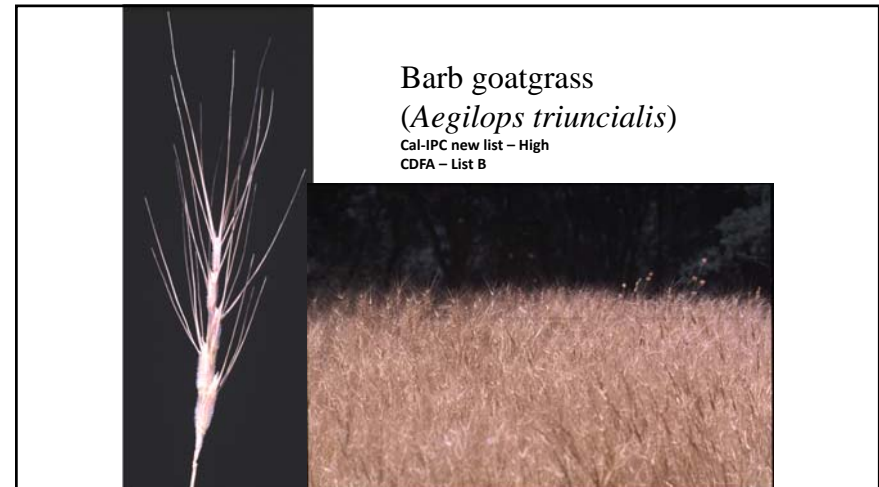


Management strategies for noxious weeds: Barb goatgrass and purple starthistle

Joe DiTomaso, UC Davis



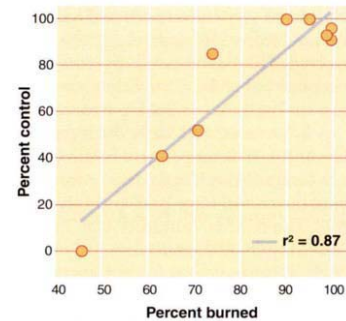
Vegetative cover for barb goatgrass

Vegetation type	% Vegetative cover or index value					
	Unburned			burn		
	1997	1998	1999	1997	1998	1999
Grasses	Pre-burn					
barbed goatgrass	45	62	63	55	54	0
native perennials	0	0	1	1	9	10
total grasses	127	156	152	116	173	68
Forbs						
introduced	3	37	14	4	15	8
total	8	46	21	10	26	11
Total native plant species	6	13	10	7	19	13

DiTomaso et al. 2001. Cal. Ag. 55, 47.



Burning increased the native perennial grass *Hordeum brachyantherum* by 13-fold while controlling barb goatgrass (*Aegilops truncialis*)



Percent of transect burned in second year plotted against percent barb goatgrass control.

Three years after the burn there was still 85% control (only 5% cover) in the plots that burned twice.

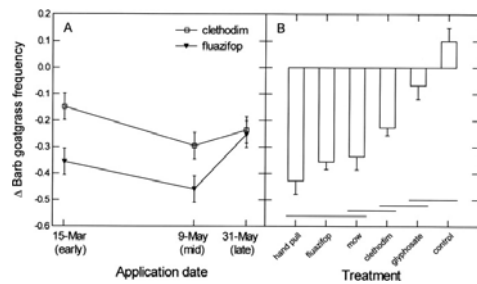
Barb goatgrass

- Postemergence (at 2-8 leaf stage)
 - Glyphosate (Roundup®) applications control barb goatgrass and medusahead
 - Paraquat (Gramoxone®) older product, toxic
 - Clethodim (Envoy Plus™) is effective where other desirable grasses are not present
 - Fluazifop (Fusilade®II) is also good but not registered in rangelands
- Preemergence
 - Sulfometuron (Oust®) can also provide control
 - Combination of sulfometuron and chlorsulfuron (Landmark®) can damage some desirables in first year, but gives longer residual control
 - Imazapic (Plateau®) shows good potential for control of cheatgrass (not registered in California)
 - Rimsulfuron (Matrix®) shows good potential for control in first year
 - Auxinic herbicides, aminopyralid (Milestone®) and aminocyclopyrachlor (Method®) have activity at high concentrations

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Clethodim (0.5%), fluazifop (0.6%), and glyphosate (2%) control for barb goatgrass

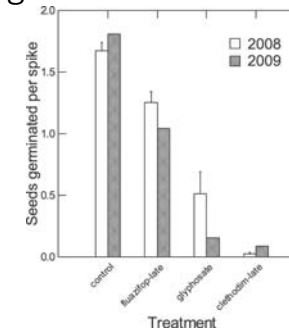
Early – before flowering
Midseason – flower initiation
Late – early seed development



Change in occurrence frequency following 2 yr of treatment

Aigner and Woerly, 2011. Invasive Plant Science and Management 4:448-457

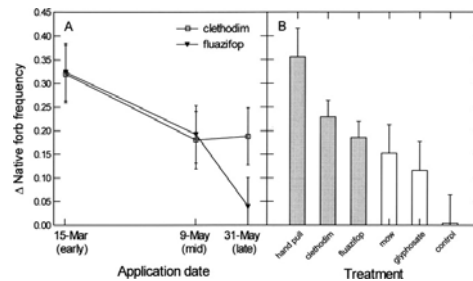
Clethodim, fluazifop, and glyphosate control for barb goatgrass



Aigner and Woerly, 2011. Invasive Plant Science and Management 4:448-457

Clethodim, fluazifop, and glyphosate control for barb goatgrass

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Summary

- Midseason application (flower initiation) of clethodim and fluazifop was most effective. Poor at early season (before flowering).
- Fluazifop and clethodim increased native forb frequency by 46 and 74%, respectively.
- Native perennial grasses were at least partially resistant to the graminicides.
- Clethodim and fluazifop show great potential to selectively remove barb goatgrass and other non-native annual grasses in areas otherwise dominated by native grasses and forbs.

Barb goatgrass

Current price per oz = \$2.72
4 oz = \$10.89

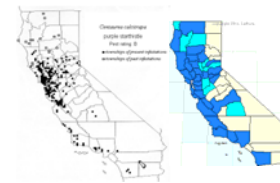
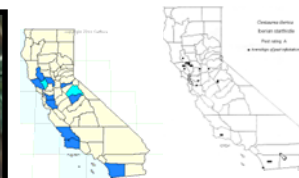
			Barb goatgrass	Other annual grasses
Timing	Chemical Method	Rate (oz/acre)	(% of untreated)	(% of untreated)
October	aminocyclopyrachlor	8	11.8	467.5
Oct + Jan	Method	4 + 4	0.5	358.8
Oct + Jan	Perspective (aminocyclopyrachlor + chlorsulfuron)	4 + 4	2.3	242.4
January	Method	8	12.7	81.8
January	Perspective	8	10.6	142.1
April	aminocyclopyrachlor	8	9.2	133.1
none	none	none	100.0*	100.0*



Purple starthistle



Purple starthistle (*Centaurea calcitrapa*)



Iberian thistle (*Centaurea iberica*)



Product	Chemical	Product per acre
Milestone	aminopyralid	3 oz, 7 oz
Transline	clopyralid	2/3 pt, 1 1/3 pt
Method	aminocyclopyrachlor	3 oz, 4.5 oz

Times of application	
Late fall	Nov to Dec
Mid winter	Jan to Feb
Spring	Mar to Apr



Milestone (aminopyralid)

Highlighted rows represent control $\geq 98\%$, with residual effects on seedling and rosette development (≤ 2.5 seedlings or rosettes per plot) and minimal effect on grass cover ($>80\%$ cover).

Herbicide	Rate (oz ac ⁻¹)	Dates timing	Stage at application	Control (%)	Seedling or rosette # per plot	% grass cover
Aminopyralid	3	winter	Pre-rosettes	96	---	79
		winter	Pre-rosettes	100	0.5	---
		winter	<15 cm diam rosettes	100	0.3	---
		spring	< 15 cm diam rosettes	93	---	---
		spring	Bolted, spiny to early heading	99	0.8	---
		spring	<20 cm diam rosettes, some bolted with spiny heads	100	---	98
	3+3	spring	Bolted, spiny to early heading	83	12.5	---
	5	winter +	Seedlings and <15 cm diam rosettes and bolted, spiny to early heading	100	0	---
	7	spring	< 15 cm diam rosettes	98	---	---
	7	winter	Pre-rosettes	98	---	97
	7	winter	<15 cm diam rosettes	100	0.3	---
	7	winter	<15 cm diam rosettes	100	0	---
	7	spring	< 15 cm diam rosettes	98	---	---
	7	spring	Bolted, spiny to early heading	99	2.5	---
	7	spring	<20 cm diam rosettes, some bolted with spiny heads	100	---	98
	7	spring	Bolted, spiny to early heading	97	2.8	---

Method (aminocyclopyrachlor)

Herbicide	Rate (oz ac ⁻¹)	Dates timing	Stage at application	Control (%)	Seedling or rosette # per plot	% grass cover
Aminocyclopyrachlor	3	winter	Pre-rosettes	98	9.8	---
		winter	<15 cm diam rosettes	100	3.3	---
		winter	Seedlings and <15 cm diam rosettes	100	0	---
		spring	Bolted, spiny to early heading	99	1.0	---
		spring	Bolted, spiny to early heading	84	7.8	---
		spring	Bolted, spiny to early heading	84	7.8	---
	4.5	winter	Pre-rosettes	99	6.8	---
	4.5	winter	<15 cm diam rosettes	100	0.5	---
	4.5	winter	Seedlings and <15 cm diam rosettes	100	0	---
	4.5	spring	Bolted, spiny to early heading	98	1.0	---
	4.5	spring	Bolted, spiny to early heading	97	3.0	---
	8	winter	Pre-rosettes	95	---	96
	8	spring	<20 cm diam rosettes, some bolted with spiny heads	100	---	98
	16	winter	Pre-rosettes	100	---	95
	16	spring	<20 cm diam rosettes, some bolted with spiny heads	100	---	93

Transline (clopyralid)

Herbicide	Rate (oz ac ⁻¹)	Dates timing	Stage at application	Control (%)	Seedling or rosette # per plot	% grass cover
Clopyralid	1.25	spring	< 15 cm diam rosettes	69	---	---
	1.86	spring	< 15 cm diam rosettes	64	---	---
	3.3	winter	Seedlings and <15 cm diam rosettes	100	0	---
	3.3	spring	Bolted, spiny to early heading	96	2.5	---
	6.6	winter	Seedlings and <15 cm diam rosettes	100	0	---
	6.6	spring	Bolted, spiny to early heading	100	0.5	---
	8	winter	Pre-rosettes	99	10.5	---
	8	winter	<15 cm diam rosettes	100	1.3	---
	8	spring	Bolted, spiny to early heading	98	0.5	---
	16	winter	Pre-rosettes	98	5.5	---
	16	winter	<15 cm diam rosettes	100	0.3	---
	16	spring	Bolted, spiny to early heading	100	0	---



