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## Weed management for small rural acreage owners

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### Quick Facts

- Weed management is developing a control plan to implement over time.
- Prevention, eradication and control are three general management strategies.
- Prevention is the first line of defense to keep weeds from occurring or increasing in an area.
- Eradication is the removal of weeds from an area so they will not recur unless reintroduced.
- Control reduces a weed population in an area to a level where you can make a living off of or enjoy using the land.
- A weed management system integrates two or more control methods into a plan of operation.

Weed management is developing a control plan to implement over time. It is different from simple weed control, which reacts to weeds after they occur. There are three general weed management strategies: prevention, eradication and control.

### Prevention

Prevention, the first line of defense, keeps weeds from occurring or increasing in an area. Preventive techniques may include planting high quality, weed-free crops or grass seed. Legislative items, such as clean seed acts and weed management laws, also can help stop weed problems before they occur and deter weed spread. An important preventive measure related to control is to keep weeds from going to seed. This is particularly important for annuals and biennials, because that is their only means to reproduce. Perennials reproduce from seed and vegetatively, from their root system. (Annual weeds live for one growing season, biennials for two and perennials more than two.) However, preventing

seed set is extremely important to keep perennials from starting new infestations some distance from existing ones.

### Eradication

Eradication is the removal of weeds from an area so they will not recur unless reintroduced. If eradication creates an open environment, a weed problem may be cured simply to create another one. If eradication is necessary and desirable, it usually is necessary to revegetate the ground to prevent another weed infestation. Eradication is desirable for small patches, e.g. 10 to 100 feet in diameter, but not always for larger ones.

### Control

Control, most often practiced, reduces a weed population in an area to a level where you can make a living off of or enjoy using the land. Adequate control also may prevent future infestations. There are four control methods: cultural, mechanical, biological and chemical.

**Cultural control methods** are implemented by the land manager to favor desirable plant growth. Fertilization, irrigation and planting at optimum densities are methods that offer the most competition from crop plants to weeds and least competition among crop plants. Weeds may respond to fertilization and/or irrigation but generally do not respond as well as crops because weeds evolved under limited environmental conditions.

**Mechanical control methods** physically disrupt weed growth. Mechanical weed control is the oldest and most often method used worldwide. Tillage, hoeing, hand-pulling, mowing and burning are examples of mechanical weed control. To mulch or smother often is considered mechanical even though it simply excludes light rather than physically disrupts weed growth.

**Biological control methods** use an organism to disrupt weed growth. Often the organism is an insect or plant pathogen and a natural enemy of

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the weed. This is called classical biological control. Classical is not the only form of biological control. Livestock can be effective weed management tools if used correctly. Generally biological control is environmentally sound, particularly classical biological control. However, improper livestock management (overgrazing) can be extremely damaging to the environment and exacerbate weed problems.

**Chemical control methods** involve herbicide use to disrupt weed growth. The first rule of herbicide (or any pesticide) use is to read the label **BEFORE** using the product and follow all directions and precautions. (NOTE: Avoid using soil-active herbicides, such as Tordon, Banvel or Telar, near windbreak plantings and other desirable woody vegetation because plant injury or death can occur. Do not allow any herbicide to drift onto woody or other desirable vegetation for the same reason.)

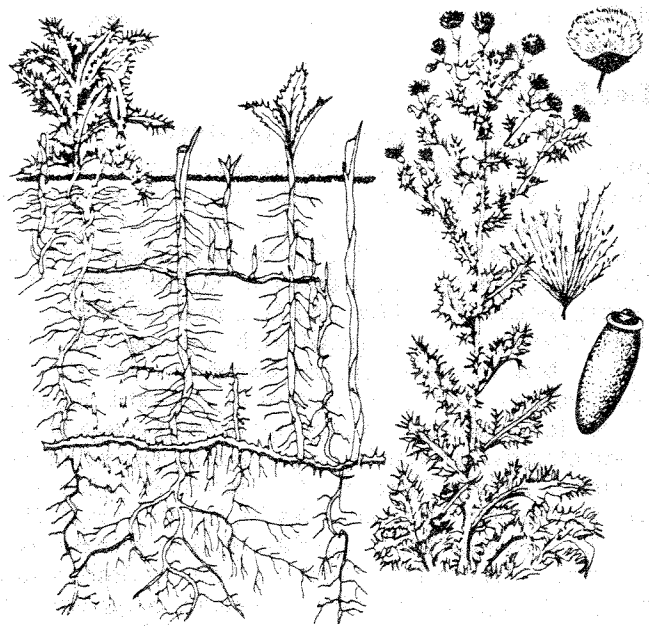
### Weed Management Systems

A weed management system integrates two or more control methods into a plan of operation. The key is to create a favorable situation for desirable plant growth with optimum fertilization and/or irrigation (cultural). Plant competition is a good tool that often is overlooked and should be used first, but not exclusively. Tillage, hoeing, hand-pulling, mowing or mulching (mechanical) should be used where possible. Herbicides are powerful tools that should be used judiciously, not exclusively. Unfortunately, herbicides are used too often to make up for poor cultural or mechanical management decisions. Herbicides should be a component of the weed management system, not comprise the system solely. Biological controls can be part of a system, but not many natural enemies currently exist in Colorado. Livestock grazing can be effective depending on the weed species, and how it is integrated with other methods.

### Canada Thistle

Canada thistle can be mowed 2 to 4 inches in height during growing season to stress plants and prevent seed formation. Mowing should be conducted at 14- to 21-day intervals. Alternatively till at three-week intervals. (Tillage or mowing during the growing season "sets up" the weed for fall herbicide treatments.) Tillage or mowing will stress Canada thistle and force it to draw upon stored root nutrients. The key to control Canada thistle and other perennials is to exhaust root nutrient stores, regardless of the control procedure used.

Allow Canada thistle to recover (cease mowing or tillage) in early to mid-August so ample foliage is present in fall to intercept herbicides. Some plants may recover to flower in fall so apply a herbicide before this occurs. Treat the infestation with Tordon at 1 quart/A (0.5 pound ai/A), Banvel at 2 quarts/A (2 pounds ai/A) or Telar at 1 ounce/A (0.75 ounce ai/A). Add an agricultural



Canada Thistle

surfactant at 0.25 percent v/v to Telar treatments or control will be inadequate.<sup>2</sup> This is not necessary for Banvel or Tordon applications on Canada thistle. Tordon is a restricted-use herbicide labelled for use in permanent grass pastures and non-crop areas. Telar is labelled for non-crop use only. Any of these herbicides kill legumes, such as alfalfa or clover. Avoid using Tordon or Banvel near water, particularly irrigation water. These herbicides can end up in a field other than a grass pasture and injure susceptible crop species or desirable woody vegetation. Consult labels for precautions or contact your local Cooperative Extension office.

Sometimes reseeding may be necessary to fill an open space left by killed thistle and provide competition to thistle that recovers. If Tordon or Banvel are used, delay seeding until the following growing season. Glean is a herbicide identical to Telar except it has a different label. It can be used in different situations than Telar. For example, Glean can be used in pastures where grass reseeding is planned and grazing is deferred, but Telar cannot. If Glean is used, reduced rates from those mentioned above will have to be applied. Follow Glean label directions for general pasture rejuvenation. The reduced Glean rates used for pasture rejuvenation do not provide the same control as 1 ounce of Telar, therefore, retreatment is necessary. Neither Telar or Glean can be used in pastures where grazing occurs.

Additionally, fertility can be improved in the controlled area to favor grass or other desirable plant growth. Take soil samples to determine nutrient needs and fertilize in fall of the following spring.

This system combines mechanical, chemical and cultural control methods. Canada thistle is

<sup>2</sup>Treatment key: /A—per acre, ai/A—active ingredient per acre, v/v—volume per volume.

difficult to control and may recover. Repeat procedures as necessary.

### Leafy Spurge

Mowing leafy spurge at 14-to-21-day intervals may cause higher susceptibility to fall applied herbicides, but there is limited data to support this. Alternatively, sheep or goats will graze leafy spurge. This stresses the weed and releases grasses from competition so pastures can be used effectively by cattle and horses. Sheep or goat grazing may allow greater control with fall applied herbicides, but there is no research to verify this. Regardless of the top-growth control method, allow leafy spurge to regrow in mid-August so a good stand is present to intercept fall applied herbicides. Apply Tordon at 1 quart/A (0.5 pound ai/A), Tordon + 2,4-D at 0.5 to 0.75 + 1 quart (0.25 to 0.375 + 1 pound ai/A) or Banvel at 2 quarts/A (2 pounds ai/A) in fall. Fertilization, as determined by soil sampling, can help grasses compete with stressed leafy spurge. Fertilize in fall or the following spring.

Repeat this system for three to four consecutive years. Leafy spurge is a persistent, hard to control weed and recovery often ensues. If necessary, repeat the management system after the initial three to four years have passed. Reduced herbicide rates often can be used at this time.

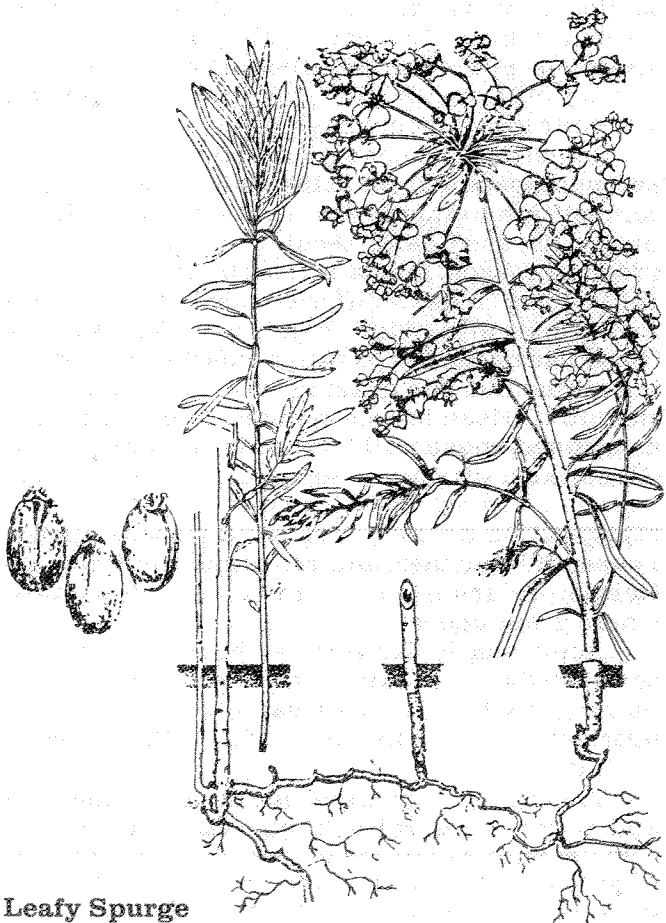
Biological control agents will be available in the future. The Colorado Department of Agricul-

ture received two flea beetles (*Apthona nigriscutis* and *A. flava*) in 1989 for leafy spurge. However, it will take several years before enough beetles are available for redistribution. Adults feed on leaves and larvae bore into leafy spurge roots.

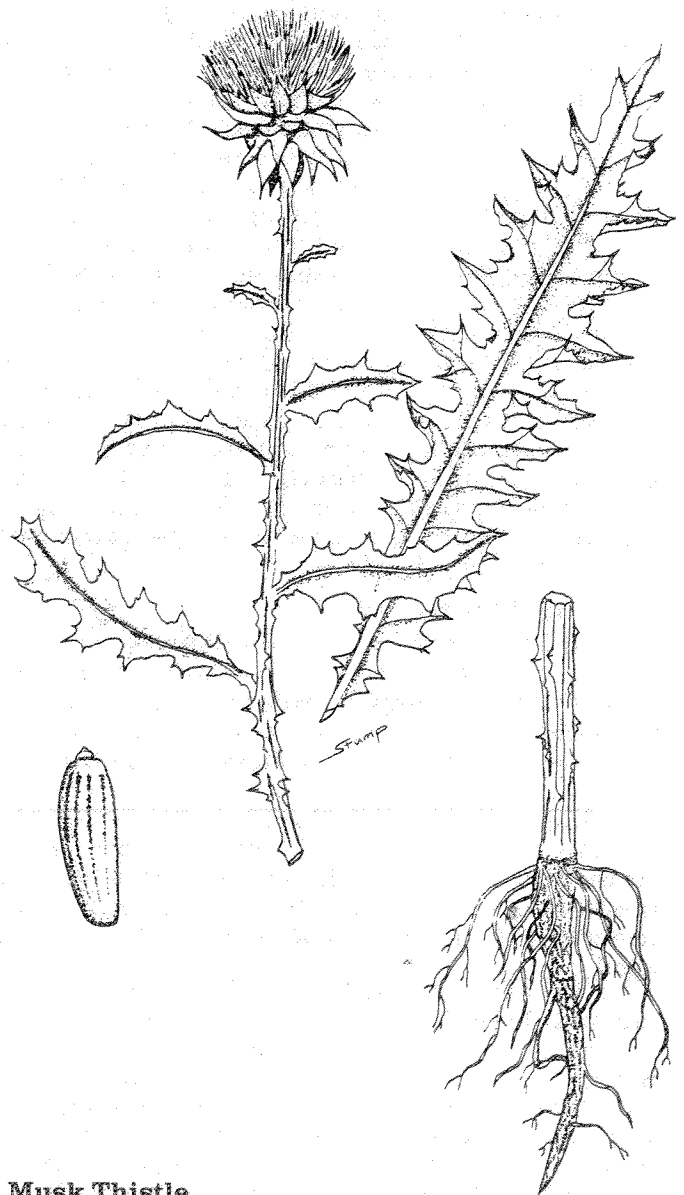
### Musk thistle

Musk thistle is a biennial and the key to its successful management is to prevent seed formation. Musk thistle occurrence in crops is proportional to moisture and sunlight. The weed more readily invades pastures that are in poor condition than in pastures in good condition. Fertilize pastures to keep them in optimum condition so plants can compete with musk thistle.

Cutting off the weed below the soil line before the bud stage will provide effective control. You also may treat the weed in spring or fall with herbicides. Apply Tordon at 0.25 to 0.5 quart (0.125 to 0.25 pound ai/A) or Banvel + 2, 4-D at 0.5 + 1.0



Leafy Spurge



Musk Thistle

quart/A (0.5 + 1.0 pound ai/A) to musk thistle rosettes. Spring treatment should occur before musk thistle bolts (shoot elongation) or it may recover and develop seed. Apply Telar or Ally at 1 ounce (0.75 ounce ai/A) or 0.5 ounce/A (0.3 ounce ai/A), respectively. Telar is labeled for non-crop use only, but Ally is registered for pasture and rangeland use. Add a good agricultural surfactant at 0.25 percent v/v. Apply in spring when musk thistle is in the rosette-to early-flower growth stages. If treating in early flower, do not allow the pink portion of the developing flower to exceed the size of a dime. Research at Colorado State University indicates little to no seed is formed when Telar or Ally are applied during these growth stages.

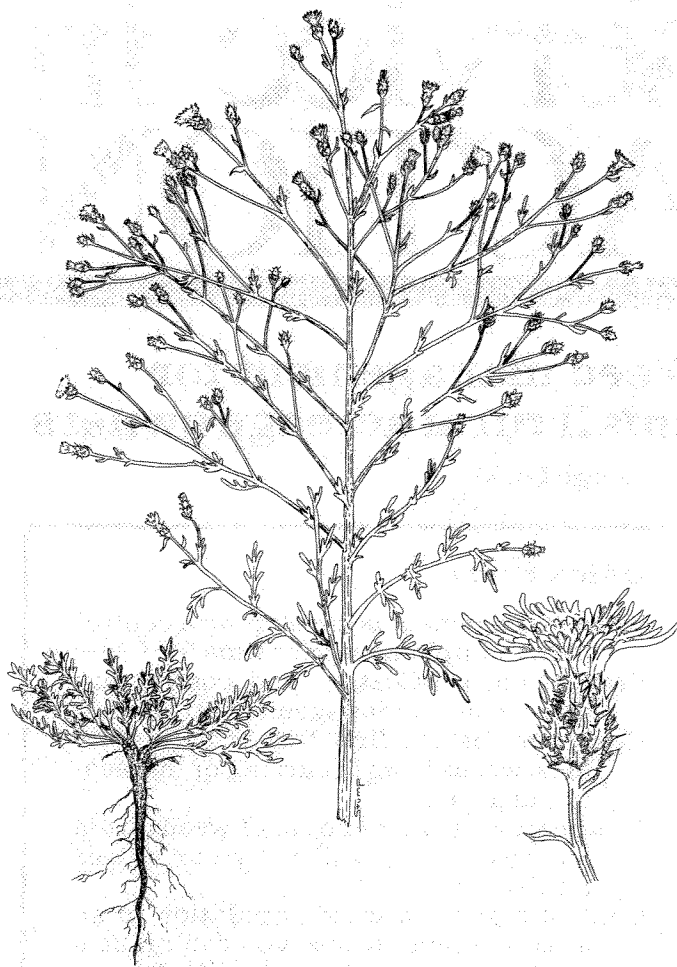
The musk thistle seed head weevil (*Rhynchocyllus conicus*) is widespread in Colorado. Larvae of this insect destroy developing seeds but are not 100 percent effective by themselves. Musk thistle has flowers in various growth stages at once and the weevil's life cycle usually is finished before all flowers develop. Apparently, the weevil normally impacts seed production by about 50 percent. Herbicides can be combined with weevils if the insects are allowed to complete their life cycles. Telar or Ally applied at early flower in spring or Tordon or Banvel + 2, 4-D in fall should allow this.

### Diffuse Knapweed

Diffuse knapweed is a biennial and grows similar to musk thistle. The key to management is to prevent it from going to seed. Diffuse knapweed invades over-grazed pastures, forms dense stands and is toxic to horses. After a herbicide treatment, reseed a poor-conditioned pasture so grasses can be present to compete with surviving diffuse knapweed.

Spring- or fall-applied herbicides are effective. Research conducted at Colorado State University indicates Tordon at 0.5 to 1 quart/A (0.25 to 0.5 pound ai/A) or Banvel + 2, 4-D at 0.5 + 1.0 quart/A (0.5 + 1.0 ai/A) applied in spring from rosette to early-bolt growth stages are effective.

Biological control will be available in the future. In 1989, the Colorado Department of Agri-



**Diffuse Knapweed**

culture received a gall fly (*Urophora affinis*) from USDA/APHIS. The females lay eggs in developing flowers and the larvae incite gall formation as they feed on heads, which reduces seed formation. The gall fly should be ready for redistribution in the future. The gall fly overwinters inside the seed head as larvae and the normal procedure for redistribution is to cut last year's 'dead stand' that contain larvae and tie the 'bouquet' to a fence post near knapweed stands. Adults will emerge in spring and repeat the life cycle. A research program in Montana is underway that might make other insects available.