflax, etc.).

Some common surfactants:
Activator 90® non-ionic, aquatic use OK
Premier 90® non-ionic
Brewer 90® non-ionic
LI 700® soy oil/non-ionic, aquatic use OK
MSO®methylated seed oil, aquatic use OK
Soy-Stik® methylated soy bean oil

Dye for marking spray patterns Hi-Light Blue®

2, 4-D Various product names

1. Most common formulation:4 lb amine ($5/ac)
2. Other formulations: 6lb amine and 4 lb and 6 lb ester ($6.50/ac)
3. Broad variety of target weeds
4. Signal word: WARNING
5. Re-entry interval > 48 hours
6. Grazing withdrawal: 0-7 days
7. Haying interval: 30 days

Amine **DANGER**

1. Lower vapor pressures=lower volatility
2. Less likely to drift
3. Lower volatility under hot, dry conditions
4. Safer near non-target plants
5. More water soluble than esters

Ester **WARNING**

1. Considered to be a "hotter" herbicide
2. Higher vapor pressure=higher volatility
3. Even **low vol** forms are more volatile than amines

Chlorsulfuron Telar®, Corsair® **CAUTION**

1. Best choice for whitetop
2. Approximate cost $13-27/acre
3. Re-entry interval: > 4 hours
4. Grazing withdrawal: none*
5. Haying withdrawal: none*

* applied at rate s < 1 1/3 oz./ac

Metsulfuron methyl Escort®, MSM 60®**CAUTION**

1. Very effective on whitetop
2. Less residual effect than Tela
3. Re-entry interval: > 4 hrs
4. Grazing withdrawal: none*
5. Haying interval: none*

*at application rates of less than 1 2/3 oz. / acr

6. Approximate cost: $5-15/acre

Dicamba Banvel®, Vanquish®, Clarity® **CAUTION**

1. Effective on many weeds
2. Approximate cost $4-18/acre
3. **Do not use when temperature is expected to exceed 85F w/in 24 hours**
4. Re-entry interval: > 24 hours
5. Grazing withdrawal: none
6. Haying interval: 37-70 days

Aminopyralid Milestone® **CAUTION**

1. Thistles and knapweeds
2. Cost: $8-55/acre
3. Water's edge application
4. Re-entry interval: > 12 hours
5. Grazing withdrawal: none
6. Haying interval: none
7. Treated foliage not for mulch
8. Broad spectrum premix of Aminopyralid and metsulfuron methyl is Opensight.®

MCPA Amine DANGER; Ester **CAUTION**

1. Amine DANGER
2. Ester CAUTION
3. Broad spectrum of weeds
4. Re-entry interval: > 48 hours
5. Grazing withdrawal: 7 days

Glyphosate Roundup®, Gly-Star,® Makaze®, Buccaneer®, Rodeo (near water) **CAUTION**

1. Non-selective
2. Crop, non-crop, fallow
3. For use to water's edge
4. Cost: $3-12.50/acre
5. Re-entry interval: > 4 hours
6. Avoid non-target plants
7. Controls grasses and forbs

Picloram Tordon **CAUTION**

RESTRICTED USE

1. Restricted Use (license required)
2. Standard treatment for Leafy spurge in non-riparian site
3. Re-entry interval: > 12 hours
4. Grazing withdrawal: none
5. Haying interval: 14 days
6. Persistent in soil
7. Do not apply near water

BIOLOGICAL CONTROLS

Insects available for

Canadian thistle
Common mullein
Field bindweed
Leafy spurge
Musk thistle
Spotted and Diffuse knapweeds
Yellow and Dalmatian toadflaxes

Plant pathogens available for

Canadian thistle (rust fungus)

Contact Information
Colorado Department of Agriculture

Palisade Insectary
Dan Bean, Program Manager
750 37 8/10 Rd
Palisade, CO 81526
(970) 464-7916
insectary@state.co.us

BIOLOGICAL CONTROLS (continued)

Targeted Grazing

1. Using grazing animals to control weeds and poisonous plants.
2. Adjusting stocking rates, animal type and use season to reduce the weed problem
3. Using one class of animal to reduce the presence of a plant toxic to another class of animal
4. Simple example:
   - Turning horses or sheep into a Canada thistle infested pasture when mature flower buds are present and flowers are starting to open. The sweet buds and blossoms seem to encourage the horses and sheep to remove the flowers, therefore reducing seed production.
5. Grazing sites infested with low larkspur or tall larkspur prior to turning in cattle will reduce the risk of poisoning the cattle.
6. Leafy spurge
   - 20%-40% infestation of leafy spurge will essentially eliminate cattle grazing on a pasture.
   - Sheep and goats will graze the leafy spurge and over the course of several years will deplete the energy reserves of the spurge and allow the grass component of the range to improve.
   - Together with insects it can greatly reduce the leafy spurge.
7. **Additional Benefits:**
   - Sheep in North Dakota have reduced leafy spurge concentrations by 90% in some areas.
   - Sheep have been used to reduce sagebrush density in the intermountain region.
   - Livestock, usually sheep, have been used effectively to reduce fire danger in many areas of the west.
   - It can be a non-toxic, income generating approach to weed control.
8. **Concerns:**
   - Targeted grazing can greatly reduce, but probably never eliminate the target weed.
   - New livestock classes may need to be acquired, or cooperative arrangements be established.
   - Additional management efforts will be required.

APPENDIX A

Mixing Herbicides for Backpack & Small (3 gallon) Sprayers

- Some of the most commonly used sprayers are small hand-held pump sprayers and backpack sprayers.
- These units can be extremely effective for some weed infestations, but the solutions for them must be carefully mixed.
- It is very easy to over apply herbicides with these sprayers. The old adage theory of "if a little is good, a lot is better" does **NOT** apply!
- Over application can cause undo expense, kill beneficial plants, and make weed infestations worse by creating bare patches.
- Always follow labeled directions - whatever is on the label is legally binding to you as an herbicide user. **These mixing directions do not supersede a label!**
- Check the labels to see if this mix is allowable, and check the label to make sure that the site where you want to use the product is also on the label. Usually the section of the label that would apply is called "Spot Applications."

Mixing metsulfuron and chlorsulfuron herbicides, including Escort®, Cimarron® and Telar®.

1. **Add 3 gallons of water to sprayer.**
2. **Add 1.3 grams (about 1/2 tsp) of product to water (this roughly equals the one ounce per acre rate.)**
3. **Stir the mixture or shake the sprayer for about a minute, until it turns cloudy.**
4. **Add 1 teaspoon of household ammonia. This should make the solution clear. If it isn't add a few drops more until it clears.**
5. **Add approximately 2 Tbsp of surfactant (Activator 90®, Adwet 90®, or similar. Soap or detergents are not recommended - they will often bind with the herbicide making less of it available.)**

Use this mix within 1.5 days or less. After that it will drastically lose its potency.

APPENDIX B: Calibration

BACKPACK – Sprayer Calibration

NO Math Version!

Step 1: Establish a calibration plot that is exactly: 18.5 feet wide X 18.5 feet long (approx. one 128th of an acre)

Step 2: Spray the calibrated plot uniformly with water, noting the number of seconds required:

Time Required = _____ seconds.

Step 3: Spray into a bucket for the same number of seconds.

Step 4: Measure the number of ounces of water in the bucket:

Volume Sprayed = _____ ounces

Step 5: The number of ounces collected from the bucket is equal to the number of gallons per acre the sprayer is delivering:

Adding the Correct Amount of Herbicide to the Tank for Liquid Herbicides

Step 6: Record sprayer output in gallons per acre (calculated in Step 5).

Output (volume) = _____ GPA

Step 7: Determine volume of full spray tank.

Tank volume = _____ gallons

Step 8: From the herbicide label determine amount of herbicide concentrate to apply per acre.

_____ Herbicide per Acre (ounces or pints)

Step 9: Determine the amount of herbicide to add to each gallon based on the chart on the next pg.

Step 10: Calculate the amount of herbicide to add to one backpack tank

Amount of herbicide/gallon **X** number of gallons in a tank = Total herbicide to add to tank

Spray Volume	Recommended Herbicide Rate/ Acre			Amount of MSO to Add to Each Gallon
GPA	8 oz	10 oz	12 oz	2 pints
10	5½ tsp	2 T	2½ T	3½ T
20	2½ tsp	1 T	3½ tsp	10 tsp
30	1½ tsp	2 tsp	2½ tsp	2 T
40	1¼ tsp	1½ tsp	2 tsp	4¾ tsp
50	1 tsp	1¼ tsp	1½ tsp	3¾ tsp

Sample mix: Assume that the calibration of your sprayer (Step 1-5) yields an output of 30 GPA and your sprayer holds 3 gallons. Example for specific herbicide: The PLATEAU® label for leafy spurge control recommends 8 to12 oz/acre of herbicide plus 2 pints of MSO. You decide to spray 10 oz/acre of PLATEAU.

Go to the chart and read across from 30 GPA to the 10 oz column – the amount of herbicide to add per gallon is 2 teaspoons in the chart.

Since your sprayer holds 3 gallons of total solution, you would add 6 teaspoons (or 2 Tablespoons) of herbicide to your tank.

Go to the chart and read across from 30 GPA to the 2 pints column – the amount of MSO to add per gallon is 2 Tablespoons.

Add 6 Tablespoons (or 3 fluid ounces) of MSO in addition to the water and herbicide in each tank.

Liquid Conversions:

tsp = teaspoon; T = Tablespoon; oz = ounces

3 teaspoons = 1 Tablespoon
8 ounces = 1 cup
2 Tablespoons = 1 ounce
1 cup = 16 Tablespoons

APPENDIX C: Calibration for spray equipment

1. Fill the sprayer with sufficient clean water to run the test.
2. Run the pump at the speed and with the nozzles that will be used for spraying.
3. Make sure there are no drips in the system or at the nozzles.
4. Choose a time interval; e.g. 15 seconds and measure the amount of water from a nozzle in that time period. That would be X4 to give amt. in 1 min.
5. If 40oz was collected that would be 40oz X 4 =160oz=160/128=1.25gal/min = 75 gal/hour

Therefore, the spray system is applying 1.25 gal / minute.

1. Spray an area as you would when actually spraying with the clean water for 30 seconds and mark the area. (This works for hand or machine spraying).
2. Measure the area.
3. Lets say we have an area of 20 feet by 45 feet sprayed uniformly. =900 sq ft

So, we sprayed 900 sq. ft./ in 30 seconds
and we used .625 gal of solution
therefore;
gal / acre=43,560/900=X/.625
and 48.4(.625)=X=30.25 gal / acre
we can round this to 30 gal/acre

- so if the label says to apply TELAR @1oz/acre we need to add 1 oz of TELAR to each 30 gal of water and apply it just as the test was conducted. Same speed walking or driving.

- If we know the sprayer is delivering 1.25 gpm what speed do we need to walk or drive if the nozzle has a 3 foot pattern and we want to continue to apply 30 gal/acre.

43,560 sq ft/acre and 5,280 ft/mile
43,560/3=14,520 ft
14,520/5,280=2.75 miles
30gal/acre=30/1.25gpm=24 min to cover 1 acre
And it takes 24 minutes to travel 2.75 miles

The speed of the sprayer needs to be 6.875mph to apply the herbicide solution at 30 gal/acre in a 3 ft width.

APPENDIX D: Calibration another 1/128 method

UNIVERSITY OF WYOMING

Cooperative Extension Service
Department of Plant Sciences
College of Agriculture

Pesticide Education Program Fact Sheet MP-93.4

August, 1998

Prepared by M.A. Ferrell, UW Cooperative Extension Pesticide Coordinator

1/128 Method of Calibration
Calibrating Hand Sprayers and High Pressure Hand Guns

Because a gallon = 128 ounces and the test area to be sprayed is 1/128th of an acre, ounces collected = gallons per acre.

STEP 1.
Measure out an area equal to 1/128th of an acre. Approximately 340 ft² or an area 18.5 feet by 18.5 feet.

STEP 2.
Measure the time it takes to spray the measured area, with water only. Repeat several times and take the average time.

STEP 3.
Spray into a container for the same amount of time it took to spray the measured area. Measure the water collected in ounces. The amount collected in ounces equals gallons per acre.

EXAMPLE: Hand sprayer

STEP 1.
Measure area. 18.5 by 18.5 feet = 340 ft²

STEP 2.
Time to spray area = 51 seconds

STEP 3.
Amount collected = 40 ounces; therefore, 40 ounces = 40 gallons per acre

Determining how much pesticide to add to the spray mixture

The recommendation is to apply 1 quart of 2,4-D per acre.

The sprayer is applying 40 gallons per acre; therefore, you will need to add 1 quart of 2,4-D to each 40 gallons of water.

Your sprayer only holds 1 gallon of spray mixture. So how much pesticide will you need to add to the gallon of water?

1 quart (32 ounces) divided by 40 gallons = 0.8 ounces.

1 fluid ounce = 2 tablespoons; therefore, you will need approximately 2 tablespoons of 2,4-D per gallon of water.

1 fluid ounce also = 29.57 milliliters (ml); therefore, if measuring in ml, you would need 0.8 ounces times 29.57 ml per ounce = 24 ml per gallon of water.

How much area will 1 gallon spray? There are 43,560 ft² per acre. If 40 gallons will spray one acre then one gallon will spray an area 1/40 that size or 43,560 ft² divided by 40 = 1089 ft².

APPENDIX E:

ROUTT COUNTY Generic Noxious Weed Management Plan For Several Common Weeds

Introduction

Noxious weeds are invasive plants that are not native to North America and as a consequence have inadequate or absent insect predators or plant pathogens to keep them controlled. They pose a serious threat to native plant populations, agriculture, wildlife, and property values. The State of Colorado and Routt County require noxious weed management on public and private land.

In order to be in compliance with the Colorado Noxious Weed Act and Routt County regulations, the following named plants must be controlled. Any weeds on the County or State Noxious weed lists not named below but detected after this plan is written shall also be controlled. (See appendix B and C.)

The following noxious weeds are subject to management requirements, according to the Routt County Weed Plan or the Colorado noxious weed act of 2003.

When using the information provided in this plan try to incorporate all of the available control options, including; mechanical, chemical, biological and cultural. This is the essence of INTEGRATED WEED MANAGEMENT (IWM)

Routt County 15 Noxious Weed List; :

__Whitetop *(Cardaria draba)*
__Houndstongue *(Cynoglossum officianale)*
__Spotted knapweed *(Centaurea maculosa)* --
__Diffuse knapweed *(Centaurea diffusa)*
__Russian knapweed *(Centaurea repens)*
__Meadow knapweed *(Centaurea pratensis)*
__Leafy spurge *(Euphorbia esula)*
__Cypress spurge *(Euphorbia cyparrissias)*
__Myrtle spurge *(Euphorbia myrsinites*
__Yellow toadflax *(Linaria vulgaris)*
__Dalmatian toadflax *(Linaria genistifolia)*
__Orange hawkweed *(Hieracium aurantiacum)*
__Purple loosestrife *(Lythrum saltcaria)*
__ Common mullein (*Verbascum thapsus*)
__ Curly dock *(Rumex crispus)*

Additions from the State and Routt County Weed List:

___oxeye daisy *(Chrysanthemum leucanthemum)*
___Canada thistle *(Cirsium arvense)*
____bull thistle *(Cirsium vulgare)*
___scotch thistle *(Onopordum acanthium)*
___ musk thistle *(Carduus nutans)*
___ cheatgrass *(Bromus tectorum)*
___mountain tarweed *(Madia glomerata)*
___bulbous bluegrass *(Poa bulbosa)*

Management Recommendations

It is essential that weeds, including weed seeds, are not spread from this property to other areas, and that is the primary goal of good weed control at this site. This requires an aggressive weed control program.

There are four main stages to weed control: detection, prevention, treatment, and monitoring.

Detection of noxious weed species begins with a survey of the site. Further detection of new weed species is essential, and the property owner shall continually monitor the property for them. Of particular concern are those weeds on the County and the State noxious weed lists.

Prevention is a key component of this plan. Those areas that are subject to disturbance shall be re-seeded as soon as possible with a weed-free mix composed primarily of grasses. (Appendix A provides potentially appropriate seed mixes, and the local County Extension Agent and the weed program can help develop any mixes in the future.) If any hay is used in the reclamation process **State Certified Weed Free Hay** shall be used. Seeding is best accomplished in the fall.

Treatment of noxious weeds varies by the severity of the infestation, the biology of the plant, location, time, and money. Biological, chemical, mechanical, and cultural controls are all important, and to maximize control it is best if more than one method is employed on each weed infestation. Specific treatments are outlined below.

Monitoring of the property for the existence of any new noxious weeds and to determine the effectiveness of controls already applied is a very important aspect of weed management. Early detection and control of noxious weeds will save money and time in the long run. Throughout the growing season the property should be carefully monitored for the start of any new noxious weed populations. The overall property should be scouted at least once a year and examined for the start of any weed problems. It is up to the land owner or manager to become familiar with the weeds on the County and State noxious weed list. Contact the Routt County Weed Program with questions about weed species and suggested treatments. All weed treatments should be logged and the recorded data should include a map of the infestations, a map of the treatment locations, the treatment dates, weather conditions at time of treatment, chemicals used, rates of herbicide dilutions, rates of herbicide applied per acre (or per square foot) and dates of monitoring for effectiveness of treatment. If this weed plan is being used for a commercial site, the operator shall provide an annual report by December 31 of each year to the Routt County Weed Program.

Re-seeding disturbed sites is essential to minimize the opportunity for weed establishment. Also, monitor hay sources and livestock imports to avoid bringing new weed infestations on to your property.

Specific treatment suggestions by species:

All herbicide recommendations contained herein are for general management purposes only, and are in no way meant to replace or supersede any information contained on the herbicide label. Herbicide labels and recommended rates change, and an applicator must read the label to see if the following recommendations are still within labeled parameters. **The herbicide label is the law** and any deviation from the instructions on the label constitutes a violation of the law.

White top ***(Cardaria draba,)*** also known as hoary cress, is a perennial, producing by seeds and rhizomes. It does not respond well to mechanical means of control such as cutting, digging pulling or mowing. Like other aggressive, rhizomatous perennials herbicides offer the only long term control. The premier herbicides for control of whitetop are in the sulfonylurea group of herbicides and include Escort at 1.5 oz/acre or Telar at 1 oz/acre. The application needs to be made early in the season, preferably prior to full flowering, but absolutely before any fading of color is detected in the blossoms. In the spring, when plants are actively growing, it responds well to 3/4 oz. Escort + 16 oz. 2,4-D amine per acre. Sixteen oz. of Banvel + 16 oz. 2,4-D amine per acre is less effective but still acceptable. Be sure and use a good quality surfactant with these mixes. The best treatment we have found is 1 oz. of Telar mixed with 32 oz. of MCPA, applied in 15-30 gal of water / acre in the spring just as blossoms form.

Dalmatian and yellow toadflax ***(Linaria genistifolia and dalmatica L.)*** **and** ***(Linaria vulgaris)*** are perennials, spreading both by root shoots and seed production. They are very aggressive, forming thick monocultures where allowed to grow unimpeded. They are difficult to control due to their extensive root and rhizome system, and in the case of Dalmatian toadflax, a waxy cuticle. Repeated treatments will most likely be necessary before they show any significant improvement. Spray with 1 quart per acre of Tordon or 1 quart of Banvel with a quart of 2,4-D amine per acre. Telar and Perspective also provide good control. Roundup is also effective in those areas where grass loss can be tolerated. Surfactant must be used whenever spraying either toadflax.

Spotted knapweed ***(Centaurea maculosa)*** and diffuse knapweed *(Centaurea diffusa)* are biennial or short-lived perennial plants. They spread solely by seed production, but can quickly dominate an area. Neither plant is very widespread in Routt County, and when found shall be treated aggressively to prevent their further establishment. Milestone is the most effective herbicide available for controlling the knapweeds. Tordon at 24 oz. per acre provides very good control and Curtail at 32 oz. per acre or Banvel at 24 oz per acre also work well. Remember, Tordon is a **Restricted Use** herbicide, requiring a pesticide applicators license from the Colorado Department of Agriculture and tordon persists in the environment for a very long time.

Russian knapweed ***(Centaurea repens)*** is a perennial producing by seeds and roots. Best control is achieved by spraying in the spring or fall with 5-7 oz/acre of Milestone. Use a non-ionic surfactant. Another herbicide control is to spray in the spring or fall with 16 oz Tordon + 32 oz. 2,4-D amine per acre with a good quality surfactant. Curtail also provides good control at 1 quart per acre.

Leafy spurge ***(Euphorbia esula)*** is a deep rooted perennial, reproducing by seeds, rhizomes and roots. It is one of the most economically and environmentally damaging plants in the West. **It is very difficult to control in riparian areas, but more easily managed on upland sites.**. In the spring spray it with 1 quart of Tordon + 1 quart of 2,4-D amine per acre, or 1 quart of Banvel with 1 quart of 2,4-D amine per acre. Twelve oz of Plateau + methylated seed oil shows good control, but must be sprayed in the fall. As it is essential that no seeds be removed from any site where leafy spurge occurs, this would not provide acceptable control unless the spurge was mowed or grazed by sheep or goats to prevent it from going to seed in the summer. Very specific site considerations must be evaluated before treating leafy spurge on riparian sites and it is wise to contact the Routt County Weed Program with any questions regarding herbicide use close to water or in areas with a high water table. Several species of Apthona flea beetle and targeted grazing with sheep or goats can be very effective biocontrols.

Oxeye daisy ***(Chrysanthemum leucanthemum)*** is an escaped ornamental, perennial, with shallow roots. It spreads by seed and roots. Due to its shallow root system it is readily controlled with cultivation or ripping. It is shade intolerant, and good grass cover helps prevent its establishment. Milestone at 5 oz/acre is a very effective control. Treating a field with 24 oz Tordon or 3/4 oz. Escort (plus surfactant) per acre provides excellent control\ as well.

Houndstongue ***(Cynoglossum officinale)*** is a biennial and very toxic to livestock, especially horses. It causes irreversible liver damage and is an accumulative poison. Early signs of poisoning in horses may include photosensitivity and blistering and peeling of skin on the nose and lips. It forms a low growing rosette the first year and the second year bolts up to 1-2 feet tall, forming rosy-purple flowers followed by a large, flat seed that sticks to almost anything with Velcro-like hooks. It can be controlled with herbicides or by cutting the roots at least 4 inches below the surface with a shovel once it has bolted. Escort at 1.5 oz/acre or Telar at 1 oz/acre, especially if mixed with 1 qt 2,4-D/ acre results in very good control. Use a non-ionic surfactant. Tordon or Banvel at 24 oz. per acre, or 2, 4-D amine at 1 quart per acre and a good quality surfactant all provide good control. Spring or fall treatments are best. Tordon is a restricted use herbicide and requires a pesticide applicators license to purchase.

Canada thistle ***(Cirsium arvense)*** is a deep rooted perennial that reproduces both vegetatively and by seed. It forms dense stands, usually reaching a height of 2 to 4 feet with small bluish-purple flowers. It readily appears throughout the County whenever the ground is disturbed. Milestone at 5 oz/acre for young plants or 7 oz/acre for well established infestations is the best treatment available. Spring and fall applications are both effective. Spray it in the spring with 1 quart of Tordon, Banvel or Curtail per acre. It is especially helpful with Canada thistle to re-seed any areas that are disturbed with a good grass mix. Fall applications work well, especially if the plants are mowed in the summer.

Musk thistle (***Carduus nutans)*** is a biennial, which reproduces from seed. The first year's growth is a large, compact rosette. Individual plants are effectively controlled with a shovel. The second year the plant bolts, growing to a height of two to six feet, with large spiny leaves with a deep green color. Flowers are large, nodding and purple. A biennial, musk thistle responds well to mechanical control and can be dug up, disked or mowed. Musk thistle also responds well to herbicide control: Milestone at 5-7oz/acre is very effective on musk thistle. Escort at 3/4 oz per acre; 2,4-D amine at 1 quart per acre; Banvel or Tordon at 1.5 pints per acre; Curtail at 1 quart per acre.

Bull thistle ***(Cirsium vulgare)*** and Scotch thistle *(Onopordum acanthium)* are biennials, and can be treated the same as musk thistle. These weeds are also best controlled with Milestone at 5-7oz/acre, applied in late summer-early fall on first year rosettes or early in the season of the second year before rosettes bolt. Plants which have flowered should have the blossoms removed before seed matures. Digging the plants with at least 4 inches of the tap root is a very effective control. If the plant has already flowered, but the seeds have not dispersed; cut, bag and securely dispose of the flower head.

Cheatgrass ***(Bromus tectorum)*** **and Downy brome** ***(Bromus secalinus)*** are highly invasive annual or winter annual grasses, and are the subject of considerable research on effective controls, because of their impact on Great Basin rangelands. Aminocychlopyraclor as Matrix has been found to be effective when applied according to specific label directions. Roundup (glyphosate), Journey, Plateau, and Landmarke may also be effective when used according to label directions. **Glyphosate at 10 oz. / acre will control cheatgrass without doing lasting damage to cool season perennial grasses more economically than other treatments.**

Tarweed ***(Madia glomerata)*** is a broadleaf annual. It can be controlled by either using Round-up, where grass loss can be tolerated, or disked before flowering. Because tarweed is an annual and prevention of seed production is the primary goal, an application of 2 qts/ acre of 2,4-D 4 lb amine can effectively dessicate the weed and prevent seed maturity. Tarweed can be controlled with Escort at 3/4 oz per acre with a good surfactant. This weed will typically disappear once good grass cover is established.

Common mullein ***(Verbascum thapsus)*** is a biennial C List noxious weed in Colorado most typically occurring on disturbed sites. If the plants are few in number a shovel is a great tool for control and loppers or pruners can be used to remove flower spikes before seed is mature. Herbicide control is more difficult because of the extremely hairy surface. Good control can be achieved with Perspective at 5 oz. / acre applied in adequate water to thoroughly wet the leaf surface (30 gal. / acre). Some applicators have achieved good control with Milestone by thoroughly wetting the plants. A crop oil surfactant works better than non-ionic surfactant to help penetrate the wooly leaf surface. Spraying should be done in the fall on first year rosettes or in spring just as the rosettes begin to bolt.

Curly dock *(Rumex crispus)* is a robust, deeply tap-rooted perennial which produces a large quantity of viable seeds. As with many tap-rooted species a shovel is a good tool for removing individual plants. When a more widespread and heavy population of Curly dock is present there are several herbicides which can be effective. A mix that works very well is 2,4-D 4 lb amine at 1 qt. / acre (1 oz. / gal of water) plus Milestone a 5 oz. / acre (5 cc / gal of water). Other herbicide controls include Escort, Telar and individual plant treatment with glyphosate. Non-ionic surfactants or crop oil based surfactants should be used with any herbicide and added to the solution according to label directions. A management objective should be to prevent seed production

Other Noxious Weeds not listed here: Glyphosate (Roundup) is often, but not always effective when treating individual plants or when loss of grass is not a problem. The Routt County Weed Supervisor will work with the land owner or manager to develop specific control measures needed to control any noxious weeds found in the future on this property but not described here.

Conclusion

Noxious weed management within Routt County is required under the Colorado State Weed law. If done regularly proper management techniques should minimize the long term impact of weeds without being overly costly. Part of being a good neighbor, a conscientious manager and a responsible steward of the land is managing weeds and maintaining healthy vegetation.

Use INTEGRATED WEED MANAGEMENT (IWM) to manage weeds whenever possible, by combining control techniques.

_____ _____

Supervisor Date
Routt County Weed Program

Table of Contents- Alphabetically

Appendix F
Useful Conversions

1 Acre = 43,560 sq. ft.
1 Mile=5,280 feet
1 Meter=3.28 feet
1 Hectare= 2.47 acres
1 Kilometer=1.6 miles or 1,000 meters

1 Gallon= 128 ounces
8 pints
4 quarts
1 Pint= 16 ounces
1 Quart= 32 ounces
1 Ounce=28,349.5 mg
1 fluid oz= 2 Tablespoon
1 Tablespoon (Tbsp)= 3 teaspoons (tsp)
1 fluid ounce=29.57cubic centimeters
1 cubic centimeter= 1 milliliter

1 Pound=16 ounces
1 Gram=.035274 ounces
1 Ounce= 28.35 grams
1 Kilogram=2.2 pounds

0 Celsius= 32 Fahrenheit
(0˚C X 9/5)+32=32˚F