



*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 seedlings in northern U.S.)

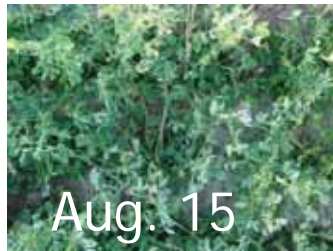
Planting dates (2006 and 2007)

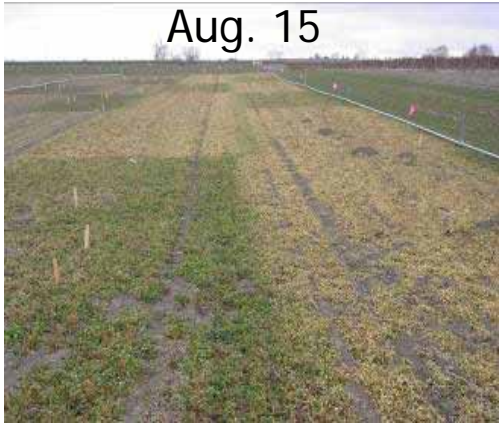
- 1) August 15
- 2) September 5
- 3) September 26

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 <sup>1</sup>	2nd cutting June 20	1st cutting May 21	2nd cutting July 9
<b><u>Planting date</u></b>	----- (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.
<b><u>Herbicide (lb ai/a)<sup>2</sup></u></b>				
Flumioxazin <sup>2</sup> (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.

<sup>1</sup>First cutting of alfalfa planted Sept. 26 was one week later, on May 23, 2007.

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

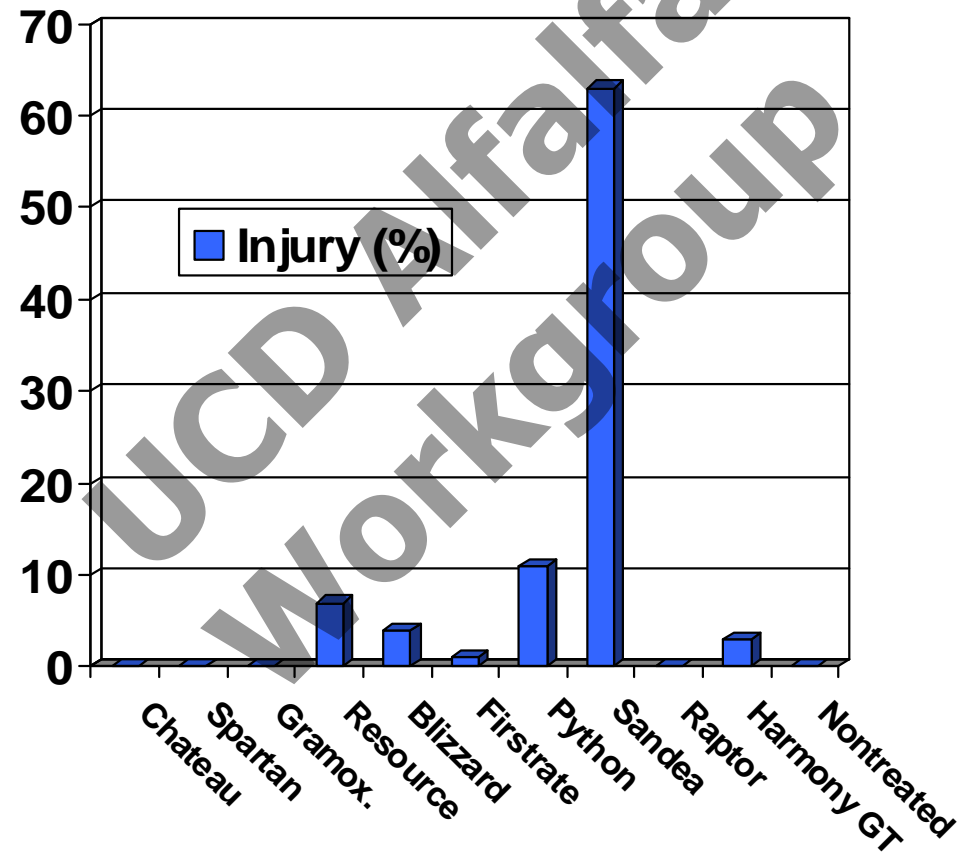
- 4) Resource (flumiclorac) 0.04 lb ai/a
- 5) Blizzard (fluthiacet-methyl) 0.0043 lb ai/a
- 6) Firstrate (chloransulam) 0.021 lb ai/a
- 7) Python (flumetsulam) 0.056 lb ai/a
- 8) Sandea (halosulfuron) 0.026 lb ai/a
- 9) Raptor (imazamox) 0.04 lb ai/a
- 10) Harmony GT (thifensulfuron) 0.004 lb ai/a
-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

All herbicides included nonionic surfactant @ 0.25% (v/v)

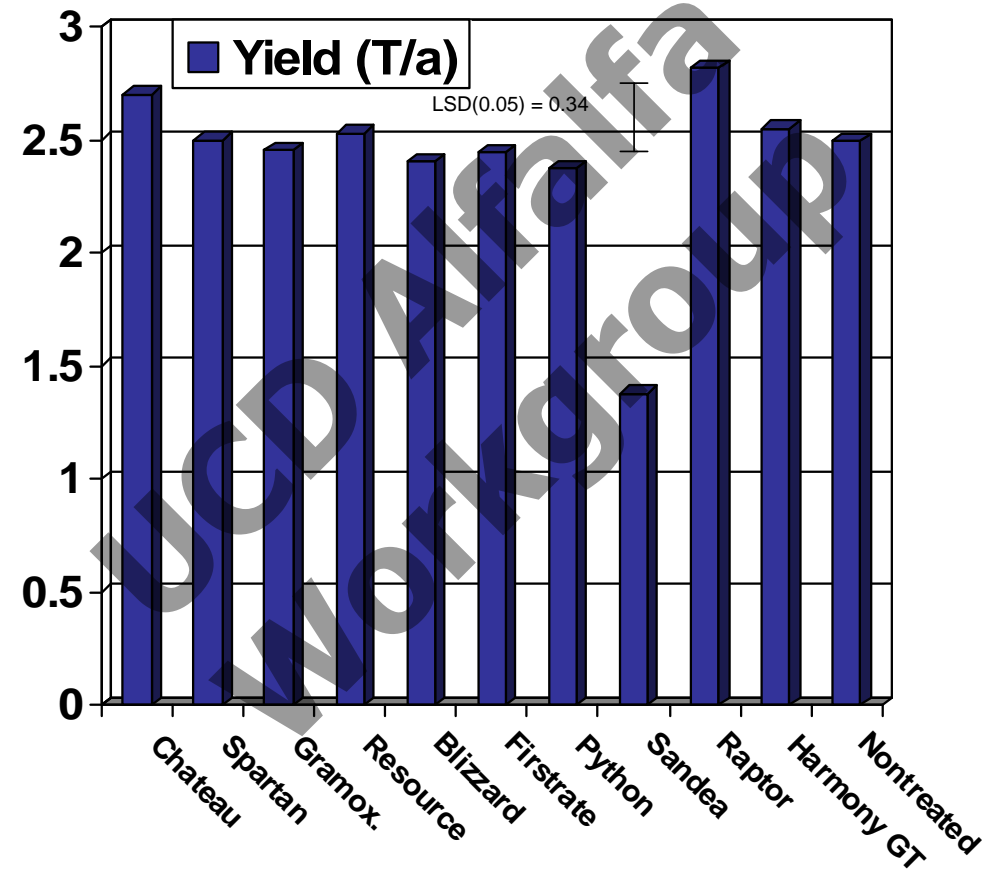
Trts replicated 3 times in a RCB design

First cutting hay yield taken May 29, 2008

Alfalfa injury April 23, 2008 following ten herbicide treatments



Alfalfa 1<sup>st</sup> cutting hay yield May 29, 2008  
following ten herbicide applications



May 14, 2008



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)

### Primary weed

Mayweed (dog fennel)



### Registered herbicides included:

- Gramoxone
- Velpar
- Karmex
- Raptor

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 <sup>2</sup> (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
<b>LSD (P=.05)</b>		<b>3.04</b>	<b>2.51</b>	<b>1.44</b>	<b>N.S.</b>

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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