

ALFALFA WEED MANAGEMENT IN NORTHEASTERN CALIFORNIA

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Introduction

Growing alfalfa in the mountain valleys of Northeastern California consists of cultural practices and conditions that are commonly unique. In many ways, this area is more like our neighboring states of Nevada and Oregon than our own state of California. The areas that I am speaking of are the mountain valleys of Sierra, Plumas, Lassen, Modoc, and Siskiyou counties, and the eastern portion of Shasta County. These mountain valleys have common characteristics of elevation between 3,000 to over 5,000 feet, short growing seasons, cutting schedules of two to four cuts per year, dormant or semi-dormant alfalfa varieties, weed spectrum, and high quality hay when managed right. The remainder of this paper will address the weed problems of alfalfa in Northeastern California and the chemical tools available to control these weeds.

Weed Problems in Established Alfalfa

Winter annual grasses and broadleaf weeds are generally only a problem in the first cutting of hay each year. Depending on the specific weed, infestations of winter annual weeds can lower the price of the first cutting up to \$30.00 per ton. Perennial grasses and broadleaf weeds tend to lower the quality and price of hay and often reduce the density and life of the alfalfa stand. Summer annual grass and broadleaf weeds are becoming more of a problem to growers as markets demand higher quality hay. In many cases, summer annual weeds have been present for a long time but growers have only recently become cognizant of the problem.

Winter Annual Broadleaf Weeds

Most of the problem winter annual broadleaf weeds belong to the mustard family. Their growth characteristics are similar in that they usually germinate from early fall thru mid winter. The majority of their growth takes place in the spring and they mature in early summer. These weeds in the mustard family are Shepherds Purse, Flixweed, Tansy Mustard, Jim Hill Mustard, Field Pepperweed and Yellowflower Pepperweed. The one major exception is Prickley Lettuce which belongs to the lettuce family. Prickley Lettuce germinates from early fall clear thru to early summer and is also considered a summer annual weed in this area.

Winter Annual Grasses

Winter annual grasses that are a problem in the first cutting are: Downy Brome (Cheatgrass), Wild Barley (Foxtail), Bulbous Bluegrass, Wild Oats, and volunteer cereals. Cheatgrass and Foxtails are considered the worst problems because they are very undesirable to animals when present in hay.

Winter Annual Weed Control Measures

We are very fortunate to have quite a few herbicides registered for use on alfalfa that control a wide variety of our winter annual broadleaf and grass weeds. Table 2. compares the common problem weeds in Northeastern California to the herbicides registered for use in Northeastern California. Simazine, VELPAR, Metribuzin, SINBAR, Paraquat, and Diuron are the most commonly used and successful herbicides for controlling winter annual weeds. Table 3. and Table 4. list some important data needed when selecting and using these herbicides.

TABLE 1 PROBLEM WEEDS OF ALFALFA IN MOUNTAIN VALLEYS OF NORTHERN CALIFORNIA

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WINTER ANNUAL BROADLEAF WEEDS:		FAMILY:

SHEPHERDS PURSE	(<i>Capsella bursa-pastoris</i>)	MUSTARD
FLIXWEED	(<i>Descurainia sophia</i>)	MUSTARD
TANSY MUSTARD	(<i>Descurainia pinnata</i>)	MUSTARD
JIM HILL MUSTARD	(<i>Sisymbrium altissimum</i>)	MUSTARD
FIELD PEPPERWEED	(<i>Lepidium campestre</i>)	MUSTARD
YELLOWFLOWER PEPPERWEED	(<i>Lepidium perfoliatum</i>)	MUSTARD
PRICKLEY LETTUCE	(<i>Lactuca scariola</i>)	LETTUCE
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WINTER ANNUAL GRASSES:		

DOWNY BROME	(<i>Bromus tectorum</i>)	GRASS
BULBOUS BLUEGRASS	(<i>Poa bulbosa</i>)	GRASS
WILD BAARLEY	(<i>Hordeum leporinum</i>)	GRASS
WILD OATS	(<i>Avena fatua</i>)	GRASS
VOLUNTEER CEREALS		GRASS
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SUMMER ANNUAL BROADLEAF WEEDS:		

PIGWEEED	(<i>Amaranthus spp.</i>)	AMARANTH
LAMBSQUARTER	(<i>Chenopodium album</i>)	GOOSEFOOT
RUSSIAN THISTLE	(<i>Salsola australis(kali)</i>)	GOOSEFOOT
COMMON SUNFLOWER	(<i>Helianthus annuus</i>)	THISTLE
DODDER	(<i>Cuscuta spp.</i>)	MORNING-GLORY
PRICKLY LETTUCE	(<i>Lactuca scariola</i>)	LETTUCE
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SUMMER ANNUAL GRASSES:		

WITCHGRASS	(<i>Panicum capillare</i>)	GRASS
GREEN FOXTAIL	(<i>Setaria viridis</i>)	GRASS
LOVEGRASS/STINKGRASS	(<i>Eragrostis cilianesis</i>)	GRASS
BARNYARD GRASS	(<i>Echinochloa spp.</i>)	GRASS
ITALIAN RYE GRASS	(<i>Lolium perenne</i> ssp. multiflorum)	GRASS
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PERENNIAL AND BIENNIAL BROADLEAF WEEDS:		

SWAMP KNOTWEED	(<i>Polygonum coccineum</i>)	BUCKWHEAT
CHICORY	(<i>Cichorium intybus</i>)	THISTLE
COMMON DANDELION	(<i>Taraxacum officinale</i>)	THISTLE
CHEESEWEED	(<i>Malva spp.</i>)	MALLOW
CANADA THISTLE	(<i>Cirsium arvense</i>)	THISTLE
BULL THISTLE	(<i>Cirsium lanceolatum</i>)	THISTLE
POVERTYWEED	(<i>Iva axillaris pursh</i>)	THISTLE
BUCKHORN PLAIN TAIN	(<i>Plantago lanceolata</i>)	PLAIN TAIN
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PERENNIAL GRASSES:		

FOXTAIL BARLEY	(<i>Hordeum jubatum</i>)	GRASS
KENTUCKY BLUEGRASS	(<i>Poa pratensis</i>)	GRASS
QUACKGRASS	(<i>Agropyron repens</i>)	GRASS
PERENNIAL RYEGRASS	(<i>Lolium perenne ssp.perenne</i>)	GRASS
TALL FESCUE	(<i>Festuca spp.</i>)	GRASS
MUHLY	(<i>Muhlenbergia spp.</i>)	GRASS
MEADOW FOXTAIL	(<i>Alopecurus pratensis</i>)	GRASS
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TABLE 2. WEED SUSEPTIBILITY TO HERBICIDES COMMONLY USED IN THE MOUNTAIN VALLEYS OF NORTHEASTERN CALIFORNIA.

	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
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WINTER ANNUAL BROADLEAF WEEDS:	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
SHEPHERDS PURSE	N	P	N	N-P	P-C	C	N-C	P	C	C	C	C	N	C
FLIXWEED	---	N	---	C	C*	C	N	C	C	C	C	C	N-P	---
TANSY MUSTARD	---	N	---	C	C*	C	N	C	C	C	C	C	N-P	---
JIM HILL MUSTARD	---	N	---	C	C*	P	P	P	C	C	C	C	N-P	---
FIELD PEPPERWEED	---	---	---	---	C*	C	N	C	C	C	C	C	---	---
YELLOWFLOWER PEPPERWEED	---	---	---	N	C*	C	N	C	C	C	P-C	C	N-P	---
PRICKLEY LETTUCE	---	---	---	P	C*	P-C	N	P-C	C	C	C	C	---	---
=====														
WINTER ANNUAL GRASSES:	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
DOWNY BROME	C	C	C	C	N	C	C	P-C	C	C	C	C	C	C
BULBOUS BLUEGRASS	---	---	C	---	N	C	C	N-P	P	P	P-C	C**	P	---
WILD BAARLEY	C	C	C	---	N	C	C	P-C	C	C	C	C	C	---
WILD OATS	P-C	C	C	C	N	P-C	C	N-P	P	C	P-C	N	N-P	C
VOLUNTEER CEREALS	P-C	C	C	C	N	P-C	C	C	P	P-C	P-C	P	N-P	C
=====														
SUMMER ANNUAL BROADLEAFS:	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
PIGWEED	C	C	N	P	C	N-C	N	C	C	C	C	C	P-C	N-C
LAMBSQUARTER	C	C	N	---	C	N-C	P	C	C	C	P-C	P-C	P-C	C
RUSSIAN THISTLE	---	---	---	---	C*	---	P	P-C	P-C	P-C	---	P-C	P	C
COMMON SUNFLOWER	---	---	---	---	C	---	N	---	---	---	---	P	---	C
DODDER	N	N	P-C	P-C	N	P	P-C	N	N	N	N	N	C	P-C
PRICKLY LETTUCE	---	---	---	P	C*	P-C	N	P-C	C	C	C	C	P	C
=====														
SUMMER ANNUAL GRASSES:	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
WITCHGRASS	---	C	---	C	N	---	---	N-P	---	C	---	C	C	C
GREEN FOXTAIL	C	C	---	---	N	---	C	C	C	---	---	P-C	C	C
LOVEGRASS/STINKGRASS	---	C	---	C	N	---	C	C	---	---	---	---	C	---
BARNYARD GRASS	C	C	N-C	P-C	N	P-C	C	P-C	P	C	P	C	N	P-C
ITALIAN RYE GRASS	C	C	C	C	N	C	C	P-C	C	C	C	C	C	---
=====														
PERENNIAL BROADLEAFS:	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
SWAMP KNOTWEED	---	---	---	---	---	---	---	---	---	N***	---	---	---	C**
CHICORY	---	---	---	---	---	---	---	---	---	N	---	---	N-P	C
COMMON DANDELION	---	---	---	---	---	---	---	---	P*	C* N***	P**	P**	N-P	---
CHEESEWEED	N	N	N	P	N	P	P	P	C*	C*	C*	C*	P	P
CANADA THISTLE	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BULL THISTLE	---	---	---	---	C*	---	---	---	---	---	---	---	---	---
POVERTYWEED	---	---	---	---	---	---	---	---	---	---	---	---	---	---
BUCKHORN PLAINTAIN	---	---	---	---	C*	---	---	N-P	P	N***	---	---	---	---
=====														
PERENNIAL GRASSES:	BENIFIN	EPTC	CHEMHOE	FURLOE	2,4-DB	PARAQUAT	KERB	DIURON	SINBAR	SIMAZINE	VELPAR	METRIBUZIN	TREFLAN	ROUNDUP
FOXTAIL BARLEY	C*	C*	---	---	N	---	C	---	---	C* N***	C*	C*	C* N***	---
KENTUCKY BLUEGRASS	---	---	---	---	N	P	C	---	---	P	P**	---	C* N***	C
QUACKGRASS	---	P**	---	---	N	N	C	P**	P**	N***	P**	---	N	C**
PERENNIAL RYEGRASS	---	---	---	---	N	---	---	---	---	---	---	---	---	---
TALL FESCUE	---	---	---	---	N	---	---	---	---	---	---	---	---	---
MUHLY	---	---	---	---	N	---	---	---	---	---	---	---	---	---
MEADOW FOXTAIL	---	---	---	---	N	---	---	---	---	---	---	---	---	---

C=CONTROLLED P=PARTIAL CONTROL L ---=NO INFORMATION **=SEEDLING ONLY ***=AT HIGHER RATES ONLY ****=ESTABLISHED

TABLE 3. 1986 ALFALFA HERBICIDE INFORMATION FOR MOUNTAIN VALLEYS
OF NORTHEASTERN CALIFORNIA

COMMON NAME	TRADE NAMES	CHEMICAL FAMILY	SOLUBILITY IN WATER		NOTES
			TEMPERATURE DEGREES C	PPM	
2,4-DB	BUTOXONE BUTYRAC	PHENOXY	PRACTICALLY INSOLUBLE		BROADLEAF ONLY. DO NOT USE SURFACTANT OR APPLY BEFORE RAIN OR IRRIGATING.
BENEFIN	BALAN BALFIN	SUBSTITUTED ANILINE	25	0.1	INCORPORATE IMMEDIATELY.
TRIFLURALIN	TREFLAN	SUBSTITUTED ANILINE	25	0.3	MUST BE WATER INCORPORATED WITHIN THREE DAYS.
SIMAZINE	PRINCEP SIMAZINE	TRIAZINE	20	3.5 84	DO NOT USE ON SAND OR LOAMY SAND. ONLY ALLOWED IN SPECIFIED COUNTIES.
PROAMIDE	KERB	AMIDE	25	15	MAINLY GRASS CONTROL. CONTINUOUS AGITATION REQUIRED.
DIURON	KARMEK	SUBSTITUTED UREA	25	42	ADDED SURFACTANT INCREASES CONTACT ACTIVITY.
CHLORPROPHAM	FURLOE CHLORO IPC	CARBUMATE	25	88	CROP OIL CONCENTRATE ENHANCES FOLIAR UPTAKE.
PROPHAM	CHEM HOE	CARBUMATE	25	250	
EPTC	EPTAM GENEP	THIOCARBAMAT	20	370	INCORPORATE IMMEDIATELY OR WATER RUN.
TERBACIL	SINBAR	URACIL	25	710	CONTINUOUS AGITATION REQUIRED. DO NOT USE SOUTH OF HWY. 80 IN CALIFORNIA.
METRIBUSIN	SENCOR LEXONE	TRIAZINE	20	1220	DO NOT USE SOUTH OF HWY. 80 IN CALIFORNIA.
HEXAZINONE	VELPAR	TRIAZINE	25	33000	NON-IONIC SURFACTANT ENHANCES CONTACT ACTIVITY.
PARAQUAT	GRAMOXONE PARAQUAT	DIPYRIDYLUM	20	COMPLETELY NON-SELECTIVE. SOLUBLE	(SEEDLING ALFALFA USE LOWER RATES)

In addition to using herbicides alone, some herbicides can be successfully tank mixed to provide either extended weed control and/or lower cost per acre with equivalent weed control. Table 5. lists the common herbicides and tank mixes used for winter annuals. Common local rates of each herbicide and tank mix are listed for sandy loam and clay loam soils with organic matter less than 3%. A comparison of costs for each of these herbicides and tank mixes are listed in Table 5. and also visually graphed in Figure 1.

Some growers use mechanical devices for weed control such as the skew treader, harrow, or disk. Mechanical weed control can be quite harsh on an alfalfa stand but is probably the preferred method of weed control the last year of the life of the stand.

TABLE 4. 1986 ALFALFA HERBICIDE USE COMPARISONS FOR MOUNTAIN VALLEYS
OF NORTHEASTERN CALIFORNIA

TRADE NAMES	ALFALFA CROP			WEED		SOIL ACTIVE	CONTACT ACTIVE	RATE LB A.I./AC	PHI DAYS	COST \$/AC.
	SEEDLING	ESTAB- LISHED	PRE- PLANT	PRE- EMERG.	POST- EMERG.					
BUTOXONE BUTYRAC	YES	YES	NO	NO	YES	SOME	YES	0.5 to 1.5	60 30*	\$8.13 @.75ai
BALAN BALFIN	NO	NO	YES	YES	NO	YES	NO	1.125 to 1.5	NONE	\$13.69 @1.125ai
TREFLAN	YES	YES	NO	YES	NO	YES	NO	2.0	NONE	\$15.60 @2.0ai
PRINCEP SIMAZINE	NO	YES	NO	YES	SLIGHT	YES	NO	0.8 to 1.6	60 30*	\$3.02 @0.8ai
KERB	YES	YES	NO	YES	YES	YES	NO	0.8 to 2.0	25	\$32.00 @1.0ai
KARMEK	NO	YES	NO	YES	SOME	YES	SLIGHT	1.2 to 2.4	NONE	\$5.63 @1.2ai
FURLOE CHLORO IPC	YES	YES	NO	YES	SOME	YES	SLIGHT	2.0 to 6.0	40	\$29.80 @4.0ai
CHEM HOE	YES	YES	YES	YES	NO	YES	SLIGHT	3.0 to 4.0	NONE	
EPTAM GENEP	YES	YES	YES	YES	NO	YES	NO	2.0 to 4.0	14	\$12.21 @3.0ai
SINBAR	NO	YES	NO	YES	YES	YES	SLIGHT	0.4 to 1.2	NONE	\$12.30 @0.4ai
SENCOR LEXONE	NO	YES	NO	YES	YES	YES	SOME	0.375 to 1.0	28	\$15.24 @0.5ai
VELPAR	NO	YES	NO	YES	YES	YES	SOME	0.5 to 1.5	30	\$11.75 @0.5ai
GRAMOXONE PARAQUAT	YES	YES	YES	NO	YES	NO	YES	0.125 to 1.0	60	\$12.13 @0.5ai

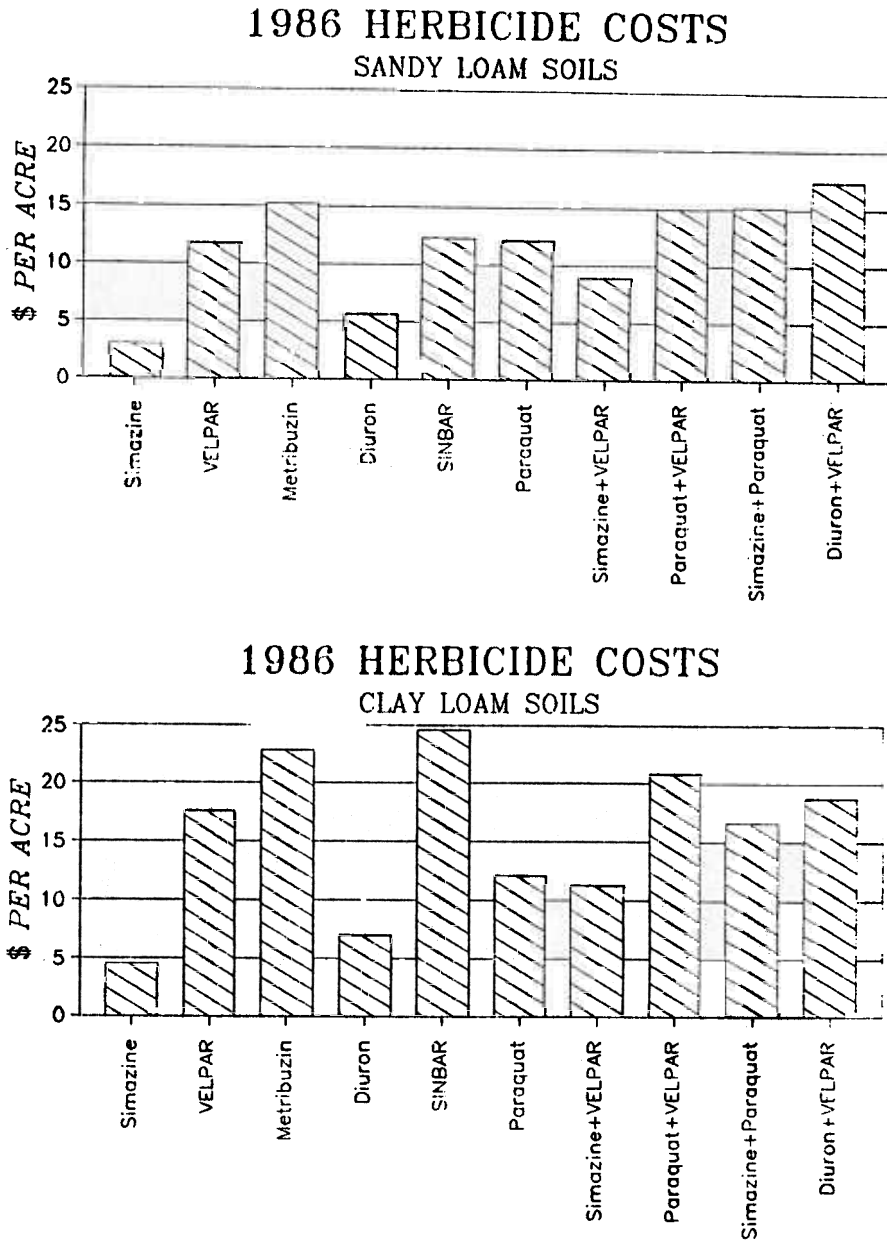
Perennial Broadleaf Weeds and Their Control?

The perennial broadleaf weeds, Swamp Knotweed, Common Dandelion, Canada Thistle, and Chicory are real problems to alfalfa because there are not any satisfactory control measures for these weeds. Most herbicides that kill these weeds also kill alfalfa. This is one case that prevention is the only cure. Field selection and crop rotation play a major role in prevention. Many times a crop previous to alfalfa can be treated with a herbicide that will kill one of these perennial broadleaf weeds, such as BANVEL (Dicamba). Growers should be cautious and observe plant back requirements because herbicide residues can kill seedling alfalfa.

Table 5. 1986 Herbicide costs for winter annual weeds. Information was based on suggested retail list prices in Susanville, Ca. Oct., 1986.

HERBICIDE	\$ / a.i.	SANDY LOAM SOILS		CLAY LOAM SOILS	
		LB.ai/ac	\$ / ac.	LB.ai/ac	\$ / ac.
Simazine	3.78	.8	3.02	1.2	4.54
VELPAR	23.50	.5	11.75	.75	17.63
Metribuzin	30.47	.5	15.23	.75	22.85
Diuron	4.69	1.2	5.63	1.5	7.04
SINBAR	30.75	.4	12.30	.8	24.60
Paraquat	24.25	.5	12.13	.5	12.13
Simazine+VELPAR		.8 +.25	8.90	.8 +.35	11.25
Paraquat+VELPAR		.375 +.25	14.97	.375 +.5	20.84
Simazine+Paraquat		.8 +.5	15.15	1.2 +.5	16.67
Diuron+VELPAR		1.2 +.5	17.38	1.5 +.5	18.79

Figure 1



Perennial Grasses and Their Control

Many of our alfalfa fields in Northeastern California were originally meadows or native pastures. The perennial grasses such as Kentucky Bluegrass, Perennial Ryegrass, and Tall Fescue along with the perennial weeds such as Foxtail Barley, Quackgrass, and Meadow Foxtail were actually encouraged for many generations. Perennial grass intrusion is a problem to alfalfa growers because grasses can lower hay quality and yield along with reducing stand density and life. Cultural practices such as plowing and crop rotation play key roles in eliminating established perennial grasses before alfalfa is planted. After alfalfa is established, soil active herbicides can be effective in controlling perennial grasses as they germinate. KERB is effective in controlling seedling and established perennial grasses. KERB is expensive and should only be used on young alfalfa stands that still have a fairly dense alfalfa plant density.

Summer Annual Weeds

Russian Thistle, Common Sunflower, Pigweed, Lambsquarter and Prickly Lettuce sometimes plague our hay fields. Spring applied soil active herbicides usually eliminate these problems.

Green Foxtail, Witchgrass, Lovegrass and Barnyard Grass sometimes show up in some of our valleys. Fortunately, TREFLAN controls most of these grasses, except for Barnyard Grass, the same way that it controls Yellow Foxtail.

Summary

Good weed control starts before you plant. Selection of fields that are free from problem weeds saves a lot of trouble and money later on. Problem weeds can be controlled by proper crop rotation and weed management. Perennials are killed much easier as they germinate or in the seedling stage. If they are allowed to mature, it can only cost you money. A thick healthy alfalfa stand is the best deterrent to weed infestations. If you use a herbicide, choose the "right" chemical, use it the "right" way at the "right" time, and be "right" on for your calibration and application. Safety pays -- Read the Label!

To simplify information, trade names of some products have been used in this report. No endorsement of named products is intended, nor is criticism implied of similar products not mentioned.

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