

TIPS for Fighting Weeds on Small Acreages in Montana

*For **individual landowner copies** please contact your local weed coordinator.*

see page 3 of booklet.

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Getting Started – Introduction

Weed Basics

How to Use This Handbook

Following the steps in this booklet will start you successfully on the road to weed control. This handbook was compiled to help landowners prevent and control weed problems. As such, it offers a solid background on weed management concepts and techniques. But it is not a comprehensive or exhaustive encyclopedia on the subject.

The main chapters explain the basic concepts and practices of good weed management. Appendices contain more detailed information, along with references to other resources and materials, including other publications, contact information for weed management agencies and organizations, and web sites. If you can't find the information you're looking for in this booklet, we'll at least direct you to other reliable resources, **including your local county weed coordinator**. Your weed coordinator can help you formulate a weed plan, identify weeds, make treatment recommendations, and help you find applicators, among other things.

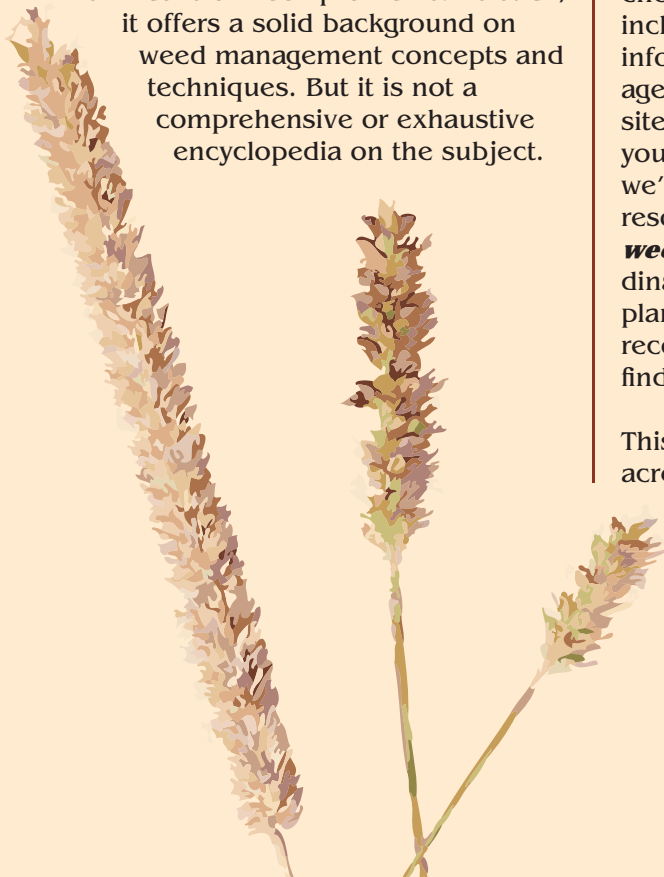
This booklet is intended for small-acreage landowners. Its main focus is the noxious weeds on the Montana state list such as spotted knapweed and leafy spurge. Although the same principles apply, our



CONTACTING YOUR LOCAL WEED COORDINATOR

Each county has a weed coordinator, usually a county employee or the county extension agent. Look in the phone book under Weed District or Extension Agent, or call the general phone listing for your county officials, and they will direct you. Contact information for county weed coordinators is also listed at www.mtweed.org

target is not nuisance weeds such as dandelions. This handbook is written for anyone unfamiliar with weed management, particularly landowners in a rural or semi-rural setting.



Managing your weeds will:

- enhance the value of your property,
- improve aesthetics,
- save money and time and reduce maintenance costs,
- improve wildlife habitat,
- improve forage for your horses and other animals,
- protect water resources,
- enable you to be a good neighbor, and
- protect the environment.



In many communities you will see signs that indicate others in your community are not only aware of weeds but actively managing them. You are not alone.

Why Worry About Weeds?

Weeds are highly competitive and thrive where soils are disturbed or natural vegetation is unhealthy.

One of the best ways to prevent weeds is by nurturing healthy plant communities. **A HEALTHY PLANT COMMUNITY WARDS OFF WEEDS.**



The number of animals you own and how you graze them will have a direct impact on the amount of weeds on your property.

If you have healthy, desirable plants, don't disturb them! Where do weeds first appear? Weeds move into areas where we have removed or weakened existing vegetation. Weeds invade disturbed sites such as new construction areas and corrals, or sunny, sheltered spots where animals graze and stand



Disturbed soil during construction is an invitation to weeds. Manage your weeds during construction to prevent weed infestations.

for long periods. Areas that are overgrazed, excessively mowed, or have heavy foot traffic all allow weed invasion because existing vegetation is no longer healthy. *This topic will be covered in greater detail in the vegetation section.*



Roadways: Common tansy found a home in the borrow pit along this road.

At first glance, weeds seem pretty harmless. It's not like you have a rampaging grizzly in your garden – they're just *plants*, right? In a word: No. Once weeds move in, they stay. And multiply. Soon your unwanted guest has taken your land and won't give it back without a fight.

Weeds crowd out more desirable plants in lawns, pastures, gardens, and croplands. They displace more nutritious plants that livestock and wildlife feed on. They can sicken pets, livestock, and people. Weeds can turn a healthy pasture or meadow into an unsightly mess, hampering usage, annoying the neighbors, and reducing the value of your land. A weed infestation can choke out healthy plant communities, leading to erosion and depleted soils.

A weed is any plant growing where it is not wanted.

Some weeds are worse than others. Plants that grow or multiply rapidly can overrun more desirable plants. Some weeds are poisonous to wildlife and livestock. Others contain skin irritants (leafy spurge) or produce pollen and other allergens (knapweed). Weeds that are particularly harmful are listed as “noxious” under federal and state laws.

Many weeds are “invasive” – plants that spread quickly and take over an area in a single season or two. Many invaders are alien or exotic species introduced here from another region or country. For example, leafy spurge is a native of Eurasia, where natural enemies keep it in check. But since its Montana arrival in the 1920s, leafy spurge has doubled in acreage every 10 years and today infests more than 1.25 million acres. Left unchecked it will spread at a rate of almost 4% a year.

Noxious Weeds – Legal Definition

“Noxious weeds” or “weeds” means any exotic plant species established or that may be introduced in the state that may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities and that is designated **by the Montana Department of Agriculture or County Weed District.**

- Montana County Noxious Weed Control Act, 7-22-2101, Montana Code Annotated

How to Stop Weeds from Spreading

Weeds rely on a variety of strategies to infest new land. They disperse their seeds on the wind and water. They travel in the guts of birds and animals. They attach themselves to animals, people, and vehicles. Some sprout from cuttings, roots, and “dormant” seeds. Some are specially adapted to emerge after fire or soil disturbance.

These natural strategies give weeds an advantage when people change or disturb the land and native plant communities. Weeds see an open invitation to move in when a roadside is graded or burned, or when fill dirt is brought onsite. They can quickly colonize tilled fields, construction sites, irrigation ditches, and ground broken or compacted by livestock.

Some weeds get their start as ornamental plants in flower boxes, gardens, and landscaping. What looks pretty in a small bunch by the house can turn ugly when it overruns the adjacent back forty. Some weed seeds remain dormant in soils for long periods of time.

There’s little we can do to disarm weeds’ natural weapons. But we *can* reduce many human-caused opportunities for weeds to spread and take root.

Take Control of Weeds – Make a Plan

Fighting weeds involves four basic steps:

- 1 knowing what you want to do with your land (land use goals),
- 2 identifying your weeds,
- 3 choosing the right methods (tools) to fight weeds, and
- 4 monitoring your progress and adjusting your strategy over time.

As a landowner, you have two main goals when it comes to weeds: **prevention** and **control**. A successful approach will combine both of these goals in an Integrated Weed Management Plan (IWMP).



yellow toadflax
(noxious weed)

Prevention and Control

Following good land use practices is the key to **prevention** of weed infestation. Limit soil disturbances and promote the health of natural plant communities by monitoring livestock grazing, tilling and seeding properly, and fertilizing and watering desirable plants when necessary. Immediately revegetate disturbed areas with desirable plants. Use certified weed free seed when planting, and provide only weed free feed for horses and other animals. Avoid spreading weed seeds in manure. Check your clothing, vehicles, pets, and livestock to avoid carrying weeds and seeds into uninfested areas.

Where weeds are already established, you can **control** them to reduce their impact and keep them from spreading. Control measures include:

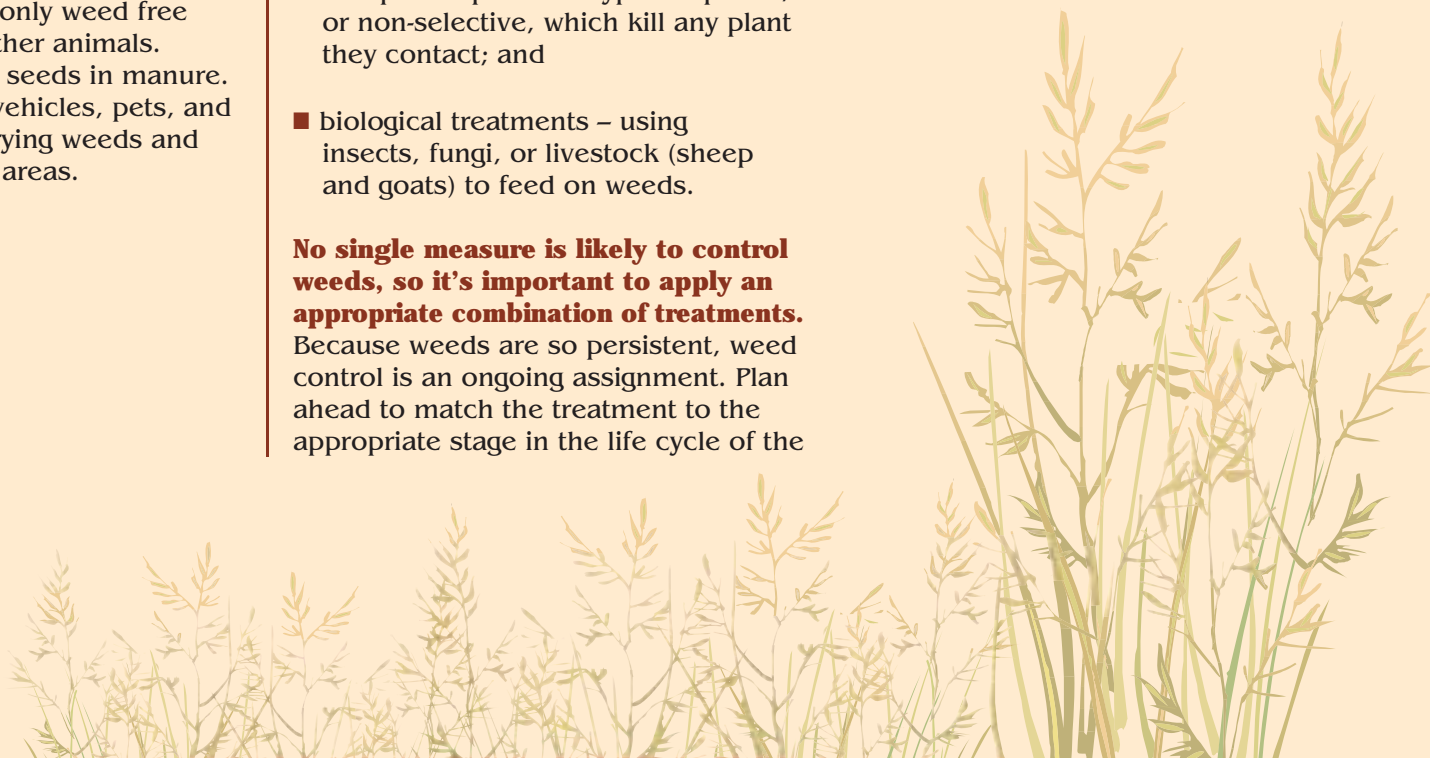
- mechanical treatments – hand-pulling, mowing;
- herbicides – selective chemicals for specific plants or types of plants, or non-selective, which kill any plant they contact; and
- biological treatments – using insects, fungi, or livestock (sheep and goats) to feed on weeds.

No single measure is likely to control weeds, so it's important to apply an appropriate combination of treatments.

Because weeds are so persistent, weed control is an ongoing assignment. Plan ahead to match the treatment to the appropriate stage in the life cycle of the

weeds. You'll also want to monitor the weeds and adjust your prevention and control measures to be as effective as possible.

Remember that it's easier and cheaper to kill weeds before they get established and when they're small, rather than when they're large, mature plants.



Four Golden Rules

Your very first step in controlling weeds is to take inventory of your property. This will tell you not only what weeds you have, but the other factors you will have to take into account. It will also determine the specific weed control methods that you will use later on. If you work with your local weed coordinators, they may talk about forming an IWMP. Weeds are extremely competitive. So if you try to control weeds without a game plan, there is a good chance you may not succeed. There are four basic principles or “golden rules” of weed control that will help you eliminate many possible mistakes.

Four Golden Rules of Weed Control

1 Know what you want to do with your property.

What were the dreams you had when you purchased the land? How do you intend to use the land in the future? You may want to graze horses, develop wildlife habitat, or simply improve the way your property looks. What you want to do with your land will be the driving force on how you will control your weeds.

Not knowing what you want to do with your land may not only prevent you from enjoying your property, but also may hinder your weed control effort.

Ask yourself if these goals are realistic. If you graze too many animals on too few acres, you will almost certainly have a weed problem. You may be set on growing certain plants, but the soil type and climate may not let you. *As you proceed you may need to change the way you do things or change what you want to do with your land.*

tansy ragwort
(noxious weed)



COOMBS

2 Promote healthy vegetation.

All plants need resources such as sunlight, moisture, soil, and nutrients. Weeds are highly competitive and there is a continual competition on your property between healthy plants and weeds. *Healthy, desirable plants use the available resources on your property and will keep them from being used by weeds.* Once you have the plants you want, do everything possible to maintain and protect them. If your desirable plants are not healthy or if you do not have many desirable plants, you need to ask yourself the question, “What is causing this condition?” The guidelines on how to promote healthy plants will be explained later in the vegetation section.

3 Implement good land use practices.

Weeds thrive on sites where soil and/or healthy plants have been disturbed. Poor land use practices such as overgrazing or excessive soil disturbance related to construction are invitations to weeds. Even if you have a relatively healthy situation, taking no action can lead to a greater weed problem in the future. By implementing good land use practices and limiting disturbances, desirable plants become healthier and noxious weeds are reduced.

4 No one weed control method works alone.

No one tool will help you build a house. You need a variety of tools. Used alone, no one weed control method, such as responsible herbicide use, mowing, or pulling, will solve your weed problems. It is the strategic combination of these control methods that leads to success.

With these “rules” in mind it is time to inventory your property. You will collect information that will determine how to manage your land and control your weeds.

Inventory/Weed Identification

Before you can start controlling your weeds, you have to know what's out there. Inventorying the health of your property is an easy and important first step.



Don't overlook the obvious. The heavily grazed bare ground to the right of the fence is more likely to sprout weeds than the healthy pasture on the left.

First, sketch a simple map of your property. Be sure to mark roads, streams and ponds, wellheads, livestock pastures, and your home. Then familiarize yourself with the weed identification information provided below.

Weed Identification - Know Your Enemy

Think of weed species as individuals. Each varies in the way it grows, where it grows, and how it spreads. Effective treatment methods vary, too. What works to control one weed may not work for another.

You can't treat what you haven't identified.



That's why the first step to effective weed management is identification.



spotted knapweed
(noxious weed)

Some weeds, such as spotted knapweed, are readily identifiable. The purple flowers have a distinctive shape and are easy to recognize. The stalks are also distinctive in the fall and winter when the plant is not flowering.

Other weeds are a bit tougher to identify and may be easily confused with native plants. For example, purple loosestrife, a noxious weed, looks much like Montana's fireweed, which is not a noxious weed.



purple loosestrife
(noxious weed)



fireweed
(native species)

As a general rule, most of the 27 listed noxious weeds have one or two distinguishing features that can aid in identification. For example, toadflax has a distinctive bell-shaped flower. When you hold St. Johnswort up to sunlight, the leaves appear to have holes. Snap a leafy spurge

stem in two, and it oozes a milky substance.

What follows are three steps to help demystify the process of identifying weeds and help you take the first step toward managing noxious weeds on your property.

Three Steps to Positive Weed Identification

STEP 1 Note the plant's distinguishing characteristics.

Weeds have several growth stages, but the easiest time to identify a weed is when it flowers. That's why guidebooks often organize weeds by color of bloom. Here are several characteristics to inspect in addition to flower color.

- **FLOWER:** Note the color, petal shape, and whether there are multiple blossoms on a single plant or just one.
- **LEAVES:** Where on the stem are they located? Note their shape and texture. Are the leaves thorny? Velvety? Shaped like arrows? Also note whether the leaves change in size or shape moving up the stem from the base.
- **STEM:** Inspect the stem itself. Does it have thorns? Is it fuzzy or smooth? Is it a single stem or a vine?



noxious weed guide



pencil
pad of paper



shovel



large plastic bags

STEP 2 Consult your guidebook.

Many guidebooks are available. Some are free through your county weed coordinator; some are available in bookstores for a modest price. Your guidebook should be specific to Montana and contain all 27 of Montana's noxious weeds. You may also want to check with your county coordinator about weed problems or special weed listings in your county. (Recommended guidebooks are listed in the appendix.)

Begin by turning to the color section in the guide that matches the flower color on your plant. Compare flowers with the photos until you find one that matches.

- **HEIGHT:** While the same species can vary in height based on where it's growing and its stage, it's helpful to note the size and overall shape of the plant.
- **SEEDS:** Note the seeds. Are they berries? Burrs? Rice-shaped pellets?
- **ROOTS:** Roots are generally divided into two categories, taproots and rhizomatous roots. Taproots extend straight down into the ground, like a carrot. Rhizomatous roots spread out in all directions and vary in size.

Then compare the other attributes you've noted to those listed in the guide.

If the picture and most of the distinguishing characteristics match, you've got your weed. You can skip step 3 and begin the process of treating your property.



You can't treat what you haven't identified.

STEP 3 Get identification assistance from the pros.

If you can't positively identify the weed, we suggest digging up three or four samples of the plant and taking them to your county weed coordinator. You should consider this a last resort. Digging up weeds can spread seeds.

Always bag noxious weeds on location and seal the bags tightly to avoid spreading seeds.



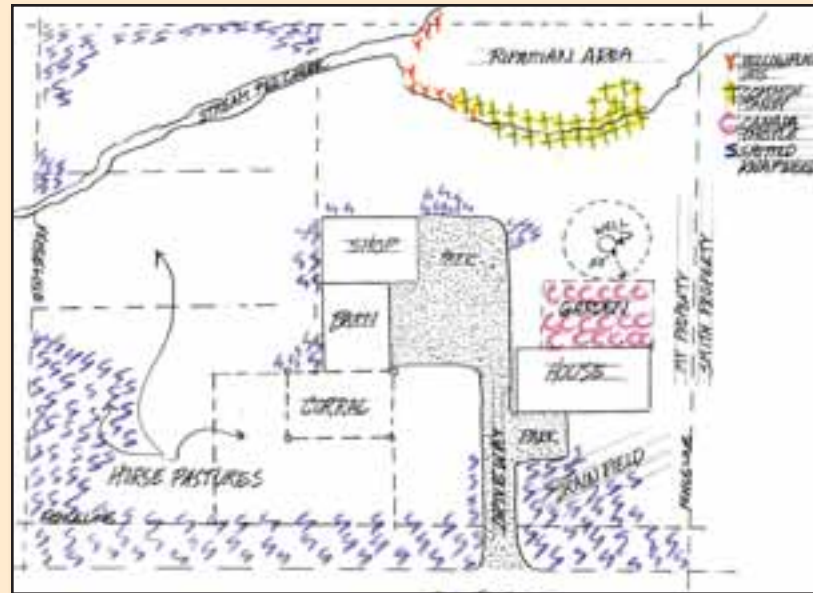
Also, be sure to dig up as much of the root as possible and get the weeds to your county coordinator within 24 hours.

In most cases, the coordinators will be able to identify the weed on the spot. If they can't, they'll send it to Montana State University for positive identification.

Congratulations... you have successfully completed the first steps toward controlling the weeds on your property and are ready to move on.

Weed Maps

As you identify weeds, you may want to create symbols for each one and mark them on a map of your property. You can then identify which areas of your property have more than one kind of weed problem. This will help later in determining the right steps for weed treatment and management. You should also mark down the numerical category of each weed. Categories are important for determining which weeds should be treated first. (Information on weed categories is available in Appendix C.)



Weed Identification Summary

- **Identification is key!** You can't effectively manage weeds you can't identify.
- **Step 1:** Make note of plant characteristics – flower color, leaf shape, stem profile, height, seed and root type.
- **Step 2:** Compare the characteristics of the plant to those listed in a Montana noxious weed guidebook. Resources are listed in the appendix.
- **Step 3:** If you have difficulties identifying weeds on your property, dig up several samples, seal them in a bag, and take them to your county weed coordinator within 24 hours.
- **Create a property map** that shows where weed species overlap, noting the numerical category for each weed for ease of treatment later on.



You can't do an inventory from your living room. Put your map and some notepaper on a clipboard and go walk your property. Take detailed notes (including the species of weeds you find) to refer to later, and add key features to your map. In particular, outline areas where weeds are growing, areas of bare or disturbed soil, and areas where desirable plants, such as grass and shrubs, are thriving.

What the inventory tells you.

Once the Inventory is complete, you will see that different parts of your property have different conditions and are in different states of health. Use this information to determine how to treat the weeds in each area.

Areas with disturbed ground from activities such as construction or roads are one of the first areas weeds will invade. **These areas need immediate and constant attention!!!!**

Bare ground may or may not indicate a problem. It can be a natural occurrence. Much of Montana is an arid or desert environment. If the bare ground is due to natural causes, it may not be prone to weeds. However, bare ground caused from human actions, such as overgrazing, construction, or fire, can lead to serious problems if left untreated.

If your property is covered with a lot of desirable plants, few weeds, and little bare soil, your land is *relatively* healthy. But it still needs your immediate attention to eradicate noxious weeds.

If you have few desirable plants, a lot of weeds, and some bare soil, your land is unhealthy. Restoring your land to health will take time, energy, and money, and you may need to plant new vegetation. But the results will be worth the work.



Bare ground, as seen here, can occur naturally on healthy land. Bare ground caused by poor land use practices is of far more concern.

Environmental conditions such as annual precipitation, temperature extremes, and soil type also determine what vegetation will grow on your property. These factors are discussed later.

You are now ready to control your weeds.

Putting it on the Ground – Weed-Fighting Weapons

Remember the Golden Rule: “No one weed control method works alone.” The following tools used in combination are your most effective weapons to control weeds. These tools work well for a wide variety of small-acreage weed problems. Which tools you use, and how you combine them, will depend on your individual situation.

Land Use Practices

Land use practices are very similar to human health practices. Without implementing good practices, there will more than likely be some consequences. When a doctor treats someone for a heart condition, part of the recovery process would be a change in life style. The changes might include eating healthier foods, getting more exercise, and reducing stress. The doctor will point out to the patient that not following these healthy practices probably led to the heart condition in the first place.

Controlling weeds is no different. Poor land use practices are a leading cause of weed problems. Good land use practices prevent weeds and are essential to helping your land recover.

In the first chapter, we identified grazing, construction, and roads as possible problem areas. The following tips will help you address these problems.



The number of animals you own and how you graze them will have a direct impact on the amount of weeds on your property.

Grazing

Good grazing practices prevent weeds. You should develop a grazing system that protects healthy, desirable plants and allows unhealthy plants to recover.

One of the secrets is to manage the grass and pasture to what you want and then adjust how your animals use it.

Some grazing tips that will help are:

- Limit the number of animals. Your property can comfortably support a limited number of animals. If you go over that number, overgrazing will lead to a weed problem. Even a small number of animals continually grazed on the same pasture will lead to weeds.
- Create smaller sub-pastures. Fencing your property into smaller sub-pastures allows you to move animals from one pasture to the next so resting pastures can recover. The number of animals you have and how you graze them will determine the amount of hay or feed you have to buy.

- Use *Weed Free Hay*. Be aware!!!! Noxious weed seeds can be brought onto your property when you purchase hay. *Certified Noxious Weed Free Hay* comes from sites that are inspected to ensure that noxious weeds are not present. Weed free hay does **not** guarantee the quality of the hay as feed; you must judge that separately. It may be slightly more expensive, but will be worth it. For more information, contact your local weed coordinator, the Montana Department of Agriculture (MDA) at (406) 444-7819, or go to <http://agr.mt.gov/weedpest/nwsff.asp>.
- Limit the time your animals are exposed to pasture, and consider using a holding pen. Horses do not need to eat 24 hours a day (although they will if given the opportunity).

For more information on good grazing practices contact your local MSU extension agent or the Natural Resource Conservation Service (NRCS).

Construction

When you are building a house or out-buildings, or installing a septic system, expect a certain amount of soil and plant disturbance. Implement weed control practices such as herbicides, mowing, or pulling as soon as construction starts. Large areas of disturbed soil may need to be revegetated once construction is completed. Also consider the following:



Disturbed soil during construction is an invitation to weeds. Manage your weeds during construction to prevent weed infestations.

- Vehicles spread weeds. Ask contractors to power wash their equipment before bringing it onto your property to prevent transferring weeds from job site to job site. Be sure to keep your own vehicles clean.
- Construction requires a certain amount of soil and plant disturbance. Try to minimize it as much as is practical.
- You may want to contract with a professional to control weeds during construction.

Roads

Road building creates a more permanent opportunity for weeds to spread. The disturbed soil on the shoulder and in the borrow pit is fertile ground for weeds. If left unmanaged, these areas provide a possible weed seed source for the rest of your property. Flat out...roads are just one of those places you have to manage all of the time. Revegetation will work only to a certain degree here, so you will have to use a combination of herbicides, mowing, or hand pulling. During road construction, it is reasonable to ask contractors to use weed free gravel.

If you live along a public roadway, find out who is responsible for managing weeds along the roadside.



Roadways: Common tansy found a home in the borrow pit along this road.



spotted knapweed
(noxious weed)

Herbicides

You may have jumped to this section assuming that simply spraying your weeds with herbicides will solve your weed problems. Although herbicides are an effective management tool for noxious weeds, they are not magic bullets. You need an effective long-term strategy that will likely include a variety of management methods to fight weeds. If you haven't read the first part of this booklet, you should go back and read the information to be sure you consider all aspects of managing noxious weeds.



Landowner spot-spraying a well-managed pasture.

This chapter explains the proper use of herbicides, and will better prepare you to discuss weed control options with your county weed coordinator. If you decide to hire a commercial herbicide applicator, this information will help ensure that you get the service you expect at a fair price.

Managing Weeds with Herbicides

Now that you have identified your weeds, developed a plan, and decided to apply herbicides as part of your overall weed management program, you need to consider some important things. This section will discuss keys to proper herbicide use, including how to:

- *select the correct herbicide,*
- *understand where and when to apply herbicides,*
- *correctly apply herbicides through calibration,*
- *mix and handle herbicides properly, and*
- *safely store and dispose of herbicides.*

Herbicides are designed to kill plants. When handled correctly, there is little toxicity risk to humans and animals. If you have never applied herbicides, the good news is that all herbicides are sold with a label. This label provides information about how to use herbicides effectively and safely. It is YOUR responsibility to use an herbicide correctly, so you must always READ THE LABEL before buying, mixing, applying, or storing any herbicide. Page 21 provides a guide on how to read an herbicide label.



orange hawkweed
(noxious weed)

Personal Safety and Herbicides

Personal protection and safety

Wear the proper protective clothing and equipment as described on the label when applying herbicides. A minimum for protective gear includes (1) eye protection, (2) long-sleeved shirt, (3) long pants, (4) chemical-resistant gloves, and (5) rubber boots. Some herbicides will have other safety gear recommendations. **Always read the label.**



purple loosestrife
(noxious weed)

Any product sold as an herbicide must have an **EPA Registration Number**. This number is usually on the front or back of the product.

Product name	● Weed Killer
Use statement	● Kills unwanted weeds Kill: dandelions, thistle, quack grass, and other weeds.
Ingredient toxic to the pest	● Active Ingredients Glyphosate 2.2% Inert Ingredients 97.8% <hr/> Total 100.0%
Signal word	● Caution See back panel for additional precautionary statements
Container contents	● Net contents 8 fl. oz.
Company name	● Manufacturer of Weed Killer Helena, MT 59601 (406) 555-5555
EPA Registration Number	● E.P.A. Reg. No. 1234-567

Products with "Warning" are more toxic than products with "Caution." Products with "Danger" are the most toxic.

Read the label

The label provides information about how to use the herbicide effectively and safely. **It is a legal document.**

Read and follow all label directions before you:

- **buy the herbicide,**
- **mix the herbicide,**
- **apply the herbicide,**
- **store the herbicide, and**
- **dispose of the container.**



Herbicide labels can be difficult to read. Labels are often in small print and contain unfamiliar words. If you have trouble understanding a label, seek help by mail or phone from your local weed coordinator, County Extension Office, the MDA, or the product manufacturer.

Confused by the label?

Hiring an Herbicide Applicator

If you choose not to apply herbicides yourself, you can hire a professional commercial applicator to do the work for you. Contact your county weed coordinator or extension agent for herbicide applicators in your area. Commercial applicators must be licensed and bonded with the MDA, and should carry liability insurance. You should ask for and review copies of *current* insurance, license, and references. If the applicator is not licensed and bonded, it is illegal for that person to be paid to control weeds on your property with herbicides.



sulfur cinquefoil
(noxious weed)

Selecting the Correct Herbicide

Many different herbicides on the market control noxious weeds. Choosing the correct herbicide to control your weeds while protecting desirable vegetation and the environment is very important. Remember, many herbicides kill only specific weeds, so you must correctly identify the weeds growing on your property.



There are many herbicides from which to choose. Make sure you choose the correct one that meets your needs.

Herbicides vary in price based on their chemistry and effectiveness in controlling weeds. A gallon of herbicide can cost from about \$20 for 2,4-D, which would treat an area the size of two football fields, to more than \$100 for some other herbicides. However, the amount of herbicide you need to apply to control weeds will vary. For example, to kill weeds on one acre, it may take 2 quarts of one herbicide, but only several fluid ounces of a different herbicide.

The cheapest herbicide may not always be best. To decide how much herbicide to purchase for your property, see Appendix D (pages 52 and 53) of this booklet. Be sure to purchase herbicides from a reputable dealer.

There are two general categories of herbicides.

Non-selective herbicides are those that kill ALL vegetation that comes in contact with the herbicide. An example of a commonly used non-selective herbicide is glyphosate (Roundup™, Rodeo™, Accord™). If you choose a non-selective herbicide such as glyphosate you will need to reseed the treated area with desirable species.

Selective herbicides are those that kill either grasses or broad-leaved plants. Most of the weeds on the Montana Noxious Weed List are broad-leaved plants. Commonly used herbicides that kill broad-leaved plants include 2,4-D (Weedar 64™, HiDep™, Amine 4™), picloram (Tordon 22K™, Grazon™), aminopyralid (Milestone™), clopyralid (Redeem™, Transline™), dicamba (Banvel™, Clarity™) and metsulfuron-methyl (Cimarron™). These herbicides will

control certain broad-leaved plants and will not harm desirable grasses when applied at recommended rates. The herbicide imazapic (Plateau™) will control some annual grasses in addition to some broad-leaved plants. Remember, even herbicides specific for broad-leaved plants can cause injury to desirable grasses if not applied correctly and according to the label.

The herbicide label will tell you the active ingredients, where the herbicide can be applied, and some of the weeds that the herbicide will control. The label is a legal document that you are required to follow. You can also contact your herbicide dealer, county weed coordinator, or county extension agent for advice about herbicide selection.

For information on recommended herbicides, application rates, and the optimum plant growth stage to kill noxious weeds, go to Appendix D (pages 52 and 53) in this booklet.



Where and When to Apply Herbicides

It is important to protect yourself and the environment when applying herbicides. The environmental conditions where your weed is growing may influence your choice of herbicides or even whether herbicides are an appropriate tool for the job. Some herbicides cannot be applied in areas next to streams or rivers where the groundwater is near the soil surface, or on certain sites such as cropland, lawns (turf), or rangeland.

READ AND FOLLOW THE LABEL

to be sure that you do not apply the herbicide in areas where it can damage the environment.

The presence of grazing animals can also influence which herbicide you select. The label will tell you if grazing is restricted during or following herbicide application. Remember that some

herbicides can pass through an animal after it eats treated forage. These herbicide residues may be present in the manure of the animal, and if the manure is used to fertilize sensitive vegetation, gardens, or flower beds, damage may occur. Herbicide residues may also be present on desirable vegetation (such as grass) that has been sprayed. Do not add clippings from sprayed plants to compost.



Read the herbicide label to determine when it is safe to turn your animals back out to pasture.



purple loosestrife
(noxious weed)

Injury to desirable vegetation can also occur if herbicide spray or vapor drifts during the application. In general, apply herbicides when there is little wind (less than 6 mph, or when a light flag is weakly extended), and moderate temperatures and humidity. Weather factors that influence how an herbicide works include temperature, moisture, and humidity. Hot, dry conditions can increase the thickness of the plant leaf surface and slow plant metabolism, making plants less susceptible to herbicides. In general, the best temperatures to kill weeds are between 65° and 85°F. Rain following application of herbicides can affect how well the herbicide will control the weed. The length of time between application and rainfall, referred to as the “rainfast” period, varies for different herbicides; some examples are shown in Table 1.

The approximate number of hours that you need between herbicide application and rainfall (rainfast) for maximum weed control from several commonly used herbicides.

TABLE 1	HERBICIDE	RAINFAST (hrs)	HERBICIDE	RAINFAST (hrs)
	Metsulfuron (Cimarron, Escort)	4	Picloram (Tordon 22K)	2
	Dicamba (Clarity, Banvel)	8	Glyphosate (Roundup)	6
	Clopyralid (Redeem, Transline)	8	2,4-D, Amine	4
	Aminopyralid (Milestone, ForeFront)	2	Imazapic (Plateau)	1

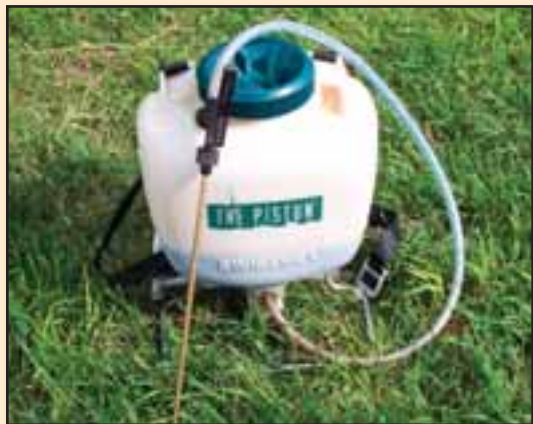
For the best control, apply herbicides when the weed is at the proper growth stage. Most noxious weeds in Montana can be controlled in mid- to late-spring or early summer before the weed flowers, and during fall. *When the plant is actively growing, it is most sensitive to herbicide applications.* The charts on pages 52 and 53 tell you the best plant growth stage to apply the herbicide for each noxious weed.



oxeye daisy
(noxious weed)

Buying Your Sprayer

You or your homeowner's association should purchase a backpack sprayer for spot-spraying noxious weeds. A backpack sprayer is better than a small garden-type hand sprayer because it allows you to keep the pressure constant as you walk, increases the accuracy of the herbicide application, and makes it easier to carry the spray solution. Cost of a backpack sprayer ranges from about \$75 to \$125, or you may be able to borrow or rent one from your county weed district. This type



A quality backpack sprayer costs around \$100, but is well worth the investment.

of equipment, with one nozzle located at the end of a wand, is used for treating small infestations or on rough ground where other application methods are not possible. Spray units that fit on the end of a garden hose are not suitable for spraying weeds because the water output is inconsistent, resulting in misapplication of an herbicide. **Be sure to label your sprayer “herbicides only” so you do not use this sprayer to apply insecticides or fertilizer.**

Herbicide residues in the sprayer could cause injury to non-target plants if it is used for other purposes.



A garden-type hand sprayer will be less expensive (about \$30), but will not be as effective.



Sprayers attached to a hose do not provide a consistent application of chemicals.

Calibrating Your Sprayer

Calibrating your sprayer before you mix and apply herbicides is VERY important. A properly calibrated sprayer will save you money, protect you and the environment, and result in good weed control. If you over- or under-apply herbicides, you will not effectively control weeds. This guide explains how to calibrate a backpack sprayer. If you want to calibrate other types of spray equipment such as broadcast, ATV-mounted, or boom-type sprayers, contact your county weed coordinator or extension agent.

STEP 1 Before you calibrate, check your sprayer carefully, repair any leaks, and clean or replace nozzles. Clean nozzles with a soft-bristled brush such as a toothbrush, never with a metal object.

Calibrate your sprayer using CLEAN water only. (DO NOT add herbicide.)



The following step-by-step method of calibrating a backpack sprayer involves very little math or formulas. It is based on the following principle: one gallon equals 128 ounces and the area you will spray for calibration is 1/128 of an acre. Thus ounces collected equals gallons per acre. A sample problem is included along with the description.

STEP 2 Measure an area 18.5 by 18.5 feet, which is equal to 1/128 of an acre. This should be done in the field on which you will be spraying.



STEP 3 Spray the measured area uniformly with water using a gentle side-to-side sweeping motion with the spray wand, similar to spray painting a home or automobile. Record the number of seconds required to spray the area. During application, be sure to maintain a constant sprayer

pressure. It will take about 4 to 6 passes through the area for complete coverage. YOU SHOULD REPEAT THIS STEP AT LEAST TWO TIMES AND CALCULATE THE AVERAGE TIME.



STEP 4 Spray into a container for the same amount of time it took you to spray the measured area in Step 3. Be sure to maintain constant sprayer pressure while you spray into the container.



The amount of herbicide you need to add to each gallon of water based on the recommended application rate for weeds you are treating.

Calibrating Your Sprayer (cont.)

STEP 5 Measure the number of ounces of water in the bucket.

- The number of ounces collected from the bucket is equal to the number of gallons of water per acre the sprayer is delivering.



• **Volume sprayed in ounces equals Gallons of water Per Acre (GPA)**

STEP 6 Use Table 2 to determine how much liquid herbicide to add to EACH gallon of water. Find your spray volume in gallons per acre (GPA – calculated in Step 5) and read across the chart to determine the amount of herbicide to add to each gallon of water based on the recommended herbicide application rate.

TABLE 2	Volume Sprayed GPA (Step 5)	RECOMMENDED HERBICIDE RATE/ACRE				
		7 fl oz/acre	1 pint/acre	1 quart/acre	2 quarts/acre	3 quarts/acre
	20	2 tsp/gal	5 tsp/gal	10 tsp/gal	3 ¼ fl oz/gal	4 ¾ fl oz/gal
	30	1 ½ tsp/gal	3 tsp/gal	6 tsp/gal	2 fl oz/gal	3 ¼ fl oz/gal
	40	1 tsp/gal	2 ⅓ tsp/gal	4 ¾ tsp/gal	1 ⅔ fl oz/gal	2 ⅓ fl oz/gal
	50	¾ tsp/gal	2 tsp/gal	3 ¾ tsp/gal	1 ¼ fl oz/gal	2 fl oz/gal
	60	⅔ tsp/gal	1 ⅔ tsp/gal	3 ¼ tsp/gal	6 ⅓ tsp/gal	1 ⅔ fl oz/gal
	70	⅔ tsp/gal	1 ⅓ tsp/gal	2 ¾ tsp/gal	5 ½ tsp/gal	1 ⅓ fl oz/gal
	80	½ tsp/gal	1 ¼ tsp/gal	2 ⅓ tsp/gal	4 ¾ tsp/gal	7 ¼ tsp/gal

tsp = teaspoons
TBS = tablespoons
fl oz = fluid ounces

Liquid conversions:
3 teaspoons = 1 tablespoon
2 tablespoons = 1 fluid ounce
8 fluid ounces = 1 cup
1 cup = 16 tablespoons

Example:


You calibrate your sprayer and the output is 30 GPA (see Step 5). The label requires an herbicide application rate of 1 pint/acre for the target weed. Go to Table 2 and read across from 30 GPA – the amount of herbicide to add to each gallon of water is 3 teaspoons. If you want to fill your sprayer, and it holds 3 gallons of total solution, you would add 9 teaspoons of herbicide to 3 gallons of water in each backpack tank. This amount is equivalent to about a 0.5% solution.

Some herbicides such as Cimarron™ are dry rather than liquid. These herbicides will come with a small measuring device with directions on how much to add to your tank based on application rate.

Herbicide Mixing and Handling

Now you are ready to add your herbicide and water to the spray container. Before mixing, be sure to **READ AND FOLLOW THE LABEL** to determine what protective clothing should be worn, how much herbicide to prepare, and the mixing procedure. Remember when you are mixing an herbicide solution, you are working with the herbicide in its most concentrated and hazardous form. Some herbicides, such as metsulfuron (Cimarron™),

require the addition of a surfactant for the herbicide to kill the target weed. A surfactant is an additive put into the tank together with the water and herbicide, allowing the herbicide solution to more easily penetrate the leaf surface. You would add about one tablespoon of surfactant to each gallon of spray solution in your backpack sprayer. You can buy surfactants at the same location where you purchased the herbicide.



WHEN USING HERBICIDES AROUND OR NEAR WATER OR WATER SOURCES, YOU SHOULD BE EXTRA CAREFUL. WHEREVER YOU SEE THIS SYMBOL, IT IS A REMINDER TO PROCEED WITH CAUTION.

The following basic precautions should be followed when mixing an herbicide:

Dos

- X** Wear the proper protective clothing and equipment
- X** Wear goggles to protect your eyes
- X** Wash your hands before touching food, drink, or skin
- X** If a spill or splash occurs, wash your clothing and yourself thoroughly within 2 minutes

Don'ts

- X** Don't wear shorts, tank tops, sandals, etc.
- X** Never pour herbicides at eye level
- X** Do not smoke, drink, eat, or go to the bathroom (without washing hands first)
- X** Don't wait to clean yourself or your clothing if herbicide is spilled or splashed



You can also add agricultural dyes such as Highlight™ liquid or tablets to your spray solution. This dye will color the spray solution and treated weeds so that you can see the sprayed area. The color will break down and fade over time. Dyes can be purchased where herbicides are sold. **Caution - This dye will stain your hands; be sure to use rubber gloves.**

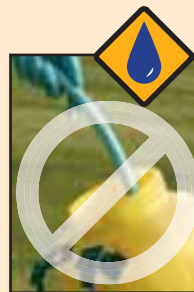
Mixing the Herbicide

Personal protection and safety

Wear the proper protective clothing and equipment as described on the label when applying herbicides. A minimum for protective gear includes eye protection, long-sleeved shirt, long pants, chemical-resistant gloves, and rubber boots. Some herbicides will have other safety gear recommendations.

Read the label.

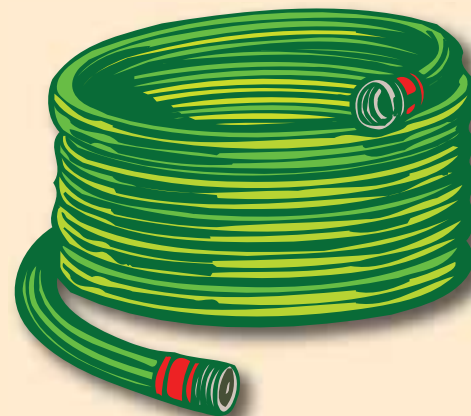
- Be sure the weather and plant growing conditions are suitable for spraying before mixing.
- Mix away from water-bodies, wellheads, food, animal feed, and high traffic areas, preferably on an impervious surface (placing the sprayer in a larger tub or bin can help contain spills). ***Do not mix herbicides within 50 feet of wellheads.***



- Do not place the end of the garden hose into the spray solution while filling your sprayer. Hold the hose clear of the tank to prevent the herbicide from siphoning back into the hose and into your drinking water supply.
- Prevent herbicide “leftovers” by mixing only the amount of herbicide you need. It is better to mix one gallon of spray solution, apply that amount, and mix more if necessary.
- Do not mix an herbicide with another herbicide or chemical unless the combination is listed on the label.
- For most liquid herbicides, fill your sprayer with half the water you need, add the proper amount of herbicide and other additives (surfactants or dye), then add the remaining water. If you are using a dry herbicide formulation (i.e., metsulfuron

(Cimarron™)), mix the dry material in a smaller container with water and vigorously shake the container until the herbicide is dissolved, then pour this solution into your spray tank as described above.

- Rinse your measuring container (spoon or cup) in clean water and add this solution to the tank – do not overfill your sprayer.
- ***Never store herbicides in food or beverage containers.*** If an inadvertent spill occurs, be sure to clean it quickly.



Applying the Herbicide

Your spray is mixed and ready to apply to kill the weed. Follow these basic guidelines to protect yourself and minimize damage to desirable vegetation and the environment.

Environmental considerations

- Look carefully at the area you are spraying so that you do not inadvertently spray desirable plants or contaminate water.
- Do not apply herbicides within 15 feet of wellheads.
- Do not apply herbicides near water, such as streams or to shallow groundwater areas, unless approved on the label.



- Do not apply under sensitive shrub or tree species or allow herbicide to drift onto desirable vegetation (some herbicides can be safely applied under trees and shrubs so be sure to READ THE LABEL).
- Weeds in areas that you cannot safely treat with herbicides can be removed or suppressed by pulling and/or mowing.



Application considerations

- Apply the herbicide solution USING THE SAME PRESSURE AND APPLICATION METHOD YOU USED WHEN YOU CALIBRATED YOUR SPRAYER.



For broadcast spraying a large infestation, maintain a gentle side-to-side sweeping motion with the spray wand, similar to spray painting a home or automobile. For individual plants, apply a one-pass spray over the plant using a gentle sweeping motion.

- Stop the application if environmental conditions become undesirable (wind, rain, excessive heat or cold).

Still confused about buying, mixing, and applying herbicides? Take your questions to your county weed coordinator or county extension agent and have them help you make the correct decisions. You can also attend pesticide applicator classes to become a licensed pesticide applicator. These classes are coordinated through your county extension agent.

What to expect from your herbicide application

The herbicide that you apply may kill noxious weeds very slowly. In some cases it may take two to four weeks before weeds are dead. The weeds will curl and start to turn reddish-brown and/or become yellow at the growing points. New growth usually dies before older portions of the plant. Mid-summer herbicide applications may not affect the stature or appearance of the weed because the plant is under summer dormancy and not actively growing. If you spray during mid-summer, you can still control some weeds, but control may be reduced depending on the weed and herbicide used. Herbicides can also

be applied to weeds in the fall if you have adequate moisture and some green growth near the base of the plant.



Clean-up and Disposal

Now that you have finished spraying your weeds, it is important to clean equipment and clothing to remove herbicide residues. Be sure to rinse herbicide residues from application equipment before storage.

- Do not rinse your equipment near a wellhead.
- Add the rinse water to your sprayer and spray it out on your application site, or use it to mix the next batch of herbicide solution.



- If the herbicide container is empty, triple-rinse at the mixing site and puncture the container before disposal. If you have questions regarding disposal of herbicides, contact the MDA at 406-444-5400 or your county extension agent.



- Wash your clothing with heavy-duty liquid detergent, ammonia, and hot water. **Do not use bleach**, which may cause a dangerous chemical reaction when mixed with ammonia. Line-dry the clothing where it will be exposed to sunlight. Take a shower using soap, and don't forget to wash your hair. Put on clean clothing. *Do not wash herbicide-contaminated clothing in the same wash water with the family laundry.*



Storing Herbicides Safely

It is best to purchase only the amount of herbicide you can apply in a season. However, this is not always possible, especially if you have small patches of weeds. Store herbicides in a safe area that doesn't get too hot. Although freezing doesn't harm most herbicides, excessive heat can damage some products very quickly. If an herbicide freezes, you will probably need to vigorously shake the solution in the container before use. Herbicides **must** be stored in their original containers. You can place the herbicide container inside a slightly larger impervious container that will contain any spills or leaks that may inadvertently occur. Store the herbicide away from

other activities, food, seed, and out of the reach of children. If possible, a locked storage area is the best! Herbicides can degrade over time, so put a date on your herbicide container and use the older containers first.

If you have old, out-of-date, or otherwise unusable herbicides, dispose of them properly to protect yourself, your family, and the environment. Contact the MDA to participate in their annual, **non-regulatory** collection program. This

program is explained in detail on the MDA website at <http://agr.mt.gov/pestfert/disposal.asp>, or call the MDA at 406-444-5400.



whitetop
(noxious weed)



Important telephone numbers to have in case you have questions or problems.

EMERGENCY

For aid in human poisoning cases:

Rocky Mountain Poison and Drug Center

(800) 525-5042 *(Montana only)*

For help involving spills, leaks, and fires:

Pesticide Accident Hotline (chemtrec)

(800) 424-9300

NON-EMERGENCY

For medical and consumer information:

Montana Department of Agriculture

(406) 444-5400

National Pesticide Telecommunications Network

(800) 858-7378



Mowing and Hand Pulling

Mowing and hand pulling are two simple techniques that stress noxious weeds and give healthy plants a chance to out-compete weeds for essential resources such as water and nutrients. They also prevent weeds by removing the seed source.

How they work

The plant parts above ground produce food, which is stored in the roots. Removing the leaves and/or roots interrupts this cycle and weakens the weed. Weeds are highly competitive and one treatment will not usually kill them. But, when combined with other weed management tools such as promoting healthy vegetation, implementing good land use practices, and effective herbicide use, desirable plants will replace weeds over time.

Mowing and hand pulling:

- can remove future seed sources,
- must be combined with other weed control measures and good land use practices,
- should be strategically timed and must be repeated, and

- are good alternatives for sensitive areas, such as near water (wellheads or streams) or sensitive plants.

Mowing

Mowing can be effective if used consistently with other tools. Weeds with strong root systems such as Canada thistle and leafy spurge will have a stronger resistance. Spotted knapweed adapts by spreading low to the ground, almost as if it were trying to hide under the mower blades.

How do I know when to mow?

Mowing frequency is determined by the general climate and growing seasons in your area. You will also have to adjust for annual changes such as an early spring, a wet summer, or drought. Each year will be different. **The best way to know when to mow is to walk your property. Let the plants tell you when to mow.** Your local weed coordinator can also help you with this.

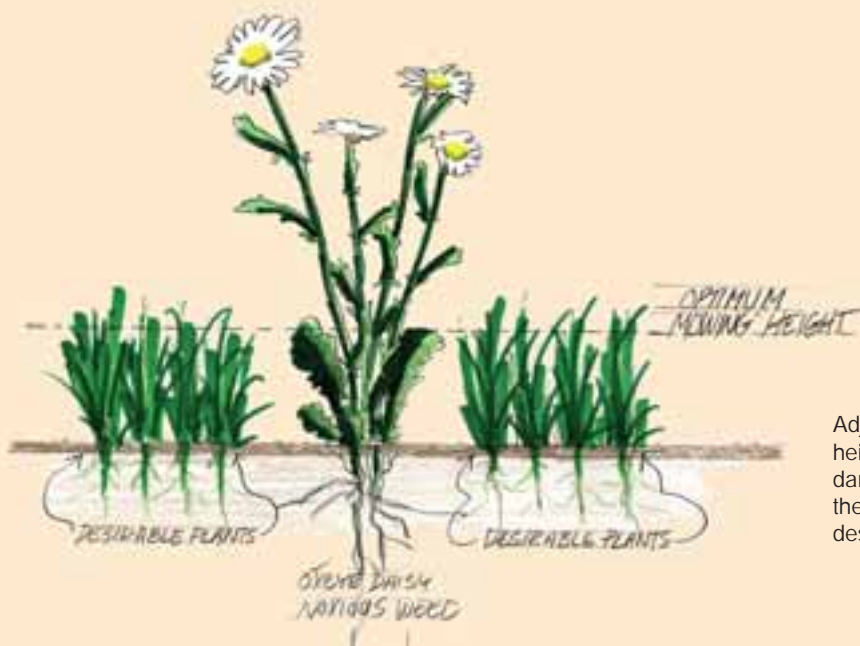


There are three general times to mow: spring, summer, and fall.

- The best time to mow is when desired plants are dormant, and just **before** the weeds reach the flowering stage. Each weed flowers at a different time, usually in the spring or early summer depending on your local growing season. Mowing before weeds flower reduces seed production. Consult your county weed coordinator if you are not sure.

Mowing (cont.)

- After revegetation, mowing in the first year removes fast-growing annual weeds before they flower.
- Before spraying herbicides in the fall, mowing removes stems and leaves to allow for better herbicide contact with the remaining weeds.
- If you are not grazing animals, mow grass stands approximately every 3 years, wherever possible, to stimulate healthy plant growth.



Adjust your mower blade height to cause the most damage to weeds and the least damage to desired plants.

Hand Pulling

Hand pulling is similar to mowing except that the plant and as much of its roots as possible are removed. This removes the weed, or at least slows its growth and reduces the seed source.

Hand pulling works well for some weeds, such as knapweed and houndstongue, if you get the whole root. The infestation then has to start over from seed. Other weeds, such as leafy spurge, have spreading underground roots (rhizomes). These can re-sprout and quickly recover from pulling.

Where to pull

- Pulling is most effective in small patches of weeds, to prevent new infestations, and as a follow-up to other treatments. Pulling larger areas (such as an acre or more) is usually an exhausting and futile experience.
- Pulling is effective on land not suited to spraying or other treatments, such as around wellheads, streams, and sensitive plants.

Timing

The best time to pull is when the ground is moist in the spring, or after rain or irrigation. Pulling should be repeated a minimum of every 10 to 20 days throughout your local growing season (usually May through October).

How to pull

- Grasp the plant firmly near the base.
- Pull the weed from the ground, trying to disturb as little soil as possible. You may need to use a shovel or other tool to pry out tap-rooted weeds. The less soil you disturb, the less likely weeds will reinvade.



- Bag as you go. Place weeds in a plastic bag to reduce the spread of seeds. Dispose of them in your trash container and haul them to your waste transfer station or landfill. Bag the weeds as you go to prevent spreading the seeds between where you pick them and where you bag them.
- If you are trying to establish a desired species, sprinkle some seed on the soils disturbed during pulling to give those plants a jumpstart.

Biological Control

Biological control is the use of insects or grazing animals such as sheep or goats for weed control. These tools are more commonly used on larger properties, but they may be appropriate for your circumstances. *The best way to see if bio-controls are a realistic option for you is to contact your local weed coordinator.*

Examples of biological control are:

- *Chyphocleonus achates*, a root-boring beetle (weevil) attacking spotted knapweed, and



- sheep munching on leafy spurge.



TIPS on biological control:

- Using biological controls alone is not a substitute for other weed control methods (remember the four golden rules). Simply turning insects or grazing animals “loose” will not solve your weed problem.
- Know what insects to release in your area. Insect species must be targeted to specific weeds.

- Insects can be very effective on large weed infestations. Be aware, however, that they may move on or die out once the weeds are thinned or eliminated.
- Other weed control methods such as herbicide use, or land use practices such as grazing, may limit the effect of bio-controls.
- Using sheep or goats requires planning and preparation. The same fence that keeps your horses in may not work for sheep or goats. You may need to install temporary fences, move other livestock, and change your pasture rotation plan.

Vegetation

Healthy vegetation wards off weeds!!!!!! It is your **best** tool to prevent weed infestations. We've highlighted this theme over and over because it is so important. *If you have healthy, desirable plants, do all that you can to maintain them.* It is much easier and less expensive to maintain healthy plants than it is to restore them.



The healthy vegetation in this pasture prevents noxious weeds from becoming a problem.

Montana's range plants have evolved with use from wildlife and domestic livestock. These plants are generally healthier when grazed (but not over-grazed). If livestock grazing is part of your land use goals, you must properly manage grazing to maintain desirable plants, which can then out-compete weeds. If you don't graze livestock, realize that a healthy plant community will attract wildlife. Excessive build-up of vegetation over time may create a fire hazard. To maintain plant vigor and minimize fire potential, a mowing program should be initiated. Please refer to the mowing section that describes how to maintain desirable vegetation while impacting noxious weeds during mowing operations.

Vegetation Strategy or Game Plan

Just as you need a game plan to control your weeds, you need a strategy to nurture healthy, desirable plants. First, identify the desirable plants growing on your acreage.

Use the plant and grasses identification charts in Appendix E on pages 55 and 56. If noxious weeds have dominated your land for years, you may have few desirable plants left.

When to Revegetate

If you have a newly disturbed site, YOU NEED TO REVEGETATE.

If you have tried controlling your weeds for one or two growing seasons and your healthy and desirable plants don't respond, then you should consider revegetating your property.

Revegetation can be costly and takes a lot of patience. Success depends on many environmental factors.

In the event you want to contract this out, the following information will help you get the job done at a fair price.

Revisit your land uses and follow these six steps to promote healthy vegetation:

- evaluate your site,
- eliminate weeds,
- choose your plants/seeds,
- prepare your site,
- apply the seed, and
- protect and manage desirable plants.

SEED IMMEDIATELY AFTER SOIL DISTURBANCE!

Bare soil creates a “vacuum” in which weeds will become the established species unless healthy seed is put in place for competition.

STEP 1 Evaluate Your Site

To start down the path to having healthy plants, ask yourself the following questions:

- Do your land use practices encourage healthy, desirable plants? If not, revegetating your site will not solve your weed problem. You may need to change how you use your land.
- What vegetation is on the site now? If it's not what you want, how hard will it be to change it?

- How much precipitation or water do you have? Is it an irrigated or non-irrigated site? The amount of precipitation or water available to your plants will determine what plant species will grow at your site.

PRECIPITATION

What is the **minimum** annual precipitation you can count on? During drought years, the lack of precipitation will greatly affect what you can do with your vegetation.

- What is your soil type? Is it sandy, loam/silt or clay, or clay? Is it compacted? Match the soil type to the plant species. See Appendix B on page 49 to judge your soil type.

- What different conditions exist at your site? Is there a stream or wetland? Are there dry south-facing slopes? Are there moist and cool north-facing slopes? Are there flat areas or swales? Categorizing your land into different climate/condition zones will help determine what type of seed needs to be planted. Different plant species are needed for wet areas as compared to dry south-facing slopes.

STEP 2 Eliminate Weeds

ADDRESS ANY WEED PROBLEMS

FIRST. As you remove weeds, desirable plants may recover on their own because more sunlight, water, and nutrients are now available.

- Eliminate weed competition by implementing options discussed in previous chapters.

BE PATIENT

It may take one or two growing seasons for your acreage to recover on its own after weed control, so please be patient. Immediate revegetation is needed on disturbed sites only. Do not rush to revegetate sites where some desirable plants exist.

STEP 3 Choose Your Plants and Seeds

Make educated choices when selecting plants and seeds. Choose plants and seed mixes that will meet your objectives and are well suited to the conditions of your site. Bear in mind your property's available moisture/precipitation, growing season, sun exposure, and soil types. Most plants and seeds are sold with an explanation of the conditions in which they will grow best. You will also have to

choose between **native** or **non-native** plants, and decide whether you want a **mix** or a **monoculture**.

- **Natives** are plants that are indigenous (*may be local or original*) to the area. They have evolved and adapted to the environmental conditions of that area. If you wish to maintain a “historical” appearance, native species are a good choice. Natives can be more difficult to reestablish, but they may be more durable over time. Native seeds tend to be expensive, and not all native species may be commercially available.



Slender wheatgrass, a native grass, provides quick cover on dry hillsides.

- **Non-native** plants are species that evolved or developed elsewhere and have been introduced to an area. Non-native plants may look similar to natives and can provide similar habitat. Non-natives usually establish more quickly, can be very competitive with noxious weeds, and are less expensive than natives.



Russian wildrye, a non-native species, is preventing the establishment of the spotted knapweed on the right.

USE TEST PLOTS

Trying to grow plants on your property is a bit of an experiment. You might spend \$300 on seed that you plant over 5 acres, only to find that it didn't work. To avoid wasting both time and money, **start small and work up**. Begin by planting small test plots so you can see the results, and then expand the successful plots.

SHOULD I PLANT A **MIX** or **MONOCULTURE**? A monoculture is a single plant species, while a mix is a combination of several species.

Some plants tend to dominate a mix and are better planted as a monoculture. Other species are poor weed competitors alone, but can suppress weeds as part of a mix.

- If a natural look is desired, a mix may provide better habitat for desirable insects, birds, and wildlife.
- An aggressive monoculture may be best for erosion control on a harsh, dry, disturbed site.
- For non-irrigated land, dormant seeding and drought-tolerant species are recommended.



Think before you plant.

It pays to think ahead. A fast-establishing monoculture may prevent weeds early on, yet it might not meet your long-term needs. Replacing it with other vegetation may prove costly and time consuming. Using the "Test Plot" method may be helpful.

Seed Suggestions

DRYLAND GRASSES

Some suggestions for mostly dryland grasses, both native and non-native, are listed below. Remember, just as there is no single “magic” weed control method, there is not a single plant species that will solve everyone’s problems. Choose the species that meets your needs. **(A chart with more information on each of these is contained in Appendix E).** SPECIES CHOICE: Some species germinate and establish more rapidly than others. Some examples of native and non-native vegetation include:

IN ORDER OF GERMINATION SPEED (fastest first):

Native

- Slender wheatgrass
- Big blue bluegrass
- Thickspike wheatgrass
- Western wheatgrass
- Streambank wheatgrass
- Bluebunch wheatgrass

Non-native

- Perennial ryegrass
- Crested wheatgrass
- Pubescent wheatgrass
- Intermediate wheatgrass
- Russian wildrye

WARNING: Canada and Kentucky bluegrass and smooth brome provide quick cover but can be invasive in native grasslands, perennial gardens, and landscapes.

SHRUBS AND WILDFLOWERS

Wildflowers and shrubs are more difficult to establish than grasses. If your weed infestation is heavy, wait 2 to 4 years after seeding grasses

before transplanting shrubs and wildflowers. If your weed infestation is low, add shrubs and wildflowers to a grass seed mix (but not greater than 1% to 5% of the mix or more than a half-pound per acre).



Caution: Some herbicides may harm shrubs, wildflowers, and other broad-leaved plants. See the herbicide section for responsible chemical use.

Good native shrub choices:

- Big basin sagebrush
- Wood’s rose
- Rubber rabbitbrush

Good native weed-competing wildflowers:

- Blue Flax
- White yarrow
- Blanketflower



Where can I get the seeds I want to plant?

Seed sources vary across the state. Compare products and prices at your local ranch supply store, agricultural seed dealer, and nurseries. Most seed suppliers sell seed mixes formulated to work in your area. Seed dealers or nurseries may be able to blend your own specialized seed mix. Your local weed coordinator/extension agent can help you find sources.

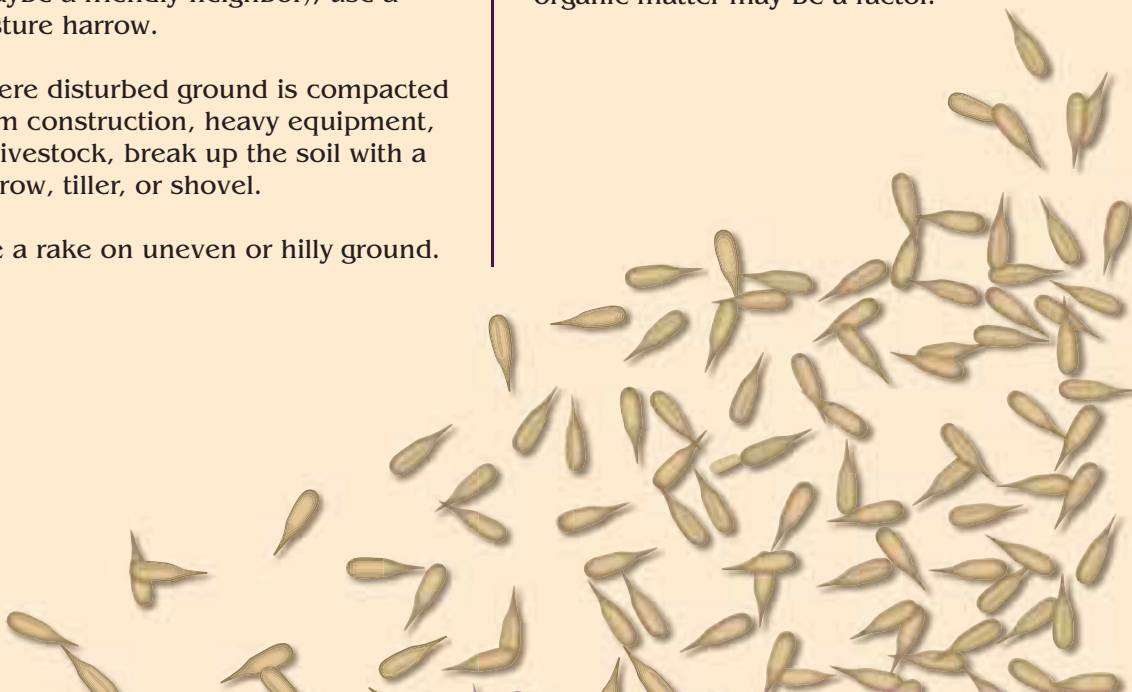
No matter what species you choose to plant, your most important action will be to select viable seed that is weed free. One of the best ways to determine this is to look at the seed label. Federal and state laws mandate that seed must have a complete analysis label or tag. Here is some key information to look for on the seed label/tag: Origin, lot number, certification number, germination (high percentage), dormant/hard seed, total viability, and the test date. Understand that no seed can be totally pure, but it should be certified noxious weed seed free.

STEP 4 Prepare Your Site

Prepare your property so that seeds will get a good start. Rough up the soil so that the seeds will be in contact with the soil and nutrients. This creates pockets so that seeds won't be washed away. Methods for site preparation include:

- Drag a piece of chain link fence with old tires on top for weight. This can be done by hand or behind an ATV.
- If you have access to farm equipment (maybe a friendly neighbor), use a pasture harrow.
- Where disturbed ground is compacted from construction, heavy equipment, or livestock, break up the soil with a harrow, tiller, or shovel.
- Use a rake on uneven or hilly ground.

- Some areas may have nuisance plants such as cheatgrass, field penny grass, and kochia. To remove these use a non-selective herbicide (see herbicide section). Be careful – this will kill all plants.
- In areas with poor soil, you may need to add topsoil or organic matter to provide good growing conditions. Depending on the size of the area you need to treat, the cost of topsoil or organic matter may be a factor.



STEP 5 Apply the Seed

When to plant: Spring or late fall? Some species require up to four months of cold, moist conditions for best germination. These species are best planted in the fall right before or after the first snow. Seed planted in the fall should be protected from rodents, insects, and runoff by raking it in, drill seeding, or mulching.

If you did not seed in the fall, seed in early spring, as soon as possible after the snow leaves and before the area “greens” up. This allows the seeds to take advantage of as much spring moisture as possible. The best window for this occurs roughly between the beginning of March and the end of May, depending on your local climate. Late spring and early summer seedings are generally not effective because the seeds cannot take advantage of spring moisture.

How to plant:

- Seed can be broadcast by hand, with a broadcast seeder, or with a seed drill.
- The basic rule of thumb is to seed at 12.5 pounds per acre. However, if you are broadcast seeding or seeding where weeds are plentiful, seed at 20 pounds per acre.
- After seeding, drag a pasture harrow or old tires over the site, to put seed in contact with the soil. **NOTE: IF GRASS SEEDS ARE COVERED BY TOO MUCH SOIL (more than half an inch), THEY MAY NOT GROW.**



STEP 6 Protect and Manage Desirable Plants

Treat your vegetation as an investment. The following tips will help protect this valuable resource.

- Irrigate lightly for the first 7 to 14 days after seeding, if possible.
- Place weed free mulch over seedings where possible.
- Implement good land use practices.
- Continue to control weeds.
- Let pastures rest and recuperate by using good grazing practices. Don't graze immediately after revegetating.



Keeping it Going – On-going Weed Management

This booklet was designed to help new small-acreage landowners and those who are struggling to control weeds on their properties. The information offered here will guide your **first two or three seasons of weed control, maybe more**. We've tried to be thorough, but you may have questions that cannot be answered in such a booklet. Wherever possible, we've referred you to other specific resources for information and advice. Don't hesitate to use them.

Some final tips on weed control:

Contact your local weed coordinators if you run into problems or have questions. If they do not have the answers, they will know where to send you to receive the information you need.



CONTACTING YOUR LOCAL WEED COORDINATOR

Each county has a weed coordinator, usually a county employee or the county extension agent. Look in the phone book under Weed District or Extension Agent, or call the general phone listing for your county officials, and they will direct you. Contact information for county weed coordinators is also listed at www.mtweed.org

Be patient and persistent. Your weed problem did not happen overnight, nor will it be solved overnight. At first, it may seem a bit overwhelming and frustrating. Weed problems will never go away entirely, but with a good game plan you will be able to successfully manage the weeds on your property. You will know you are successful when you:

- have fewer weeds and can enjoy your property more, and
- spend less time, money, and energy on weed control.

Keep records of how you control your weeds. Keep track of what weed control methods you used, when you used them, and how and where you applied them. For example, you can track:

- what herbicide you used and at what rates,
- what species you planted and where, and
- how much money you spent to control weeds.

This information will help you adjust your plan as you go. When a tool or strategy works, you will know exactly what you did so you can repeat it. It's also important to document when something doesn't work so you can adjust your plan accordingly. And when you seek help from professionals, your records will make their job more efficient and effective.



Record keeping may be as simple as writing on a calendar on the shop wall or in a notebook. Maps such as the one shown in the Weed ID section or photos are also helpful.

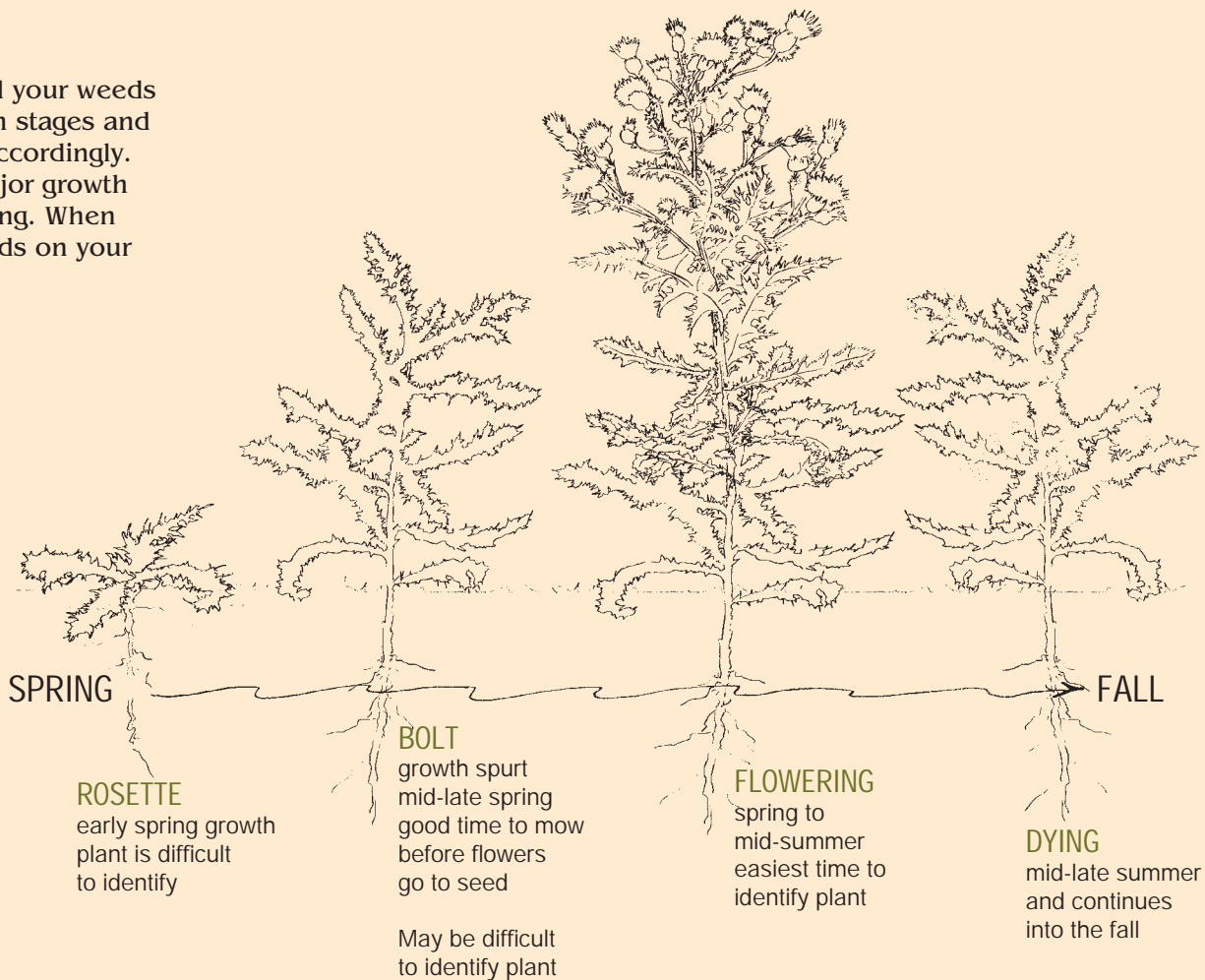
Join a weed co-op (sometimes called a Weed Management Area). When neighbors work together, they can share information and resources. Such groups are often more effective than individual landowners working alone. Ask your local weed coordinator if a weed co-op is available or would be appropriate for your area.

Good luck.....

Four Stages of Weed Growth

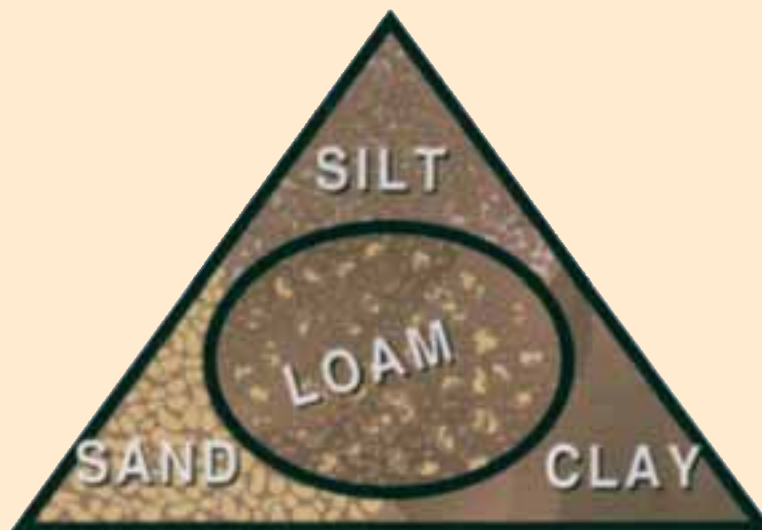
Growth Stages

Part of learning to control your weeds is to recognize the growth stages and plan your weed control accordingly. This chart shows four major growth stages starting in the spring. When this process starts depends on your local climate.



Soils

For larger sites, do a soil test and have your extension or Natural Resource Conservation Service (NRCS) agent help you check pH, nitrogen, and salt levels. For smaller sites, add a little moisture to 1 cup of soil. If the soil feels gritty and will not form a ball in your hand, you have sand. If soil feels like talcum powder and forms a loose ball in your hand, you have silt/loam. If soil feels sticky and forms a solid, tight ball in your hand, you have clay. Heavy clay soils that have been compacted by construction may need to be broken up with tillage before seeding. If you have lighter soils, you may not need to disturb the soil, but can instead use a no-till drill to seed or rake seed into the top 1-2 inches of soil surface.



Weed Identification Chart

As of 2005, 27 weeds are listed on the Montana Noxious Weed List. These weeds are of statewide concern. All Montanans need to be aware of their existence. However, what may be a weed problem in Great Falls may not be a problem in Hamilton. Therefore, each county has the option to list weeds of local concern. *Check with your local weed coordinator to find out what weeds may be on your local weed list. These lists change frequently.*

There are three categories for weeds on the Montana Noxious Weed List. Some weeds are located in specific areas of the state and are not on the state weed list.

In some cases, there is a “best” characteristic to identify each weed. Some of the distinguishing characteristics for each weed are listed below.

The noxious weeds are listed by category. The amount of weeds on your property and their category may affect your management strategy. Category One and Two weeds are generally more established. Category Three and locally listed weeds are usually newcomers. It is to your benefit and your community’s to treat these newcomers aggressively and prevent them from becoming well-established weeds in either Category One or Two.

MONTANA NOXIOUS WEED LIST

Weed	Best Characteristic	Weed	Best Characteristic
CATEGORY 1		CATEGORY 1	
Canada thistle	deep, creeping root; irregularly-lobed leaves with spines on margins only; small male and female heads on separate plants	oxeye daisy	short, creeping roots; spoon-shaped, coarsely-toothed basal leaves; strong, unpleasant odor; daisy-like flowers
common tansy	short rhizomes; fern-like aromatic leaves; yellow button-like heads in clusters	Russian knapweed	black, scaly roots that extend deep and wide; papery bracts around the heads; young leaves grey-green and wooly-hairy; flowers appear silvery before opening, turning to pink-purple
dalmatian toadflax	found in patches due to creeping roots; yellow snapdragon-like flowers; arrow-shaped leaves	spotted knapweed	deeply lobed, “cobwebby” basal leaves; generally purple flowers; oval bracts with black-tipped fringe
diffuse knapweed	much-divided, “cobwebby” basal leaves; generally white flowers; triangular, spine-tipped bracts	St. Johnswort	yellow flowers may have black glands along the margins; leaves have tiny transparent dots on the surface; stems reddish in color
field bindweed	twining stems; arrow-shaped leaves with blunt tips; funnel-shaped, white to pinkish flowers with long stalks	sulfur cinquefoil	creeping woody roots; five-petal pale-yellow flowers; many hairs perpendicular to stem
houndstongue	broad basal leaves in the shape of a dog's tongue; soft white hairs over the entire plant; reddish-purple, cup-shaped flowers that form a spikelet	whitetop	many four-petaled white flowers in dense clusters appearing flat-topped; lance-shaped, blue-green leaves
leafy spurge	white latex in all parts of the plant; deep and spreading roots with buds; greenish-yellow bracts underneath the flower groupings		

STATE NOXIOUS WEED LIST

Weed	Best Characteristic	Weed	Best Characteristic
CATEGORY 1		CATEGORY 3	
yellow toadflax	flowers are one inch long, with bearded orange throats; leaves are pale green, numerous, narrow, and pointed at both ends	common crupina	rose to purple long-narrow flowers; fleshy, oval-shaped rosette leaves having distinct purple midribs; rough, short stiff spines on leaves
CATEGORY 2		eurasian watermilfoil	forms large, floating mats of vegetation on the water surface preventing light penetration; red flowers bloom near the water surface
dyer's woad	thick tap-rooted and lateral roots; four yellow petals with purplish-brown, hanging tear-drop-shaped seedpods; leaves have a white midrib on the upper surface	rush skeletonweed	yellow flowers; sharp, deeply toothed basal leaves; reddish, coarse hairs on lower leaves; 20,000 seeds per plant
meadow hawkweed	winter annual habit; narrow stem leaves; milky juice in stem; five to 30 dandelion-like flowers	yellowflag iris	forms large dense colonies; grows in wet areas in water up to 10 inches deep; reproduces from seeds and vegetatively by rhizomes
orange hawkweed	leafy runners; leafless, hairy stems; clusters of orange-red dandelion-like heads	yellow starthistle	sharp, straw-colored spines radiate from the bracts around yellow flower heads; rosette leaves are deeply lobed, pointed tips resemble dandelion; cottony hairs on stems
perennial pepperweed	basal rosette of petioled leaves with irregularly and deeply lobed margins; dense spikelets of tiny, green seedpods; pods with two seeds		
purple loosestrife	leaves in twos or threes at stem nodes; square stems; showy, magenta flowers in long, dense, leafy spikes		
saltcedar	foliage is salty to taste; stems are highly branched; purple flower; fern-like leaves; can be either deciduous or evergreen shrub		
tall buttercup	long, erect, hairy stems; hairy, palmately divided leaves; bright yellow flowers on long stalks		
tansy ragwort	tiny daisy-like flowers around a yellow center; rosettes have 10 to 20 leaves with web-like hairs; crushed leaves have a foul odor; stem and leaf stalks can be purple		

Other Weed Identification Resources

Guidebooks

- *Montana's Noxious Weeds*, Monica Pokorny and Roger Sheley - MSU Extension Publication EB 159 (2005)
- *Weeds of the West*, Western Society of Weed Science

Websites

- Montana Statewide Noxious Weed Awareness and Education Program, http://www.weedawareness.org/weed_id.html
- Montana Department of Agriculture, <http://agr.state.mt.us/weedpest/noxiousweedslist.asp>

Herbicide Application Chart Appendix

Herbicide application rate and time of application on key noxious weeds growing on range, pasture, and wildland areas.

Weed Species	Plant Biology	Herbicide (trademark)	Herbicide Rate/Acre	Herbicide Application Timing ¹	Comments
Canada thistle	Perennial/Deep-rooted Rhizominous	ForeFront R&P	2 to 2.6 pints	Bolt to bud, or fall	Can apply to water's edge – do not get in water
		Milestone	5 to 7 fl oz	Bolt to bud, or fall	
		Redeem	3 pints	Bolt to bud	
cinquefoil sulfur (<i>erect</i>)	Perennial/ Tap-rooted	2,4-D ²	2 quarts	Bolt	Do not apply to shallow groundwater areas Suppression of top-growth only – will not kill roots Can apply to water's edge – do not get in water
		ForeFront R&P	2 to 2.6 pints	Active growth	
		Milestone	5 to 7 fl oz	Active growth	
common tansy	Perennial/ Rhizominous	2,4-D ²	2 quarts	Rosette to bud	Apply before flower growth stage Use a non-ionic surfactant Suppression of top-growth only – will not kill roots
		Cimarron	0.5 oz to 1 oz	Bolt to bud	
		ForeFront R&P	2 to 2.6 pints	Bolt to bud	
dyer's woad	Perennial/ Tap-rooted	Cimarron	0.5 to 1 oz	Rosette to bud	Use a non-ionic surfactant Use with a methylated seed oil surfactant @ 1 qt/ac
		Telar	0.5 to 1 oz		
		Plateau	8 fl oz	Pre-bud	
field bindweed	Perennial/Deep-rooted Rhizominous	Tordon 22K + 2,4-D ²	1 quart + 1 quart	12" of growth, or fall	Do not apply to shallow groundwater areas Suppression of top-growth only – will not kill roots Can apply to water's edge – do not get in water Addition of N fertilizer after the herbicide treatment may improve control.
		Tordon 22K	1 quart	12" of growth, or fall	
		2,4-D ²	2 quarts	12" of growth	
hawkweed meadow orange	Perennial/Shallow-rooted Rhizominous	ForeFront R&P	2 to 2.6 pints	Bolt to bud	Can apply to water's edge – do not get in water Addition of N fertilizer after the herbicide treatment may improve control.
		Milestone	4 to 7 fl oz		
		Redeem	3 pints	Bolt to bud	
houndstongue	Tap-rooted	Cimarron	0.5 to 1 oz	Rosette to late bud	Use a non-ionic surfactant Must apply before bolting growth stage
		2,4-D ²	2 quarts	Rosette	
knapweed spotted diffuse	Tap-rooted	ForeFront R&P	2 pints	Actively growing	Can apply to water's edge – do not get in water Do not apply to shallow groundwater areas Apply annually for at least 2 years
		Milestone	5 to 7 fl oz		
		Redeem	2 pints	Rosette to bud	
		2,4-D ²	2 quarts	Rosette to bolt	
knapweed russian	Perennial/Deep-rooted Rhizominous	ForeFront R&P	2 to 2.6 pints	Bolt to bud, or fall	Can apply to water's edge – do not get in water Suppression of top-growth only – will not kill roots
		Milestone	4 to 7 fl oz	Bolt to bud, or fall	
		2,4-D ²	2 quarts	Bolt to bud	
leafy spurge	Perennial/Deep-rooted Rhizominous	Tordon 22K	1 to 1.5 quarts	Full flower or fall	Do not apply to shallow groundwater areas Use with either a non-ionic or methylated seed oil surfactant Suppression of top-growth only – will not kill roots
		Plateau	8 to 10 fl oz	Fall or before first frost	
		2,4-D ²	2 quarts	Early flower	

¹ Plant growth stage is referenced on page 48 of this publication. For example, bolt growth stage is when the plant begins to send up a flower stalk.

² The 2,4-D rate is based on a one-gallon container that has 4 lbs of active ingredients.

Herbicide application rate and time of application on key noxious weeds growing on range, pasture, and wildland areas.

Weed Species	Plant Biology	Herbicide (trademark)	Herbicide Rate/Acre	Herbicide Application Timing ¹	Comments
oxeye daisy	Perennial/Shallow-rooted Rhizominous	ForeFront R&P	2 to 2.6 pints	Rosette to early flower	Can apply to water's edge – do not get in water
		Milestone	5 to 7 fl oz	Rosette to early flower	
		Redeem	3 to 4 pints	Rosette to early flower	Do not apply to shallow groundwater areas
		Cimarron	0.5 oz	Rosette to early flower	Use with a non-ionic surfactant
perennial pepperweed	Perennial/ Deep-rooted Rhizominous	Cimarron	0.75 to 1 oz	Bud to flower	Use with a non-ionic surfactant
		Telar	1 oz	Bud to flower	
		Plateau	10 oz	Bud to flower	Use with a methylated seed oil surfactant @ 1 qt/ac
		2,4-D ²	2 quarts	Pre-bud	Suppression of top-growth only – will not kill roots
purple loosestrife	Perennial/ Deep-rooted Rootstock	Cimarron	1 oz	Pre-flower	Use with a non-ionic surfactant; do not get in water
		Glyphosate	2 quarts	Pre-flower	Use aquatic label glyphosate such as Rodeo and add an approved surfactant
		2,4-D ²	2 quarts	Spring - <15% growth	Suppression of top-growth only – will not kill roots
		St. Johnswort	Perennial/ Deep-rooted Rhizominous	Tordon 22K	1 to 1.5 pints
tall buttercup	Perennial/ Rhizominous	2,4-D ²	2 quarts	Seedling to pre-flower	May have to apply annually for at least 2 years
		Milestone	4 to 6 fl oz	Seedling to early flower	Can apply to water's edge – do not get in water
		ForeFront R&P	2 pints	Seedling to early flower	
		MCPA Amine	2 quarts	Seedling to early flower	Treat annually for 2 consecutive years
tamarisk	Woody Tree	Arsenal	1% solution	Apply to foliage	Apply 1.3 oz herbicide/gallon water
<i>mature tree</i>		Remedy	25% solution (crop oil)	Apply to cut stump	Cut tree and apply herbicide within 10 minutes to cut stump: 1 part Remedy to 3 parts veg. crop oil
<i>young tree</i>		Remedy	20% solution (crop oil)	Apply to basal bark	Spray 12 to 18 inches of tree bark with herbicide solution: 1 part Remedy to 4 parts veg. crop oil
tansy ragwort	Perennial/ Rhizominous	ForeFront R&P	2 to 2.6 pints	Seedling to pre-bud	Can apply to water's edge – do not get in water; will damage conifers
		Milestone	5 to 7 fl oz	Seedling to pre-bud	
		Transline	1 pint	Actively growing	Clip flowers prior to treating to stop seed production – safe to use in conifer trees
		2,4-D ²	2 quarts	Seedling to rosette	Not effective when applied at flower stage
toadflax <i>dalmatian yellow</i>	Perennial/ Rhizominous	Tordon 22K	1 to 2 quarts	Flower or fall	Do not apply to shallow groundwater areas Use 2 qts on yellow toadflax for spot treatment
		Telar	1 oz	Fall	Use with a non-ionic surfactant
		Tordon + Telar	1 qt + 1 oz	Fall	Use with a non-ionic surfactant
whitetop (hoary cress)	Perennial/ Rhizominous	Cimarron	0.2 to 0.75 oz product/ ac	Pre-bud	Use with a non-ionic surfactant
		Plateau	8 fl oz	Pre-bud	Use with a methylated seed oil surfactant @ 1 qt/ac
		2,4-D ²	2 quarts	Pre-bud	Suppression of top-growth only – will not kill roots

¹ Plant growth stage is referenced on page 48 of this publication. For example, bolt growth stage is when the plant begins to send up a flower stalk.

² The 2,4-D rate is based on a one-gallon container that has 4 lbs of active ingredients.

Vegetation

The following tables provide some possible vegetation choices for your property. Your plant selection should be based on realistic expectations for your land and your local climate. If you are unable to make a vegetation choice for your property, this information will help you work with local resource professional(s), and compare products and prices at your local ranch supply store, agricultural seed dealer, and nurseries. Most seed suppliers sell seed mixes formulated to work in your area. Seed dealers or nurseries may be able to blend your own specialized seed mix. Your local weed coordinator/extension agent can help you find sources for this.

Additional choices and information on vegetation:

- *MontGuide fact sheet #199811/Agriculture, Rehabilitation of Weed-Infested Rangeland*, by James S. Jacobs, Michael F. Carpinelli, and Roger L. Sheley, can be obtained from your local Montana State University (MSU) Extension Agent or from their website at <http://www.montana.edu/wwwpb/pubs/mt9811.pdf>
- *Creating Native Landscapes in the Northern Great Plains and Rocky Mountains*, by the USDA/Natural Resource Conservation Service (NRCS). Contact your local NRCS office, call 406-587-6842, or email: publications@mt.usda.gov

Native Grass

NATIVE Grass	Type & Size	Soil	Precipitation Zone	Germination Rate	Establishment Rate	Variety	Comments
Slender wheatgrass	Bunchgrass ②	Sandy loam Clay loam	<13"	Fast	First year	Pryor	Drops out in 3 to 7 years; dominates mix first 3 years if >2 lbs/acre if monoculture.
Thickspike wheatgrass	Rhizomatous ②	Sandy loam	<13"	Fast - Moderate	1 to 2 years	Banek Critana	Dominates mix if > 2lbs/acre rate; aggressive spreader; competes with knapweed once established; 10 lbs/acre if monoculture.
Streambank wheatgrass	Rhizomatous ②	Sandy loam to Loam	<13"	Moderate	2 years	Sodar	Best for harsh, dry sites but needs water for germination; more drought tolerant than Thickspike though closely related; 10 lbs/acre.
Bluebunch wheatgrass	Bunchgrass ②	Sandy to Clay loam	<13"	Slow	2 to 4 years	Goldar	Most common native in Missoula Valley; good in a mix; weak weed competitor; fall seeding; seed heavily - 14 lbs/acre.
Western wheatgrass	Rhizomatous ②	Loam to Clay	13-15"	Moderate	2 years	Rosana	Good weed competitor in heavier/moist soil; mix with Thickspike and Slender; 12 lbs/acre.
Big blue bluegrass	Bunchgrass ②	Sandy loam Loam	<13"	Fast	First year	Sherman	Taller and much more aggressive than Sandberg bluegrass; good in mix with Bluebunch; 6 lbs/acre.
Basin wildrye	Bunchgrass ③	Sandy loam Clay loam	<13"	Slow	3 to 5 years	Trailhead	Best on moist sites and heavier soils; spindly first 2 years, then very persistent and aggressive; good mixed with 25% to 40% Western; 3' to 7' tall; good for wildlife; 12 lbs/acre.
Green needlegrass	Bunchgrass ②	Sandy loam Clay loam	13-15"	Moderate	2 years	Lodorm	Hard seed coat; plant in fall; reported better than Western and Bluebunch for weed suppression; good in mix; 12 lbs/acre.
Mountain brome	Bunchgrass ②	Clay loam Loam	>18"	Moderate - Fast	2 to 3 years	Gamet	Good substitute for Slender and Thickspike at elevation >4000'; seed in fall; 20 lbs/acre; short lived.

SIZE KEY: ① <8" ② 12" to 30" ③ >30"

Other good native species for "creating a grassland" (<10% of mix) but poor weed competitors are:

IDAHO FESCUE - 3 to 4 years to establish; greens up in November; attracts herbivores

PRAIRIE JUNEGRASS - warm-season bunchgrass, common

SANDBERG BLUEGRASS - fills in on disturbed sites but not aggressive; "High Plains" cultivar to be released soon

ROUGH FESCUE - long-lived on heavier/moist soils

Non-native Grass

NON-NATIVE Grass	Type & Size	Soil	Precipitation Zone	Germination Rate	Establishment Rate	Variety	Comments
Pubescent wheatgrass	Rhizomatous ②	Sandy loam	13"-15"	Fast	First year	Manska Luna Rush	Reportedly best weed competitor; good in mix with 10% alfalfa (Ladak 65, Spredor 3); handles harsh site better than intermediate; 14 lbs/acre.
Russian wildrye	Bunchgrass ①	Loam Clay Loam	<13"	Slow	2 to 3 years	Bozoisky	Plant as monoculture; takes over mix; reportedly competes very well with knapweed after first 2 years; best if drill seeded; 12 lbs/acre; slow to establish.
Intermediate wheatgrass	Rhizomatous ②	Loam Clay Loam	14"-15"	Moderate	1 to 2 years	Oahe Rush	Vigorous stand after 2 years; possible alternative to smooth brome on weedy site with horses; 14 lbs/acre.
Hard fescue	Bunchgrass ①	Sandy loam Loam	<13"	Fast	First year	Durar	Aggressive; forms monoculture after 4 to 5 years; not good in clay soils; plant as monoculture or with sheep fescue; competitive with knapweed; 6 lbs/acre.
Sheep fescue	Bunchgrass ①	Sandy loam	<13"	Fast	1 to 2 years	MX-86 Covar (from Europe)	Like Hard fescue but will invade bare soil areas; though a native species, no North American selections are available; 6 lbs/acre.
Big blue bluegrass	Bunchgrass ②	Sandy loam Loam	<13"	Fast	First year	Sherman	Taller and much more aggressive than Sandberg bluegrass; good in mix with Bluebunch; 6 lbs/acre.
Crested wheatgrass	Bunchgrass ① ③	Loam Clay Loam	<13"	Fast	First year	Roadcrest Ephraim	Slightly rhizomatous; good on harsh site, rocky hillside; best weed control if kept lightly mowed or grazed (early); some cultivars considered invasive; 8 lbs/acre.
Siberian wheatgrass	Bunchgrass ②	Loam Clay Loam	<13"	Fast	First year	Vavilov	Same as Crested wheatgrass but shorter in height; 12 lbs/acre.
Perennial ryegrass	Treat as an annual; may winterkill ②	Loam Clay Loam	<16"	Very Fast	First year	Variety not specified	Can be planted spring or early fall for winter cover; requires irrigation for germination; short lived; not winter hardy; 10 lbs/acre. Good in mixes with Pubescent and Russian wildrye up to 20%.

SIZE KEY: ① <8" ② 12" to 30" ③ >30"

Other weed-competitive species are Kentucky and Canada bluegrass and smooth brome; all three species can be invasive in native grasslands.

Draw Your Map

Use this area to draw your property map of weeds. Reference page 15 for tips in creating this valuable map.

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