WEED MANAGEMENT HANDBOOK

2006-2007

Montana • Utah • Wyoming

INTRODUCTION

Purpose: This handbook is designed as a quick and ready reference of weed control practices used in various cropping systems or sites/situations in Utah, Montana and Wyoming. Because chemical regulation of plant growth is complex and requires considerable knowledge, a large portion of the handbook is devoted to registered uses of herbicides, crop desiccants, and some plant growth regulators. In all cases, authors have made every effort to list only registered herbicides and to ensure that the information conforms with product labels and company recommendations.

Intended Users: The handbook may be useful to producers, company field representatives, commercial spray applicators, consultants, and herbicide dealers. The editor of each section is listed. Feel free to call them or your state weed Extension specialist, if you have questions.

Revision and Availability: The handbook is revised every 2 years and is available from the Bulletin rooms at Montana State University (406-994-3273), Utah State University (435-797-2251) and the University of Wyoming (307-766-2115).

Caution!

The information provided in this handbook is not intended to be a complete guide to herbicide use.

Before using any chemical, you should thoroughly read the label. The recommendation on the manufacturers label, when followed, can prevent many problems arising from incorrect use of a chemical.

This information is supplied with the understanding that no discrimination is intended and no endorsement is implied by the University Cooperative Extension Service. Trade names (brand names) are used in this handbook. The authors have assembled the most reliable information available to them at time of publication. Due to constantly changing laws and regulations, the authors assume no liability for the recommendations. Any use of a pesticide contrary to instructions on the label is not legal or recommended.

Weed Management Suggestions

- **Weed Prevention**

Weed prevention means a land manager prevents the introduction of weed seed or vegetative propagules onto the land. This requires vigilance and the ability to identify weed seeds, seedlings, and mature plants. After a weed is introduced to a piece of land WEED ERADICATION is nearly impossible, and the endless process of WEED MANAGEMENT begins.

One of the most important aspects of weed management is the development of a multi-tactic program to control weeds. This approach, known as **Integrated Weed Management** (IWM), reduces the chances of a weed to adapt to any particular control technique. For example, the increased reliance in herbicides with the same mode of action has resulted in weeds that are resistant to those herbicides (see Section IV. Herbicide Resistant Weeds). Also, the continuous production of certain crops provides weeds a chance to adapt to the particular environment associated with that crop. IWM takes advantage of cultural, mechanical and chemical

weed control strategies in the best possible way with the goal of maintaining weed densities at manageable levels while preventing shifts in weed populations to more difficult-to-control weeds.

Combining as many of the following practices as possible will allow you to design an IWM program:

- Avoid weed establishment; eliminate individual survivors.
- Establish competitive crops that will "choke out" weeds.
- Identify and map weed infestations.
- Keep records over years.
- Recognize and eliminate new weeds before they multiply and establish.
- Control vegetation and seed sources around the field or site.
- Comply with or become involved in establishing county/state weed laws and noxious weed control programs.
- Employ sanitary procedures; prevent weed spread:
    - Clean equipment between sites or infestations.
    - Examine nursery plants, seed, and imported soil or media.
    - Use Certified Seed.
    - Screen irrigation water that comes from surface storage through canals.

Cultural Practices of an IWM Program

Crop Rotation, defined as the alternation of different crops in a systematic sequence on the same land, is one of the most important components of an IWM program. Weeds thrive in crops having similar environmental requirements as their own. Moreover, management practices designed to benefits certain crops may also benefit the growth of specific weeds. For example, winter annual weeds such as downy brome or jointed goatgrass are commonly found in winter wheat fields as they share similar environmental requirements. Crop rotation helps managing weeds because the different environmental conditions created by different crops within a rotation disrupt weed germination and growth cycles. Also, the wide variety of management options associated with each crop (tillage, planting dates, herbicide rotation, etc.) creates multiple stresses on weeds.

Know the weed spectrum in a field then select the crops according to their ability to compete with those weeds. Rotate crops to disrupt weed life cycles or suppress weeds in a competitive crop before planting a less competitive crop.

Plant competitive crops instead of fallowing to improve soils and weed management. Research with Indianhead lentils and other annual legumes appears to be promising fallow substitutes. Also, alfalfa reduces the ability of annual weeds to grow, however it favors growth of perennial weeds. Sudangrass, perennial grasses and tame buckwheat, grown in dense stands, provide intense competition against weeds.

- Consider legumes to supplement soil nitrogen requirements.
- Consider specific varieties of cereals with natural plant toxins (allelopathy); vegetation must remain uniform on the soil surface; either perennial or large-seeded crops can be planted through undisturbed mulch.
- Consider crops such as oats or spring barley that winter kill after vigorous fall growth. This avoids or reduces the need for controls the following spring.

Alter **planting dates** to encourage maximum early crop growth or delay planting until the first flush of weeds is controlled.

Modify **placement and time of application of fertilizer**, especially nitrogen.

- Band or spot fertilizer below crop seed to reduce its availability to surface-germinating weeds.
- Time the application of fertilizer using side-dressing for maximum crop growth or to minimize weed development.

Develop crop canopy to shade weeds and suppress weed germination.

- Select crops or varieties that form a canopy quickly.
- Space plants in equidistant (triangular) arrangements and vary density depending on crop management constraints or harvest requirements.
- Interplant crops in space and time (consider mechanical limitations in commercial plantings).

Manage an appropriate **living mulch** (grass or legume) between perennial crop rows.

Improve **pasture management by reseeding and/or fertilizing** to reduce weed infestation (weeds are usually a symptom of poor management).

Apply Mulch

- Organic mulches such as straw may reduce available N when decomposing, but it could be infested with weed seed.
- Sawdust can be used but you must avoid vertebrate pests by maintaining a mulch-free circle around trees. Also, perennial weeds can become a serious problem under mulch.
- Use bark mulch, black plastic or landscaping fabric which excludes light and therefore controls most annual weeds.
- Avoid clear plastic mulch because it acts like a greenhouse and produces poor weed control.
- There are wavelength-selective plastics that can help in weed and pest management.

Mechanical Weed Control

Mechanical weed control involves the physical destruction of a weed. Techniques involve HAND PULLING or HAND HOEING which are practical for small infestations. MOWING is often used; but by far, the most common practice of mechanical control includes TILLAGE. Advantages of tillage include:

- Elimination of weed debris
- Controll of annual weeds
- Suppression of perennial weeds
- Tillage methods include plowing, rototilling, disking, and harrowing. Weed control implements include sweeps, rolling cultivators, finger weeders, push hoes, rotary hoes, etc.

Other Cultural Methods of Weed Control

Flaming is a technique that can be useful but it requires a physical difference or separation between crops and weeds, or crop protection with a hooded row cover or protein foaming agents.

Proper **water management,** such as the use of drip irrigation or uniform irrigation, can eliminate certain weeds.

Stale seedbeds involve a delay in planting after seedbed preparation to control the first flush of weeds before seeding.

Biological Weed Control

Biological control involves the use of **natural enemies**, such as predators, parasitoids, competitors, or pathogens to control pest insects, weeds, or diseases to levels lower than they would otherwise be. There are three main methods of biological control: conservation, introduction, or augmentation. Human activities can greatly influence the extent to which natural enemies are able to suppress pests. **Conservation Biological Control** is defined as any biological control practice designed to protect and maintain populations of existing natural enemies. This approach is particularly useful in agroecosystems where management practices such as cultivation, pesticide applications, and harvest disrupt the life cycle of the beneficial organisms. **Introduction** or **Classical Biological Control** refers to the importation of foreign natural enemies to control previously introduced, or native, pests. Finally, **Augmentation Biological Control** involves control practices intended to increase the number or effectiveness of existing natural enemies. This approach is commonly used in cases where natural enemies are missing (greenhouses) or late to arrive at new plantings (some row crops), or simply too scarce to provide control.

Many of our worst weeds originated in foreign countries and biological control practices can help us to maintain them below threshold levels. These newly introduced plants, free from the natural enemies found in their homelands, gained a competitive advantage over native plants. Once they are out of control, other methods of weed management are usually not economical or physically possible. The need for a method of weed reduction that was economical, self-sustaining, and environmentally safe provides opportunities for biological control. There are several well-documented successes of biological control: St. Johnswort (Klamathweed in California), tansy ragwort in Oregon, and rush skeletonweed in the Pacific Northwest.

Biological control is a slow process, and its efficacy is highly variable. It usually takes several years for a biological control agent to become established and control a weed. Biological control agents impact weeds in two ways: directly and indirectly. Direct impact destroys vital plant tissues and functions. Indirect impact increases stress on the weeds, which may reduce their ability to compete with desirable plants. Thus, it is very useful to integrate biological control with other weed management practices. For example, once weeds are weakened by Biological Control Agents, competitive plantings may be used to outcompete the weeds.

The goal of a biological control program is not to eradicate a pest, but to maintain it below an acceptable threshold level. When using BCAs, a residual level of the weed populations must be expected since the survival of the agents is dependent on the density of their host weeds. After populations of the host weeds decrease, populations of BCAs will correspondingly decrease. This is a natural cycle and should be expected.

The BCAs released in the U.S. have been thoroughly tested to ensure they are host-specific. This is an expensive and time-consuming task that must be done before the agents are allowed to be introduced. An extensive assessment of BCAs prior to their release secures they will not switch to crops, native flora, and endangered plant species.

Biological control of certain weeds may not work in your area, even though an insect may be very effective in another area. Climate variations such as cold winters, and plant biotype differences may account for some of the failures that have occurred in the past. To ensure maximum success, trained personnel must supervise biological control programs. Biological control agents are living entities and require specific conditions to survive.

As with any other weed management method, biological control has benefits and disadvantages. The benefits include: reduction of herbicide residues in the environment, host specificity on target weeds, long-term self-perpetuating control, low cost per acre, searching ability to locate hosts, synchronization of agents to life cycles of hosts, and unlikelihood that hosts will develop resistance to agents. Some of the disadvantages of biological control include: the limited availability of agents from their native homelands, the dependence of control on plant density, the slow rate at which control occurs, biotype matching, and host specificity when host populations are low.

CONTROL OF PROBLEM WEEDS AND POISONOUS PLANTS IN RANGE AND PASTURE

This section provides herbicide recommendations for many plants that are typically very difficult to control in range and pasture. The majority of the plants listed here are plants that were introduced from other parts of the world such as Europe or Asia. A few plants in this section are natives, such as the larkspurs, skeletonleaf bursage, and curlycup gumweed. The reason we have included control recommendations for these and a few other natives is because in certain situations, they may cause serious problems for agricultural production and livestock or human health. We do not advocate or recommend attempting eradication of any native plants. However, it is clear that they may cause problems great enough to warrant providing control recommendations for them.

The problem weeds and poisonous plants in this section are not limited to Montana, Utah, and Wyoming. Most are found and may be troublesome in many areas of the Western United States. However, the herbicide recommendations provided here are only in accordance with the labels as specified for Montana, Utah, and Wyoming.

The primary reason these weeds are listed is because they are difficult to control. It is important to understand that there are no herbicides that are silver bullets for weed control. Very rarely will one application of any herbicide result in the eradication of a problem weed. There are several herbicides that may provide season long weed control. Some may provide effective residual weed control for a few years. This is highly beneficial, but may lead to the false conclusion that eradication has been achieved. Generally, many perennial weeds will recover after a few years from deep rootstocks that were never killed, but only held in check by herbicide treatment. Given the financial commitment required for herbicide use, it is important that land managers understand this.

Knowing the life cycle of the problem weed is important in maximizing the effectiveness of chemical control. Winter annuals, such as cheatgrass and many mustards, emerge in the fall or early spring while summer annuals such as kochia or buffalobur may emerge from late spring through the summer. For annual weeds, postemergent herbicides are almost always most effective on newly emerged seedlings that are very small and less effective on larger mature plants. Preemergent herbicides must be applied before the weeds emerge to be effective. Applying a herbicide to annuals following seed production is a waste of resources unless it is required for burn down of green material prior to harvesting operations. Established perennial weeds emerge from rootstocks in the spring and early summer before bolting, forming flowers, and producing seed. Many perennials will often produce new shoots in the late summer or fall, which will not flower, but may be important for producing and transporting energy storage products to the roots. Generally, there are two key timings for perennial weed control. The first timing is after the majority of new shoots have emerged in the spring but before the plants begin to flower. This period generally coincides with when the plants have the lowest energy root reserves and allocation into root growth is high. The second timing is in the fall when new shoots emerge, which is called fall regrowth, and allocation to the roots is high.

The following recommendations provide a starting reference for individuals looking for herbicide options for many difficult to control weeds. The information provided here is not a complete summary of all pertinent label information. ALWAYS read the label prior to using any herbicide. We have provided several links to online labels so that the reader may access labels before purchasing the product.

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Herbicide	Application and Remarks	
Arrowgrass, seaside *(Triglochin maritima)*		
Escort *metsulfuron*	**Rate:**	0.5 oz product/A
	Timing and Remarks:	Apply when arrowgrass is fully emerged in the spring up to late summer when seeds are developing. Do not graze treated forage until the arrowgrass is dead.
Bindweed, field *(Convolvulus arvensis)*		
Banvel or Clarity *dicamba*	**Rate:**	1-2 pt product/A
	Timing and Remarks:	Apply during the fallow period prior to planting when weeds are actively growing. This treatment is for suppression of field bindweed only.
2,4-D amine, many trade names *2,4-D*	**Rate:**	2-3 qt product/A
	Timing and Remarks:	Apply at the bud stage to actively growing bindweed or as a post wheat harvest summer fallow treatment in August. This treatment is for bindweed suppression. Repeated annual treatments may reduce but will not eliminate bindweed stands.
Weedmaster *dicamba + 2,4-D*	**Rate:**	4-6 pt product/A
	Timing and Remarks:	Apply when bindweed has reached or is beyond full bloom if plants are not drought stressed.
Tordon *picloram*	**Rate:**	0.5-1.0 pt product /A tank mixed with 1 quart 2,4-D (4EC)/A 1-2 qt product/A as a spot treatment
	Timing and Remarks:	Timing is not critical, but most consistent results when bindweed runners are 8-12 inches.
Paramount *quinclorac*	**Rate:**	3.0-5.3 oz product/A
	Timing and Remarks:	Apply in fall before the first killing frost. Prior to application, allow 30 days for regrowth following tillage.
Plateau *imazapic*	**Rate:**	8-12 oz product/A
	Timing and Remarks:	Apply after 25% bloom and up to the first killing frost. Always use 1 qt MSO/A.
Roundup and several other trade names *glyphosate*	**Rate:**	4-5 qt product/A
	Timing and Remarks:	Apply at full bloom to early seed stage or to fall regrowth before a killing frost. Control may be improved if treatment is followed by tillage 2-3 weeks following treatment.

Herbicide	Application and Remarks	
Landmaster BW *glyphosate + 2,4-D*	**Rate:**	54 oz product/A
	Timing and Remarks:	Apply during fallow period or post-harvest when bindweed regrowth is at least 10 inches long.

Black Henbane *(Hyoscyamus niger)*

Escort *metsulfuron*	**Rate:**	0.5-1.0 oz product/A
	Timing and Remarks:	Apply to actively growing plants from the rosette to the bloom stage. Larger rosettes may require the higher rate for effective control.
Tordon *picloram*	**Rate:**	1-2 pt product/A
	Timing and Remarks:	Apply to plants from the rosette to the bolting stage. Tank mix low rate of Tordon with 2,4-D (1 qt product/A).

Brackenfern, Western *(Pteridium aquilinum)*

Tordon *picloram*	**Rate:**	2 qt product/A (spot treatment only)
	Timing and Remarks:	Apply in the spring when fronds are actively growing
Roundup, several other trade names *glyphosate*	**Rate:**	1.0-1.5% v/v using hand held spray equipment
	Timing and Remarks:	Apply when fronds are at least 18 inches long. Good foliar coverage is essential for effective control.
Clarity, Banvel *dicamba*	**Rate:**	1-2 gal product/A
	Timing and Remarks:	Apply in late winter before frond emergence.

Burdock, common *(Arctium minus)*

2,4-D (many trade names, formula- ester or amine forms) *2,4-D*	**Rate:**	2 qt product/A of the 4EC formulation or 2.7 pt/A of the 6 EC tion
	Timing and Remarks:	Apply from the rosette through bolting stages but before flower bud development.
Banvel or Clarity *dicamba*	**Rate:**	0.5-1.0 pt product/A for rosettes less than 3 inches 1-2 pt product/A for larger rosettes 2-3 pt product/A for bolting plants
	Timing and Remarks:	Apply to actively growing plants from rosette through bolting stages.
Milestone *aminopyralid*	**Rate:**	4-6 oz product/A
	Timing and Remarks:	Apply from the late rosette to the late bolting stage.

Herbicide	Application and Remarks	
Remedy *triclopyr*	**Rate:**	1-1.5 qt product/A
	Timing and Remarks:	Apply in late spring or early summer when leaves are fully developed.
Redeem R&P *clopyralid + triclopyr*	**Rate:**	1-2 qt product/A
	Timing and Remarks:	Apply to actively growing plants.

Bursage, skeletonleaf *(Franseria discolor)*

2,4-D (many trade names, amine or ester forms) *2,4-D*	**Rate:**	1.5-2.0 qt product/A of the 4EC formulation or 2.0-2.7 pt/A of the 6 EC formulation.
	Timing and Remarks:	Treat after shallow cultivation, when regrowth is 4-6 inches. Without cultivation, treat in spring and again to regrowth in fall. This is a native plant that becomes weedy in turf and some cropping situations. The name has been changed from *Ambrosia tormentosa* to *Franseria discolor*.
Tordon *picloram*	**Rate:**	2 qt product/A
	Timing and Remarks:	Apply to actively growing plants.

Cactus, pricklypear *(Opuntia polyacantha)*

Tordon *picloram*	**Rate:**	0.5-1.0 pt product/A
	Timing and Remarks:	Apply at the bloom stage for optimal control. Dense prickly pear may be an indication of range overuse. Treated plants die very slowly. Two to three years may be required for complete kill.
Grazon P&D *picloram + 2,4-D*	**Rate:**	1-2 qt product/A
	Timing and Remarks:	Apply at the bloom stage for optimal control.

Cattail, common *(Typha latifolia* and closely related species.)

Habitat *imazapyr*	**Rate:**	2-4 pt product/A or a 1% v/v solution spot treatment
	Timing and Remarks:	Apply to actively growing, green cattail foliage after full leaf elongation. This product is toxic to vascular plants and should be used strictly in accordance to the label. Consult the label for application restrictions in and around water.
Rodeo *glyphosate*	**Rate:**	4.5-6.0 pt product/A or a 0.75% v/v solution for spot treatment.
	Timing and Remarks:	Apply to actively growing cattails when they are at or beyond the early to full bloom growth stage. Allow 7 days or more before mowing or tillage of treated areas.

Herbicide	Application and Remarks
Crazyweed, silky and lambert crazyweed *(Oxytropis sericea* and *O. lambertii)*	
Transline *clopyralid*	**Rate:** 6 oz product/A **Timing and Remarks:** Apply from the rosette to the bloom stage. To prevent livestock poisoning, avoid grazing until the plants are completely dead.
Curtail *clopyralid + 2,4-D*	**Rate:** 1.5 qt product/A **Timing and Remarks:** Apply from the rosette to the bloom stage. To prevent livestock poisoning, avoid grazing until the plants are completely dead.
Clarity + 2,4-D *dicamba + 2,4-D*	**Rate:** 1 pt product/A + 1 qt product/A **Timing and Remarks:** Apply from the rosette to the early bloom stage. To prevent livestock poisoning, avoid grazing until the plants are completely dead.
Escort *metsulfuron*	**Rate:** 0.5 oz product/A **Timing and Remarks:** Apply from the rosette to the bloom stage. To prevent livestock poisoning, avoid grazing until the plants are completely dead.
Tordon *picloram*	**Rate:** 1 pt product/A **Timing and Remarks:** Apply from early bud to early bloom stage.
Grazon P&D *picloram + 2,4-D*	**Rate:** 3-4 pt product/A **Timing and Remarks:** Apply from the rosette to the bloom stage. To prevent livestock poisoning, avoid grazing until the plants are completely dead.
Redeem R&P *clopyralid + triclopyr*	**Rate:** 1-2 qt product/A **Timing and Remarks:** Apply to actively growing weeds. To prevent livestock poisoning, avoid grazing until the plants are completely dead.
Dalmatian toadflax *(Linaria dalmatica)*	
Plateau *imazapic*	**Rate:** 12 oz product/A **Timing and Remarks:** Apply in late fall to green basal regrowth. Earlier applications may provide poor or inconsistent control. Apply with 1 qt MSO/A.
Tordon *picloram*	**Rate:** 1-2 qt product/A

Herbicide	Application and Remarks	
	Timing and Remarks:	Apply to actively growing toadflax through full bloom or to fall regrowth. Fall applications with lower rates are especially effective when they are made shortly after the first killing frost.
Dock, curly *(Rumex crispus)*		
Telar *chlorsulfuron*	**Rate:**	1 oz product/A
	Timing and Remarks:	Apply when dock is actively growing. Apply with a nonionic surfactant at 0.25%v/v.
Escort *metsulfuron*	**Rate:**	0.5-1.0 oz product/A
	Timing and Remarks:	Apply to actively growing dock. Apply with a nonionic surfactant at 0.25%v/v.
Roundup or Rodeo *glyphosate*	**Rate:**	3-5 qt product/A
	Timing and Remarks:	Apply to the early bud stage. Use Rodeo if dock is growing along waterways.
Milestone *aminopyralid*	**Rate:**	4-6 oz product/A
	Timing and Remarks:	Apply from the late rosette to late bolting stages.
Curtail *clopyralid + 2,4-D*	**Rate:**	2-4 qt product/A
	Timing and Remarks:	Apply before flowering.
Tordon *picloram*	**Rate:**	1-2 pt product/A
	Timing and Remarks:	Apply to actively growing dock.
Butyrac 200 *2,4-DB amine or ester*	**Rate:**	1-3 qt product/A
	Timing and Remarks:	Apply to dock rosettes before bolting. Retreatment will likely be necessary.
Dodder, field *(Cuscuta campestris)*		
Prowl *pendimethalin*	**Rate:**	2.4-4.8 qt product/A
	Timing and Remarks:	Apply to dormant, established **alfalfa grown for seed** in late winter or early spring before dodder emergence. This product is labeled for seed production alfalfa only. See supplemental label for additional restrictions.
Kerb *pronamide*	**Rate:**	2-4 lb product/A
	Timing and Remarks:	Apply in the spring before dodder germination. **This product is for alfalfa grown for seed in Utah only.** It requires incorporation with rainfall or irrigation before dodder germination. See supplemental label for incorporation timing.

Herbicide	Application and Remarks	
Treflan *trifluralin*	**Rate:**	Liquid formulations: 1.5-2 pt product/A Granular formulations: 20 lb product/A
	Timing and Remarks:	Apply liquid or granular formulations **only to established, dormant alfalfa grown for seed.** Incorporation is required for this treatment to be effective. Do not apply to seedling alfalfa. Treflan TR-10 may be applied to established seed alfalfa in Utah only. See supplemental label for additional restrictions.
Dacthal *DCPA*	**Rate:**	13.3 lb product/A
	Timing and Remarks:	Apply in the early spring before dodder germination. **Labeled only for alfalfa grown for seed.** Good soil coverage is essential for dodder control.
Downy brome also called cheatgrass *(Bromus tectorum)*		
Aatrex *atrazine*	**Rate:**	1-2 pt product/A of the 4L formulation 0.63-1.25 lb product/A of the 80WP formulation 0.55-1.1 lb product/A of the 90 DG formulation
	Timing and Remarks:	Apply in October or November after perennial grasses are dormant but before cheatgrass has emerged. Moisture is required to activate the atrazine, which is effective as a preemergent treatment. Do not apply to perennial grasses that are not dormant.
Gramoxone Extra *paraquat*	**Rate:**	26 oz product/A
	Timing and Remarks:	Apply when downy brome has initiated seedhead formation but before seed set. This treatment timing allows for control of both fall and spring germinating downy brome in rangelands. Apply with a nonionic surfactant at 0.25% v/v. Do not apply unless some perennial grass injury can be tolerated.
Plateau *imazapic*	**Rate:**	2-12 oz product/A
	Timing and Remarks:	Apply in fall before cheatgrass germinates. Apply with one 1 quart/A MSO if any cheatgrass has emerged. Perennial grass tolerance varies considerably. See the label for specific grass and forb tolerances.
Journey *glyphosate + imazapic*	**Rate:**	10.7-32 oz product/A
	Timing and Remarks:	Apply preemergence or early postemergence in the fall.
Roundup *glyphosate*	**Rate:**	12-16 oz product/A
	Timing and Remarks:	Apply when downy brome has initiated seedhead formation but before seed set. This treatment timing allows for control of both fall and s pring germinating downy brome in range

Herbicide	Application and Remarks
	lands. Glyphosate is a nonslelective, systemic herbicide that may injure perennial grasses and forbs at these rates. Rates above 20 oz/A may severly damage perennial grasses. Do not apply unless some perennial grass injury can be tolerated.
Dyer's woad *(Isatis tinctoria)*	
2,4-D amine or ester	**Rate:** 1.5-2.0 qt product/A of the 4EC or 2.0-2.7 pt product/A of the 6 EC
	Timing and Remarks: Apply to seedlings and rosettes in the fall.
Escort or Ally *metsulfuron*	**Rate:** 0.75 oz product/A
	Timing and Remarks: Apply to actively growing plants with a nonionic surfactant at 0.25%v/v.
Plateau *imazapic*	**Rate:** 8-12 oz product/A
	Timing and Remarks: Apply to rosettes or after bolting. Always add a surfactant.
Telar *chlorsulfuron*	**Rate:** 1 oz product/A
	Timing and Remarks: Apply pre- or early postemergence with a nonionic surfactant at 0.25%v/v.
Curlycup gumweed *(Grindelia squarrosa)*	
Escort *metsulfuron*	**Rate:** 1 oz product/A
	Timing and Remarks: Apply in the early spring when new growth and seedlings have emerged.
2,4-D ester *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pint product/A of the 6EC
	Timing and Remarks: Apply in the early spring when new growth and seedlings have emerged. Reduced control is likely if plants have reached the bloom stage.
Tordon *picloram*	**Rate:** 1 pt product/A
	Timing and Remarks: Apply in the early spring when new growth and seedlings have emerged.
Grazon P&D *tordon + 2,4-D*	**Rate:** 1-2 qt product/A
	Timing and Remarks: Apply in the early spring when new growth and seedlings have emerged.

Herbicide	Application and Remarks
Halogeton *(Halogeton glomeratus)*	
Escort *metsulfuron*	**Rate:** 0.5-1.0 oz product/A **Timing and Remarks:** Apply in the spring or early summer when seedlings have emerged.
2,4-D ester *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply to actively growing plants up to the early bud stage. Apply with a crop oil concentrate for consistent control. Do not graze until plants are dried following treatment.
Plateau *imazapic*	**Rate:** 4-12 oz product/A **Tming and Remarks:** Apply preemergence to halogeton. Use 6 or more oz for postemergence application. Always add a surfactant.
Hoary cress (whitetop) *(Cardaria draba* and other closely related *Cardari*a species)	
2,4-D amine or ester *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply in the spring to actively growing plants before the bud stage.
Plateau *imazapic*	**Rate:** 8-12 oz product/A **Timing and Remarks:** Apply after full bloom and until plants become necrotic. Always add a 1 qt MSO/A.
Telar *chlorsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply from the bud to early bloom stages.
Escort *metsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply from the bud to early bloom stages.
Horsebrush, grey *(Tetradymia canescens)*	
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply in the spring when plants are actively growing. This is a spot treatment only that will require retreatment to control resprouting. This is a poisonous native shrub that is toxic to sheep. Do not graze treated areas until plants have completely dried or for at least 2 weeks following treatment.

Herbicide	Application and Remarks
Horsetail, field *(Equisetum arvense)*	
Telar *chlorsulfuron*	**Rate:** 1.5 oz product/A **Timing and Remarks:** Apply in the early spring with a nonionic surfactant at .25%v/v.
MCPA ester *MCPA*	**Rate:** 1 qt product/A of the 4EC **Timing and Remarks:** Apply after emergence but before spore heads are formed. Use the isooctyl ester formulation for best results.
Houndstongue *(Cynoglossum officinale)*	
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply to actively growing rosettes before the bloom stage. Early treatments prevent seed production of this toxic biennial. Do not graze for 2 weeks following treatment.
Escort *metsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply to actively growing plants from the rosette to bolting stages.
Plateau *imazapic*	**Rate:** 8-12 oz product-A **Timing and Remarks:** Apply to actively growing plants from the rosette to bolting stages. Apply with 1 qt MSO/A. Consult the label for perennial grass tolerance to Plateau.
Iris, Rocky Mountain *(Iris missouriensis)*	
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:** 2 qt product of the 4EC or 2.7 pt product of the 6EC per 100 gal water **Timing and Remarks:** Apply during the early bloom stage. High application volume treatment. Thorough coverage is needed. This is a native plant that may become weedy in heavily grazed meadows.
Knapweed, diffuse and spotted *(Centaurea diffusa* and *Centaurea maculosa)*	
Tordon *picloram*	**Rate:** 1-1.5 pt product/A **Timing and Remarks:** Apply during active growth with optimum time from rosette to mid bolting stage or fall regrowth.
Grazon P&D *picloram + 2,4-D*	**Rate:** 2-3 qt product/A **Timing and Remarks:** Apply during active growth with optimum time from the rosette to mid bolting stage.

Herbicide	Application and Remarks
Overdrive *dicamba + diflufenzopyr*	**Rate:** 6-8 oz product/A **Timing and Remarks:** Apply to rosettes. Larger rosettes will be slow to die.
2,4-D ester or amine *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply when plants begin to bolt. This treatment will only control emerged plants.
Weedmaster *dicamba + 2,4-D*	**Rate:** 4-6 pt product/A **Timing and Remarks:** Apply to actively growing rosettes before the bolting stage.
Transline *clopyralid*	**Rate:** 0.33-1.33 pt product/A **Timing and Remarks:** Apply from rosette to mid bolting stage.
Curtail *clopyralid + 2,4-D*	**Rate:** 2-3 qt product/A **Timing and Remarks:** Apply from rosette to late bolt stage.
Redeem R&P *clopyralid + triclopyr*	**Rate:** 1-2 qt product/A **Timing and Remarks:** Apply in the late rosette stage before bolting.
Knapweed, Russian *(Acroptilon repens)*	
Plateau *imazapic*	**Rate:** 12 oz product/A **Timing and Remarks:** Apply after plants become completely brown in fall or early winter.
Milestone *aminopyralid*	**Rate:** 4-6 oz product/A **Timing and Remarks:** Apply during bud to flowering stage or to dormant plants in the fall.
Roundup *glyphosate*	**Rate:** 1 gal product/A **Timing and Remarks:** Apply to actively growing knapweed when most plants are at the late bud to early flower stage. Retreatment will likely be necessary the following year.
Tordon *picloram*	**Rate:** 1-4 pt product /A **Timing and Remarks:** Apply when plants are in the early flowering stage to fall.
Transline *clopyralid*	**Rate:** 0.66-1.33 pt product/A **Timing and Remarks:** Apply when plants are in the early flowering stage to fall.

Herbicide	Application and Remarks	
Curtail *clopyralid + 2,4-D*	**Rate:**	2-4 pt product/A
	Timing and Remarks:	Apply from full bloom up to killing frost in the fall.
Redeem R&P *clopyralid + triclopyr*	**Rate:**	3-4 pt product/A
	Timing and Remarks:	Apply when plants are in the early flowering stage to fall.
Telar *chlorsulfuron*	**Rate:**	1.5 oz product/A
	Timing and Remarks:	Apply prebloom to bloom or to new fall regrowth.
Larkspur, Tall *(Delphinium barbeyi (L.) Huth)* **Larkspur, Duncecap** *(Delphinium occidentale S. Wats.)*		
Escort *metsulfuron*	**Rate:**	1.5 oz product/A
	Timing and Remarks:	Apply in the spring when larkspur plants are in the rosette stage.
Larkspur, geyer *(Delphinium geyeri)*		
Tordon *picloram*	**Rate:**	2-3 qt product/A
	Timing and Remarks:	Apply from late bolting to the early flower stage.
Leafy spurge *(Euphorbia esula)*		
Clarity or Banvel *dicamba*	**Rate:**	2 qt product/A
	Timing and Remarks:	Apply from bud to early flowering.
Tordon *picloram*	**Rate:**	1-3 qt product/A
	Timing and Remarks:	Apply at any time during the growing season up to and following first frost. Optimum times are true flower or fall.
2,4-D ester *2,4-D*	**Rate:**	1 qt product/A of the 4EC formulation or 1.4 pt product of the 6 EC forrmulation to prevent seed formation. 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC for control.
	Timing and Remarks:	Low rates are for seed suppression only. Higher rates require repeated applications in the spring and fall to be effective.
Plateau *imazapic*	**Rate:**	8-12 oz product/A
	Timing and Remarks:	Apply in the late fall before leafy spurge loses its milky sap after a killing frost.

Herbicide	Application and Remarks
Licorice, wild *(Glycyrrhiza lepidota)*	
Tordon *picloram*	**Rate:** 1 qt product/A **Timing and Remarks:** Apply in late summer or fall following seed set when leaves are still green.
Clarity or Banvel *dicamba*	**Rate:** 2 qt product/A **Timing and Remarks:** Apply when plants are flowering.
Redeem R&P *clopyralid + triclopyr*	**Rate:** 1-2 qt product/A **Timing and Remarks:** Apply when licorice is actively growing in the spring and early summer.
Lupine *(Lupinus* spp.)	
2,4-D ester *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply to actively growing plants at the early bud stage. Do not graze until plants are dead following treatment.
Milkweed, showy *(Asclepias speciosa)*	
Tordon *picloram*	**Rate:** 2 qt product/A **Timing and Remarks:** Apply at the bud to early bloom stages
Clarity or Banvel *dicamba*	**Rate:** 2 qt product/A **Timing and Remarks:** Apply to actively growing plants until full bloom.
Oxeye daisy *(Chrysanthemum leucanthemum)*	
Milestone *aminopyralid*	**Rate:** 4-6 oz product/A **Timing and Remarks:** Apply to actively growing plants in the prebud stage.
Transline *clopyralid*	**Rate:** 1.33 pt product/A **Timing and Remarks:** Apply to actively growing plants.
Tordon *picloram*	**Rate:** 1.5-2 pt product/A **Timing and Remarks:** Apply when all plants have emerged to late flowering.
Perennial pepperweed *(Lepidium latifolium)*	
Escort *metsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply when plants are actively growing but before full bloom.

Herbicide	Application and Remarks	
Plateau *imazapic*	**Rate:**	8-12 oz product/A
	Timing and Remarks:	Apply after full bloom and until plants become necrotic. Always add 1 qt MSO/A.
Telar *chlorsulfuron*	**Rate:**	1 oz product/A
	Timing and Remarks:	Apply during the bud to early bloom stages.
Poison ivy or oak *(Toxicodendron radicans* or *T. diversilobum)*		
Roundup *glyphosate*	**Rate:**	4-5 qt product/A or a 2% v/v solution for handheld sprayers
	Timing and Remarks:	Apply when plants are actively growing at or beyond the bloom stage. Best results are achieved when treatments are applied following fruit set. Late summer or fall treatments should be made before leaves lose their green color.
Garlon 4 or Remedy *triclopyr ester*	**Rate:**	3 qt product/100 gal water for spot treatment 1-2 gal product/A for broadcast treatment
	Timing and Remarks:	Apply when plants are actively growing.
Garlon 3A *triclopyr amine*	**Rate:**	3 qt product/100 gal water for spot treatment 1-3 gal product/A for broadcast treatment
	Timing and Remarks:	Apply when plants are actively growing.
Poverty sumpweed *(Iva axillaris)*		
Clarity or Banvel *dicamba*	**Rate:**	1-2 qt product/A
	Timing and Remarks:	Apply when plants are actively growing.
Tordon *picloram*	**Rate:**	1 qt product/A
	Timing and Remarks:	Apply any time during the growing season when there will be sufficient moisture to move the herbicide into the soil.
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:**	1-1.5 gal product/A of the 4 EC or 5.3-8 pt product/A of the 6EC
	Timing and Remarks:	Apply when plants are actively growing at the bud stage.
Puncturevine *(Tribulus terrestris)*		
2,4-D amine or ester *2,4-D*	**Rate:**	2 qt product/A
	Timing and Remarks:	Apply when puncturevine has emerged but before the bloom stage.

Herbicide	Application and Remarks	
Plateau *imazapic*	**Rate:**	8-12 oz product/A
	Timing and Remarks:	Apply after cracking. Always add a surfactant.
Telar *chlorsulfuron*	**Rate:**	1.5 oz product/A
	Timing and Remarks:	Apply after puncturevine has emerged in late spring or early summer.
Quackgrass *(Elytrigia repens)*		
Accent *nicosulfuron*	**Rate:**	0.67 oz product/A
	Timing and Remarks:	Apply when quackgrass is 4-10 inches tall and corn is up to 20 inches tall (free standing) or that has 6 or fewer collars (V6). Applications of ACCENT must include either a crop oil concentrate or a nonionic surfactant. The addition of ammonium nitrogen fertilizer is recommended. Treatment may be made in corn only.
Roundup *glyphosate*	**Rate:**	1-2 qt product/A for new infestations, 2-3 qt product/A when quackgrass has formed a dense sod.
	Timing and Remarks:	Apply to early flowering stage or to new growth in the fall.
Fusilade *fluazifop*	**Rate:**	2-3 pt product/A
	Timing and Remarks:	Apply to actively growing quackgrass 6-10 inches tall. Apply with 1% v/v COC or 0.25% v/v NIS. Repeat applications will be necessary for good control. Do not apply to stressed quackgrass as treatment effectiveness will be reduced.
Ragweed, common *(Ambrosia artemisiifolia)*		
2,4-D ester *2,4-D*	**Rate:**	2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC
	Timing and Remarks:	Apply after ragweed has emerged but before flowering.
Milestone *aminopyralid*	**Rate:**	3-5 oz product/A
	Timing and Remarks:	Apply to young actively growing plants.
Redeem R&P *clopyralid + triclopyr*	**Rate:**	1-1.5 qt product/A
	Timing and Remarks:	Apply when ragweed is actively growing before flowering.
Reed canarygrass *(Phalaris arundinaceae)*		
Habitat *imazapyr*	**Rate:**	3-4 pt product/A
	Timing and Remarks:	Apply after plants reach the boot stage through early fall until winter dormancy.

Herbicide	Application and Remarks	
Rodeo *glyphosate*	**Rate:**	1.5-2.25 qt product/A
	Timing and Remarks:	Apply in fall up to first light frost.
Oust *sulfometuron*	**Rate:**	1.33 – 2.0 oz product/A
	Timing and Remarks:	Apply preemergence to early postemergence (up to 6 to 12 inches tall) during the rainy season when weeds are actively germinating or growing. To improve the control of weeds, add surfactant at 0.25% by volume. Recommended for use on noncrop areas only.
Russian olive *(Eleagnus angustifolia)*		
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:**	2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC
	Timing and Remarks:	Apply when leaves are fully developed. 2-3 annual retreatments may be necessary for complete control.
Habitat or Arsenal *imazapyr*	**Rate:**	2-4 pt product/A or a 1% v/v solution for spot foliar treatments.
	Timing and Remarks:	
Garlon 4 or Remedy *triclopyr ester*	**Rate:**	2-4 qt product/100 gal water for spot treatment 1-2 quarts product/A for broadcast treatment 25% v/v with basal oil as a carrier for basal bark application or cut-stump applications
	Timing and Remarks:	Apply in the summer after full leaf-out for foliar applications. Basal bark or cut-stump can be applied year round. Stump applications should be made as soon after cutting as possible.
Garlon 3A *triclopyr amine*	**Rate:**	50% v/v with water
	Timing and Remarks:	Apply to cut stumps right after cutting. Method can be used year round.
Sagebrush, big *(Artemesia tridentata)*		
2,4-D LVE *2,4-D*	**Rate:**	2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC
	Timing and Remarks:	Apply to actively growing plants in late spring. Timing is critical for effective control.
Spike *tebuthiuron*	**Rate:**	1.0-2.5 lb product/A
	Timing and Remarks:	May be applied any time, except winter when soil is frozen. Use lower rates on sandy or high pH soils with low organic matter. Apply higher rates for complete control or for thinning on high organic matter soils above 8,000 feet elevation. Treatments only become effective after sufficient rainfall has occurred to move the chemical into the root zone

Herbicide	Application and Remarks
	where it is absorbed by the roots. Plants will go through repeated several cycles of greenup and defoliation before death. A single treatment is normally effective for several years.

Sagebrush, fringed *(Artemesia frigida)*

Tordon *picloram*	**Rate:**	1 pt product/A
	Timing and Remarks:	Apply to actively growing plants up to the flowering stage. Add 1 pt/A of 2,4-D ester.
Grazon P&D *picloram + 2,4-D*	**Rate:**	2 qt product/A
	Timing and Remarks:	Apply to actively growing plants up to the flowering stage.

Saltcedar *(Tamarix spp.)*

Garlon 4 or Remedy *triclopyr*	**Rate:**	25-30% v/v with a basal oil as a low volume basal bark treatment
	Timing and Remarks:	Can be applied year round. Do not spray when brk is frozen.
Garlon 3A *triclopyramine*	**Rate:**	50% v/v with water
	Timing and Remarks:	Apply to cut stumps immediately after cutting. Any time during the year.
Habitat or Arsenal *imazapyr*	**Rate:**	2 qt product/A + 0.25% v/v NIS 1% v/v as a foliar spot treatment
	Timing and Remarks:	Apply when Saltcedar is in full bloom. Use Habitat when making applications around water.

Scouringrush, smooth *(Equisetum laevigatum)*

Telar *chlorsulfuron*	**Rate:**	1.5 oz product/A
	Timing and Remarks:	Apply in the early spring with a nonionic surfactant at 0.25%v/v.
MCPA ester *MCPA*	**Rate:**	1 qt product/A of the 4EC
	Timing and Remarks:	Apply after emergence but before spore heads are formed. Use the isooctyl ester formulation for best results.

Snakeweed, broom *(Gutierrezia sarothrae)*

Tordon *picloram*	**Rate:**	1 pt product/A
	Timing and Remarks:	Apply after leaves are fully expanded until early bloom.
Grazon P&D *picloram + 2,4-D*	**Rate:**	2 qt product/A
	Timing and Remarks:	Apply after leaves are fully expanded until early bloom.

Herbicide	Application and Remarks
Escort *metsulfuron*	**Rate:** 0.5 oz product/A **Timing and Remarks:** Apply when snakeweed is young (3-4 inches tall) and actively growing.
Sowthistle, perennial *(Sonchus arvensis)*	
2,4-D ester *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply to actively growing plants at the bud stage or to regrowth 8-10 inches tall.
Tordon *picloram*	**Rate:** 1-1.5 pt product/A **Timing and Remarks:** Apply after a majority of rosettes have emerged prior to bud stage.
Curtail *clopyralid + 2,4-D*	**Rate:** 2-4 pt product/A **Timing and Remarks:** Apply after a majority of rosettes have emerged but prior to bud stage.
Milestone *aminopyralid*	**Rate:** 3-5 oz product/A **Timing and Remarks:** Apply to actively growing plants from the late rosette to bud stage.
Transline *clopyralid*	**Rate:** 0.25-1.33 pt product/A **Timing and Remarks:** Apply after a majority of rosettes have emerged but prior to bud stage.
St. Johnswort, common *(Hypericum perforatum)*	
Escort *metsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply to actively growing plants.
Tordon *picloram*	**Rate:** 1-2 qt product/A for spot treatments 1-2 pt product/A + 1 qt 2,4-D (4EC)/A for broadcast treatment **Timing and Remarks:** Apply to actively growing plants before bloom.
Sulfur cinquefoil *(Potentilla recta)*	
Milestone *aminophyralid*	**Rate:** 4-6 oz product/A **Timing and Remarks:** Apply to actively growing plants during the prebud stage.
Tordon *picloram*	**Rate:** 1 pt product/A **Timing and Remarks:** Apply when plants are actively growing in the spring or fall.

Herbicide	Application and Remarks
Swainsonpea *(Sphaerophysa salsula)*	
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:** 2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC **Timing and Remarks:** Apply when plants are in early bloom.
Tamarix (see Saltcedar)	
Tansy, common *(Tanacetum vulgare)*	
Clarity + Tordon *dicamba + picloram*	**Rate:** 1-2 qt Clarity/A + 1 qt Tordon/A **Timing and Remarks:** Apply to actively growing plants in the bud to bloom stage.
Telar *chlorsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply to actively growing plants before bloom.
Escort *metsulfuron*	**Rate:** 1 oz product/A **Timing and Remarks:** Apply to actively growing plants before bloom.
Thistle, Canada *(Cirsium arvense)*	
Transline *clopyralid*	**Rate:** 0.66-1.33 pt product/A **Timing and Remarks:** Apply to actively growing plants after rosette emergence but before the early bloom stage.
Curtail *clopyralid + 2,4-D*	**Rate:** 4-6 pt product/A **Timing and Remarks:** Apply to actively growing plants after rosette emergence but before the early bloom stage.
Milestone *aminopyralid*	**Rate:** 5-7 oz product/A **Timin g and Remarks:** Apply to plants prebud in the early summer or to fall rosette regrowth
Telar *chlorsulfuron*	**Rate:** 1.0-1.5 oz product/A **Timing and Remarks:** Apply to actively growing thistle in the bud to bloom stage.
Clarity *dicamba*	**Rate:** 0.5-1.0 qt product/A **Timing and Remarks:** Apply from the late rosette stage to the early bud stage.
Tordon *picloram*	**Rate:** 1-2 qt product/A **Timing and Remarks:** Apply from the late rosette stage to the early bud stage.

Herbicide	Application and Remarks	
Roundup or Rodeo *glyphosate*	**Rate:**	2-3 qt product/A for broadcast treatment 2% v/v for hand held equipment
	Timing and Remarks:	Apply to actively growing thistles that have reached the bud stage to bloom stages.
Thistle, musk and Scotch *(Carduus nutans* and *Onopordum acanthium)*		
Transline *clopyralid*	**Rate:**	0.66 pt product/A
	Timing and Remarks:	Apply from the late rosette to the early bolting stage.
Overdrive *dicamba + diflufenzopyr*	**Rate:**	4-8 oz product/A
	Timing and Remarks:	4 oz for musk thistle rosettes, 6-8 oz after bolting. 6 oz for scotch thistle rosettes or 8 oz after bolting.
Curtail *clopyralid + 2,4-D*	**Rate:**	1-2 qt product/A
	Timing and Remarks:	Apply from the late rosette to the early bolting stage.
Milestone *aminopyralid*	**Rate:**	3-5 oz product/A
	Timing and Records:	For musk thistle, apply lower rate to rosettes and early bolting plants and higher rate to late bolting and early flowering plants.
Escort *metsulfuron*	**Rate:**	0.5-1.0 oz product/A
	Timing and Remarks:	Apply to actively growing rosettes.
Tordon *picloram*	**Rate:**	10-16 fl oz product/A
	Timing and Remarks:	Apply to actively growing rosettes - fall is optimum timing. Add 1 pt/A or 2,4-D hen thistles are bolting in the spring.
Telar *chlorsulfuron*	**Rate:**	0.5-1.0 oz product/A for musk thistle 1-3 oz product/A for Scotch thistle
	Timing and Remarks:	Apply to actively growing rosettes.
Western Waterhemlock *(Cicuta maculata)*		
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:**	1-2 qt product/A of the 4EC or 1.3-2.7 pt product/A of the 6EC
	Timing and Remarks:	Apply at the flower bud stage.
Willows *(Salix spp.)*		
2,4-D LVE (low volatile ester) *2,4-D*	**Rate:**	2 qt product/A of the 4EC or 2.7 pt product/A of the 6EC
	Timing and Remarks:	Apply when leaves are fully developed and trees are actively growing. Most willows are native plants that can be weedy in some situations.

Herbicide	Application and Remarks	
Rodeo *glyphosate*	**Rate:**	4.5 pt product/A broadcast or 0.75% v/v for hand-held equipment
	Timing and Remarks:	Apply when willows are actively growing during the summer.
Garlon 4 *triclopyr ester*	**Rate:**	4-8 qt product/A
	Timing and Remarks:	Apply when willows are actively growing.
Habitat *imazapyr*	**Rate:**	2-3 pt product/A
	Timing and Remarks:	Apply to actively growing willows. Good coverage is important.