Weed Management Research in Alfalfa Seed Production

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Weed Control Issues and Challenges in Alfalfa Seed Production

- Weeds lower seed yield and quality and increase seed cleaning costs
- Alfalfa seed crops normally planted in wider rows and lower plant populations – providing less competition with weeds
- Multiple harvests of forage alfalfa also provide weed control benefits that are lacking in alfalfa seed production
- Weed resistance/tolerance to ALS inhibitor type herbicides (Pursuit and Raptor). Prickly lettuce, mayweed chamomile, kochia, Russian thistle, common groundsel, sowthistle)

Alfalfa Weed Research

- Fall-seeded alfalfa tolerance to flumioxazin (Chateau). (3 planting dates, 4 forage harvests)
- Tolerance of established forage alfalfa to herbicides
- Tolerance of seed alfalfa to herbicides
- ‘Setback’ herbicide trial in alfalfa seed

Fall-seeded alfalfa tolerance to flumioxazin (Chateau)

1) Flumioxazin @ 0.125 lb ai/a + 0.5 lb ai/a paraquat
2) Flumioxazin @ 0.25 lb ai/a + 0.5 lb ai/a paraquat
3) Paraquat @ 0.5 lb ai/a
4) Nontreated Check

(paraquat NOT labeled on new seedings in northern U.S.)

Planting dates (2006 and 2007)

1) August 15
2) September 5
3) September 26

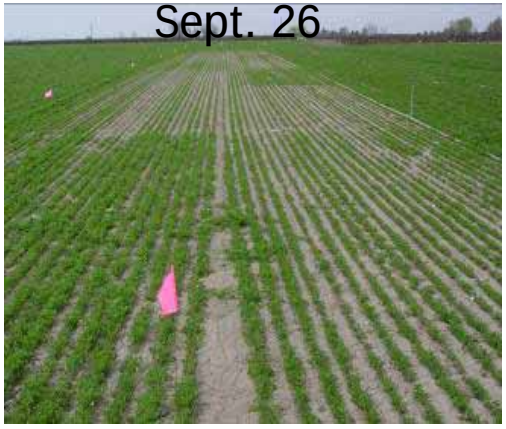
Herbicides applied February 4, 2007 and February 19, 2008.

Treatments replicated 4 times in split block design.

Fall-seeded alfalfa tolerance to Chateau applied in dormant stage (Feb. 4, 2007 or Feb. 19, 2008).

Late February

Early April



Effect of planting date and Chateau + Gramoxone on hay yield of fall-seeded alfalfa near Prosser, WA in 2007-08.

	Alfalfa hay yield			
	2007		2008	
	1st cutting May 15[1]	2nd cutting June 20	1st cutting May 21	2nd cutting July 9
Planting date	----------(ton dry hay/acre)----------			
August 15 (early)	2.7 a	1.7 a	2.9 a	1.6
September 5 (mid)	1.8 b	1.6 a	1.9 b	1.5
September 26 (late)	1.6 b	1.3 b	1.7 b	1.6
Lsd (0.05)	0.29	0.19	0.56	n.s.
Herbicide (lb ai/a) [2]				
Flumioxazin[2] (0.125) + Paraq.	1.9 b	1.5	2.2	1.5
Flumioxazin (0.25) + Paraq.	1.8 b	1.5	2.0	1.5
Paraquat (0.5)	--	--	2.2	1.5
Nontreated	2.4 a	1.6	2.4	1.6
Lsd (0.05)	0.11	n.s.	n.s.	n.s.

[1]First cutting of alfalfa planted Sept. 26 was one week later, on May 23, 2007.
[2]Flumioxazin treatments included paraquat at 0.5 lb ai/a and COC at 1% (v/v).

Summary

- Later planted alfalfa (Sept. 5 or 26) yielded less in 1st cutting than early planted (Aug. 15).
- Flumioxazin applied during dormant stage reduced 1st cutting hay yield in 1 of 2 years.
- Flumioxazin did not affect yield of 2nd cutting.
- Later planted (smaller) alfalfa was injured more by dormant applied flumioxazin, but no signif. interaction between planting date and herbicide treatment on 1st cutting hay yield.

Supplemental Label

EPA Reg. No. 59639-119
(Except New York)

CHATEAU® HERBICIDE WDG USE IN ALFALFA Supplemental Label

TIMING TO ALFALFA
Chateau WDG may be applied to **established alfalfa** with a maximum amount of regrowth of 6 inches or less for the preemergence control of the weeds listed in Table 1,….

Use on alfalfa seed crops is allowed.

Weeds controlled by flumioxazin

- Carpetweed
- Chickweeds
- Dandelion
- Eclipta
- Evengingprimrose
- Florida Pusley
- Henbit
- Kochia
- Lambsquarters
- Little Mallow
- Marestail/horseweed
- Nightshade sp.
- Pigweed sp.
- Prickly Sida
- Puncturevine
- Purslane
- Radish, wild
- Redmaids
- Shepherd’s-purse
- Smallflower Morningglory
- Spotted spurge
- Venice mallow

Some annual grass suppression

Established Forage Alfalfa Tolerance to Herbicides - 2008

Trts 1-3 applied Feb. 27, 2008 to dormant alfalfa

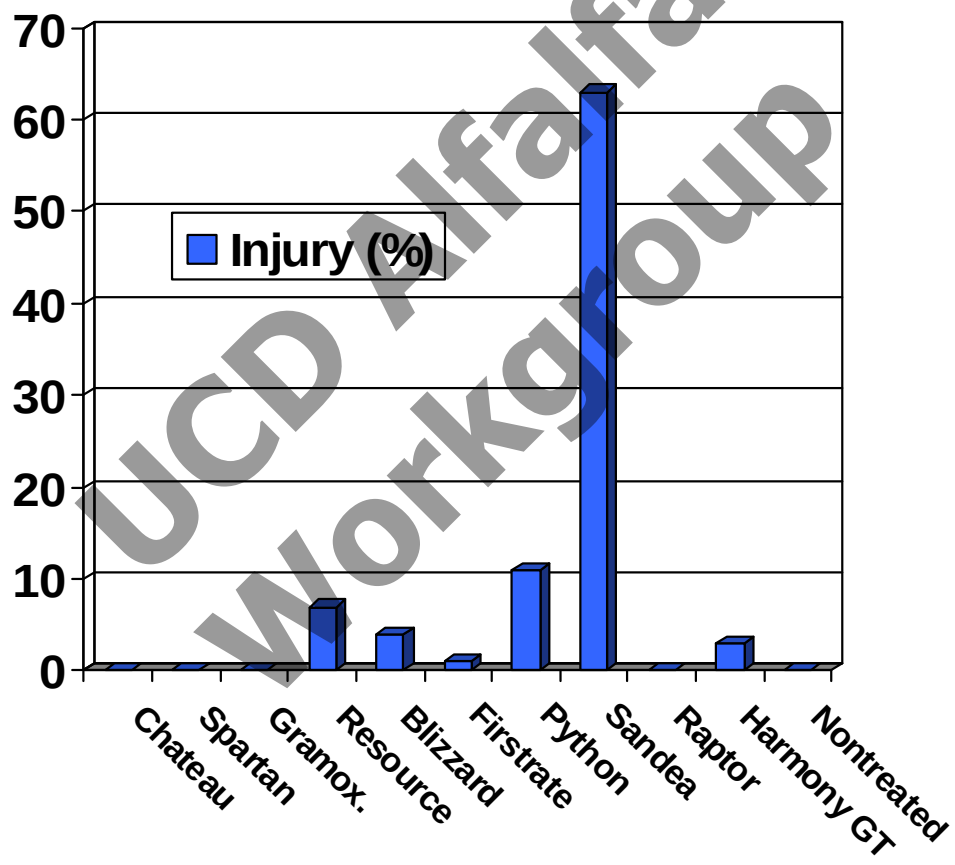
1) Chateau (flumioxazin) 0.125 lb ai/a + Gramoxone
2) Spartan (sulfentrazone) 0.19 lb ai/a + Gramoxone
3) Gramoxone (paraquat) 0.5 lb ai/a

Trts 4-10 applied March 25, 2008 to alfalfa 2 to 4 inches tall

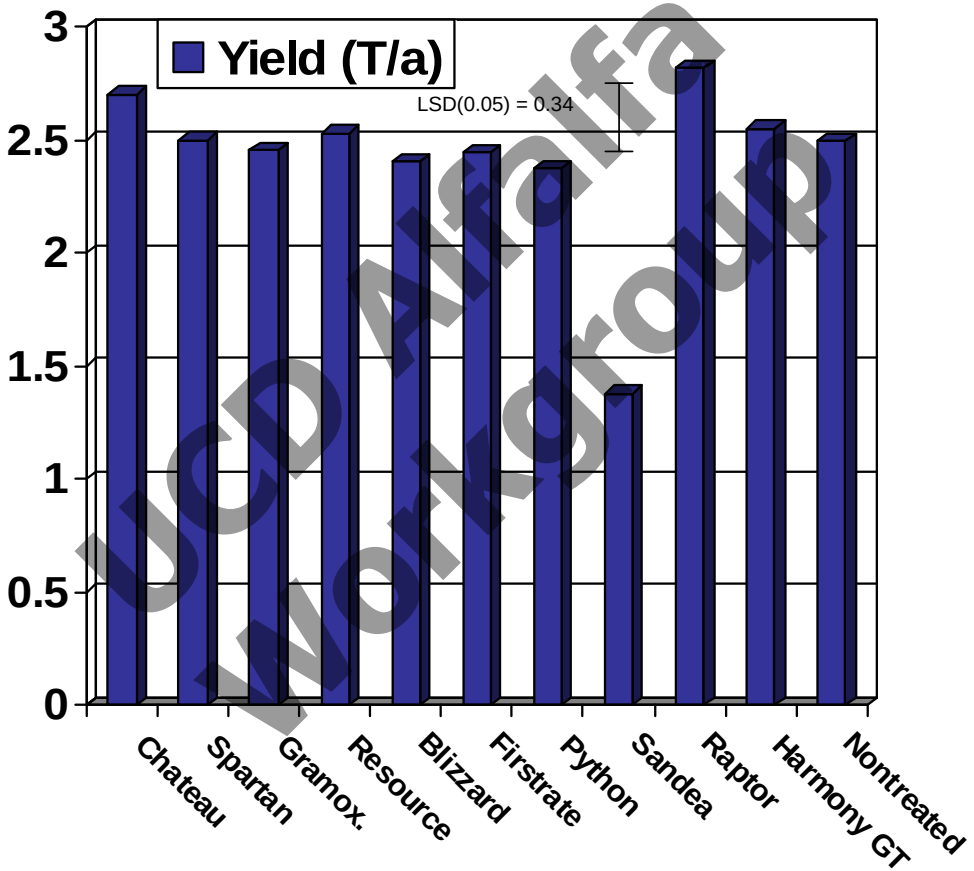
4) Resource (flumiclorac) 0.04 lb ai/a
5) Blizzard (fluthiacet-methyl) 0.0043 lb ai/a
6) Firstrate (chloransulam) 0.021 lb ai/a
7) Python (flumetsulam) 0.056 lb ai/a
8) Sandea (halosulfuron) 0.026 lb ai/a
9) Raptor (imazamox) 0.04 lb ai/a
10) Harmony GT (thifensulfuron) 0.004 lb ai/a
11) Nontreated check

All herbicides included nonionic surfactant @ 0.25% (v/v)
Trts replicated 3 times in a RCB design
First cutting hay yield taken May 29, 2008

Alfalfa injury April 23, 2008 following ten herbicide treatments



Alfalfa 1st cutting hay yield May 29, 2008
following ten herbicide applications




May 14, 2008
UCD Alfalfa Workgroup
Sandea 0.026 lb ai/a

Summary: Spring-applied herbicides on established alfalfa

- Chateau, Spartan, Firstrate, Harmony GT*, Raptor – no alfalfa injury or yield reduction at rates and timing tested.
- Resource and Blizzard - < 15% injury early, none at 60 DAT
- Python – 16% stunting at 60 DAT
- Sandea – excessive injury ~ 80%

(Sandea labeled in AZ and CA between cuttings and spot treatment for yellow nutsedge)

Herbicide Trial in Alfalfa Seed - 2007

Established commercial alfalfa seed field, sprinkler irrigated
PRE – applied March 15, 2007 (alfalfa 1-2 in. tall)
POST – applied April 5 (alfalfa 5-10 in. tall)
Entire trial treated with Prowl (2 lb ai/a)

Non-registered herbicides tested

- Asulox (asulam)
- Aim (carfentrazone)
- Chateau (flumioxazin)
  (now labeled)

Registered herbicides included;

- Gramoxone
- Velpar
- Karmex
- Raptor

Primary weed
Mayweed (dog fennel)

Herbicide (lb ai/a)	Application Timing	Alfalfa injury April 19, 2007	Alfalfa bloom May 23, 2007	Alfalfa seed yield Aug. 9, 2007
		(%)	(%)	(lb/acre)
1. Diuron (1.5) + paraquat (0.5)	PRE	0	13	1929
2. Flumioxazin (.125) + paraquat (0.5)	PRE	3	8	1731
3. Flumioxazin (.25) + paraquat (0.5)	PRE	5	12	1700
4. Hexazinone (0.67) + paraquat (0.5)	PRE	1	14	1183
5. Hexazinone (1.34) + paraquat (0.5)	PRE	0	15	1796
6. Asulam (1.25) + (1.25)	PRE + POST	0	23	1681
7. Paraquat (0.5) + Asulam[2] (1.25)	PRE + POST	0	13	1828
8. Carfentrazone (.016) + (.016)	PRE + POST	86	0	1449
9. Carfentrazone (.032) + (.032)	PRE + POST	89	0	1368
10. Paraquat (0.5) + Imazamox (0.04)	PRE + POST	1	14	--
11. Paraquat (0.05) - Control	PRE	0	20	1664
Lsd (0.05)		3.5	8.4	388.8

PRE treatments were applied March 15, 2007 and POST treatments were applied April 5, 2007
All treatments included R-11 nonionic surfactant at 0.25% spray volume.

Summary: 2007 Herbicide Trial in Alfalfa Seed

• Asulox – good alfalfa tolerance with 3 or 6 pt/A, ~80% control of mayweed. Seed yield unaffected.
(8 pt/a safe on alfalfa in several 2008 trials – marestail, prickly lettuce, blue mustard, wild oat, and downy brome control)

• Aim – 1 or 2 oz/A totally desiccated emerged alfalfa, normal regrowth, delayed bloom, did not control mayweed. Seed yield slightly reduced. Good candidate for 'set-back' herbicide.

• Chateau - applied PRE @ 4 or 8 oz/A slightly stunted alfalfa growth and 4 oz slightly delayed bloom. ~90% control of mayweed. Seed yield unaffected.

Summary: 2007 Herbicide Trial in Alfalfa Seed

• Velpar – applied PRE at 0.67 and 1.35 lb ai/a (2.7 to 5.4 pts) good alfalfa tolerance and 100% control of mayweed. Lower rate reduced seed yield, higher rate did not. ???

• Karmex – applied PRE at 1.5 lb ai/a (1.9 lb product) gave 100% control of mayweed. Highest alfalfa seed yield in trial – 1929 lb/a.

• Raptor – applied POST at 5 oz/A in April controlled mayweed 67%.

Alfalfa Set-back Trial – 2008

1) Aim (carfentrazone) 0.032 lb ai/a (2 fl oz/a)
2) Gramoxone Inteon (paraquat) 0.5 lb ai/a (2 pts/a)
3) Blizzard (fluthiacet-methyl) 0.0089 lb ai/a (1.25 fl oz/a)
4) Nontreated check
5) Tillage set back

- Herbicides applied in water volume of 20 gpa and included NIS @ 0.25% (v/v)
- Tillage/herbicides applied April 17, 2008, when alfalfa was 6-8 inches tall
- Metribuzin + paraquat applied to entire trial March 15, 2008
- Treatments replicated 4 times in RCB

Two Weeks after Treatment

Aim (2 fl oz/a)

Gramoxone (2 pt/a)

Blizzard (1.25 fl oz/a)

Tillage

Nontreated

Alfalfa Regrowth at Five Weeks after Treatment

Aim (2 fl oz/a)

Tillage

Alfalfa desiccation, percent bloom, height, and seed yield after 'set-back' herbicide or tillage treatments on April 17, 2008 near Moses Lake, WA.

		Alfalfa desiccation 5/1/08	Alfalfa bloom 5/23/08	Alfalfa height 5/23/08	Alfalfa Seed Yield 8/12/08
Treatment	Rate (Lb ai/a)	(%)	(%)	(Inches)	(lb/acre)
Carfentrazone (Aim)	0.032	96 a	0 b	16 c	418 a
Paraquat (Gramox. Inteon)	0.5	78 c	1.3 b	18 b	449 a
Fluthiacet (Blizzard)	0.009	69 d	10.0 a	19 b	322 a
Mechanical set-back	--	89 b	0.5 b	16 c	431a
Nontreated (no setback)	--	0 e	12.5 a	24 a	369 a
LSD (P=.05)		3.04	2.51	1.44	N.S.

Means within a column followed by same letter do not significantly differ (P=0.05)

Summary: Set-back trial – 2008

- Aim – alfalfa set-back, regrowth, and delay of bloom very similar to grower's tillage treatment
- Gramoxone Inteon – only partial set-back and quicker regrowth and bloom than tillage
- Blizzard – least injury, quickest regrowth, and bloom
- Alfalfa seed yield low and variable – no significant differences

Acknowledgements

- Washington Alfalfa Seed Commission
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Questions ??
UCD Alfalfa
Workgroup