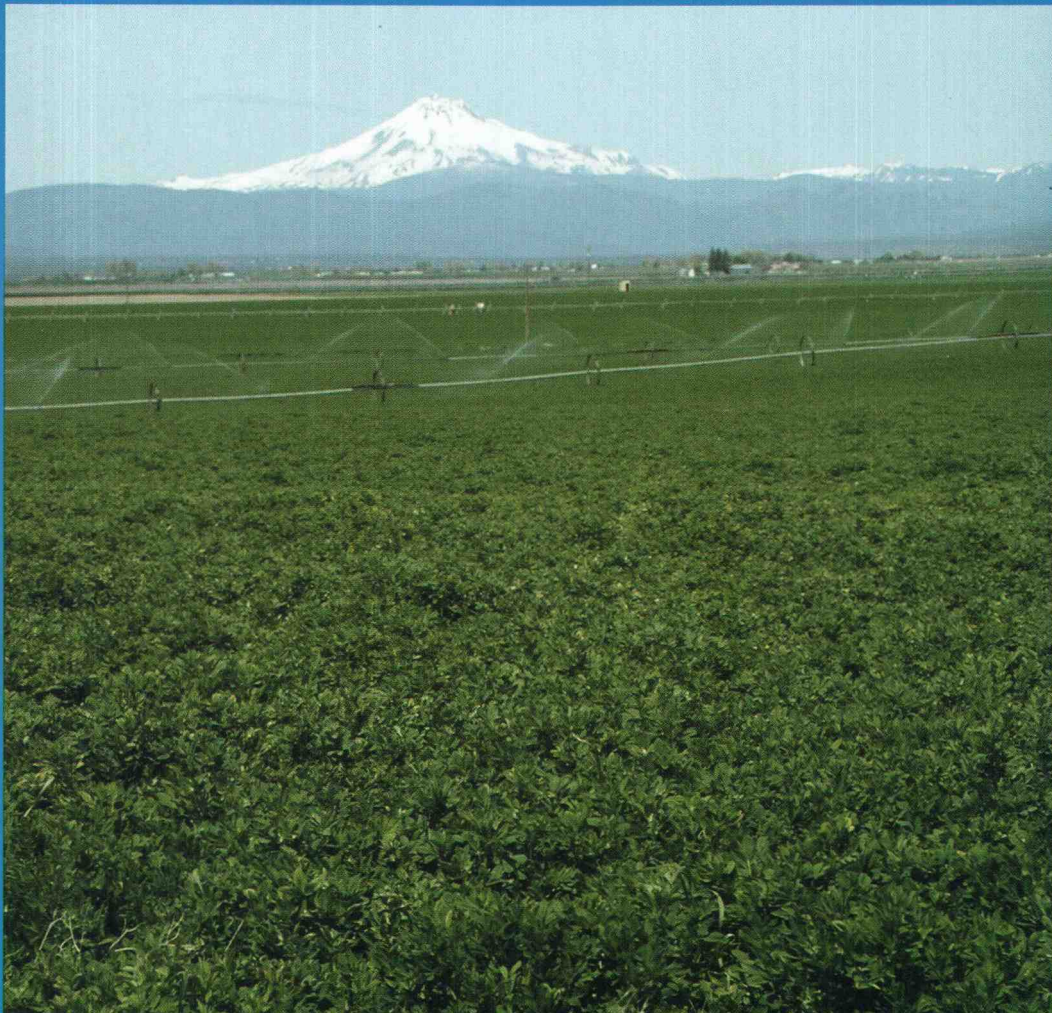


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WEED MANAGEMENT

in Hay Production



OREGON STATE UNIVERSITY
EXTENSION SERVICE

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Weed Terms

Auricle—A small, ear-shaped lobe or appendage at the base of a grass leaf.

Awn—A slender, usually terminal bristle in a seed head.

Axil—The angle between a leaf and stem.

Bract—A small, leaflike structure below a flower.

Glabrous—Smooth; without hairs.

Ligule—A thin, membranous outgrowth or fringe of hairs from the base of a grass blade.

Panicle—A loose, irregularly compound flowering part of a plant with flowers borne on individual stalks.

Petiole—A stem or stalk of a leaf.

Raceme—An arrangement of flowers along a stem on individual stalks about equal in length.

Rhizome—An underground stem, usually lateral, sending out shoots above ground and roots below.

Rosette—A compact cluster of leaves arranged in an often basal circle.

Sepal—The outer, leaflike part of a flower.

Silique—An elongated capsule with two separate valves.

Spikelet—A flower cluster in grasses consisting of usually two basal bracts and one or more florets.

Stipule—One of a pair of appendages at the junction of a leaf petiole and a stem.

Stolon—A horizontal stem that roots at the nodes.

Umbel—A group of flowers growing from a common point on a stem.

Weed Management in Hay Production

How to Use This Publication

There are three ways to use this publication as a decision aid for managing weeds in hay production.

1) **For the weeds I have, which herbicides are best for my situation?** To answer this question, begin with the herbicide–weed charts in **Section 1** (pages 4–6). Then check Sections 2 and 3 for more details. Herbicide activity ratings are based on the following scale:

P = poor control

F = fair control

G = good control

(s) = seedling control

2) **What is the best timing and rate for a specific herbicide?** **Section 2** (pages 7–11) includes details on application timings, rates, and combinations that provide broad-spectrum weed management.

3) **What weeds do I have?** **Section 3** (pages 12–29) includes photographs, a brief description, and animal toxicity information for the weeds most commonly found in hay fields.

Use Herbicides Safely!

- Wear protective clothing and safety devices as recommended on the label. Bathe or shower after each use.
- Read the herbicide label—even if you’ve used the herbicide before. Follow closely the instructions on the label (and any other directions you have).
- Be cautious when you apply herbicides. Know your legal responsibility as a pesticide applicator. You may be liable for injury or damage resulting from herbicide use.

Herbicide Mode of Action

Group name	Mode of action
1 ACCase inhibitors	Inhibition of ACCase enzyme
2 ALS inhibitors	Inhibition of ALS enzyme
3 Dinitroanilines and others	Microtubule assembly inhibition
4 Synthetic auxins	Synthetic auxin
5 Triazines and others	Inhibition of photosystem II
6 Nitriles and others	Inhibition of photosystem II
7 Ureas and amides	Inhibition of photosystem II
8 Thiocarbamates	Unknown
9 Glycines	Inhibition of EPSP synthase enzyme
12 Pyridazinones	Inhibition of carotenoid synthesis
22 Bipyridyliums	Photosystem I electron diversion

Weed Management in Hay

Effective weed management in perennial forage crops begins before planting and continues through the life of the stand. The most important step in weed management in a hay crop is the establishment of a reasonably dense, vigorous, well-fertilized stand. A dense stand will make efficient use of resources and greatly reduce the opportunity for weeds to encroach. Varietal selection, proper soil fertility and pH, seedbed preparation, and an appropriate cutting schedule are critical to preventing weed encroachment.

Growing quality forage presents different weed control problems than does row crop production.

- Small-seeded forage crops are not strong competitors during establishment.
- Cultivation is not an option since forage crops are seeded in a solid stand.
- Mixtures of crop species (grasses and legumes) may limit herbicide options.

Crop and cultivar selection

Weed management in hay starts with crop and cultivar selection. Choosing the best-suited crop and cultivar will reduce the risk of stand thinning as the stand matures.

When choosing a hay crop, select the best adapted, highest yielding, and most persistent species for your climate, soil, and growing conditions. For example, birdsfoot trefoil has greater tolerance than alfalfa to acidic, infertile, or poorly drained soils, but alfalfa is more drought-tolerant, easier to establish, and typically higher yielding. Also consider compatibility with other forage crops in mixed hay establishment.

Cultivar selection should be based on the production issues that are specific to your region. Cultivar characteristics to consider include disease, nematode, and insect resistance; winter hardiness; seedling vigor; regrowth potential; and overall yield potential.

Certified seed

Certified seed is free of noxious weeds, off-types, and in some cases seed-borne diseases. Planting weed-free, certified seed can save a lot of effort in controlling problem weeds in an established stand. Certified seed will have a blue tag on the bag that indicates its purity.

Seedbed preparation

Proper soil pH and adequate soil fertility at planting are very important when growing perennial forage crops. A soil test is an inexpensive management tool that will help a crop reach full yield potential. Pre-plant additions of fertilizer, lime, sulfur, or gypsum, according to soil test recommendations, will provide readily available nitrogen, phosphorus, potassium, and other essential elements for the crop. If needed, adjustments to pH and phosphorus should be made before the crop is planted.

Planting into a clean seedbed will reduce the risk of crop failure because of weed infestation and weed encroachment into the mature stand. Once the crop is established, there may be limited herbicide options for controlling established weeds.

Before preparing the seedbed, control established perennial weeds with glyphosate (sold under various trade names). Tillage during seedbed preparation can reduce weed infestations if the crop is planted as soon as possible after final tillage so the weeds cannot get a head start. Another very useful technique is to allow the initial flush of weeds to germinate, kill them with herbicides, and then plant into a “stale seedbed” with minimal soil disturbance. When establishing alfalfa, a preplant herbicide such as EPTC (Eptam) or benefin (Balan) can be very effective in starting with a clean stand.

Planting date

Planting at the proper time facilitates a healthy, competitive stand and can be a way to manage potential weed problems. For some forage crops, fall planting may help the crop outcompete aggressive summer annual weeds, since the crop will be more competitive by summer than a spring planting would be. If winter annual weeds are a major problem, spring planting may be more beneficial, since these weeds can be easily controlled before planting.

Herbicides

Herbicides can be applied preplant, preemergence, postemergence, or when the crop is dormant. Pre-plant applications are made during seedbed preparation, and preemergence applications are made after the seed is planted. These applications are an important step in establishing a dense hay stand. Postemergence herbicide selection will be determined by weed and crop growth stage, crop species, and

growing conditions. Dormant applications are made to established crops in the winter when the crop is not actively growing. They are used for control of winter annual weeds.

Harvest timing

Harvest timing also can be utilized to manage weeds. For example, by taking the first or second cutting earlier than the optimum timing for the crop, annual weeds such as redroot pigweed and Russian thistle should still be relatively palatable and can be kept from going to seed. This type of harvest management also reduces the potential for new flushes of these weeds as their seed bank is diminished. However, more frequent than recommended cutting can reduce stand vigor and stand life and can allow weed encroachment. Forage yield, quality, and stand persistence are major considerations to balance in a profitable harvest schedule.

Stand maintenance

Maintaining a persistent stand will give you better return on your initial investment in crop establishment and is the best weed control strategy in mature stands. Forage growers often think of persistence in terms of the stand as a whole. When it comes to keeping out weedy invaders, however, consider crop

persistence on a plant-by-plant basis since weed encroachment is most recognizable at this scale. This fact is especially important for crops such as alfalfa and red clover, which do not reproduce vegetatively and do not reseed under a typical cutting schedule. (Furthermore, a condition known as autotoxicity restricts young alfalfa plants from establishing in a mature stand.)

When weeds encroach into mature stands, forage quality is much more likely to be affected than yield. Weeds such as common dandelion or common lambsquarters do not significantly influence forage quality and animal intake, whereas a weed such as mayweed chamomile is irritating to livestock and decreases animal intake. Higher fiber content in grassy weeds also decreases animal intake. Some weeds, such as common groundsel and tansy ragwort, are poisonous to animals.

Conclusion

Weed management in hay crops is based on maintaining a healthy, competitive, and persistent crop stand. Competitive crop maintenance includes proper harvest management, cutting height, disease and insect control, fertility and pH maintenance, and irrigation. Encroachment of summer annual and perennial weeds often is a sign of a weak crop stand, and renovation should be considered.

SECTION I: HERBICIDE-WEED CHARTS

Alfalfa hay: broadleaf weeds

	Velpar (hexazinone)	Raptor (imazamox)	Pursuit (imazethapyr)	trifluralin (various trade names)	Kerb (pronamide)	Balan (benefin)	Karmex, Direx, Diuron (diuron)	Zorial (norflurazon)	Eptam (EPTC)	Sencor (metribuzin)	paraquat (various trade names)	glyphosate (various trade names)	Sinbar (terbacil)	bromoxynil (various trade names)	2,4-DB (various trade names)
Mode of action (see page I)	5	2	2	3	3	3	7	12	8	5	22	9	5	6	4
Bedstraw (<i>Galium aparine</i>)							P			P	F-G	G		P-F	P-F
Broadleaf plantain (<i>Plantago major</i>)	P		P	P		P	P	F			F	F-G	F	P	G
Buckhorn plantain (<i>Plantago lanceolata</i>)	P		P	P		P	P	F			F	F-G	F	P	G
Canada thistle (<i>Cirsium arvense</i>)	P	F	P	P	P	P	P	P	P	P	P	F-G	P	P	F
Common chickweed (<i>Stellaria media</i>)	F	G	G	F	F	G	G	G	G	G	F	G	G	P	P
Common dandelion (<i>Taraxacum officinale</i>)	F		P	P	P	P	G(s)			F	F	G	F-G(s)	P	G
Common groundsel (<i>Senecio vulgaris</i>)	G	P-F	P-F	P	P	P	P	P	F	F	F	G	P-F	F	G
Common lambsquarters (<i>Chenopodium album</i>)	F	G	F	F	G	G	G		G	F	F	G	G	G	G
Dodder (<i>Cuscuta</i> spp.)	P	F	F	P-F	P-F	P	P		P	P	P-F	G	P	P	P
Fiddleneck (<i>Amsinckia intermedia</i>)	F	F	F	G	G	G	G	F	F	G	F	G	F	G	P
Field bindweed (<i>Convolvulus arvensis</i>)	P		P	G	P	P	P	P	P	P	P	F	P	P	P-F
Filaree (<i>Erodium</i> spp.)	G	F	G	P	P	P	G	P	P	G	P	G	F	F	F
Flixweed (<i>Descurainia sophia</i>)	G	G	G	P	P	P	G	G	P	G	F-G	G	G	G	F
Hedge mustard (<i>Sisymbrium officinale</i>)			G			P						G			F-G
Henbit (<i>Lamium amplexicaule</i>)	G	F	F	G			G	F	G	F	G	G	G		
Mayweed chamomile (<i>Anthemis cotula</i>)	F	P	P	P	P	P	F-G			F-G	F-G	F	F-G	F-G	P-F
Miner's lettuce (<i>Montia perfoliata</i>)	G	G	G	G	F	F	G	F	P		G	G		F	P
Mustard (<i>Brassica</i> spp.)	G	G	G	P	F	P	F-G	G	P	G	F	G	G	G	G
Nightshade (<i>Solanum</i> spp.)	G	G	G	P	G	P	G	G	G	P	F	G	G	G	G
Perennial pepperweed (<i>Lepidium latifolium</i>)	F		F-G	P	P		G	P		F-G	F-G	F-G		F-G	F-G
Poison hemlock (<i>Conium maculatum</i>)							F			P		G		P	
Prickly lettuce (<i>Lactuca serriola</i>)	G	P	P	P	P	P	F	P	G	G	F	G	G	F	G
Prostrate knotweed (<i>Polygonum aviculare</i>)	G	F	G	G	G	G	G		F	P-F	F	F-G	G	F	F
Puncturevine (<i>Tribulus terrestris</i>)			F-G	G				F	F		F	G	F	G	
Redroot pigweed (<i>Amaranthus retroflexus</i>)	F	G	G	G	G	G	G	G	G	G	F	G	G	F	G
Russian thistle (<i>Salsola iberica</i>)		F-G		G	G	G	G	F	P	F-G	G	G	G	G	G
Shepherdspurse (<i>Capsella bursa-pastoris</i>)	G	G	G	P	G	P	G	G	F	G	F	G	G	G	F
Smartweed (<i>Polygonum</i> spp.)		G						F			G	G	F	G	F-G
Sowthistle (<i>Sonchus</i> spp.)	G	F-G	P	G	F	P	F	F	G	P	P	G	G	G	G
Spotted catsear (<i>Hypochaeris radicata</i>)	F	P	P	P	P	P	G(s)			F-G(s)	G(s)	G	G(s)	F-G(s)	
Sticky chickweed (<i>Cerastium viscosum</i>)		G	G				G			G	G	G	G	P	P
Western waterhemlock (<i>Cicuta douglasii</i>)												G			
Wild radish (<i>Raphanus raphanistrum</i>)	G	G	G	P	F	P	G	G	P	G	F	G		G	P
Yellow starthistle (<i>Centaurea solstitialis</i>)	G		P	P	P	F	G	P	G		F	G		F	G

P = poor control; F = fair control; G = good control; (s) = seedling control

SECTION 1: HERBICIDE-WEED CHARTS

Alfalfa hay: grass weeds

	Velpar (hexazinone)	Raptor (imazamox)	Pursuit (imazethapyr)	trifluralin (various trade names)	Kerb (pronamide)	Balan (benefin)	Karmex, Direx, Diuron (diuron)	Zorial (norflurazon)	Eptam (EPTC)	Sencor, Lexone (metribuzin)	paraquat (various trade names)	glyphosate (various trade names)	Prism, Select (clethodim)	Poast, Poast Plus (sethoxydim)
Mode of action (see page 1)	5	2	2	3	3	3	7	12	8	5	22	9	1	1
Annual bluegrass—susceptible (<i>Poa annua</i>)	F	F	F	G	G	G	G	G	G	F	F	G	F–G	P
Annual bluegrass—resistant (<i>Poa annua</i>)	F	F	F	G	G	G	P	F	G	F	F	G	F–G	P
Barnyardgrass (<i>Echinochloa crus-galli</i>)	F	G	G	G	G	G	F–G	G	G	F–G	F	G	G	G
Bulbous bluegrass (<i>Poa bulbosa</i>)	F		P	F	G		P			G	G	G	P	P
California brome (<i>Bromus carinatus</i>)	F–G	G				F	P	G		P		G		G
Downy brome (<i>Bromus tectorum</i>)	G	G	P	G	G	F	P	G	G	F	G	G	F–G	F
Other bromes (<i>Bromus</i> spp.)	G	G				F	P	G		F		G		G
Foxtail (<i>Setaria</i> spp.)	G	G	G	G	F–G	G	F–G	G	G	P–F	P–F	G	G	G
Foxtail barley (<i>Hordeum jubatum</i>)	F		P	F	G	F	F	G	F	G	F	G	G	G
Italian ryegrass (<i>Lolium multiflorum</i>)	G	G	P	F–G	G	G	F–G	G	G	F–G	G	G	G	G
Quackgrass (<i>Elytrigia repens</i>)	F	F	F	P	G	P	P–F	F–G	F		P–F	G	F	F
Rattail fescue (<i>Vulpia myuros</i>)		F					G	G		F	F–G	G	P–F	P
Wild oat (<i>Avena fatua</i>)	F	G	F	P	G	P	P–F	G	G	P–F	F	G	G	G
Yellow nutsedge (<i>Cyperus esculentus</i>)	P	F	F	P	P	P	P	F	F	P	P	F	P	P

P = poor control; F = fair control; G = good control; (s) = seedling control

SECTION 1: HERBICIDE-WEED CHARTS

Grass hay: broadleaf weeds

	Ally (metsulfuron)	Amber (triasulfuron)	MCPA (various trade names)	Weedmaster (dicamba + 2,4-D)	dicamba (various trade names)	2,4-D (various trade names)	Curtail (clopyralid + 2,4-D)	Stinger (clopyralid)	Crossbow (triclopyr + 2,4-D)	Redeem R&P (triclopyr + clopyralid)	glyphosate (various trade names)
Mode of action (see page 1)	2	2	4	4	4	4	4	4	4	4	9
Bedstraw (<i>Galium aparine</i>)	G		P-F	F	F	F	F	P	G		G
Broadleaf plantain (<i>Plantago major</i>)	F		F	F-G	F-G	F-G		P	G	G	F-G
Buckhorn plantain (<i>Plantago lanceolata</i>)	F		F	F-G	F-G	F-G	F-G	P	G	G	F-G
Canada thistle (<i>Cirsium arvense</i>)	G	P-F	F-G(s)	F-G(s)	F(s)	F-G(s)	G	G	F-G	F	F-G
Common chickweed (<i>Stellaria media</i>)	G	F-G	P-F	G	F-G	F	F	P	F-G		G
Common dandelion (<i>Taraxacum officinale</i>)	G		G	G	F-G	F-G	G	F	G	G	G
Common groundsel (<i>Senecio vulgaris</i>)	G		F-G	F-G	F-G	F-G	G	G	P	G	G
Common lambsquarters (<i>Chenopodium album</i>)	G		G	G	G	G	F-G	P	G	G	G
Dodder (<i>Cuscuta</i> spp.)								P			G
Fiddleneck (<i>Amsinckia intermedia</i>)		G						P			G
Field bindweed (<i>Convolvulus arvensis</i>)	G		F-G	F	F	F	P-F	P	G		F
Filaree (<i>Erodium</i> spp.)	G		G	G	G	G	P-F	P			G
Hedge mustard (<i>Sisymbrium officinale</i>)	F			F-G	P-F	G	P-G	P			G
Henbit (<i>Lamium amplexicaule</i>)	G	F-G	F	G	G	G		P	F-G		G
Mayweed chamomile (<i>Anthemis cotula</i>)	F		P-F	G	F	P-F	G	G	F	F	F
Miner's lettuce (<i>Montia perfoliata</i>)		G									G
Mustard (<i>Brassica</i> spp.)	G	G	G	G	F	G	F	P	G		G
Nightshade (<i>Solanum</i> spp.)	G			G	F-G	F	G	P	G	G	G
Perennial pepperweed (<i>Lepidium latifolium</i>)	G	G		G	F-G	G	F	P	G	G	G
Poison hemlock (<i>Conium maculatum</i>)		G	P	G	P	F					G
Prickly lettuce (<i>Lactuca serriola</i>)	G	G	G	G	G	G	G	G	G	G	G
Prostrate knotweed (<i>Polygonum aviculare</i>)			P-F	G	G	P-F		F			F-G
Puncturevine (<i>Tribulus terrestris</i>)		G			G	G					G
Redroot pigweed (<i>Amaranthus retroflexus</i>)	G	G	G	G	G	G	F-G	P	G		G
Russian thistle (<i>Salsola iberica</i>)		F-G	F					P			G
Shepherdspurse (<i>Capsella bursa-pastoris</i>)	G	G	G	F-G	F-G	G	F	P	G	G	G
Smartweed (<i>Polygonum</i> spp.)	G		F	G	G	F-G	F-G	F	G		G
Sowthistle (<i>Sonchus</i> spp.)			G	G	G	F	G	G	F-G	F-G	G
Spotted catsear (<i>Hypochaeris radicata</i>)			G	G	G	G	G		G	G	G
Sticky chickweed (<i>Cerastium viscosum</i>)	G		P-F	F	F	P-F		P			G
Western waterhemlock (<i>Cicuta douglasii</i>)			G		G	G					G
Wild radish (<i>Raphanus raphanistrum</i>)		G	G	F-G	F-G	G	P-G	P			G
Yellow starthistle (<i>Centaurea solstitialis</i>)				F				G		F-G	G

P = poor control; F = fair control; G = good control; (s) = seedling control

Section 2: Herbicide Notes

Alfalfa hay

2,4-DB (various trade names)

Labeled rate: 0.5 lb ae/A

Comments: Apply postemergence when broadleaf weeds are less than 3 inches in height or diameter.

Precautions: Alfalfa injury from 2,4-DB application increases as alfalfa stands age. Do not graze seedling alfalfa within 60 days following application.

benefin (Balan)

Labeled rate: 1.2–1.5 lb ai/A (2.0–2.5 lb/A Balan DF)

Comments: Apply preplant and incorporate within 3 weeks prior to alfalfa planting. Incorporate within 4 hours of application. Even incorporation is critical for weed control and to prevent crop injury.

Precautions: In arid regions, do not plant wheat, barley, oats, rye, other grasses, onions, corn, milo, spinach, red beet, sugarbeet, or other root crops for 10 months following application of benefin. Do not apply benefin to soils that are wet or cloddy or where there is excessive plant residue.

bromoxynil (various trade names)

Labeled rate: 0.25–0.375 lb ai/A (1.0–1.5 pt/A Buctril 2.0 or Moxy 2E; 0.5–0.75 pt/A Buctril 4EC).
Chemigation: 0.5 lb ai/A (2.0 pt/A Buctril 2.0 or Moxy 2E; 1.0 pt/A Buctril 4EC)

Comments: Apply in fall or spring to seedling alfalfa when the majority of the field has a minimum of two trifoliolates. Apply when weeds do not exceed the four-leaf stage, 2 inches in height, or 1 inch in diameter.

Precautions: Bromoxynil applications made when temperatures are expected to exceed 80°F at and 3 days following application can result in crop injury. Do not apply to alfalfa that is stressed. Do not add a surfactant or crop oil. Do not cut or graze alfalfa within 30 days following treatment. Do not cut or graze fall- or winter-treated alfalfa until spring, at least 60 days following treatment. Total annual application should not exceed 0.5 lb ai/A. Tank-mixes with 2,4-DB or application following a preemergence EPTC treatment can cause crop injury.

clethodim (Select, Prism)

Labeled rate: 0.094–0.125 lb ai/A (6–8 oz/A Select 2EC or 13–17 oz/A Prism) + 1% v/v crop oil concentrate. Use up to 0.25 lb ai/A for grass control in established alfalfa.

Comments: Apply postemergence when grass weeds are small.

Precautions: Do not apply more than 0.5 lb ai/A per season. Do not apply a broadleaf herbicide within 1 day following application or reduced grass control may result. Tank-mixes with broadleaf herbicides can result in reduced weed control. Do not graze, feed, or harvest alfalfa within 15 days of application. Do not plant rotational crops within 30 days of application.

diuron (Karmex, Direx, Diuron)

Labeled rate: 1.2–2.4 lb ai/A (1.5–3.0 lb/A Karmex 80DF, Direx 80DF, or Diuron 80DF; 38.4–76.8 oz/A Direx 4L or Diuron 4L)

Comments: Apply at beginning of fall dormancy to alfalfa established for 1 year or more. Do not apply after mid-December or when ground is frozen.

Precautions: Do not apply to seedling alfalfa or to alfalfa interseeded with grass species. Do not apply to stressed alfalfa or alfalfa on soils with less than 1 percent organic matter.

EPTC (Eptam)

Labeled rate: 1.97–3.94 lb ai/A (2.25–4.5 pt/A Eptam 7E or 10–20 lb/A Eptam 20G)

Comments: Apply preplant and incorporate (Eptam 7E or Eptam 20G) or meter into irrigation water immediately after planting (Eptam 7E only). On established stands, meter Eptam 7E (2.25–3.5 pt/A) into irrigation water prior to weed emergence or apply Eptam 20G (10–15 lb/A) and incorporate with irrigation.

Precautions: Do not graze or cut within 14 days of application. Do not use EPTC if alfalfa will be interseeded with a grass species. Apply lower rate on coarse-textured soils. Apply and incorporate only into dry soil. Do not exceed 15 lb/A Eptam 20G in any single application or 60 lb/A Eptam 20G per season. When incorporating with irrigation, wet soil to a depth of 3 to 4 inches.

SECTION 2: HERBICIDE NOTES

glyphosate (various trade names)

Labeled rate: 0.75–3.75 lb ae/A

Comments: Apply preplant to perennial weeds at least 10 days before planting alfalfa, or as a spot treatment in alfalfa. Also can be used as a preharvest treatment prior to last cutting before removing alfalfa stand (can be cut for hay 36 hours after treatment).

Precautions: Do not apply to weeds stressed by drought or near maturity. If used as a spot treatment, do not treat more than 10 percent of the field. Do not cut hay or graze within 14 days of treatment.

hexazinone (Velpar)

Labeled rate: 0.5 to 1.5 lb ai/A (0.67–2.0 lb/A Velpar DF or 2–6 pt/A Velpar L)

Comments: *Nondormant and semidormant varieties:* single application during winter months when alfalfa growth is least active. Best results when applied before or soon after weed emergence.

Precautions: Severe alfalfa injury may occur when application is made after cutting or when regrowth is more than 2 inches high. Do not replant treated areas to any crop except corn or root crops within 2 years after treatment. Do not apply to snow-covered or frozen ground. Treat only stands established for at least 1 year or 1 growing season. Hexazinone will injure or kill grass companion crops.

imazamox (Raptor)

Labeled rate: 0.031–0.047 lb ai/A (4–6 oz/A Raptor)

Comments: *Seedling alfalfa:* apply to alfalfa in the second trifoliolate or larger. *Established alfalfa:* apply to dormant or semidormant alfalfa or between cuttings. Apply before alfalfa regrowth is greater than 3 inches.

Precautions: See replant restrictions on label before using imazamox. Imazamox applications to seedling alfalfa may result in a temporary reduction of growth.

imazethapyr (Pursuit)

Labeled rate: 0.047–0.094 lb ai/A (1.08–2.16 oz/A Pursuit DG)

Comments: *Seedling alfalfa:* apply to alfalfa in the second trifoliolate or larger. *Established alfalfa:* apply to dormant or semidormant alfalfa or between cuttings.

Precautions: Do not apply more than 0.094 lb ai/A per season. Do not apply more than 0.063 lb ai/A in the last year of a stand. See replant restrictions before using. Yellowing and temporary stunting of alfalfa may occur when imazethapyr is applied when air temperature is 40°F or less. Imazethapyr will damage or kill interseeded grass companion crops such as oats, fescues, bromes, orchardgrass, or timothy.

metribuzin (Sencor)

Labeled rate: 0.25–1.0 lb ai/A (0.33–1.33 lb/A Sencor 75 DF). Do not apply more than 0.5 lb ai/A on loamy sand soils in Oregon or Washington.

Comments: Apply only on established alfalfa when weeds are 2 inches or less in height or diameter and when alfalfa is dormant. Sencor can be used on mixed stands of alfalfa and grass, but higher rates will severely reduce grass stands.

Precautions: Do not graze or harvest within 28 days after application. Do not use on sandy soils or on soils with a pH greater than 8.2. Do not apply to frozen ground.

norflurazon (Zorial)

Labeled rate: 1–2 lb ai/A (20–40 lb/A Zorial 5G or 1.25–2.5 lb/A Zorial Rapid 80)

Comments: Do not apply within 5 months after alfalfa planting. Apply to dormant alfalfa or after alfalfa cutting but prior to weed emergence. Incorporation with 0.5 to 1.0 inch of irrigation or precipitation is necessary to activate norflurazon.

Precautions: Do not apply through irrigation system or within 28 days of hay harvest. Interseeded grasses in alfalfa will be injured or killed by norflurazon. Do not apply to frozen ground. Crop rotations are restricted on soils with greater than 65 percent sand to soybean or aparagus within 16 months and with a minimum of two summers after application.

SECTION 2: HERBICIDE NOTES

paraquat (various trade names)

Labeled rate: 0.47–0.625 lb ai/A + nonionic surfactant

Comments: Apply to new seedlings prior to crop emergence or in fall and winter when alfalfa is dormant and weeds are small. Paraquat will control only emerged weeds.

Precautions: Weed control decreases as weed size increases. Combine paraquat with a residual herbicide for improved weed control. Do not apply more than once per season. Do not harvest or graze within 60 days of application. Do not tank mix with metribuzin when alfalfa is less than 1 year old.

pronamide (Kerb 50W)

Labeled rate: 0.5–2.0 lb ai/A (1–4 lb/A Kerb 50W)

Comments: Apply October through December to alfalfa with at least one trifoliolate. Herbicide is most effective when temperatures are less than 50°F and pronamide is incorporated into the soil with irrigation or precipitation. Controls weeds prior to or soon after emergence.

Precautions: Apply pronamide only to a residue-free surface. See replant restrictions on label before using pronamide. Do not apply pronamide to frozen soil. Do not apply more than 2 lb ai/A per season. Do not graze or feed cuttings within 25 days of application (1.5 lb ai/A or less) or within 45 days of application of more than 1.5 lb ai/A.

sethoxydim (Poast or Poast Plus)

Labeled rate: 0.19–0.47 lb ai/A (1.0–2.5 pt/A Poast or 1.5–3.75 pt/A Poast Plus) + 2 pt crop oil concentrate or 1.5 pt methylated seed oil

Comments: Apply postemergence when grass weeds are small and at least 14 days before cutting hay or at least 7 days before grazing. For irrigated alfalfa, apply 2 to 4 days after irrigation when grasses are actively growing.

Precautions: Sethoxydim is rainfast 1 hour after application. Do not apply through any type of irrigation equipment.

terbacil (Sinbar)

Labeled rate: *Seedling alfalfa:* 0.2–0.4 lb ai/A (0.25–0.5 lb/A Sinbar). *Established alfalfa:* 0.4–1.2 lb ai/A (0.5–1.5 lb/A Sinbar)

Comments: Apply in fall or early spring to dormant alfalfa or after last cutting in fall for semidormant alfalfa. Apply before weeds are 2 inches in height or width. Spring applications on seedling alfalfa should be made before 2 inches of new growth occurs, but can result in crop injury.

Precautions: Do not apply when alfalfa is actively growing. Crop injury may occur where soil organic matter is less than 1 percent. Do not apply terbacil and paraquat as a sequential treatment. Do not use with surfactants. Applications made when temperatures are less than 40°F can result in reduced weed control.

trifluralin (various trade names)

Labeled rate: 0.75–1.0 lb ai/A preplant incorporated; 2 lb ai/A on established alfalfa

Comments: Trifluralin should be applied prior to alfalfa planting and incorporated to a depth of 2 to 3 inches. Alternatively, apply to established alfalfa before weeds emerge but within 3 days of 0.5 inch of precipitation or irrigation.

Precautions: See replant restrictions on label before using trifluralin.

Grass Hay

2,4-D amine (various trade names)

Labeled rate: 0.7–2.0 lb ae/A

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Underseeded legumes or other broadleaf plants will be injured or killed. Do not cut hay within 30 days of application, and do not graze lactating dairy cattle within 7 days of application. Do not permit animals being finished for slaughter to graze treated fields within 3 days of slaughter.

clopyralid (Stinger)

Labeled rate: 0.1875–0.5 lb ae/A (0.5–1.33 pt/A Stinger)

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: Do not allow to drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Underseeded legumes and broadleaf plants will be injured or killed. Do not use plant residues, including treated hay and manure from animals that have been fed treated hay, for composting or mulching where susceptible plants may be grown in the following season. Do not exceed 4 pt/A per year. Note rotational restrictions on label prior to use.

clopyralid + 2,4-D (Curtail)

Labeled rate: 2–4 qt/A Curtail

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: Do not allow to drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Underseeded legumes and broadleaf plants will be injured or killed. Do not use plant residues, including treated hay and manure from animals that have been fed treated hay, for composting or mulching where susceptible plants may be grown in the

following season. Do not cut hay within 30 days of application. Do not graze lactating dairy cattle in treated areas within 14 days of application. Do not graze animals being finished for slaughter within 7 days of slaughter. Do not transfer livestock from treated areas to sensitive broadleaf crops without allowing at least 7 days of grazing on an untreated pasture, as animal urine containing clopyralid will injure plants. Note rotational restrictions on label prior to use.

dicamba (various trade names)

Labeled rate: 0.25–2.0 lb ae/A

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Underseeded legumes or other broadleaf plants will be injured or killed. See label for restrictions on feeding dicamba-treated hay to or grazing lactating dairy animals. In research trials, injury to timothy has been observed when treated with dicamba.

dicamba + 2,4-D (Weedmaster)

Labeled rate: 0.5–4.0 pt/A Weedmaster

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: Do not allow to drift to desirable vegetation. Remove meat animals 30 days prior to slaughter. Do not graze lactating dairy animals within 7 days of treatment. Treated grasses may not be harvested for hay within 37 days of treatment. In research trials, injury to timothy has been observed when treated with dicamba.

glyphosate (various trade names)

Labeled rate: Use as a spot treatment, treating up to 10 percent of acreage.

Comments: Repeat applications for perennial weed control from the early flower growth stage to the first hard frost.

Precautions: Nonselective herbicide that will kill desirable vegetation. Remove livestock before applying and do not graze or harvest within 14 days of application.

SECTION 2: HERBICIDE NOTES

metsulfuron (various trade names)

Labeled rate: Consult label for rate. Rates vary by label and manufacturer.

Comments: Apply postemergence to actively growing broadleaf weeds. See label for minimum time from grass establishment to metsulfuron application.

Precautions: Consult label for grazing and haying restrictions. Recommended for land primarily dedicated to production of grass crops. Broadleaf crops such as alfalfa and clover will be severely injured by metsulfuron.

triasulfuron (Amber)

Labeled rate: 0.21–0.42 oz ai/A (0.28–0.56 oz/A Amber) + nonionic surfactant

Comments: Use higher rates to suppress downy brome. Triasulfuron can be used only on selected grass hay species. Ryegrasses, red fescue, and orchardgrass will be severely injured.

Precautions: Consult label for suitable grass hay species. Do not cut hay for 30 days following application. Treated fields may be grazed immediately following application. Sugarbeet, sunflower, and onions are extremely sensitive to low rates of triasulfuron in the soil. See rotational restrictions on the label. Do not apply more than a total of 0.63 oz ai/A in a season. Triasulfuron is extremely mobile in the soil. See label restrictions for use in areas where soil is coarse, annual precipitation is greater than 35 inches, and the groundwater table is 30 feet or less below the soil surface.

triclopyr + clopyralid (Redeem R&P)

Labeled rate: 1.5–4.0 pt/A Redeem R&P + nonionic surfactant

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: Do not allow to drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Underseeded legumes and broadleaf plants will be injured or killed. Do not use plant residues, including treated hay and manure from animals that have been fed treated hay, for composting or mulching where susceptible plants may be grown in the following season. Do not harvest hay to be fed to lactating dairy animals until the next growing season. Do not harvest hay for other animals within 7 days of treatment. Do not forage or graze lactating dairy cattle in treated areas within 14 days of application. Do not transfer livestock from treated areas to sensitive broadleaf crops without allowing at least 7 days of grazing on an untreated pasture, as animal urine containing clopyralid will injure plants. Withdraw slaughter animals from grazing or consuming treated hay at least 3 days before slaughter.

triclopyr + 2,4-D (Crossbow)

Labeled rate: 1.0–1.5% solution for spot treatments or up to 1 gal/A Crossbow

Comments: Apply when annual and biennial weeds are small and actively growing or when perennial weeds are in the seedling or bud stage.

Precautions: May not be applied to forage that is to be cut and sold for commercial purposes. Do not allow to drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Underseeded legumes and broadleaf plants will be injured or killed. Do not use plant residues, including treated hay and manure from animals that have been fed treated hay, for composting or mulching where susceptible plants may be grown in the following season.

Section 3: Weed Identification

Annual bluegrass (*Poa annua*)



Identification

Flattened stems that are spreading or erect, forming dense clumps 2 to 12 inches long. Short leaves are bright green with the tip curved. Inflorescences on short, spreading branches.

Life cycle: Annual

Annual sowthistle (*Sonchus oleraceus*)



Identification

Erect, fleshy stem 1 to 4 feet tall with deeply lobed leaves. Lower leaves with one to three lobes along each side; upper leaves not lobed. Numerous pale yellow flowers.

Life cycle: Annual

SECTION 3: WEED IDENTIFICATION

Barnyardgrass (*Echinochloa crus-galli*)



Identification

Vigorous and numerous stems 1 to 5 feet tall with stem bases often red or purple. Flat, wide leaves without a ligule. Panicles often are red or purple.

Life cycle: Annual

Bedstraw (*Galium aparine*)



Identification

Numerous square stems often intertwined and up to 7 feet in length. Slender leaves in whorls of six to eight and with stiff hairs. Minuscule, white flowers in leaf axils.

Life cycle: Annual

Black nightshade (*Solanum nigrum*)



Identification

Erect, glabrous or hairy stems 6 inches to 2 feet tall. Leaves are smooth to wavy edged. Young leaves often deep purple underneath. White or pale blue flowers resemble those of a potato or tomato.

Life cycle: Annual

Animal toxicity

Can cause digestive tract and neurological problems in horses, sheep, chickens, and livestock.

SECTION 3: WEED IDENTIFICATION

Blue mustard (*Chorispora tenella*)



Identification

Leaves wavy or coarsely toothed with gland-tipped hairs. Branched stems 6 to 18 inches tall. Flowers with four pale purple petals.

Life cycle: Annual

Broadleaf plantain (*Plantago major*)

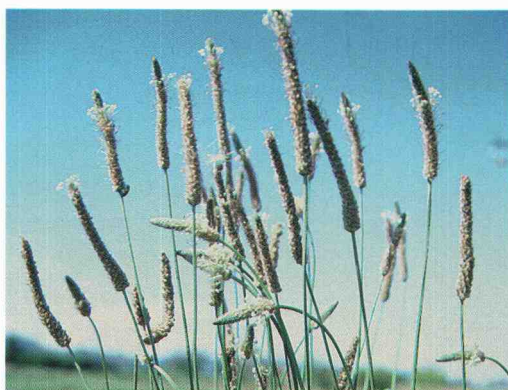


Identification

Basal leaves are smooth and broad with wavy margins and distinctive sunken veins. Blades measure 3 to 7 inches long. Flower stems are up to 15 inches long with elongated but dense spikes.

Life cycle: Perennial

Buckhorn plantain (*Plantago lanceolata*)



Identification

Lancelike leaves 4 to 12 inches long and less than 1½ inches wide, covered with tan, wooly hairs. Leaves have three or more distinct parallel veins. Abundant flower stalks up to 18 inches tall end with tan, compacted spike.

Life cycle: Perennial

SECTION 3: WEED IDENTIFICATION

Bulbous bluegrass (*Poa bulbosa*)



Identification

Leaf blades are flat and narrow, with short, membranous ligules. Plant grows from basal bulbs to 6 inches to 2 feet tall. Flowers are modified to bulblets with dark purple base.

Life cycle: Perennial

California brome (*Bromus carinatus*)



Identification

Rough, hairy leaf blades 8 to 12 inches long and up to ½ inch wide. Plant ranges from 25 to 40 inches tall. Highly variable growth.

Life cycle: Perennial

Canada thistle (*Cirsium arvense*)



Identification

Forms colony of plants interconnected by deep roots. Stems 1 to 4 feet tall and branched above. Leaves are alternate and lobed with spiny margins. Flowers are purple or occasionally white in heads ½ to ¾ inch in diameter.

Life cycle: Perennial

SECTION 3: WEED IDENTIFICATION

Common chickweed (*Stellaria media*)



Identification

Prostrate stems, with numerous branches, form mat 4 to 12 inches tall. Lower leaves small with petioles, while upper leaves lack petioles and are up to 1½ inches long. Numerous white flowers with petioles shorter than sepals.

Life cycle: Annual

Common dandelion (*Taraxacum officinale*)



Identification

Taprooted perennial that forms a basal rosette of toothed leaves. Yellow flowers produced on leafless stalks. Vegetative parts exude milky sap when injured.

Life cycle: Perennial

Common groundsel (*Senecio vulgaris*)



Identification

Branched annual or biennial with taproot. Leaves are alternate and irregularly produced. Young leaves are hairy and purplish on the underside. Yellow disk flowers on several heads per plant.

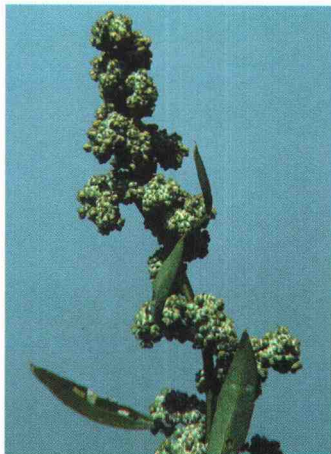
Life cycle: Annual, biennial

Animal toxicity

Chronic consumption can cause liver disease in livestock.

SECTION 3: WEED IDENTIFICATION

Common lambsquarters (*Chenopodium album*)



Identification

Erect with branched stem up to 5 feet in height. Leaves are irregularly toothed and dusted with a gray, mealy coating. Inconspicuous flowers produced on upper stem ends and in leaf axils.

Life cycle: Annual

Cutleaf nightshade (*Solanum triflorum*)



Identification

Multiple branches with deeply lobed leaves. Plant has foul odor. Flowers similar to tomato. Although somewhat prostrate in growth, plant height can reach 2 feet.

Life cycle: Annual

Animal toxicity

Plant contains alkaloids toxic to animals.

Dodder (*Cuscuta* spp.)



Identification

Parasitic, yellow vine that lacks chlorophyll. Wormlike stems wrap around neighboring plants, forming a dense mat.

Life cycle: Annual

SECTION 3: WEED IDENTIFICATION

Downy brome (*Bromus tectorum*)



Identification

Annual or winter annual 4 to 30 inches tall with densely hairy leaf sheaths and blades. Inflorescence usually is drooping and one-sided. Awns are $\frac{3}{8}$ to $\frac{5}{8}$ inch long and often slightly purple at maturity.

Life cycle: Annual

Fiddleneck (*Amsinckia intermedia*)



Identification

Alternate leaves have bristlelike hairs. Stems 1 to 2½ feet tall with abundant long hairs. Yellow flowers grouped on one side of inflorescence, which is curled when immature.

Life cycle: Annual

Animal toxicity

Causes “walking disease” in horses.

Field bindweed (*Convolvulus arvensis*)



Identification

Prostrate stems 1 to 4 feet in length form dense mats. Alternate leaves are arrowhead-shaped with rounded tips. Bell-shaped white or white-pink flowers measure 1 inch in diameter.

Life cycle: Perennial

SECTION 3: WEED IDENTIFICATION

Filaree (*Erodium cicutarium*)



Identification

Numerous stems 1 inch to 2 feet in length form a spreading rosette. Hairy leaves finely divided. Flowers are purple to pink in clusters of two or more.

Life cycle: Annual, biennial

Flixweed (*Descurainia sophia*)



Identification

Stems 8 to 24 inches high with finely dissected, alternately arranged leaves. Leaves covered with numerous branched hairs. Inflorescence forms a raceme with small, yellow-green flowers. Seed capsules $\frac{1}{2}$ to $1\frac{1}{4}$ inches long.

Life cycle: Annual, biennial

Foxtail barley (*Hordeum jubatum*)



Identification

Plants 1 to 2 feet tall with a whitish, bushy spike. Sheaths range from smooth to densely hairy. Awns are 1 to $2\frac{1}{2}$ inches long.

Life cycle: Perennial

SECTION 3: WEED IDENTIFICATION

Green foxtail (*Setaria viridis*)



Identification

Forms clumps up to 3 feet tall. Rough leaves are rolled in bud and have hairs only on the lower margin. Hairy ligule. Seedhead is foxtail-like and pale green.

Life cycle: Annual

Hairy nightshade (*Solanum sarrachoides*)



Identification

Erect stem 1 to 2 feet tall. Leaves are hairy and sticky when touched. Flowers resemble those of potato or tomato.

Life cycle: Annual

Animal toxicity

Can cause digestive tract and neurological problems in horses, sheep, chickens, and livestock.

Hedge mustard (*Sisymbrium officinale*)



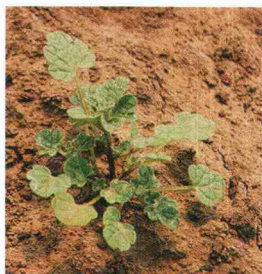
Identification

Young leaves egg-shaped with toothed margins; older leaves deeply lobed and bristly. Flowering stems are erect, hairy, and branched. Alternate leaves. Yellow flowers produced in clusters on ends of elongated stems.

Life cycle: Annual

SECTION 3: WEED IDENTIFICATION

Henbit (*Lamium amplexicaule*)



Identification

Opposite leaves with petioles on lower stem, clasping a square stem on upper plant. Rounded leaves moderately toothed. Flowers are borne in upper leaf axils, have two lips, and are pink or purple and white.

Life cycle: Annual

Italian ryegrass (*Lolium multiflorum*)



Identification

Erect stems often purplish at base and 1 to 2½ feet tall. Shiny, dark green leaves have prominent veins. Long spikes have spikelets that are alternate along the stem.

Life cycle: Annual

Mayweed chamomile (*Anthemis cotula*)



Identification

Bushy plant with finely dissected leaves. Branched stems ½ to 2 feet in length. Leaves have foul odor when crushed. Flowers ¾ inch in diameter with 12 white rays surrounding a yellow center.

Life cycle: Annual

Animal toxicity

Can add off-flavor to milk.

SECTION 3: WEED IDENTIFICATION

Miner's lettuce (*Montia perfoliata*)



Identification

Fleshy annual with narrow basal leaves and encompassing, circular leaf pairs below white or pink flowers.

Life cycle: Annual

Perennial pepperweed (*Lepidium latifolium*)



Identification

Bright green to gray-green leaves, slightly toothed. Stems range from 1 to 3 feet tall and terminate in clusters of white flowers. Each rounded fruit (silique) contains two seeds.

Life cycle: Perennial

Poison hemlock (*Conium maculatum*)



Identification

Erect stems 6 to 8 feet tall with purple speckles. Leaves resemble those of parsley and are shiny. White flowers are borne in multiple umbels per plant.

Life cycle: Biennial

Animal toxicity

All parts of the plant are extremely poisonous to animals and humans. Often confused with parsley, leading to accidental poisonings.

SECTION 3: WEED IDENTIFICATION

Prickly lettuce (*Lactuca serriola*)



Identification

Produces erect stems 2 to 4 feet tall from a basal rosette. Leaf margin and lower midrib lined with prickles. Exudes milky sap when injured.

Life cycle: Annual, biennial

Prostrate knotweed (*Polygonum aviculare*)



Identification

Prostrate annual with multiple stems 1 to 3 feet in length. Stems swollen at each branch. Leaves slender and hairless with papery sheath at leaf base. Small, pink flowers in clusters produced on stems in the leaf axils.

Life cycle: Annual

Animal toxicity

Anecdotal evidence of nitrate toxicity to horses.

Puncturevine (*Tribulus terrestris*)



Identification

Plants form mat with trailing stems 3 to 5 feet long. Hairy leaves are opposite and divided into four to eight pairs of leaflets. Fruits consist of five sharp, piercing spines.

Life cycle: Annual



SECTION 3: WEED IDENTIFICATION

Quackgrass (*Elytrigia repens*)



Identification

Erect stems 1 to 3 feet tall rise from shallow, below-ground rhizomes. Leaf blades are flat and have small, clawlike auricles that wrap around the leaf sheath. Short spikelets arranged in two rows.

Life cycle: Perennial

Rattail fescue (*Vulpia myuros*)



Identification

Prostrate annual up to 2 feet tall. Narrow leaf blades are folded and hairless. Panicles are slender and up to 8 inches in length. Awns are $\frac{5}{16}$ to $\frac{3}{8}$ inch long.

Life cycle: Annual

Redroot pigweed (*Amaranthus retroflexus*)



Identification

Egg-shaped leaves are dull green on top and have defined veins. Underside of young leaves often red. Erect stem, often 2 to 3 feet tall, shaded red or red-striped and often hairy. Large, spikelike inflorescence.

Life cycle: Annual

Animal toxicity

Foliage can be toxic to pigs, sheep, and cattle when consumed in large quantities. Can result in renal failure.

SECTION 3: WEED IDENTIFICATION

Russian thistle (*Salsola iberica*)

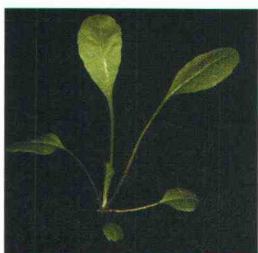


Identification

Seedlings have narrow, fleshy leaves. Mature plant is bushy, with many branches. Red- or purple-striped stems 6 inches to 3 feet tall with alternate leaves. Older leaves are scalelike.

Life cycle: Annual

Shepherdspurse (*Capsella bursa-pastoris*)



Identification

Lower leaves deeply lobed and form a basal rosette, while upper leaves are slightly toothed or entire on erect stems from 3 to 18 inches tall. Small, white flowers on end of elongated racemes. Fruits are heart-shaped.

Life cycle: Annual

Smartweed (*Polygonum* spp.)



Identification

Alternate, narrow leaves are lance-shaped. Leaf nodes are sheathed. Erect or spreading stems 1 to 3 feet long. Small, pink to rose-colored flowers borne in dense spikes. Ladysthumb smartweed has characteristic thumbprint near center of leaf.

Life cycle: Annual

SECTION 3: WEED IDENTIFICATION

Spotted catsear (*Hypochaeris radicata*)



Identification

Hairy, shallowly lobed leaves in a basal rosette 4 to 12 inches in diameter. Flowering stems 1 to 2 feet tall with few branches. Yellow flowers similar to that of common dandelion, hence the alternative name “false dandelion.”

Life cycle: Perennial

Sticky chickweed (*Cerastium viscosum*)



Identification

Stems and leaves abundantly hairy. Many branched stems form dense mats. Small, oval- or egg-shaped leaves. Flowers with five white petals.

Life cycle: Perennial

Tansy mustard (*Descurainia pinnata*)



Identification

Alternate leaves finely dissected. Erect plant 4 to 32 inches tall terminating in siliques about $\frac{3}{4}$ inch long. Often confused with flaxweed.

Life cycle: Annual

Animal toxicity

Can be toxic to livestock when consumed prior to bloom.

SECTION 3: WEED IDENTIFICATION

Tumble mustard (*Sisymbrium altissimum*)



Identification

Winter annual 2 to 5 feet tall. Upper stem branched numerously, forming a bushy appearance. Lower leaves large and divided into coarsely divided leaflets, upper leaves small and less divided. Yellow flowers form small raceme. Also known as Jim Hill mustard.

Life cycle: Annual

Western waterhemlock (*Cicuta douglasii*)



Identification

Stems 3 to 7 feet tall, swollen at the base, with alternate leaves. Leaves are pinnately divided with veins terminating at the bottom of leaf serrations. Two kidney-shaped seeds produced in each flower.

Animal toxicity

One of the most poisonous plants in North America. All plant parts are toxic to animals and humans.

Life cycle: Perennial

Wild mustard (*Brassica kaber*)



Identification

Lower leaves large (2 to 8 inches long and 1 to 4 inches wide) and irregularly but deeply lobed. Upper leaves smaller and slightly toothed. Erect stems with hairs on lower portions, branched near end, and terminating in yellow flowers with four petals.

Life cycle: Annual

SECTION 3: WEED IDENTIFICATION

Wild oat (*Avena fatua*)



Identification

Seedling leaves twist counterclockwise. Membranous ligule. Plant 1 to 4 feet tall with hollow stems. Open panicle with drooping spikelets.

Life cycle: Annual

Wild radish (*Raphanus raphanistrum*)



Identification

Lower leaves 1 to 2 inches wide and up to 6 inches long, broadly divided. Upper leaves smaller and irregularly toothed but not distinctly divided. Stem branches reach 2 to 5 feet tall. Usually has yellow flowers with dark veins.

Life cycle: Annual

Animal toxicity

Seeds are slightly toxic to horses in large quantities.

Yellow nutsedge (*Cyperus esculentus*)



Identification

Triangular-shaped stems. Long, grasslike, yellowish-green leaves. Rhizomes end with ½- to ¾-inch tubers. Yellow flowers form in spikelets at the end of the stem.

Life cycle: Perennial

SECTION 3: WEED IDENTIFICATION

Yellow starthistle (*Centaurea solstitialis*)



Identification

Ridged, winged stems are branched several times and covered with wooly hair. Basal leaves are deeply lobed; upper leaves entire. Yellow flowers have sharp, tan thorns. Plants are 2 to 3 feet tall.

Life cycle: Annual

Animal toxicity

Occasional intoxicant to horses when consumed in large quantities.

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