



Compiled and Edited by

Calvin H. Pearson
Colorado State University
Western Colorado Research
Center at Fruita
1910 L Road
Fruita, CO 81521

Joe E. Brummer
Colorado State University
Soil and Crop Sciences
Fort Collins, CO 80523

Bob Hammon
Melissa L. Franklin
Colorado State University
Tri River Area Extension
2775 Highway 50
Grand Junction, CO 81502

June 2011

Section II

Alfalfa

Chapter 17

Weed Control in Alfalfa

Calvin H. Pearson, Bob Hammon, and Ed Page

Weeds can have a significant impact on lowering yield and quality of alfalfa. Left unchecked, weeds can dramatically reduce alfalfa stands and profits, which, in turn, can create significant economic hardship on producers. There are a number of weeds, both annual and perennial, that are troublesome weeds in alfalfa (Table 1). Some weeds, such as foxtail and hare barley, can be harmful to animals. The awns (beards) from mature seeds of these weeds can cause injury to eyes, mouth, throat, and nose of animals. When eaten, weeds such as western whorled milkweed can be poisonous to livestock (Fig 1.).



Fig. 1. Western whorled milkweed (*Asclepias subverticillata*). Photo by Mary Ellen (Mel) Harte, Bugwood.org.

Controlling weeds is an essential production practice of alfalfa. Prevention, eradication, and control are the three main approaches to weed control. Prevention requires a management strategy that is devel-

oped and deployed over a long period of time; nevertheless, prevention should be a high priority weed management effort for producers. Keeping new weed species from becoming a problem can save a great deal of future time and expense. Producers should use weed-free seed, clean equipment, and quarantine grazing animals, along with monitoring weed movement in irrigation water and from the neighbor's property.

Eradication means the complete elimination of the weed and, in most cases, this approach is not practical or cost effective. Eradication methods are often effectively deployed when a new weed species slips by prevention defenses. When a new weed is discovered early as a single plant or small patch, eradication is a realistic approach. Seeds may persist in the soil for several years, thus, monitoring and control should be ongoing for several years to make sure the weed has been totally eliminated.

Control becomes the goal after eradication is no longer feasible and the weed species is present year after year. The goal is to minimize the presence and impact in a field, on the farm, or within an area. Using cost effective methods to control weeds at a level that has reasonable or minimal impact on yield and quality is often the most realistic approach to weed control. Minimizing the impact should take into consideration the weed's affect on crop yields, crop quality, animal performance, and environmental considerations.

Producers should develop a weed management plan well before planting. Numerous weed control methods can be selected to

include in a management plan (Table 2). The weed management plan does not need to be lengthy or complicated; however, producers should thoughtfully consider several aspects of a good weed management plan for alfalfa production including cropping history, crop production history including herbicide applications, weed species and abundance within the field, and alfalfa production plans.

If a weed problem occurs in an alfalfa field, a first step in developing an effective control strategy is correct weed identification. A professional such as a plant taxonomist, weed scientist, agronomist, Extension specialist/agent, or plant biologist may need to be consulted to obtain an accurate identification of the weed. Another initial step in developing an effective weed control strategy is to determine what caused or contributed to the occurrence of the weed problem. Did the weed problem develop because of wet areas, disturbed areas, or a chronic weed problem in an infested area? Has the field been over grazed? Has the field been in production for many years and is stand decline creating open areas for weed invasion? Are there soil problems such as salinity that contributed to the development of a weed problem? Have traffic patterns by animals or equipment been created to allow weed invasion?

Alfalfa is quite competitive against many weeds but may not eliminate them. Alfalfa is more competitive with weeds once it is established. Newly seeded alfalfa does not compete well with annual weeds or perennial weed species. Established perennial weeds have deep, well developed root systems that produce highly competitive plants much more quickly than alfalfa seedlings. Therefore, established perennial weeds will compete heavily against newly seeded alfalfa and can actually out-compete newly seeded alfalfa. Thus, controlling weeds, particu-

larly perennial weeds, before establishing new alfalfa stands is important.

Weed Control in New Stands

Weeds that are allowed to thrive in newly seeded alfalfa will reduce forage yield and hay quality and, thus, profits. A weed-free field and a properly prepared seedbed are important to quickly establish a stand and to be competitive against many weed species. A proper seedbed needs to be prepared using best management practices, taking into account soil fertility, irrigation, and harvesting as well as control of weeds, disease, and insects. Excellent weed control in alfalfa can be achieved in many situations by applying labeled herbicides at the proper timing, rate, and growth stage for both the crop and weed species.

Crop Rotation

Proven crop rotations are important for controlling broadleaf and other weeds prior to planting alfalfa. By rotating crops, a diversity of production practices are used that are likely to disrupt weed growth cycles. While cultivation may help to control many weeds, it may be ineffective to control deep rooted or creeping perennials. For example, with Canada thistle or field bindweed cultivation may promote additional weed germination by turning up weed seed that otherwise is buried too deep in the soil to germinate. It can also break up and move rhizomes, which help spread the weed throughout a field from once isolated patches.

Crops such as winter rye or triticale, sorghum, or Sudangrass can be used as a smother crop. Weeds may not grow as fast or have as aggressive seedlings as the smother crop. This is especially effective when used after a season of repeated clean cultivation. For creeping perennials, cultivation is typically not an effective weed control approach.

Rotating out of alfalfa for two years to a non-leguminous crop before planting alfalfa again in the same field is recommended for many areas of the Intermountain West. This will reduce nematode and disease pressures to a level that will again be acceptable for a new field of alfalfa. A two-year crop rotation also allows producers to apply herbicides to control tough weeds such as thistles, field bindweed, dodder, and others that are difficult to control when alfalfa is being produced in the field. It is possible that longer crop rotation intervals out of alfalfa may be necessary to control severe weed problems.

If a hard to control weed, especially perennial weed, issue exists in a field to be planted to alfalfa, crop rotation is possibly the best possible management strategy. Grow a crop in which there is an effective weed control strategy for the problem species, or you may be fighting a losing battle for the life of the alfalfa stand.

Site Selection

Alfalfa grows best in well drained soils. Choosing a field with a productive soil is an important prerequisite for developing the desired alfalfa stand. Soils should be a minimum of five to six feet deep without compaction layers to prevent root growth or allow saturated soils to persist. Under ideal soil conditions, alfalfa roots have the capability of penetrating into the soil to depths of up to 20 feet. Soil compaction should be eliminated by deep ripping during seedbed preparation when the soil is dry and subject to a high degree of fracturing.

The planting site impacts the ability of alfalfa to compete against weeds. Weed competition in alfalfa is best prevented by selecting sites for alfalfa by reducing or eliminating weed competition before alfalfa seed is planted.

Because alfalfa is sensitive to flooding or prolonged periods of saturated soil, the

surface of the soil, especially when furrow irrigation is used, must be land planed to level fields to accommodate irrigations for the life of the stand. Also, a field slope grade of ½ to 1 percent is needed to allow water to flow properly down irrigation furrows. Quality field leveling should be performed to prevent pooling of water and subsequent drowning of the plants. Field leveling is also necessary for other irrigation methods such as sprinkler irrigation, particularly if soils have a slow infiltration rate.

Soil Fertility

One of the key factors involved in maintaining a highly competitive stand is proper soil fertility. To achieve optimal fertility producers must soil test regularly to assess the nutrient content of the soil. In established fields, soil sampling is preferred in the fall of the year. For planting of new alfalfa, the soil should be sampled well ahead of planting, soil samples analyzed, and soil fertility needs determined. A reputable laboratory should be used in the Intermountain West to ensure the lab understands the characteristics of our alkaline soils, uses the proper tests and procedures for our soils, and gives a reliable recommendation for the application of needed fertilizers. Soil samples should be taken in a timely manner to allow the field to be fertilized when wheel traffic to plants will be minimized.

In the Intermountain West, alfalfa normally requires adequate amounts of phosphorus, potassium, and boron and the application quantities will be determined by soil analysis and yield target levels. Other nutrients may be required depending on the soil, but nitrogen is not needed in an established stand because alfalfa produces its own nitrogen if it is properly inoculated with *Rhizobium* bacteria. Samples should include soil from the surface to 12 inches in depth. A minimum of 15 to 20 of these subsamples should be combined and air dried before

sending to your laboratory. See Chapter 14 for more information on proper soil fertility management for alfalfa.

Seed Source

The source of the seed affects seed quality and hence plant stand population and uniformity. Planting alfalfa seed contaminated with weed seed will likely reduce the stand population and the uniformity of the stand. Certified seed is important in developing a weed-free stand of alfalfa. Growers should purchase high quality seed from reputable seed suppliers. Purchasing certified seed provides assurances including a known pedigree, seed germination percentage, weed seed content, seed purity, other crop seed content, seed production year, and date of seed analysis. Certified alfalfa seed has been inspected one or more times by independent inspectors who check fields during the seed crop production year for weed and disease presence, among other things.

Stand Establishment

Planting date has a significant effect on successful alfalfa stand establishment and early field cycle hay production. Alfalfa should not be planted in the spring as early as cool season grasses, but should be planted, depending on elevation and other factors, so it germinates and seedlings establish before the heat of the summer arrives. This timing is critical in order to keep sufficient moisture in the soil so seedlings do not wilt and die. Another suitable time to plant is in the late summer or fall when temperatures have cooled enough that seedlings will also establish well. The key again is keeping the soil moist. It is best to plant into a firm seedbed using a seed drill that is well suited to the planting conditions. The drill should allow seed to be planted at a precise depth, usually ¼ to 1 inch in depth on heavier soils and slightly deeper on sandy soils. Placing alfalfa seed on the surface will reduce ger-

mination and establishment by 50% or more and make it much more difficult for seedlings to be moist enough to survive, especially with competition from weeds that have germinated at a more favorable soil depth for optimal growth and establishment.

Stand Competition

During stand establishment, many weed species will germinate along with the crop. Weeds can be successfully suppressed or controlled by a companion crop to shade and compete with them. Oats or other annual crops can be planted along with the alfalfa as a companion crop to reduce weed pressure. The process is one of competition for water, nutrients, and sun light. At the point when the companion crop begins to compete more with the alfalfa than the weeds, normally before it has headed, it must be removed. If annual weeds continue to be a problem, they can be mowed to reduce the amount of new weed seed that is introduced into the field. It is important to do this before the weed seed has hardened and become mature enough to survive on its own – generally after the milk growth stage.

Weed Control in Established Stands

General Weed Culture and Control

Timing of management operations is a critical aspect for successful weed control. For all weed control methods, deploying them at the proper weed growth stage will increase the chances for successful control in the shortest period of time and with the least cost.

Control methods differ for the weed species present in an alfalfa field. The ideal time to mechanically or chemically control annual (winter or summer), biennial or simple perennial weeds is prior to flower stalk initiation when the weed is a small seedling or in the rosette stage for most biennials and some perennials. Weeds are easier to kill at

this stage because they have fewer reserves for the plant to use in regrowth. Early treatment also eliminates seed production and helps to decrease the weed seed bank in the soil. Creeping perennials are generally the most difficult to control because they spread primarily by stolons, rhizomes, or underground lateral root systems once they are established (e.g. Canada thistle, field bindweed, Russian knapweed, etc.).

The general rule for chemically treating creeping perennials is to treat at the bud to flower stage or in the fall. The exception to this is Canada thistle, which should be treated at an early growth stage up to bud formation or in the fall. These two times in the life cycle of Canada thistle are when chemicals are most readily translocated to the root system and the best control can be achieved.

The definition of “fall” varies, depending on elevation and the weed species being targeted, and can be from late August on into November. For most weed species, as long as green tissue is present, then chemical applications in the fall should provide an adequate level of control. For example, if at least 50% of field bindweed plants are still green, control can be effective. For weed species such as Russian knapweed, plants can be treated with an effective herbicide well into winter and excellent control can be achieved because of the plant’s physiology. As long as latex is still present in the shoots of leafy spurge, late fall applications with an appropriate herbicide remain effective. Thus, fall herbicide applications can be an excellent time; however, specific recommendations should be obtained for each weed species.

Mechanical Weed Control

Attempts to mechanically control creeping perennials (by tillage or hand-weeding) may require many years to achieve even minimal control, making it an unlikely option for an alfalfa forage production. Timing

for mechanical control measures of creeping perennials is completely different than when herbicides are used. With mechanical control, the vegetative growth of the weeds should be removed shortly after emergence, when the third leaf appears and as many times as that stage is reached during the growing season. Plants use stored carbohydrates in the root system to emerge; therefore, by never allowing the vegetative growth to have time to restore the carbohydrates to the root system, the root reserves will be depleted and the plant will succumb.

Cultivation can be effective, although it may not be practical or economical, if used repeatedly over long periods of time to kill weeds as they germinate and, in the case of creeping perennials, prevent them from building root reserves to sustain individual plants. This process requires cultivation every time the weed reaches the three leaf stage.

Herbicides

The use of herbicides allows producers to target specific weed species that infest alfalfa fields. With hard to kill weeds such as Canada thistle, rotating out of alfalfa to a cereal or grass allows the use of chemicals specific to broadleaf plants. Once the weeds that could not be chemically controlled in alfalfa have been brought under control, alfalfa can again be planted. For many areas in the Intermountain West, this practice will be necessary every few years when the alfalfa stand has reached the end of its economic life. Fields that are flood or furrow-irrigated or are bordered by lands with severe weed problems will likely have a higher weed pressure than otherwise. The renovation of fields with severe weed problems will likely be required more often than other fields.

Herbicides are one of the primary methods to control weeds in alfalfa (Table 3). In most cases, chemicals are selective for targeted weeds and are likely to be more effective on either grasses or broadleaf weeds. Grasses can be controlled during much of

the season without harming the alfalfa stand, but timing is much more critical for broadleaf treatments because these products will generally have an adverse effect on the alfalfa, which is also a broadleaf plant. If significant forage remains at the end of the season, winter or dormant-season grazing may increase the effectiveness of herbicide applications applied in the spring by exposing more bare ground for pre-emergent herbicide application or to allow the sprayed product to reach the weed.

Annual grasses and broadleaf weeds can be controlled in an alfalfa stand with pre-emergent herbicide applications. Many pre-emergent herbicides can control weeds that germinate before or during the early part of the growing season. This type of treatment has particular value when winter annuals are a primary concern. It normally needs to be watered in using irrigation or with precipitation to activate it. Many herbicides with post emergent or pre and post emergent activity are applied when the alfalfa is dormant, a time which they have little or no effect on the alfalfa, while having a maximum effect on target weed species. Examples of this timing, though its application varies among chemicals and species of weeds, include the winter dormant season of the alfalfa and specific and narrow windows of time after cutting and before initiation of new growth during the growing year. Two key factors for successful use of herbicides are an accurate identification of weed species to be controlled and the proper timing for application.

Herbicides typically used for grass control in alfalfa include: Eptam, Balan, Karmex, Gramoxone, Sencor, Kerb, Treflan TR10, Poast, Select/Prism, Pursuit, Zorial/Solicam, Raptor, Roundup (especially with Roundup Ready varieties), Prowl, Velpar, AlfaMax Gold, Sandea, and Chateau. The time, amount, and method of application will vary as will the weeds controlled and the degree of control achieved.

Herbicides typically used for broadleaf weed control in alfalfa include: Butoxone, Eptam, Balan, Karmex, Gramoxone, Sencor, Kerb, Treflan TR10, Pursuit, Zorial/Solicam, Raptor, Roundup (especially with Roundup Ready varieties), Prowl, Velpar, AlfaMax Gold, Sandea, and Chateau. The time, amount, and method of application will vary as will the weeds controlled and the degree of control achieved.

Always read the label before using herbicides. New herbicides or improved formulations of existing herbicides routinely enter the marketplace and it is important to read the label of new products. Herbicide compounds and formulations have different application methods, application rates (depending on weed species, soil types, restrictions on crop rotations, intervals between application and planting certain crops, etc.), timing of application, pre-harvest intervals, cautions, and restrictions. Even though herbicides are registered for use in alfalfa, incorrect usage can cause crop injury, poor weed control, or both when label instructions are not carefully followed. Use only herbicides that are registered for use in alfalfa and use the products according to the timing based on crop development stage as specified in the herbicide label (e.g. pre-establishment, dormancy, or active growth).

When troublesome weed species are found in an alfalfa field, producers should contact their local Extension agent for a recommendation regarding control options, including the use of herbicides.

***Note to the Reader:** It is not within the scope of this publication to provide an up-to-date and detailed discussion of the various uses and restrictions of herbicides, thus, it becomes the reader's responsibility to carefully read current herbicide labels to be informed of how herbicides are to be used.*

Dodder Control

Dodder can be a serious weed problem in alfalfa in some areas of the Intermountain West. This parasitic annual weed germinates and grows in the soil until it attaches to the alfalfa plant and becomes dependent on the alfalfa host to complete its life cycle. Weakening from dodder attachment will cause loss of production and increased susceptibility to nematodes, disease, and insects. Dodder seed can survive up to 20 years in the soil. Several other host plants that are commonly found in alfalfa fields can also serve as host plants for dodder; therefore, it is important to control dodder. Other host plants for dodders that affect alfalfa include: pigweed, lambsquarters, field bindweed, Russian thistle, asparagus, melons, safflower, and tomato.

The best management is to prevent dodder from entering the field. Dodder seed is similar in size to alfalfa. Always buy seed from a source that is known to be free of dodder. Dodder seed can be carried from infested to clean fields by machinery, animals, feed, and people. Producers should prevent the transfer of dodder seed to clean fields.

Crop rotation is a reliable method for controlling dodder. Many plants are not parasitized by dodder. Specifically, members of the grass family, including corn are not affected by dodder and can be used to break the life cycle of dodder. Keep in mind that dodder seed in the soil can remain viable for as long as 20 years.

Dodder should be controlled early to prevent it from setting seed. In these cases the dodder infestation should be mowed closely, removed, and burned or deposited in a landfill. Removal of the dodder and all parts of the host plant at least 1/4 inch below the dodder's point of attachment will prevent regeneration of that dodder plant in that year.

Chemical control with most herbicides has provided limited control of dodder. A

pre-emergent application of trifluralin can be effective in preventing dodder seed germination. Kerb 50 WSP is labeled for dodder control in alfalfa grown for seed, and Prowl H₂O is also labeled for dodder control in some soil types and in some states.

Glyphosate provides good control of dodder and planting Roundup-Ready alfalfa and applying glyphosate is an excellent control approach for dodder-infested fields. Nevertheless, producers should still use preventative measures to keep fields free of dodder. Preventing dodder infestations from developing in alfalfa fields continues to be an economical approach.

***We repeat this again** - it is not within the scope of this publication to provide an up-to-date and detailed discussion of the various uses and restrictions of herbicides, thus, it becomes the reader's responsibility to carefully read current herbicide labels to be informed of how herbicides are to be used.*

Roundup-Ready Alfalfa

Roundup-Ready (RR) alfalfa was originally released for commercial production in fall 2005. On May 3, 2007 the United States District Court for the Northern District of California issued an injunction for the production of RR alfalfa, following a preliminary injunction order issued on March 12, 2007. These injunctions vacated the USDA's June 2005 decision to deregulate RR alfalfa. After a long period of time and much legal activity, a ruling was issued by the United States Supreme Court in which RR alfalfa was ultimately deregulated in January 2011. Thus, RR alfalfa has once again been approved for commercial planting in the United States beginning in early 2011. However, producers must still sign and comply with a Monsanto Technology Agreement when planting RR alfalfa.

RR seed is patented for its biotechnological properties, which prevents alfalfa plants

from being damaged or killed by glyphosate. Glyphosate is the active compound in Roundup and similar generic herbicides. Roundup-Ready alfalfa allows this broad spectrum herbicide to be applied on alfalfa fields for the control of many weed species while not causing crop damage to Roundup-Ready alfalfa varieties. Because of the genetic diversity of Roundup Ready alfalfa, up to 10% of alfalfa seedlings are susceptible to Roundup and will not survive the first application of Roundup and similar generic glyphosate products.

There is much flexibility in applying glyphosate to alfalfa; however, the label contains specific requirements that need to be followed. For example, in a seedling alfalfa stand, glyphosate is to be applied at or before the three to fourth trifoliolate leaf growth stage. As needed, a second application can be made after the fifth trifoliolate leaf growth stage, but should be applied at least five days before harvest. After the first cutting of a newly established alfalfa stand, there are other application timing amounts and rates noted on the label that should be followed.

Grazing

Both broadleaf and grass weeds can often be suppressed by grazing at specific times of the year. This practice may extend the life of an alfalfa stand by creating an alternative profit center that does not require renovation while converting weed plant matter into animal feed. If grazing is used as part of an overall weed control management strategy in a predominant haying system, it is important to use a high density, well managed animal stocking rate during the winter months when alfalfa is dormant. During this time of year, the soil should be dry or frozen to prevent crown damage to alfalfa and to minimize soil compaction. Relatively small fenced paddocks should be used for short (7-10 day rotations) duration. Portable electric

fencing works well to keep animals confined in targeted grazing areas

In cases where the alfalfa stand is thinning and weeds or grasses are becoming more prominent, grazing at other times of the year may be more profitable than haying. Summer grazing in July and August may be an appropriate strategy when summer weeds have become or are becoming dominant competitors. In locations where the first cutting may be damaged by rain, spring grazing can be used to slow the development of the first cutting and delay harvest to occur at a time when there is less of a risk for rain.

Bloat can be a problem when grazing alfalfa fields; however, grazing alfalfa fields can be managed and used for weed management practice. For more information on preventing bloat while ruminant animals graze bloat-prone legumes see Chapter 19. While grazing in grass/alfalfa mixtures normally results in fewer bloat problems, preventing bloat on pure stands of alfalfa can often be accomplished by using the following practices:

- Don't turn hungry animals into a fresh alfalfa field.
- Provide salt, minerals, and bloat preventing compounds.
- Avoid grazing immature alfalfa or alfalfa that is wet from dew or irrigation.
- Avoid grazing after a killing frost for at least three days to avoid toxicity.
- Monitor animals closely, especially when turning them into new pastures.

Also, animals can carry viable weed seeds in their digestive system for several days. If animals have grazed weedy pastures or have eaten feed contaminated with weed seed, they should be fed weed-free feed for 3-5 days to allow time for weed seeds time to pass through the animal before entering a

new alfalfa field. This will reduce the potential for new weed infestations from developing in clean, weed-free alfalfa fields.

Burning

Young weeds that are only a few inches tall can be readily controlled by flaming. Broadleaf weeds are somewhat easier than grasses to control by burning. Grasses are more tolerant of flaming than many broadleaf weeds. To prevent damage and reduced production, burning should be performed before alfalfa growth is initiated in the spring. Burning will also control some weeds found in crop residue. Burning is not an effective broad spectrum weed control method because seed of many weed species requires a high temperature to destroy weed seed that cannot be achieved by flaming. Furthermore, to achieve a thorough and effective burn, it is desirable to have large amounts of residue that are uniformly spread across the field, or to uniformly burn the surface of the field at high enough temperatures to kill weed seeds. This approach requires large flaming equipment and may not be an economical method in many cases.

Fall Harvest Management

To maintain a healthy stand of alfalfa, it is important to allow four to six weeks of plant growth in the fall before the first killing frost (28°F). This allows sufficient plant growth to establish a root system with adequate carbohydrates to survive most winters and also permit early spring growth. Assuring that this process takes place will help to maintain a healthy and competitive stand, which is important for alfalfa to compete against weeds. Once alfalfa is dormant, fields may be grazed.

Biological Weed Control

Table 1. Weed species that can infest alfalfa fields in the Intermountain West.

Biological control of weeds has its basis on evolutionary patterns of relationships between plant species and specific organisms that feed on specific plant species. Normally, the plant species and the organism have evolved together such that they have an integral relationship in which the “control” organism is sustained by the plant and as the plant population diminishes, so does the population of the organism. This relationship is ongoing because the organism’s numbers are reduced by less available food and a balance is created that does not allow the organism to completely eliminate the plant host.

A critical characteristic of effective biological control is an exclusive relationship of the organism with the host plant. This allows the use of biological control without fear of the organism being transferred to other plant species and becoming a pest that requires control methods to be deployed.

Due to the slow nature of achieving a balance in most plant host/biological control organism relationships, using biological control in an intensive crop such as alfalfa that has a relatively short productive life span is of questionable value. Long-term perennial cropping systems such as pasture or areas surrounding hay fields may be better candidates for biological control agents to reduce weed pressures on those nearby alfalfa fields.

Biological agents available include nematodes that attack plant roots in Russian knapweed; weevils, beetles, and moths that attack Canada and musk thistle, spotted and diffuse knapweed, and dalmation and yellow toadflax. An eriophyid mite, *Aceria mahlerbae*, biological control agent of field bindweed is established across much of the Intermountain West. Its effectiveness will probably be greatest in long lived dryland alfalfa fields.

Winter annual weeds	Scientific name	Notes
Flixweed	<i>Descurainia sophia</i> L. Webb	Also called tansy mustard and easily confused with this similar weed. Reproduces by seed.
Tumble mustard	<i>Sisymbrium altissimum</i> L.	Also called tall mustard. Reproduces by seed. Widespread in NW United States.
Shepherdspurse	<i>Capsella bursa-pastoris</i> L. Medic	Also called pepperweed. Reproduces by seed.
Cheatgrass	<i>Bromus secalinus</i> L. <i>Bromus tectorum</i> L.	Also called chess or downy brome. Common weed. Reproduces by seed.
Hare barley	<i>Hordeum leporinum</i> Link	Reproduces by seed. Abundant across region. Often confused with foxtail barley.
Prickly lettuce	<i>Lactuca serriola</i> L.	Also called wild lettuce and compass plant. Reproduces by seed.
Blue mustard	<i>Chorispora tenella</i> Pallas DC	Also called beadpodded mustard. Reproduces by seed.
Western salsify	<i>Tragopogon dubius</i> Scop.	Also called yellow salsify and goatsbeard. This weed is actually a biennial.
Summer annual weeds	Scientific name	Notes
Barnyardgrass	<i>Echinochloa crus-galli</i> L. Beauv.	Also called watergrass. Reproduces by seed. Widespread weed.
Green/yellow foxtail	<i>Setaria viridis</i> L. and <i>Setaria glauca</i> L.	Also called pigeongrass, bristlegrass, wild millet. Reproduces by seed. Very widespread weed.
Lambsquarter	<i>Chenopodium album</i> L.	Also known as goosefoot. Very common weed. Fast growing.
Kochia	<i>Kochia scoparia</i> L. Schrad.	Also called fireweed and Mexican fireweed. Reproduces by seed.
Redroot pigweed	<i>Amaranthus retroflexus</i> L.	Also called rough pigweed. Very widespread weed.
Puncturevine	<i>Tribulus terrestris</i> L.	Reproduces by seed. Very widespread weed.
Sowthistle	<i>Sonchus oleraceus</i> L.	Also called field sowthistle and annual sowthistle. Reproduces by seed.
Purslane	<i>Portulaca oleracea</i> L.	Reproduces by seed. Widespread.. The purslane sawfly, <i>Schizocerella pilicornis</i> is a widely distributed biological control agent that can occasionally defoliate plants in July/August
Russian thistle	<i>Salsola iberica</i> Sennen & Pau	Also called Russian tumbleweed. Widespread weed. Germinates in early spring.
Venice mallow	<i>Hibiscus trionum</i> L.	An annual primary noxious annual weed in Colorado. Also, known as flower-of-an-hour, spiny mallow, and Indian mallow. Prolific producer of seeds that are triangular to kidney-shaped.
Sandbur	<i>Cenchrus longispinus</i> (Hackel) Fern.	Also called burgrass. Reproduces by seed.
Prostrate knotweed	<i>Polygonum aviculare</i> L.	Also known as doorweed and matweed
Buffalobur	<i>Solanum rostratum</i> Dunal	Also called horsenettle. Reproduces by seed. Mostly found in western states.

Dodder	<i>Cuscuta</i> spp.	A parasitic annual weed that can be serious problem in alfalfa in some areas of the Intermountain West.
Wild oat	<i>Avena fatua</i> L.	Noxious weed. Reproduces by seed.
Perennial weeds	Scientific name	Notes
Buckhorn plaintain	<i>Plantago lanceolata</i> L.	A simple perennial. Reproduces by seed. Apply approved herbicides at the rosette stage prior to flower stalk initiation.
Foxtail barley	<i>Hordeum jubatum</i> L.	Also called wild barley. A simple perennial.
Field bindweed	<i>Convolvulus arvensis</i> L.	Also called European bindweed, wild morningglory, creeping-jenny, greenvine. A noxious creeping perennial. A widely distributed weed. Two biological agents, the bindweed mite, <i>Aceria malherbae</i> , and the bindweed moth, <i>Tyta luctuosa</i> , are widely distributed.
Dandelion	<i>Taraxacum officinale</i> Weber	A simple perennial. Reproduces by seed. Very widespread weed. Apply approved herbicides at the rosette stage.
Common mallow	<i>Malva neglecta</i> Wallr.	Also called roundleaf mallow, cheeseweed, and buttonweed. Has deep taproot
Canada thistle	<i>Cirsium arvense</i> L.	Also called creeping thistle. A noxious, creeping perennial. Apply approved herbicides in the fall at bud to early flower and in some cases rosettes.
Curly dock	<i>Rumex crispus</i> L. R. <i>stenophyllus</i> Ledeb.	Also known as yellow dock, narrow-leaved dock, sour dock
Showy milkweed	<i>Asclepias speciosa</i> Torr.	Reproduces by seed and horizontal roots. Widespread weed.

Table 2. General methods of weed control for use in alfalfa fields.

Methods of Weed Control

- Site selection
- Cultivation
- Planting time and methods
- A dense, vigorous stand
- Proper irrigation
- Adequate soil fertility
- Crop rotation
- Adapted varieties
- Good soil drainage
- Pest control
- Flooding
- Weed-free seed
- Companion crops
- Weed control before planting
- Mowing
- Mob grazing
- Burning/flaming
- Herbicides
- Biological
- Smother crops
- Herbicide-resistant varieties
- Residue management

Table 3. Herbicides (trade name and chemical name), primary manufacturer, and recommended timing to apply in alfalfa. Read and follow the manufacturer's herbicide label.

Herbicide	Primary Manufacturer	Application timing
AlfaMax Gold (hexazinone and diuron)	DuPont	Contact and residual control of annual and biennial weeds. Pre-emergence or post-emergence when weeds are less than 2 inches in height or diameter.
Arrow 240 EC (clethodim)	Makhteshim Agan of North American	Selective post-emergence herbicide for control of a broad range of grasses. For use in seedling alfalfa.
Balan	Lebanon Seaboard Corp.	Pre-emergent control of annual grasses and broadleaf weeds. Requires incorporation. Controls weeds as they germinate. Does not control established weeds.
Butoxone 2,4-DB	Cedar Chemical	For use on seedling (reached 1 to 2 trifoliolate leaf stage) and established stands of alfalfa. Spray broadleaf weeds in the 2- to 5-leaf stage of growth.
Chateau WDG (flumioxazin)	Valent	Apply as soon as possible after cutting established alfalfa. Regrowth of alfalfa must be 6 inches tall or less. For pre-emergent control of weeds.
Eptam (EPTC)	Gowan	Controls weeds by interfering with normal germination and seedling development. Preplant incorporated herbicide. Does not control established weeds.
Gramoxone Extra (paraquat)	Zeneca	Restricted use herbicide. Contact herbicide to control or suppress a broad spectrum of emerged broadleaf and grass weeds. Can be applied on dormant stands or between cuttings.
Karmex DF (diuron)	DuPont	Apply to healthy stands of alfalfa that have been established for at least one full growing season. Applied when alfalfa is dormant or new growth is less than 2 inches high.
Kerb 50 WSP (pronamide)	Dow AgroSciences	Selective herbicide to control certain perennial grasses and most annual grasses. Should be applied in the fall from late September to early November.
Poast (sethoxydim)	BASF	Selective, post emergence herbicide for control and annual and perennial grasses.
Prowl H ₂ O (pendimethalin)	BASF	Control most annual grasses and certain broadleaf weeds as they germinate. For application in established alfalfa for forage/hay and in seedling alfalfa.
Pursuit (imazethapyr)	BASF	Controls weeds by uptake of herbicide by roots and foliage and rapid translocation to growing points. Apply to established alfalfa in the fall or spring to dormant or semi-dormant alfalfa or between cuttings.
Raptor (imazamox)	BASF	Controls weeds by uptake of herbicide by roots and foliage and rapid translocation to growing points. Apply to established alfalfa in the fall or spring to dormant or semi-dormant alfalfa or between cuttings.

Roundup (glyphosate)	Monsanto	Use rates are different for stand establishment and established stands. There is also a maximum single application rate and a maximum seasonal application rate. Can be applied up to 5 days before cutting.
Sandea (halosulfuron)	Gowan	Sandea is absorbed through roots, shoots, and foliage. Applied to established alfalfa fields as a post emergence with ground equipment.
Select 2 EC	Valent	For application to seedling and established alfalfa grown for seed, hay, silage, green chop, or direct grazing. Selective control of grasses. Time from application to harvest (grazing, feeding, cutting) is 15 days.
Sencor 4 flowable (metribuzin)	Bayer CropScience	Apply to established alfalfa when it is dormant. Weeds should be less than 2 inches tall or 2 inches in diameter.
Solicam DF (norflurazon)	Syngenta	Pre-emergent herbicide to control certain grass and broadleaf weeds. Apply to healthy stands of established alfalfa. Seedling alfalfa must be emerged and actively growing for 3 months.
Treflan TR-10 (trifluralin)	Dow AgroSciences	Selective pre-emergent herbicide for control of many annual grasses and broadleaf weeds. Requires soil incorporation within 24 hours after application of herbicide. Controls weeds as they germinate. Does not control established weeds.
Velpar DF (hexazinon)	DuPont	Provides both contact and residual control of many annual and biennial weeds and woody plants and most perennial weeds. For control of certain weeds in established alfalfa grown for hay.
Zorial Rapid 80 (norflurazon)	Novartis	Pre-emergent herbicide for control of certain grass, broadleaf, and sedge weeds. Apply to healthy stands of established alfalfa. Do not apply to seedling alfalfa until it has emerged and been actively growing for 5 months.

Selected References

Whitson T.D., L.C. Burrill, S.A. Dewey, D.W. Cudney, B.E. Nelson, R.D. Lee, and R. Parker. 1996. *Weeds of the West, 5th edition*. Western Society of Weed Science, Western United States Land Grant Universities, Cooperative Extension Services. Pioneer of Jackson Hole. Jackson, WY.

Zimdahl R.L. 1983. *Weeds of Colorado*. Bulletin 521A. Cooperative Extension Service. Colorado State University. Fort Collins, CO.