2002 Lassen County Weed Research Report

Rob Wilson
UCCE Weed Ecology and
Cropping Systems Farm Advisor
Susanville, CA 96130

This is a report of weed control experiments field tested in Lassen County in 2002. This publication includes research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed herein have been registered. Pesticides must be registered by appropriate federal and state agencies before they can be recommended.

Commercial companies and products are mentioned in this publication solely for the purpose of providing specific information. Mention of a company does not constitute a guarantee of its products by the University of California or an endorsement over products of other companies not mentioned.

For additional information on individual research experiments contact:
Rob Wilson
UCCE Weed Ecology/Cropping Systems Farm Advisor
707 Nevada Street
Susanville, CA 96130
530-251-8132
rgwilson@ucdavis.edu

The authors would like to specially thank all landowners who cooperated on experiments. Many cooperators donated valuable land, time, and equipment to make this research possible.

Herbicides and Weeds Used the Report

Herbicides

Common Name	Product used in experiments
chlorsulfuron	Telar®
clethodim	Prism®
clopyralid	Transline™
dicamba	Banvel®
diflufenzopyr + dicamba	Distinct®
ethalfluralin	Curbit EC
ethalfluralin + clomazone	Strategy®
glyphosate	Round-up Ultra®
hexazinone	Velpar®
imazamox	Raptor®
imazapic	Plateau®
imazethapyr	Pursuit®
paraquat	Gramoxone Extra®
pro-carbazone-sodium	Olympus
sethoxydim	Poast Plus®
triclopyr	Garlon 4A®
trifluralin	Treflan HFP®
2,4-DB	Butyrac 200®
2,4-D + glyphosate	Landmaster II®
2,4-D ester	Weedone LV6 or 2,4-D LV4®

Weeds

Common Name	Scientific Name
Canada thistle	*Cirsium arvense* (L.) Scop.
common mallow	*Malva neglecta* Wallr.
curly dock	*Rumex crispus* L.
dandelion	*Taraxacum officinale* Weber in Wiggers
foxtail barley	*Hordeum jubatum* L.
hare barley	*Hordeum leporinum* Link
lambsquarter	*Chenopodium album* L.
purple lovegrass	*Eragrostis spectabilis* (Pursh) Steud.
medusahead	*Taeniatherum caput-medusae* (L.) Nevski
perennial pepperweed or tall whitetop	*Lepidium latifolium* L.
redroot pigweed	*Amaranthus retroflexus* L.
prickly lettuce	*Lactuca seriola* L.
puncturevine	*Tribulus terrestris* L.
purslane	*Porulaca oleracea* L.
shepards-purse	*Capsella bursa-pastoris* (L.) Medik.
tansy mustard	*Descurainia pinnata* (Walt.) Britt.
tumble mustard	*Sisymbrium altissimum* L.

2002 Lassen County Weed Research Report
Table of Contents

The Effect of Mowing Followed by Fall Herbicide Treatment on Perennial Pepperweed (Tall Whitetop) Control

Introduction: Perennial pepperweed is a noxious weed that reproduces via underground roots and seed. In recent times, several Western United States researchers have obtained favorable results by using late fall herbicide treatments (often applied after plant senescent) to control troublesome perennials such as Russian knapweed and Dalmatian toadflax. Research by Mark Renz at UC Davis suggests applying herbicides to perennial pepperweed re-growth after plants are mowed will often improve herbicide control. Since perennial pepperweed starts to senesce (dry down) shortly after flowering in mid-summer, the site was mowed in early August to stimulate fall re-growth. Most shoots that were mowed in August (post flower) produced fall rosettes. This experiment set out to determine if a fall herbicide application to mowed perennial pepperweed plants is an effective control strategy.

Study Director: Rob Wilson

Cooperator: KSUE Radio (located at the Radio Tower near McDonalds)

Date and Time of Herbicide Applications:
Herbicides were applied on October 15, 2001 at 11:00 am; Temperature 76 °F

Plot Size and Application Method: Plot size was 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Weather, Precipitation, and Soil Type/Moisture: The study site historically receives 9 inches of precipitation a year. The soil is an alkali sandy loam. The soil surface and sub-surface were dry at the time of application.

Plant Community Present at the Time of Application: The site is heavily infested with perennial pepperweed with sporadic Canada thistle patches. Approximately, 60% of the perennial pepperweed plants were flowering and 40% were rosettes at the time of application. All Canada thistle plants were in the rosette stage. Favorable vegetation within the test site consisted of creeping wildrye, smooth brome, and inland saltgrass.

Data Collected: Evaluations were made on May 02, 2002 (7 MAT) and July 10, 2002 (9 MAT) in three 1 m^2 quadrats in each plot to determine herbicide effects on perennial pepperweed and favorable perennial grasses. Perennial pepperweed shoot density and perennial grass cover were the plant variables measured at each evaluation. Additional evaluations will be taken in spring and fall of 2003 to help determine long term effects of the herbicides on perennial pepperweed control.

Results: All the herbicide treatments greatly reduce perennial pepperweed density nine months after treatment (9 MAT), but further investigation is needed in 2003 to determine long-term effects of the herbicides. Telar and Plateau (not registered in California) were the best treatments reducing perennial pepperweed density by more than 93 %. When compared to spring treatments applied at the rosette and flower-bud stage in 2002, fall treatments provided better control especially in the case of Plateau and Distinct. All fall treatments caused minimal injury to perennial grasses within the test site, unlike some of the spring applied treatments. For a complete listing of the experimental results see Table 1. In summary, preliminary results suggest summer mowing combined with a fall herbicide treatment is a viable option for perennial pepperweed control, but further investigation is needed. Examining fall herbicide treatments at multiple sites over multiple years should provide a clear picture of the potential for this treatment approach.

Table 1. The effect of combining summer mowing with fall herbicides on perennial pepperweed shoot density and perennial grass cover.

Herbicide Treatment	Product Rate	May 2nd – 7 MAT		July 10th – 9 MAT	
		Perennial pepperweed shoot density	Perennial grass % cover	Perennial pepperweed shoot density	Perennial grass % cover
1. Untreated Control	-----	13a*	19a	15a	17a
2. 2,4-D- 4 SC non-ionic surfactant	1.0 qt/A 0.25 % v/v	3b	--	3b	--
3. 2,4-D- 4 SC non-ionic surfactant	2.0 qt/A 0.25 % v/v	3b	11a	4b	15a
4. Distinct- 70 DF non-ionic surfactant ammonium sulfate	6.0 oz/A 0.25 % v/v 5 lb/100 gal	2b	32a	3bc	41a
5. Round-up- 4 L ammonium sulfate	4.0 qt/A 10 lb/100 gal	2b	12a	2bc	27a
6. Telar- 75 DF non-ionic surfactant	0.75 oz/A 0.25 % v/v	0b	35a	0c	45a
7. Telar- 75 DF non-ionic surfactant	1..5 oz/A 0.25 % v/v	0b	36a	0c	38a
8. Plateau- 2 SL methylated seed oil ammonium sulfate	6.0 fl oz/A 1.0 pt/A 10 lb/100 gal	1b	39a	1bc	41a
9. Plateau- 2 SL methylated seed oil ammonium sulfate	12.0 fl oz/A 1.0 pt/A 10 lb/100 gal	1b	21a	1bc	23a
10. 2,4-D- 4 SC Round-up- 4L non-ionic surfactant ammonium sulfate	1.0 qt/A 2.0 qt/A 0.25 % v/v 10 lb/100 gal	3b	---	3bc	--
11. Landmaster II- 2.2L non-ionic surfactant	4.0 qt/A 0.25 % v/v	2b	---	3bc	--

* - means followed by the same letter do not significantly differ (P= .05)

Canada thistle Control Using Herbicides Applied in the fall After the First Frost

Introduction: Canada thistle is an aggressive root creeping perennial that invades crop and non-crop areas. The weed is quite difficult to control, although studies show multiple year efforts can yield favorable results. Previous research suggests repeated mowing, re-vegetation with perennial grasses, and/or herbicide treatments are the best control methods. This experiment tested several herbicides applied at moderate rates in late fall to determine their potential for Canada thistle control. The experiment was conducted at two sites: 1.) in a non-crop area with little residual vegetation and 2.) in irrigated pasture with a solid stand of perennial bluegrass and alfalfa. A major reason for conducting this experiment was to test Transline's effectiveness on Canada thistle control when applied at California's maximum yearly rate (2/3 pint/acre).

Study Director: Rob Wilson

Cooperator: KSUE Radio (located at the Radio Tower near McDonalds)- non-crop location
Jack and Darcy Hanson- irrigated pasture

Date and Time of Herbicide Applications:
KSUE Radio Tower: Herbicides were applied on October 17, 2001 at 2:00 pm; 76°F
Hanson Ranch: Herbicides were applied on October 19, 2001 at 10:00 am; 67°F

Plot Size and Application Method: Plot size was 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Weather, Precipitation, and Soil Type/Moisture: The study sites historically receive approx. 9 inches of precipitation a year, although the pasture received supplemental irrigations. The soil at the non-crop location is a sandy loam; soil surface and sub-surface was dry at the time of application. The soil at the irrigated pasture location is a sandy loam with a thick layer of grass thatch; soil surface was dry and sub-surface moist at the time of herbicide application.

Plant Community Present at the Time of Application: The non-crop site was heavily infested with Canada thistle with sporadic perennial pepperweed , tansy mustard, creeping wildrye, and saltgrass. The irrigated pasture site was located in a corner section of the field with moderate Canada thistle density. Perennial bluegrass and alfalfa were the predominant vegetation. All Canada thistle plants were in the rosette stage at the time of application.

Data Collected: Evaluations were made on May 07, 2002 (7 MAT) and July 28, 2002 (9 MAT) in three 1 m^2 quadrats in each plot to determine herbicide effects on Canada thistle and favorable perennial grasses. Canada thistle shoot density and perennial grass cover were the plant variables measured at the non-crop site. Canada thistle shoot density and alfalfa density were measured at the irrigated pasture site.

Results: At the May evaluation, many of the treatments provided acceptable control of Canada thistle, but by July the treatment effects wore off. A few treatments maintained significantly lower Canada thistle shoot densities in July nine months after treatment (9 MAT), but none of the treatments provide good control. Banvel at 2.0 qt/A and 2,4-D at 1.5 qt/A were the best treatments at the irrigated pasture site. Transline at 0.66 pt/A and Telar at 1.0 oz/A were the best treatments at the non-crop site. Round-up provided descent control of Canada thistle but had a disadvantage in that it injured the perennial grasses. Most herbicide treatments at the Hanson Ranch caused alfalfa density to decrease the following May after application, although alfalfa density rebounded somewhat by July. See table 1 for results in irrigated pasture and Table 2 for results regarding control at the non-crop site. In summary, results suggest California's maximum labeled rate of Transline is probably too low to provide expectable year long Canada thistle control, but further investigation is needed. The same experimental treatments will be applied next spring when Canada thistle reaches the bud stage to test the herbicides' effectiveness at a different timing.

Table 1. The effect of fall herbicides on Canada thistle and alfalfa density in irrigated pasture.

Herbicide Treatment	**Product Rate**	**May 7th – 7 MAT**		**July 28th – 9 MAT**	
		C. Thistle shoot density	Alfalfa shoot density	C. thistle shoot density	Alfalfa shoot density
1. Untreated Control	-----	6a	15a	8ab	9a
2. Transline- 3 L non-ionic surfactant	0.33 pt/A 0.25 % v/v	1cd	6b	6abc	6ab
3. Transline- 3 L non-ionic surfactant	0.66 pt/A 0.25 % v/v	0d	2bc	6abc	4b
4. Banvel- 4 EC non-ionic surfactant	1.0 qt/A 0.25 % v/v	1bcd	0c	7abc	4ab
5. Banvel- 4 EC non-ionic surfactant	2.0 qt/A 0.25 % v/v	0cd	0c	5bc	3b
7. 2,4-D- 4 EC non-ionic surfactant	1.0 qt/A 0.25 % v/v	3b	6b	9a	5ab
8. 2,4-D- 4 EC non-ionic surfactant	1.5 qt/A 0.25 % v/v	2bc	4bc	4c	7ab

* - means followed by the same letter do not significantly differ (P= .05)

Table 2. The effect of fall herbicides on Canada thistle density and perennial grass cover at the non-crop site.

Herbicide Treatment	Product Rate	May 7th – 7 MAT		July 28th – 9 MAT	
		C. Thistle shoot density	Perennial grass cover	C. thistle shoot density	Perennial grass cover
1. Untreated Control	-----	12a	57a	16a	31ab
2. Transline- 3 L non-ionic surfactant	0.33 pt/A 0.25 % v/v	6bcd	41ab	12ab	29ab
3. Transline- 3 L non-ionic surfactant	0.66 pt/A 0.25 % v/v	2cd	56ab	5b	38ab
4. Banvel- 4 EC non-ionic surfactant	1.0 qt/A 0.25 % v/v	7abc	53ab	17a	46ab
5. Banvel- 4 EC non-ionic surfactant	2.0 qt/A 0.25 % v/v	3bcd	41ab	11ab	41ab
6. Distinct- 70 DF non-ionic surfactant ammonium sulfate	4.0 oz/A 0.25 % v/v 5 lb/100 gal	8ab	36b	18a	30ab
7. Distinct- 70 DF non-ionic surfactant ammonium sulfate	6.0 oz/A 0.25 % v/v 5 lb/100 gal	5bcd	51ab	15ab	36ab
8. 2,4-D- 4 SC non-ionic surfactant	1.5 qt/A 0.25 % v/v	8ab	39ab	15a	26ab
9. Telar- 75 DF non-ionic surfactant	1.0 oz/A 0.25 % v/v	0d	51ab	9ab	53a
10. Round-up- 4L ammonium sulfate	2.5 qt/A 10 lb/100 gal	4bcd	12c	8ab	14b

Perennial Pepperweed (Tall Whitetop) Control with Herbicides Applied at the Rosette and Flower-bud Stage

Introduction: Perennial pepperweed is currently Lassen Counties' # 1 weed problem. The invasive plant spreads via underground roots and seed forming near monoculture populations within wildlife areas, rangeland, irrigated cropland, and waste areas. This experiment examined several herbicide treatments applied at the rosette and flower-bud stage to determine the best application time/herbicide combination for perennial pepperweed control before flowering. The plot area was mowed in early April prior to perennial pepperweed greened up to reduce the amount of litter and facilitate better spray coverage during herbicide application. It is important to note this is an ongoing experiment; evaluations will be made spring and fall of 2003 to determine residual effects of the herbicides on the perennial pepperweed population.

Study Director: Rob Wilson

Cooperator: CDFG Honey Lake Wildlife area

Date and Time of Herbicide Applications:
Rosette Application- April 16th, 2002 at 8:00 am; Temperature 44 degrees F
Flower-bud Application- May 30th, 2002 at 10:30 am; Temperature 85 degrees F

Plot Size and Application Method: Plot size was 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Weather, Precipitation, and Soil Type/Moisture: The study site historically receives approx. 6 inches of precipitation a year; the soil is a sodic, alkali clay loam. The soil surface was dry and sub-surface was moist at the time of the rosette application; soil surface and sub-surface was dry at the time of the flower-bud application. The field only received one significant rainfall event of 0.62 inches on April 29, 2002 after treatments were initiated.

Plant Community Present at the Time of Application: The first three replications were heavily infested with perennial pepperweed. The fourth replication was moderately infested with perennial pepperweed with considerable tall wheatgrass cover.

Data Collected: Evaluations were made in three 1 m^2 quadrats in each plot to determine herbicide effects on perennial pepperweed and tall wheatgrass. Perennial pepperweed shoot density and tall wheatgrass cover was measured on June 26, 2002 (2 MAT), July 29, 2002 (3 MAT), and September 19, 2002 (5 MAT) in plots sprayed at the rosette stage. In plots sprayed at the flowerbud stage, perennial pepperweed density and tall wheatgrass cover was evaluated on July 29, 2002 (2 MAT) and September 19, 2002 (4 MAT). Additional evaluations will be taken spring and fall of 2003 to determine long term effects of the herbicides on perennial pepperweed and tall wheatgrass.

Results: Overall, herbicide treatments applied at the flower-bud stage provided slightly better pepperweed control compared to treatments applied at the rosette stage. Telar was clearly the best herbicide treatment at both application times reducing perennial pepperweed density by ≥90% at all rates on the September 19th evaluation. 2,4-D and Plateau were also acceptable treatments reducing perennial pepperweed density by more than 60% at the September 19th evaluation. Round-up was not an acceptable treatment when applied at the rosette or flower-bud stage. Round-up killed the majority of tall wheatgrass plants and provided mediocre perennial pepperweed control. An interesting observation is the tested low rates of Telar, 2,4-D, and Plateau provided equal perennial pepperweed control compared to high rate. Although further investigation is needed, low rates provide the advantage of reduced cost, environmental safety, and less plant-back restrictions. See Table 1 for a complete listing of all herbicide treatments applied at the rosette stage and Table 2 for all herbicide treatments applied at the flower-bud stage. Evaluations next year will be conducted to determine residual control from the herbicides one year after treatment.

Table 1. The effect of herbicides applied at the rosette stage on perennial pepperweed density and tall wheatgrass cover.

Herbicide Treatment	Product Rate	June 26th 2 MAT		July 29th 3 MAT		Sept. 19th 5 MAT	
		P. Pepper-weed density	T. wheat-grass % cover	P. Pepper-weed density	T. wheat-grass % cover	P. Pepper-weed density	T. wheat-grass % cover
1. Untreated Control	-----	26a	21ab	22a	19a	18a	12ab
2. Telar- 75 DF non-ionic surfactant	1.0 oz/A 0.25 % v/v	2c	22ab	2b	19a	2c	12ab
3. 2,4-D- 4 SC non-ionic surfactant	2.0 qt/A 0.25 % v/v	6bc	18ab	7b	14a	7bc	10ab
4. Plateau- 2 SL methylated seed oil ammonium sulfate	8.0 fl oz/A 1.0 pt/A 10 lb/100 gal	3c	14ab	9b	14a	4c	9ab
5. Plateau- 2 SL methylated seed oil ammonium sulfate	12.0 fl oz/A 1.0 pt/A 10 lb/100 gal	3c	25a	7b	20a	3c	16a
6. Round-up- 4L ammonium sulfate	3.0 qt/A 10 lb/100 gal	15b	0b	19a	0a	13ab	0b

Table 2. The effect of herbicides applied at the flowerbud stage on perennial pepperweed density and tall wheatgrass % cover.

Herbicide Treatment	Product Rate	July 29th- 2 MAT		Sept. 19th- 4 MAT	
		perennial pepperweed shoot density	tall wheatgrass % cover	Perennial pepperweed shoot density	Tall wheatgrass % cover
1. Untreated Control	-----	30a	9abc	19a	5abc
2. 2,4-D- 4 SC non-ionic surfactant	1.0 qt/A 0.25 % v/v	5gh	14ab	7c-f	9abc
3. 2,4-D- 4 SC non-ionic surfactant	2.0 qt/A 0.25 % v/v	1h	15ab	6c-f	5abc
4. Distinct- 70 DF non-ionic surfactant ammonium sulfate	6.0 oz/A 0.25 % v/v 5 lb/100 gal	18cd	13abc	11a-e	4abc
5. Round-up- 4 L ammonium sulfate	3.0 qt/A 10 lb/100 gal	18cde	0c	10b-e	0c
6. Telar- 75 DF non-ionic surfactant	0.75 oz/A 0.25 % v/v	1h	23a	0f	8abc
7. Telar- 75 DF non-ionic surfactant	1.0 oz/A 0.25 % v/v	1h	9bc	1f	3bc
8. Telar- 75 DF non-ionic surfactant	2.0 oz/A 0.25 % v/v	0h	14ab	1f	5abc
9. Plateau- 2 SL methylated seed oil ammonium sulfate	8.0 fl oz/A 1.0 pt/A 10 lb/100 gal	14def	7bc	4ef	6abc
10. Plateau- 2 SL methylated seed oil ammonium sulfate	12.0 fl oz/A 1.0 pt/A 10 lb/100 gal	12ef	13abc	5def	13a
11. Landmaster II- 2.2L non-ionic surfactant ammonium sulfate	3.0 qt/A 0.25 % v/v 10 lb/100 gal	10fg	3bc	11a-e	7abc
12. Olympus- 70 DF non-ionic surfactant	0.9 oz/A 0.25 % v/v	28ab	2bc	16ab	2bc
13. Olympus- 70 DF non-ionic surfactant	1.8 oz/A 0.25 % v/v	31a	8bc	15abc	6ab
14. Garlon- 4 EC Round-up- 4 L non-ionic surfactant	0.5 % v/v 0.5 % v/v 0.25 % v/v	23bc	3bc	13a-d	3bc

Perennial Pepperweed Control in Established Alfalfa

Introduction: Perennial pepperweed (tall whitetop) is an aggressive, root creeping perennial that commonly infests irrigated pasture and alfalfa in Lassen County. Perennial pepperweed can spread throughout a field in a short period of time and becomes quite persistent in many perennial crops. To date, cultural and mechanical control methods have been ineffective at controlling perennial pepperweed. This experiment examined several herbicide treatments applied in the fall after the third cutting or in early spring after alfalfa broke dormancy to find effective chemical controls for perennial pepperweed growing in alfalfa.

Study Director: Rob Wilson

Cooperator: Jay Dow

Date and Time of Herbicide Applications:
Fall Application- October 10, 2001- 10:00 am; Temperature 57°F (the application was made 5 days after the first hard frost)
Spring Application- March 28, 2002- 11:00 am; Temperature 66°F

Plot Size and Application Method: Plots were 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Soil Type and Moisture: Clay loam. The soil surface was dry and soil sub-surface moist at the time of both applications. The spring herbicide treatments received irrigation 2 wks after application.

Weed Species Present at time of application: Perennial pepperweed, curly dock, and foxtail barley were the predominant weeds within the test site, although foxtail barley and curly dock densities were sporadic in several plots. All weed species were well established before treatments began. During the fall application, perennial pepperweed and curly dock were in the rosette stage with a diameter of 4 – 8 in; approximately 50% of the perennial pepperweed leaves had senesced from a frost earlier in the week. During the spring application, perennial pepperweed and curly dock rosettes were 2-5 inches in diameter, and foxtail barley was 3-5 in tall.

Crop Stage: During the spring application, alfalfa was vigorously growing with 2 in regrowth. During the fall application, alfalfa had 2-5 in regrowth after the third cutting. The alfalfa stand was older than 5 years and had begun to thin.

Data Collected: Weed control evaluations were taken on April 26th and August 5th, 2002 for both spring and fall treatments. An additional evaluation was made on May 22nd, 2002 for the spring applied treatments. The April 26th evaluation took place when perennial pepperweed was bolting. The May 22nd evaluation coincided with the 1st cutting of alfalfa, and the August 5th evaluation occurred 2 wks after the second cutting. Curly dock was only evaluated during the

August evaluation. Foxtail barley was not evaluated during the August evaluation since the majority of plants had little re-growth following the second cutting.

Result Summary: None of the treatments caused noticeable stand reduction, although all of the spring treatments stunted the alfalfa. The fall applied treatments showed no sign of stunting or injury to alfalfa. The spring applied plateau treatment caused severe stunting and chlorosis to the alfalfa after treatment, although the alfalfa was vigorously growing again by the first cutting.

As far as weed control, the high rate of pursuit and raptor provided good control of perennial pepperweed. Both spring and fall applications offered control above 80% during the April and August evaluations, but fall treatments seemed to provide the best control with the least alfalfa injury. Surprisingly, the high rates of pursuit applied in the fall provided acceptable perennial pepperweed control nearly one year after treatment. Adding Butyrac 200 as a tank mix with Pursuit or Raptor did not improve perennial pepperweed control compared to using Pursuit or Raptor alone. Curly dock control was marginal for all treatments. The best treatment for curly dock was Pursuit + Butyrac 200 applied in the fall. The best foxtail barley control was achieved by applying Prism at 26 oz/A, although the high rate of Raptor + MSO + ammonium sulfate and Prism at 17 oz/A provided suppression. See Table 1 for fall treatment results and Table 2 for spring treatment results.

Table 1. The effect of fall 2001 herbicides on perennial pepperweed control in alfalfa

Fall Herbicide Treatments	Product Rate per Acre	% control on April 26, 2002	% control on August 5th, 2002	
		Perennial Pepperweed	perennial pepperweed	curly dock
1. Control (No herbicide applied)	---	0b	0c	0c
2. Pursuit- 70 DG methylated seed oil-Hasten	1.08 oz/A 1.0 pt/A	98a	45b	27bc
3. Pursuit- 70 DG methylated seed oil-Hasten	2.16 oz/A 1.0 pt/A	100a	83a	52abc
4. Pursuit- 70 DG Butyrac 200- 2 SC methylated seed oil-Hasten ammonium sulfate	2.16 oz/A 1.0 qt/A 1.0 pt/A 15 lb/ 100 gal	98a	80a	72ab
5. Pursuit- 70 DG Butyrac 200- 2 SC methylated seed oil-Hasten	2.16 oz/A 3.0 qt/A 1.0 pt/A	96a	69a	75a
6. Pursuit- 70 DG Butyrac 200- 2 SC methylated seed oil-Hasten	2.16 oz/A 1.0 qt/A 1.0 pt/A	98a	76a	70ab
6. Pursuit- 70 DG Butyrac 200- 2 SC methylated seed oil-Hasten	1.08 oz/A 1.0 qt/A 1.0 pt/A	95a	14c	13c

Weed data is expressed as % control of the particular weed specie

- % control over 80 suggest good control
- % control between 65-80 suggest partial control with some crop contamination
- % control between 50-65 suggest suppression with crop contamination
- % control below 50 suggest poor control

** Means followed by the same letter do not significantly differ (P= 0.05)**

Table 2. The effect of Spring 2002 herbicides on perennial pepperweed control in alfalfa

Spring Herbicide Treatments	Product Rate per Acre	% Control April 26, 2002		% Control May 22, 2002		% Control August 6, 2002	
		perennial pepperweed	foxtail barley	perennial pepperweed	Foxtail barley	perennial pepperweed	curly dock
1. Control (No herbicide applied)		0 d	0d	0d	0d	0c	0d
2. Pursuit- 70DG methylated seed oil-Hasten	2.16 oz/A 2 pt/A	80bc	5d	86b	6d	81ab	26bc
3. Pursuit- 70 DG methylated seed oil-Hasten ammonium sulfate	2.16 oz/A 2.0 pt/A 2.5 lb/A	75bc	14d	78c	9d	75ab	45a
4. Raptor- 1L crop oil concentrate-Hasten	6.0 fl oz/A 2.0 pt/A	80bc	40c	90ab	62c	80ab	35abc
5. Raptor- 1L methylated seed oil-Hasten ammonium sulfate	6.0 fl oz/A 2.0 pt/A 15 lb/100 gal	83ab	34c	84bc	74b	89a	25bcd
6. Pursuit- 70 DG Butyrac 200- 2 SC methylated seed oil-Hasten	2.16 oz/A 1.0 qt/A 2.0 pt/A	71c	10d	84bc	9d	59b	21cd
7. Raptor- 1 L Butyrac 200- 2 SC methylated seed oil-Hasten	6.0 fl oz/A 1.0 qt/A 2.0 pt/A	75bc	34c	86b	61c	80ab	39abc
8. Plateau- 2 SL methylated seed oil-Hasten	12.0 fl oz/A 1.0 pt/A	93a	59b	95a	57c	81ab	50ab
9. Prism 0.94 EC methylated seed oil-Hasten	17 fl oz/A 2.0 pt/A	0d	80a	0d	80b	0c	0d
10. Prism 0.94 EC methylated seed oil-Hasten	26 oz/A 2.0 pt/A	0d	93a	0d	91a	0c	0d

Weed data is expressed as % control of the particular weed specie

- % control over 80 suggest good control
- % control between 65-80 suggest partial control with some crop contamination
- % control between 50-65 suggest suppression with crop contamination
- % control below 50 suggest poor control

** Means followed by the same letter do not significantly differ (P= 0.05)**

Post Emergent Weed Control in Established Alfalfa

Introduction: If alfalfa greens up or weeds emerge in early spring before dormant herbicides (Velpar, Sencor, Karmex, etc.) can be applied, growers are often obligated to apply post-emergent herbicides to control unwanted weeds. This experiment examined several post-emergent herbicide treatments labeled for early spring application in established alfalfa.

Study Director: Rob Wilson

Cooperator: Tim Garrod

Date and Time of Herbicide Application: March 25, 2002 at 2:00 pm;
Temperature 54 degrees F

Plot Size and Application Method: Plot size was 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Soil Type and Moisture: loamy sand. The soil surface and sub-surface was dry at the time of herbicide application. The field did not receive irrigation or rainfall for three weeks after application.

Weed Species Present at time of application: **shepard's-purse**- rosette 1-3 in diameter, **dandelion**- rosette 2-5 in diameter, and **hare barley (annual foxtail)**-1-3 in tall.

Crop Stage: **alfalfa**- green with 1 in re-growth

Data Collected: Weed control evaluations were made on April 10, May 01, and May 21 following herbicide application. The May 01 evaluation coincided with the time the majority of the weeds were flowering. Crop injury data was recorded on April 10 and alfalfa yield was recorded on May 21 (one week before the field was harvested by the grower). Yield was determined by measuring the amount of alfalfa and weed biomass within a 1 m^2 quadrat in each plot. Yields are expressed as the percent change in tons per acre compared the untreated control.

Results Summary: None of the treatments caused noticeable stand reduction, although some treatments caused significant visual alfalfa injury. The Raptor + ammonium sulfate treatments caused 5 % injury and the Gramoxone Xtra treatment caused 20 % crop injury. 100% crop injury equaled plant death. Gramoxone Xtra plots also had the lowest yield compared to any of the treatments. All herbicide treatments with Pursuit and Raptor provided good control of shepards-purse. None of the herbicides provided good control of dandelion, although the medium and high rate of Raptor provided decent suppression. Prism provided the best control of hare barley, while Poast and Raptor provided suppression. For a complete listing of treatment weed control see Table 1. Overall, Pursuit + Prism or Raptor + MSO + ammonium sulfate was the best herbicide treatment for the weed species present in the field. Gramoxone Xtra was the worst herbicide treatment in the trial since it offered poor weed control and caused significant alfalfa injury.

Table 1. Weed control evaluation results **Herbicide Treatment**	**Product Rate per Acre**	**% control**									**alfalfa**	**alfalfa yield**
		Shepards-purse			**dandelion**			**hare barley**			**% injury**	**% change**
		4/10	5/01	5/21	4/10	5/01	5/21	4/10	5/01	5/21	4/10	5/21
1. Control- No herbicide applied	---	0c	0c	0c	0d	0d	0e	0f	0f	0d	0c	0abc
2. Prism- 0.94 EC methylated seed oil-Hasten	13.0 oz/A 2.0 pt/A	0c	0c	0c	0d	0d	0e	60bc	60c	70b	0c	0abc
3. Prism- 0.94 EC MSO-Hasten	17.0 oz/A 2.0 pt/A	0c	0c	0c	0d	0d	0e	60bc	70bc	90a	0c	+ 5ab
4. Prism- 0.94 EC MSO-Hasten	26.0 oz/A 2.0 pt/A	0c	0c	0c	0d	0d	0e	70ab	95a	95a	0c	- 2bc
5. Prism- 0.94 EC MSO-Hasten ammonium sulfate	17.0 oz/A 2.0 pt/A 2.5 lb/A	0c	0c	0c	0d	0d	0e	80a	75bc	90a	0c	+ 4ab
6. Poast Plus- 1.0 EC MSO-Hasten	2.25 pt/A 1.5 pt/A	0c	0c	0c	0d	0d	0e	60bc	70bc	60b	0c	0abc
7. Poast Plus- 1.0 EC MSO-Hasten	3.0 pt/A 1.5 pt/A	0c	0c	0c	0d	0d	0e	60bc	80ab	70b	0c	- 3bc
8. Pursuit- 70 DG Prism- 0.94EC MSO-Hasten	1.44 oz/A 17.0 oz/A 1.5 pt/A	90a	80a	88a	30b	63b	41.7c	80a	80ab	90a	2.5bc	- 2bc
9. Pursuit- 70 DG MSO-Hasten	1.44 oz/A 1.5 pt/A	100a	83a	89a	30b	62b	43bc	20e	30d	8cd	3.8b	+ 5ab
10. Raptor- 1L MSO-Hasten	5.0 fl oz/A 1.5 pt/A	80ab	83a	89a	25bc	68ab	48ab	20e	35d	25c	3.8b	+ 9a
11. Raptor- 1L MSO-Hasten ammonium sulfate	5.0 fl oz/A 1.5 pt/A 12 lb per 100 G	100a	81a	90a	40ab	68ab	50a	40d	35d	60b	5.0b	- 5bc
12. Raptor- 1L MSO-Hasten ammonium sulfate	6.0 fl oz/A 1.5 pt/A 12 lb per 100 G	75ab	89a	90a	60a	70a	47ab	40d	60c	60b	5.0b	- 7cd
13. Gramoxone Xtra- 2.5L	1.0 pt/A	60b	15b	23b	20cd	9c	10d	50cd	15e	11cd	20a	- 16d
14. Gramoxone Xtra- 2.5L*	2.0 pt/A	---	---	65	---	---	30	---	---	44	---	- 21

Weed data is expressed as % control of the particular weed specie

- % control over 80 suggest good control
- % control between 65-80 suggest partial control with some crop contamination
- % control between 50-65 suggest suppression with crop contamination
- % control below 50 suggest poor control

** Means followed by the same letter do not significantly differ (P= 0.05)**

* Treatment 14 was the grower herbicide treatment applied 2 wks after herbicide application in the experimental plots. Trt 14 was not included in the statistical analysis.

Post Emergent Broadleaf Weed Control in Alfalfa Less than One Year Old

Introduction: In order to achieve a weed free first cutting, young alfalfa fields often require a late fall or early spring herbicide treatment to control winter annual and perennial weeds that germinate during the first year of the stand. Alfalfa growers can also miss the window for dormant herbicide applications in established alfalfa and are required to apply herbicides in early spring after alfalfa and weed growth has resumed. This experiment examined several post-emergent herbicide treatments labeled for use in alfalfa less than one yr old.

Study Director: Rob Wilson

Cooperator: Bob Pyle

Date and Time of Herbicide Application: March 25, 2002 at 8:30 am; Temperature 56 degrees F

Plot Size and Application Method: Plot size was 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Soil Type and Moisture: Sandy loam. The soil surface was dry and sub-surface was moist at the time of herbicide application. The field did not receive irrigation or rainfall until three weeks after application.

Weed Species Present at time of application: **shepard's-purse**- rosette 2 in diameter, **tansymustard (flixweed)**- rosette 3 in diameter, **volunteer wheat**- 2-4 in tall, **dandelion**- rosette 2 ½ in diameter, and **prickly lettuce**- rosette 1 ½ in diameter.

Crop Stage: **alfalfa**- green with 1 in re-growth planted the spring of 2001

Data Collected: Weed control evaluations were made on April 08 and May 01 following herbicide application. The May 01 evaluation coincided with the time the majority of the weeds were flowering. Crop injury data was recorded on April 08 and alfalfa height was recorded on May 01. Crop height data is not included because there were no significant differences between treatments. Yield data was not recorded due to irregularities in the alfalfa stand.

Results Summary: None of the treatments caused noticeable stand reduction, although a few treatments showed significant alfalfa injury on April 08. Velpar, Velpar + Gramoxone, and Gramoxone alone caused 22, 27, and 23 % crop injury respectively. 100% crop injury equaled plant death. All Pursuit and Raptor treatments (except the low rate of pursuit) along with Velpar + Gramoxone provided good control of shepard's-purse and tansymustard. Butyrac 200 alone or tank mixed with Pursuit and the Velpar + Gramoxone treatment provided good control of prickly lettuce. Pursuit + Prism, Velpar + Gramoxone, and the medium and high rate of Raptor provided good control of volunteer wheat. None of the treatments offered control of dandelion, although Pursuit and Raptor offered partial control. For a complete listing of the treatments and their associated weed control see Table 1. Overall, the medium rate of Raptor + MSO + ammonium sulfate was the best herbicide treatment providing good weed control with minimal injury to the alfalfa. Velpar + Gramoxone also provided good weed control but caused significant alfalfa injury.

Table 1. Weed Control Evaluations. Herbicide Treatment	Product Rate per Acre	% control shepard-purse		Tansymustard		prickly lettuce		Wheat		dandelion	
		4/08	5/01	4/08	5/01	4/08	5/01	4/08	5/01	4/08	5/01
1. Control (No herbicide applied)	---	0e	0e	0g	0e	0i	0f	0e	0g	0g	0e
2. Pursuit- 70 DG methylated seed oil-Hasten	1.08 oz/A 1.5 pt/A	76b	74b	---	85ab	39fgh	20de	50cd	54cd	38cd	58bc
3. Pursuit- 70 DG methylated seed oil-Hasten	1.44 oz/A 1.5 pt/A	77b	80ab	62cde	85ab	30h	17de	64bc	49de	40cd	60bc
4. Pursuit- 70 DG methylated seed oil-Hasten	2.16 oz/A 1.5 pt/A	75b	83ab	87ab	90ab	53d-g	20de	45cd	45de	55ab	60bc
5. Pursuit- 70 DG Prism- 0.94 EC methylated seed oil-Hasten	1.44 oz/A 17.0 oz/A 1.5 pt/A	80ab	84ab	60de	91ab	33gh	25cd	64bc	91ab	38cd	65ab
6. Pursuit- 70 DG Butyrac 200- 2 SC non-ionic surfactant- R-11	1.44 oz/A 1.0 qt/A 0.25 % V/V	76b	90a	85ab	93ab	75abc	83a	51bcd	31ef	60a	67ab
7. Butyrac 200- 2 SC	1.0 qt/A	18d	9de	15fg	19d	55def	78a	0e	1g	13fg	7e
8. Butyrac 200- 2 SC	3.0 qt/A	31c	15d	22f	20d	70a-d	81a	0e	3g	23ef	23d
9. Raptor- 1L methylated seed oil-Hasten	4.0 fl oz/A 1.5 pt/A	74b	83ab	70bcd	86ab	50efg	23cde	51bcd	73bc	35cde	53c
10. Raptor- 1L methylated seed oil-Hasten	5.0 fl oz/A 1.5 pt/A	80ab	84ab	82ab	93ab	50efg	28cd	45cd	81ab	37cde	68ab
11. Raptor- 1L methylated seed oil-Hasten	6.0 fl oz/A 1.5 pt/A	80ab	83ab	90a	91ab	58cde	38c	49cd	91ab	30de	72a
12. Raptor- 1L methylated seed oil-Hasten ammonium sulfate	5.0 fl oz/A 1.5 pt/A 12 lb per 100 G	84ab	88a	90a	96a	85a	58b	68abc	95a	45bc	72a
13. Velpar- 75DF	1.0 lb/A	78b	29c	43e	21cd	63b-e	8ed	28d	11fg	38cd	9e
14. Velpar- 75DF Gramoxone Xtra- 2.5L	1.0 lb/A 1.0 pt/A	90a	84ab	80abc	81b	88a	78a	94a	93ab	30de	30d
15. Gramoxone Xtra- 2.5L	1.0 pt/A	85ab	40c	50e	35c	50e	69ab	78ab	29ef	--	5e

Weed data is expressed as % control of the particular weed specie

- % control over 80 suggest good control
- % control between 65-80 suggest partial control with some crop contamination
- % control between 50-65 suggest suppression with crop contamination
- % control below 50 suggest poor control

** Means followed by the same letter do not significantly differ (P= 0.05)**

Post Emergent Weed Control in Spring Planted Seedling Alfalfa

Introduction: One herbicide application in seedling alfalfa is often needed to successfully establish the crop and allow for a weed free first cutting. Seedling alfalfa is too small and immature to compete with germinating annual weeds, which can arise in large numbers after tillage activities and planting. Herbicide applications in seedling alfalfa are also important if perennial weeds are historically a problem in the field since several perennial weeds can only be controlled with herbicides at the seedling stage of growth. This experiment examined several post-emergent herbicide options for weed control in seedling alfalfa.

Study Director: Rob Wilson

Cooperator: Bob Pyle

Date and Time of Herbicide Application: May 29, 2002 at 10:00 am; Temperature 80 degrees F

Plot Size and Application Method: Plot size was 10 X 30 ft. The experiment was arranged in a randomized complete block design with four replications. Herbicides were applied at 20 gallons per acre using a 10 ft boom CO_2 backpack sprayer.

Soil Type/Moisture: Sandy loam. The soil surface and sub-surface was moist at the time of application. The field received irrigation within a week after the herbicide application. None of the alfalfa or wheat plants showed signs of stress.

Weed Species Present at time of application: **shepard's-purse**- rosette 2-3 in diameter, **tumble mustard**- rosette 3 in diameter and sporadic through the field, **wheat nurse crop**- 7-16 in tall, **lambsquarter**- rosette 2-4 in diameter, and **common mallow (cheeseweed)**- rosette 1 ½-3 in diameter.

Crop Stage: **alfalfa**- vigorously growing at 2-5 trifoliate leaf stage; **wheat nurse crop**-tillered 7-16 in tall

Data Collected: A weed control evaluation was made on June 20 three weeks following herbicide application. The majority of the weeds and wheat were flowering at the time of evaluation. Alfalfa height was also recorded during the June 20 evaluation. Yield data was not recorded due to compounding variables associated with the interseeded wheat crop.

Result Summary: None of the treatments caused noticeable stand reduction. All treatments provided good control of shepards-purse and tumble mustard. Pursuit + Buctril and Raptor provided the best control of lambsquarter and common mallow. Wheat was suppressed by all herbicide treatments, but Raptor, Pursuit + Prism, and Pursuit + Poast were the only treatments that effectively controlled wheat. For a complete listing of the treatments and their associated weed control see Table 1. Overall, the best herbicide treatment for broadleaf weed control was Pursuit + Buctril. The best herbicide treatments for combined broadleaf and grass weed control were the medium and high rate of Raptor and Pursuit + Prism.

Table 1. Weed Control Evaluations. Herbicide Treatment	**Product Rate per Acre**	**% control on June 20th evaluation**					
		Shepards-purse	**tumble mustard**	**lambsquarter**	**wheat**	**mallow**	**alfalfa height (in)**
1. Control (No herbicide applied)	---	0f	0c	0f	0f	0e	8a
2. Pursuit- 70 DG methylated seed oil-Hasten	1.08 oz/A 1.5 pt/A	80e	97a	76e	26de	65c	7.2a
3. Pursuit- 70 DG methylated seed oil-Hasten	1.44 oz/A 1.5 pt/A	84cde	97a	76e	21e	65c	6.8a
4. Pursuit- 70 DG methylated seed oil-Hasten	2.16 oz/A 1.5 pt/A	85cde	93ab	81cde	39c	68bc	7.3a
5. Pursuit- 70 DG methylated seed oil-Hasten ammonium sulfate	1.44 oz/A 1.5 pt/A 2.5 lb/A	83de	98a	79de	36c	72bc	6.6a
6. Pursuit- 70 DG Butyrac 200- 2 SC non-ionic surfactant- R-11	1.44 oz/A 0.75 qt/A 0.25 % V/V	79e	96a	83b-e	20e	45d	6.7a
7. Pursuit- 70 DG Buctril- 2EC non-ionic surfactant- R-11	1.44 oz/A 0.75 pt/A 0.25 % V/V	99a	96a	100a	32cd	96a	6.5a
8. Raptor- 1L methylated seed oil-Hasten	4.0 fl oz/A 1.5 pt/A	89cd	95a	89bc	81b	79b	7.9a
9. Raptor- 1L methylated seed oil-Hasten	5.0 fl oz/A 1.5 pt/A	90bc	96a	88bcd	82b	75bc	7.8a
10. Raptor- 1L methylated seed oil-Hasten	6.0 fl oz/A 1.5 pt/A	96ab	96a	90ab	80b	80b	7.65a
11. Pursuit- 70 DG Prism- 0.94 EC methylated seed oil-Hasten	1.44 oz/A 17.0 fl oz/A 1.5 pt/A	90bc	90ab	80cde	93a	78bc	7.15a
12. Pursuit- 70 DG Poast Plus- 1 EC methylated seed oil-Hasten	1.44 oz/A 2.25 pt/A 1.5 pt/A	89cd	87b	82b-e	86ab	75bc	7.3a

Weed data is expressed as % control of the particular weed specie

- % control over 80 suggest good control
- % control between 65-80 suggest partial control with some crop contamination
- % control between 50-65 suggest suppression with crop contamination
- % control below 50 suggest poor control

** Means followed by the same letter do not significantly differ (P= 0.05)**

Weed Control in Pumpkins

Introduction: Puncturevine can become a severe problem in pumpkins and other cucurbit crops. Punturevine not only causes problems by competing with the crop, but the thorny seeds make it quite painful for gardeners to weed, walk, or hand harvest within the field. Pre-emergent herbicides offer cucurbit growers a weed control option besides cultivation or hand-weeding. Traditionally cultivation and/or hand-weeding has been the primary means for removing weeds in cucurbits grown in Lassen County, but weeds within the row are difficult to mechanically control and cultivation cannot be used after the cucurbit canopy covers the row. This experiment examined several pre-emergent herbicide treatments applied before and after crop emergence to try and find a chemical control answer for removing puncturevine (and other weeds) in pumpkins.

Study Director: Rob Wilson

Cooperator: Fred and Dena Wemple

Herbicide Application Times:
Pre-plant treatments: August 7, 2002 at 10:30 am; Temperature 78° F
Post-plant treatments: August 8, 2002 at 9:00 am; Temperature 74° F
Layby treatments at the 3-4 leaf crop stage: August 22, 2002 at 3:00 pm; Temperature 82° F

Plot Size and Application Method: Plot size was 6.5 ft X 20 ft. Plots were replicated four times in a randomized complete block design. Herbicides were applied at 20 gallons per acre using a 6.5 ft boom CO_2 backpack sprayer. Pre-plant treatments were mechanically incorporated immediately after application within the top 2 inches of soil. Post-plant treatments were incorporated with a 0.5 inch irrigation 7 hrs after application. Layby treatments at the 3-4 leaf stage were mechanically incorporated within the top 2 inches of soil by cultivating between the pumpkin rows immediately after application. Banded treatments were applied in bands between the pumpkin rows avoiding herbicide contact with pumpkin foliage.

Soil Type and Moisture: The soil was loamy sand with little organic matter. The soil surface and sub-surface was dry at the time of the pre-plant treatment. After pre- and post-plant treatments were applied, the field received a 0.5 in irrigation with set sprinklers. The field was irrigated subsequently with two more 0.5 in irrigations on August 15 and August 22.

Weed Species Present at the time of application: All treatments were applied before weed emergence, all control plots were infested with puncturevine, lovegrass, purslane, and redroot pigweed.

Crop Stage: During the pre and post-plant herbicide applications, no pumpkins had emerged within the test site. Pumpkins were in the 2-4 leaf stage and approximately 1-2 inches tall at the time of the layby treatments.

Data Collected: A weed control evaluation for all treatments was made on September 4th, 2002. Most of the weeds were 1-4 inches tall and pumpkins were 3-6 inches tall at the time of evaluation. Visual pumpkin injury and the number of live pumpkin plants per nine planted seeds were recorded to determine herbicide effects on the crop.

Result Summary: None of the treatments caused significant reduction in pumpkin stand density compared to the control, although two treatments caused considerable visual injury. Treflan at 1.0 pints/A applied pre-plant and Strategy at 3.0 pt/A applied post-plant caused 23 and 19 % injury respectively. Curbit applied post-plant was the safest treatment causing the least injury to the pumpkins.

With regard to weed control, none of the herbicides treatments effectively controlled puncturevine. Although Treflan showed some activity on puncturevine, this experiment suggests few herbicide options are available for puncturevine control in cucurbits. Treflan applied pre-plant and all rates of Curbit and Strategy effectively controlled lovegrass and purslane. Treflan applied layby along with Curbit and the high rate Strategy provided adequate control of redroot pigweed, although none of the treatments provided redroot pigweed control above 90%. For a complete listing of herbicide weed control and crop injury see the table below. In general, Curbit at 3 or 4 pt/A was the best herbicide treatment in this experiment. Curbit caused minimal injury to the pumpkins and provided acceptable weed control for all weed species except puncturevine.

The Effect of Herbicide Treatments on Weed Control and Pumpkin Injury

Herbicide Treatments	Rate	Application Time	% Control				Pumpkin % Injury	Pumpkin Stand
			lovegrass	puncture-vine	pigweed	purslane		
1.Control	----	----	0f	0d	0d	0d	5c	8a
2.Treflan-4.0 EC	1.0 pt/A	Pre-plant	88abc	63a	70b	78abc	23a	8a
3.Treflan-4.0 EC	1.0 pt/A	Post-plant	84bcd	44b	51c	71bc	15abc	8a
4.Treflan-4.0 EC	1.5 pt/A	Layby-Broadcast	74cde	71a	76ab	65c	11abc	8a
5.Treflan-4.0 EC	2.0 pt/A	Layby-banded	73de	73a	74ab	63c	13abc	8a
6.Treflan-4.0 EC	1.5 pt/A	Layby-banded	68e	71a	75ab	66c	14abc	7a
7.Curbit-3.0 EC	3.0 pt/A	Post-plant	98ab	39bc	78ab	93a	9bc	7a
8.Curbit-3.0 EC	4.0 pt/A	Post-plant	100a	39bc	86a	90ab	9bc	8a
9.Strategy-2.1 EC	2.0 pt/A	Post-plant	96ab	28c	70b	93a	15abc	8a
10.Strategy-2.1 EC	3.0 pt/A	Post-plant	100a	31bc	74ab	96a	19ab	8a

Weed data is expressed as % control of the particular weed specie

- % control over 80 suggest good control
- % control between 65-80 suggest partial control with some crop contamination
- % control between 50-65 suggest suppression with crop contamination
- % control below 50 suggest poor control

** Means followed by the same letter do not significantly differ (P= 0.05)**

Influence of Medusahead Thatch Removal and Plateau on Medusahead Control and Perennial Grass Establishment

Study directors:
Don Lancaster UCCE Farm Advisor Modoc County; David Lile and Rob Wilson UCCE Farm Advisors Lassen County; & Marni Porath Cooperative Extension agent Lake County Oregon

Site Information

The trial was initiated at two locations in the fall of 2001. One site was located near Likely, CA on rangeland heavily infested with medusahead. The total precipitation at the CIMIS station near Likely from Nov. 2001- July 2002 was 5.2 in. The soil at the site is a Bieber cobbly loam consisting of grayish brown cobbly loam from the 0-6 in depth and dark grayish brown clay loam and brown clay from the 6-18 in depth. The likely site is extremely rocky and has approximately a ½ to 2 in medushead litter layer covering 60 % of the ground. Very few perennial grasses or shrubs were present at the time of treatment initiation. The second site was located near Paisley, OR. The site was rangeland heavily infested with medusahead. The Paisley site is very similar to the Likely site with regard to soil type and rocks. The total precipitation at the Paisley site from Nov. 2001- July 2002 was 8.4 in.

Materials and Methods

In Likely, plots were tilled or burned the beginning of November. The plots were very difficult to till due to a plethora of large rocks. Due to soil type and terrain, tillage is unpractical at most medusahead sites in northeastern California. Plots were also difficult to burn due to a lack of consistent litter accumulation (a small amount of medusahead plants established the spring of 2001 due to drought conditions) and a tolerance for medusahead litter to carry a fire. The fire had to be carried with a propane torch to conduct a complete burn. Herbicide treatments were applied November 5th, 2001 at 3:00 pm. The air temperature was 63 degrees F and wind speed was 0-2 mph at the time of application. Soil surface and sub-surface were dry and relative humidity was around 28%. No medusahead seedlings had germinated in the plots prior to the herbicide application. The plots were seeded with western wheatgrass and squirreltail the same day herbicides were applied. Seed was broadcast applied without incorporation due to a large number of rocks. Smaller plots located outside the experimental area were sprayed with the 4 oz rate of plateau and seeded with various native perennial grasses. In these plots, seed was broadcasted and raked into the soil.

In Paisley, fall and spring litter removal/herbicide treatments were conducted. Plots were burned or tilled the beginning of November or the beginning of April. The plots were difficult to till and burn similar to the plots at Likely. The plots were especially difficult to burn in the spring due to increased moisture content in the soil and litter.

Fall herbicide treatments were applied November 15th, 2001 at 11:00 am. The air temperature was 46 degrees F and wind speed was 5-10 mph with gusts up to 15 mph. A long piece of tin was used as a windshield to try and minimize drift. Soil surface and sub-surface was dry. No medusahead seedlings had germinated in the plots prior to the fall herbicide application. Spring herbicide treatments were applied April 12th, 2002 at 9:30 am. The air temperature was 52 degrees F and wind speed was 0-5 mph. Soil surface was dry and soil sub-surface was moist at the time of application. A lot of medusahead seedlings (1-2.5 in tall) had emerged in the plots prior the spring herbicide application. Plots were seeded with basin wildrye, bluebunch wheatgrass, and Idaho fescue in the fall and squirreltail, sheep fescue, bluebunch wheatgrass, and crested wheatgrass in the spring. Fall and spring planted seed was sown the same day herbicides were applied. The seed was broadcast applied without incorporation.

In late June 2002, plots were evaluated to determine treatment success at controlling medusahead and facilitating perennial grass establishment. In Likely, medusahead density, bare ground cover, and other vegetation cover was measured in two 1 m^2 quadrats per plot. Bare ground cover consisted of areas with only bare soil or thatch present. Other vegetation cover primarily consisted of native winter annual mustards, but sporadic lupine, perennial *Poa* species, bluebunch wheatgrass, Thurber needlegrass, and low sagebrush were also present. In Paisley, medusahead, bare ground, and other vegetation percent cover was measured in two 1 m^2 quadrats per plot. Bare ground cover consisted of areas with only bare soil or thatch present. Other vegetation cover primarily consisted of a mix of low sagebrush, Japanese brome, fiddleneck, crested wheatgrass, and alfalfa. Other vegetation that was sporadic in the plots included squirreltail, milk thistle, Mediterranean sage, kochia, vetch, and bulbous bluegrass.

Results

Perennial grass seeding was virtually a complete failure. There was not a difference in seeding success between untreated plots and plots treated with plateau, although no perennial grass seedlings were found in plots that received plateau at rates greater than 6 oz per acre. Repeat seeding this fall will be conducted to try and establish perennial grasses one year after the plateau application. The fall seeding failure was likely a result of winter weather conditions and lack of spring moisture since heavy clay soils are inherently difficult to establish grasses on, although Plateau injury cannot be ruled out. Further research and discovery is needed.

At both sites, all rates of Plateau significantly decreased medusahead cover and density. The effect of tillage, burning, or leaving the residue undisturbed did not significantly change medusahead density in untreated plots or plots treated with Plateau. At Likely, the 2 oz rate **(herbicide rates are expressed as the amount of product per acre)** of Plateau decreased medusahead density by 73% compared to the control. The 4 oz rate of Plateau decreased medusahead density by 98% leaving less than one medusahead plant per 1 m^2. All Plateau rates greater than 4 ounces provided 100% control of medusahead. See Figure 1 for a complete listing of Plateau treatment effects on medusahead density at Likely.

At Paisley, both spring and fall Plateau treatments provided good control of medusahead, although the control was not quite as good as at Likely. The difference in control between Paisley and Likely is probably due to a several factors. In general, the Paisley site had a more robust medusahead population in the untreated areas compared to the Likely site. The Paisley site also received more winter/spring moisture compared to Likely, and fall Plateau treatments at Paisley were applied on a windy day causing significant herbicide drift.

When comparing the spring vs. fall application at Paisley, it appears the spring Plateau application provided slightly better medusahead control at rates less than 4 oz per acre. The spring applied 4 oz rate of Plateau decrease medusahead cover by 82 %, and the fall applied 4 oz rate decreased medusahead cover by 72%. In plots that received rates higher than 6 oz of Plateau per acre (both spring and fall applied), medusahead cover was reduced by more than 85% and consisted of less than 10% of the total cover. See Figure 2 for a complete listing of Plateau treatment effects on medusahead cover at Paisley.

At both sites, there was general trend for bare ground cover to increase as the Plateau rate increased. The high rates of Plateau often had more than 95 % bare ground cover. At Likely, all rates above 2 oz had more than 90 % bare ground cover. Other vegetation cover tended to decrease as the Plateau rate increased. At Likely, other vegetation cover decreased by more than 90% in plots that received 4 oz or more of Plateau in the fall. At Paisley, other vegetation cover actually remained the same in plots that received 4 oz of Plateau in the spring or fall. The 12 oz rate of Plateau at Paisley decreased other vegetation cover by 50%. The dissimilarity in Plateau's effect on other vegetation cover between sites is likely due to vegetation differences between sites. At Likely, the majority of other vegetation was annual mustards which are very susceptible to Plateau. At Paisley, the majority of other vegetation consisted of Japanese brome, fiddleneck, sagebrush, legumes, and perennial grasses. Since many of the perennial grasses, legumes, and shrubs are tolerant to Plateau, Plateau had less of an effect on the residual plant community at Paisley. See Figures 3 and 4 for a complete listing of Plateau treatment effects on bare ground and other vegetation cover at Likely and Paisley.

Figure 1. The Effect of Plateau Applied November 2001 on Medusahead Density June 2002- Likely, CA

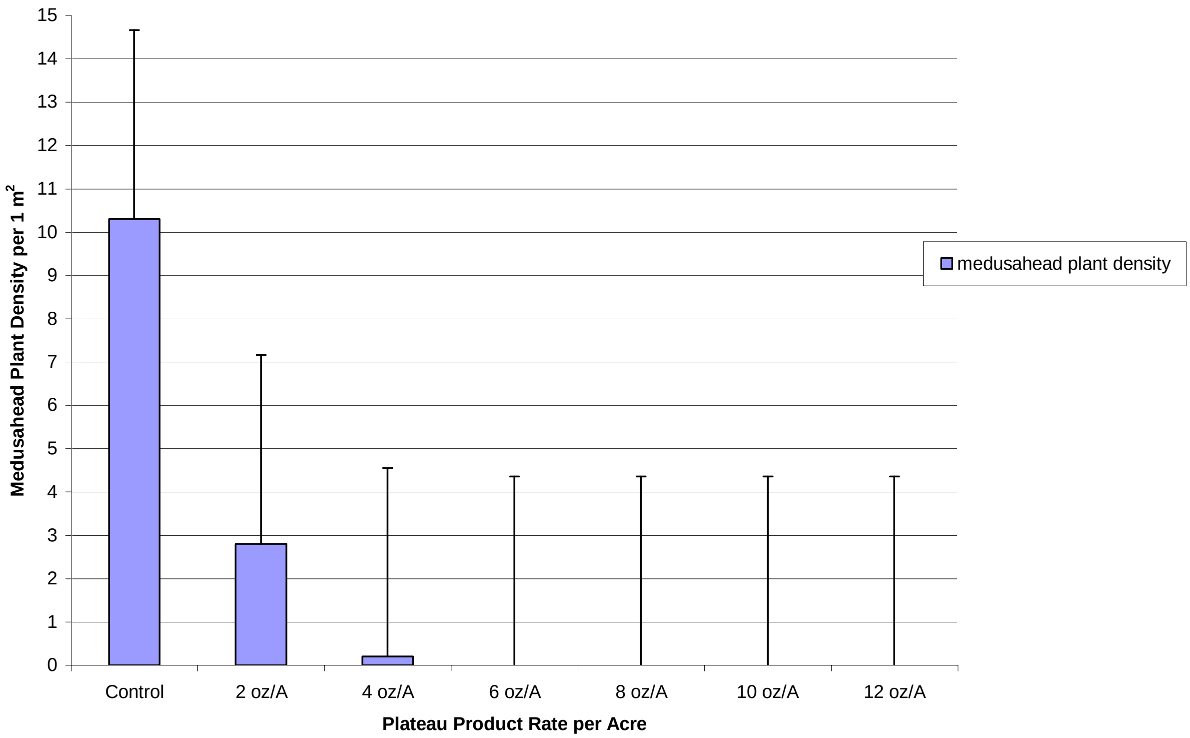

Figure 2. The Effect of Plateau Application Time on Medusahead Cover June 2002- Paisley, OR

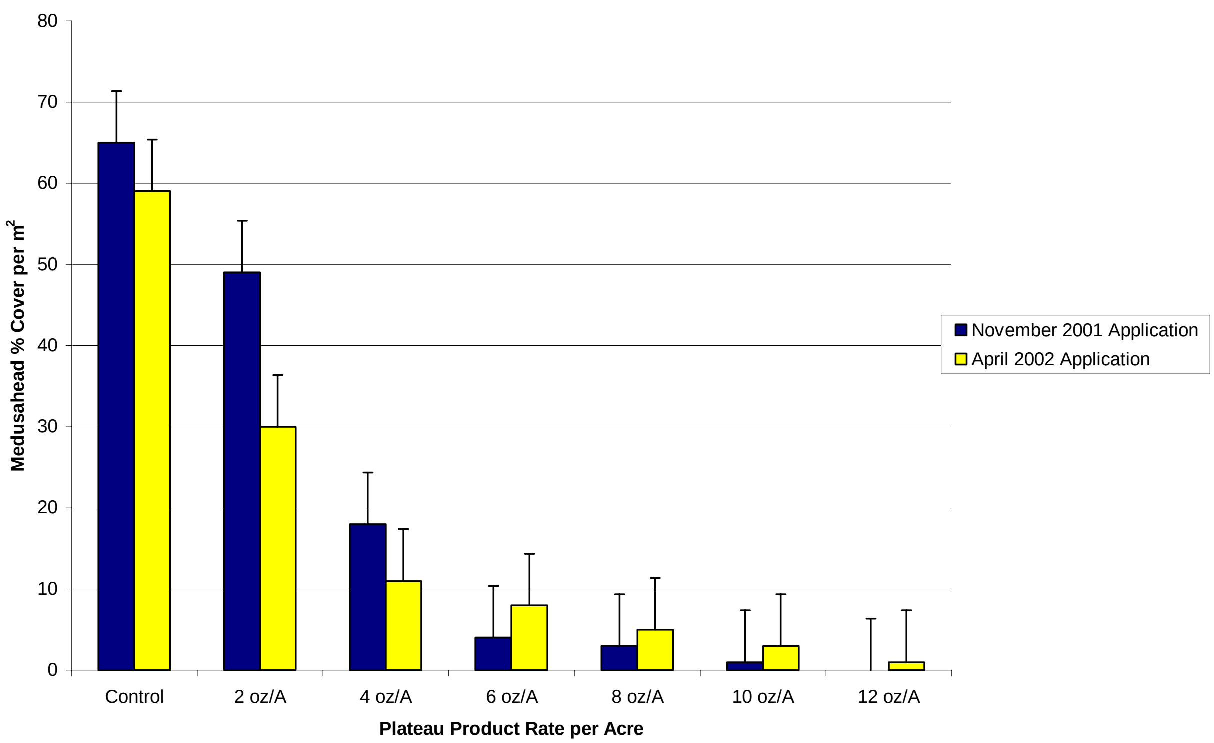

Figure 3. The Effect of Plateau Applied November 2001 on Bareground and Other Vegetation Cover June 2002- Likely, CA

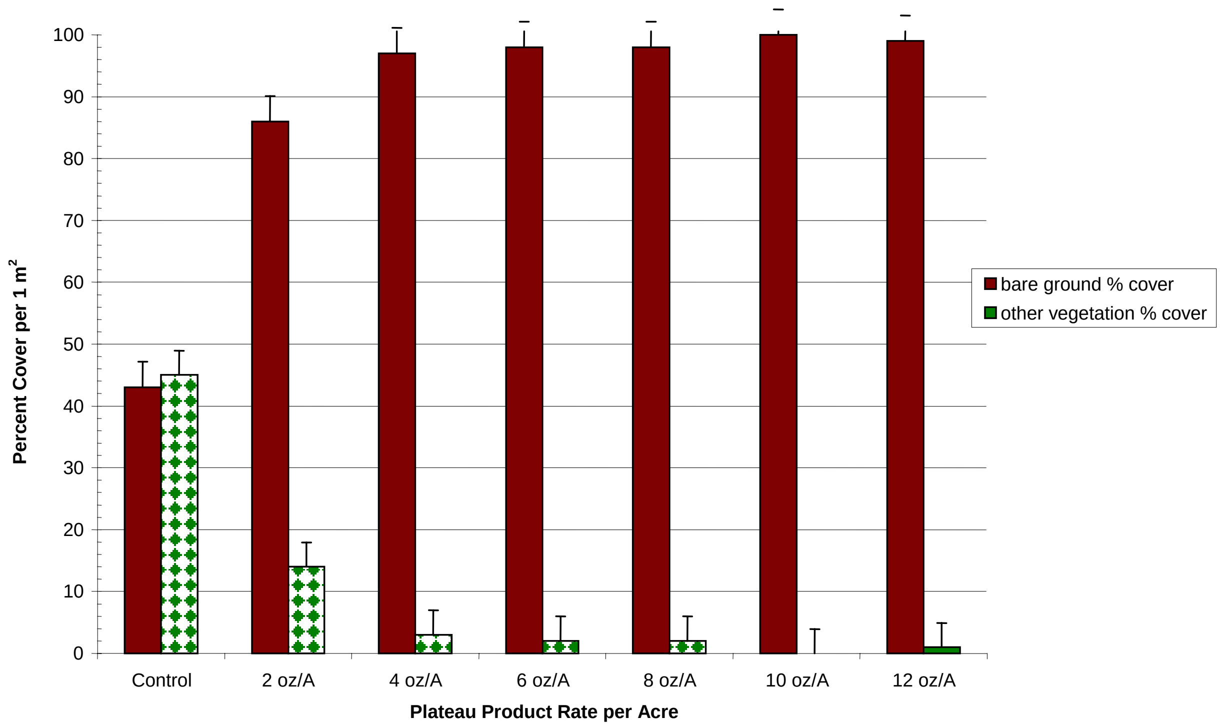

Figure 4. The Effect of Plateau at Varying Rates on Medusahead, Bareground, and Other Vegetation Cover June 2002- Paisley, OR