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WEED MANAGEMENT

in Hay Production



OREGON STATE UNIVERSITY
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This is a preview of a 29-page publication. See last page for ordering instructions.

*by Jed Colquhoun, Extension weed specialist, and
Richard Affeldt, faculty research assistant in crop and
soil science, Oregon State University.*

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 Bipirydyliums	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 1)	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 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.

benfin (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 benfin. Do not apply benfin 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 Bucril 2.0 or Moxy 2E; 0.5–0.75 pt/A Bucril 4EC).
Chemigation: 0.5 lb ai/A (2.0 pt/A Bucril 2.0 or Moxy 2E; 1.0 pt/A Bucril 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 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

Ordering Information

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