

Best Management Practices for Noxious Weeds

Effective control of weeds requires persistence and vigilance as well as an understanding of weed management principles and the weed's life cycle. Choosing a method of weed control depends on many factors, including the weed species, proximity to water, presence of desirable vegetation, soil type, depth of the water table, growth stage of the weed, temperature, rainfall or lack thereof, and available labor, time, and money. The following recommendations are general in scope. Landowners should consult with weed management specialists, CSU Cooperative Extension personnel, or the Mesa County Weed and Pest Inspector when making plans to treat noxious weeds.

General Guidelines

- 1) **KNOW YOUR WEEDS!** Identification is the first step in forming a weed management plan.
- 2) Early detection is always the best defense against noxious weeds. Treat intensely when a new or small patch is found.
- 3) Understand the biology of the weed to better select the best management practices. Know the plant's life cycle, what type of root system it has, what time of year it flowers and how long the seeds last in the soil.
- 4) Weed management is a long term process and hence a long term commitment to the land. Weed seeds last 5-50 years in the soil and pieces of root as small as 1/2" can start a new plant and a new infestation.
- 5) Know at which growth stage to implement control measures so that control is most effective. For example, once a biennial or annual has gone to seed, it is too late to do anything about it. Spraying a perennial weed in the rosette stage is a waste of chemicals because the root system will respond by sending up new shoots.
- 6) Use weed free seed, hay, forage, and mulch to prevent introduction of new weeds.
- 7) Reseed the site with competitive species. Grasses are often recommended so that broadleaf herbicides can be used to spot treat broadleaf weeds. Plant a diversity of species rather than a single species if possible.
- 8) Mowing and burning are effective weed management tools in some situations and with certain weeds. Mowing may cause the plant to flower at the mowed height, so seed set may be reduced but not eliminated. Burning may stimulate germination of some weed seeds. Most weed seeds are not destroyed by burning because temperatures are not high enough to completely burn the seed.
- 9) When tilling, till the weed patch last and then clean the equipment as best as possible in the field to prevent spreading roots and seeds. Always clean equipment and machinery

after working in a weed patch. To avoid picking up and spreading mud that contains weed seeds do not drive through a weed patch when the soil is wet.

- 10) Many biological control agents are available for control of large weed patches. This is a complicated process and not recommended for small patches. Long term monitoring is essential to determine the extent of control and establishment of the agent. Biological control never provides 100% control and must be incorporated with other methods for successful management.
- 11) Grazing can be used as a weed management tool, but is not as simple as letting the animals out into the weed patch. Obtain information on which animals to use, level of intensity and duration, and what results you can expect. Temporary fencing may be necessary until the stand is established, particularly in areas where wildlife and other grazers are active.
- 12) Drought causes plants to shut down their growth process. Spraying weeds during dry periods is not recommended because effectiveness diminishes greatly. Treat after rainfall IF the weed is still in the proper stage for effective control.
- 13) Not all herbicides work equally on all weeds nor can every herbicide be used in every situation. Noxious weeds, in particular, are often not controlled successfully with products available at nurseries, garden shops and other retail gardening markets. **Read the label** and consult weed manuals and experts for the most effective chemical to use.
- 14) When developing a weed management plan, consider how much time, money, and land is involved. If you want to do non-chemical control, you may not need a lot of money, but you will need a lot of time and energy. If you want fast action, herbicides can be the most efficient use of money and time. Annual weeds may be as effectively controlled with tillage or hoeing as spraying if done properly and at the right time.

Control of Annuals & Biennials

Target: Prevent seed production; many seeds lay dormant in the soil for 3-10 years.

- 1) Hand grubbing (pulling), hoeing, tillage, solarization, cultivation in rosette stage and before flowering or seed maturity.
- 2) Chop roots at least 2" below soil level.
- 3) Post emergent herbicide treatment in the rosette or bolting stage, before flowering.
- 4) Pre-emergent herbicide treatment is effective on most annual weeds. Apply in the early spring before spring annual weeds emerge and in the late summer for winter annuals. Pre-emergent treatments can be effective for up to 3 months. Watering into the soil may be necessary to get the herbicide into the germination zone. **Follow label instructions carefully.**

- 5) Mow biennials after bolting stage and before seed set; be aware that mowing annuals may not prevent the plants from flowering and setting seed.

Control of Perennials

Target: Deplete nutrient reserves in root system, prevent seed production. Seeds of many species lay dormant in the soil for 10 or more years. Root systems may reach 40 feet depth.

- 1) It is very important to know what perennial weed you have before deciding on a control tactic. Perennials vary widely in their response to mechanical control.
- 2) Allow plants to expend as much energy from root system as possible; do not treat when first emerging in spring but allow them to grow to bud to bloom stage.
- 3) Herbicide treatment at bud to bloom stage or in the fall. Spraying in the fall will kill the following year's shoots, which are formed in the fall. If the weed patch has been there a long time, another season of seed production is not as important as getting the herbicide into the root system.
- 4) Mowing is not recommended for all perennials because some of them will flower at the mowed height; seed production may be reduced, however. Herbicides alone may be more effective than mowing followed by herbicide treatment. However, a combination of repeated mowing to prevent flowering followed by herbicide treatment in the fall is effective for some perennial weeds such as Canada thistle. The effect of mowing is species dependent so know what weed you are working with and consult the experts.
- 5) Tillage may or may not be effective. Most perennial roots can sprout from pieces only ½" - 1" long. Repeated tillage over the course of a summer may destroy soil structure and be more detrimental than an herbicide treatment. Clean machinery thoroughly before leaving the weed patch.

Integrated Pest Management Practices

No single method of weed control will provide 100% control. A combination of two or more of the following methods should be used. The following practices can be applied to all species of weeds.

Prevention

An ounce of prevention is worth a gallon of sweat, 100 gallons of herbicide spray, several shovels, several pounds of grass seeds, and a ton of money. Weed problems can be avoided by using simple precautions.

Hay for mulch or erosion control should be certified weed seed free. Using weed seed free hay is mandatory for feeding pack animals in the National Forest. A list of certified growers

can be obtained from National Forest Ranger Districts or the Colorado Department of Agriculture.

When disturbing weed infested land for development (e.g. blading) or agriculture (e.g. tillage), clean machinery and equipment before moving between sites. Equipment should be thoroughly cleaned before coming into a new site and before moving out of a weed infested area. In industrial situations, power washing is a good way to clean equipment. **DO NOT MOVE** soil from construction sites with known weed patches. Soil should be banked and used at the site. Emerging weeds should be treated accordingly.

Buy and plant noxious weed free seed. Laws require that containers (lots) of seed state the kind and percentage of noxious and other weed seed, and there are restrictions on the amount and kinds of weed seeds that are allowed in a lot. Over half of the weeds on the Colorado Noxious Weed List are escaped ornamentals. Do not buy ornamental seed mixes that do not give the scientific name of all the species in the mix. Check the scientific names against the list of noxious weeds. If the package just says "toadflax" you don't know whether or not you are buying a noxious species.

Eradicating single plants or small patches of weeds as soon as possible prevents their spread. In areas where the weeds are not yet present or are not very abundant, proper land management is necessary to keep the weeds out.

Cultural Practices

Cultural methods work on all species of weeds and are simply described as methods of sensible land management. Methods include improved land management practices, dense seeding with competitive species, crop rotation, careful irrigation practices, fertilization, and sensible grazing regimes.

New property owners should have their property assessed by a specialist. Growing conditions and land management practices in Western Colorado are very different from other regions of the country. Obviously, pasture and range lands are treated differently from lawn and garden areas. The intended use of the property will determine the best management practices for weed control. Even if you have owned your property for a long time, improvements probably can be made. Technical assistance is available from the Natural Resources Conservation Service or the CSU Cooperative Extension Office.

Competition with desirable plants can keep weeds suppressed and prevent weeds from becoming a problem. Plants compete for light, moisture and nutrients. Some weed species emerge early in the season to take advantage of these resources before natives or desirables. The choice of species used to provide competition for weeds depends on the intended use of the land, the types of weeds present, availability of irrigation water, soil types, and accessibility to the property. Native or non-native species can be used. In general, use a combination of species that will provide the best competition for the weeds that are present. It is generally better to plant grasses in broadleaf weed infestations so that a broadleaf herbicide can be used to treat the weeds if necessary. Some species of desirable plants are tolerant to herbicides. If irrigation water is not available, dryland species must be used. Seeding must be timed to take advantage of natural rain patterns to improve seed germination. Weed control will take much longer in dryland situations.

Proper water and fertility regimens are necessary to keep weeds from taking over. Over watering as well as under watering can lead to weed problems. Appropriate levels of fertilizer must be applied at optimal times in order to enhance desirable plant growth. Some species of weeds, such as Russian knapweed, diminish when water and fertilizer are properly managed.

Other management practices currently used on the property, such as grazing, may need to be adjusted to allow the desirable species to gain a foothold. Avoid overgrazing by livestock, including horses. When land is stripped of all plants by overgrazing, weeds are given the opportunity to move in. Because weeds are often undesirable as feed, they are sometimes the only plants left after livestock have overgrazed an area. Overgrazing gives them the light, space, water and nutrients they need to give them a competitive edge over desirable species. Do not allow overgrazing to happen. Be sure you have enough land for the number of grazing animals. Move livestock frequently to fresh pastures and allow pastures enough time to recover from grazing. Dividing up a pasture into three sections and moving animals between the sections can greatly improve conditions in an overgrazed pasture. Use a combination of perennial and annual, and warm and cool season pasture grasses to provide a diversity of plant types. Plant broadleaf pasture species only after broadleaf weeds are under control.

Mechanical Control

Mechanical control is the physical removal of a weed and includes methods such as hoeing, tilling, hand grubbing or pulling, mulching, burning, grazing, and mowing. Labor costs can be considerable for large weed patches. Mechanical methods are more practical for small patches or scattered plants.

Mechanical control works well on annual and biennial weeds, but is much less effective on perennial species, unless they are in the seedling stage. Mechanical control is most effective when done before the plants have flowered. Annuals and biennials can be removed by severing the root at least 2 inches below the soil level. If flowers and seeds are mature, cut off flower heads and carefully place them in contractor's heavy duty black plastic bags. Setting bags in the hot sun for several hours will help destroy seeds. Burning the cut material works if the fire is hot enough to totally destroy the seeds. Check the ashes for intact seeds. For perennial species, mechanical means are not very effective unless you are sure that the plant is a young seedling and all the root system can be removed. Digging up perennial plants may cut the roots into small pieces that can sprout new plants.

When using machinery to till the land, till within the weed patch and then clean the equipment before moving to uninfested areas. Avoid tilling when the soil is wet. Mud sticking to the machinery will make cleaning difficult and will likely carry weed seeds to other areas.

Mulching works by killing seeds or smothering emerging weeds. Grass clipping, leaves, hay, seed hulls from industrial applications, plastic and many other materials can be used as mulch. Organic (carbon based) mulch must be weed seed free. Apply and maintain organic mulch several inches deep. Solarization, the application of clear plastic to damp ground and left for several weeks, can kill weed seeds and roots and some plant pathogens to 3 inches depth. This method also kills soil micro-organisms and insects that may be beneficial. Solarization works best on annual and biennial weeds. Reseeding with competitive species must follow mulching and solarization, regardless of the material or method used.

Burning standing dead weeds generally does not totally destroy weed seeds and may actually benefit some weed species. Burning newly emerging annual weeds may be effective but the flame must be hot enough and applied long enough to cause the plant cells to burst. Some species may recover from burning by putting out new shoots. Burning is not effective on perennial species because the root system is not affected. Avoid breathing fumes from burning weeds because some species contain compounds that are toxic when burned and can cause severe respiratory distress.

Grazing and mowing can be used successfully with some noxious weed species, primarily to reduce seed production. Mowing usually must be done several times per season. Both grazing and mowing should be combined with other methods, usually herbicide application. However, some species will flower at the grazed or mowed height. Grazing must be carefully timed for best results. Sheep, goats, and cattle can be used. Grazing is also considered a biological control method. Consult with an expert if you intend to use these methods.

Biological Control

Biocontrol agents, such as herbivorous insects, vertebrate predators, and plant diseases, are not available for every weed species, nor are they effective in every situation. Generally, the weed patch must be large enough to sustain multiple generations of the agent. Effects may not be seen for several years, so the presence of the weed must be tolerated. Seed prevention methods may need to be combined with biocontrol to keep the weed from reproducing.

Biocontrol agents can be obtained from mail order sources or the Biological Control Section of the Colorado Department of Agriculture, Division of Plant Industry in Palisade. You should consult with a biocontrol or weed specialist before buying or releasing biocontrol agents.

Sheep and goats are used to manage some weed species and can be quite effective when used properly. Animals can be trained or conditioned to eat specific weeds and often leave desirable grasses alone. There are several grazing regimes that can be used, each with varying levels of intensity and duration. Grazing animals remove above ground growth and do not directly affect roots. However, repeated grazing will stress the root system of perennials. Grazing in combination with herbicide application can be very effective. In areas where dense weed infestations prohibit the entry of spray equipment, grazing can open up the area to allow equipment in after some regrowth of the weeds has occurred.

Chemical Control

Herbicides must be used with extreme caution. They are poisons and should be treated with respect. Most herbicides can be purchased without an applicator license. The label is a legal document that outlines the uses and restrictions of the chemical. **READ THE LABEL** before buying, before applying and again after using an herbicide. **READ THE LABEL** before buying to determine if the herbicide is the right one for your situation, if it is labeled for the weeds you are trying to control, for information on the addition of adjuvant or surfactants, and for other restrictions, such as for grazing and planting. **READ THE LABEL** before applying to get the correct rate to use, how to mix and apply the product, what personal protection you may need while mixing and applying the herbicide, and for information on how to dispose of left over mix. **READ THE LABEL** after applying to check reentry intervals, to check planting and grazing restrictions, and for disposal and clean-up information.

Never use more than the recommended rate on the label. Higher rates will cause the tops of the plants to burn down quickly. The herbicide may not have the chance to move into the root zone and the weed may sprout again—and it's a waste of money!

Pre-emergent herbicides prevent the germination of seeds and do not work on established perennial weeds. Application timing of pre-emergents is critical; they are usually applied in the spring. Precipitation or irrigation may be needed to move the chemical into the germination zone (the top 3-5 inches of soil).

Post-emergent herbicides work on the growing parts of the weed, including roots. Therefore post-emergent herbicides work on annuals, biennials, and perennials. Drought and heat may reduce the effectiveness of these herbicides.

The herbicide label may require the addition of a surfactant (surface active ingredient) to the spray tank. Surfactants make the herbicide more effective by breaking down waxes on the leaf surface, helping the spray spread on or stick to the plant, or aid in penetration of the spray into the leaf. Read the label to determine if a surfactant is needed and what type to purchase. These products are usually inexpensive and do result in better weed control.

The use of herbicides may be the only effective control method for some species. However, herbicides should be used in conjunction with other methods to achieve the highest level of control.

Herbicide use is determined by restrictions and instructions on the product label. Materials or products mentioned in this Plan are based on experience in Mesa County or recommendations of Colorado State University Cooperative Extension Service and should not be construed as endorsement by Mesa County.