

Management strategies for noxious thistles:

Yellow starthistle, purple starthistle,
Italian thistle, and milk thistle

Joe DiTomaso, UC Davis



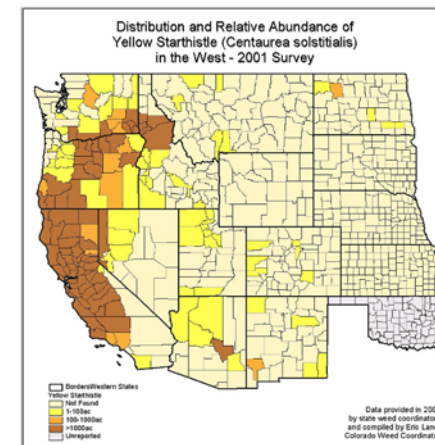
Yellow starthistle
(*Centaurea solstitialis*)

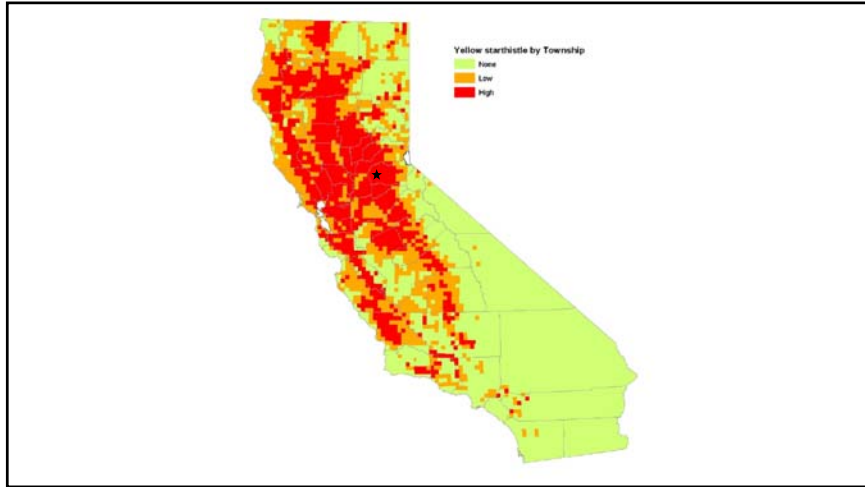
Acres of the US infested with major invasive species



Species	Acres infested (x million)	% annual increase
Downy brome	56.0	14
Yellow starthistle	14.8	13-17
Canada thistle	7.1	10-12
Sericea lespedeza	5.5	24
Spotted knapweed	5.2	10-24
Musk thistle	4.7	12-22
Leafy spurge	3.7	12-16
Saltcedar	3.7	1-25
Medusahead	2.4	12
Perennial pepperweed	2.0	11-18
Diffuse knapweed	1.8	16
Russian knapweed	1.2	8-14

Duncan, Jachetta, DiTomaso et al. 2004. Weed Technology 18, 1411

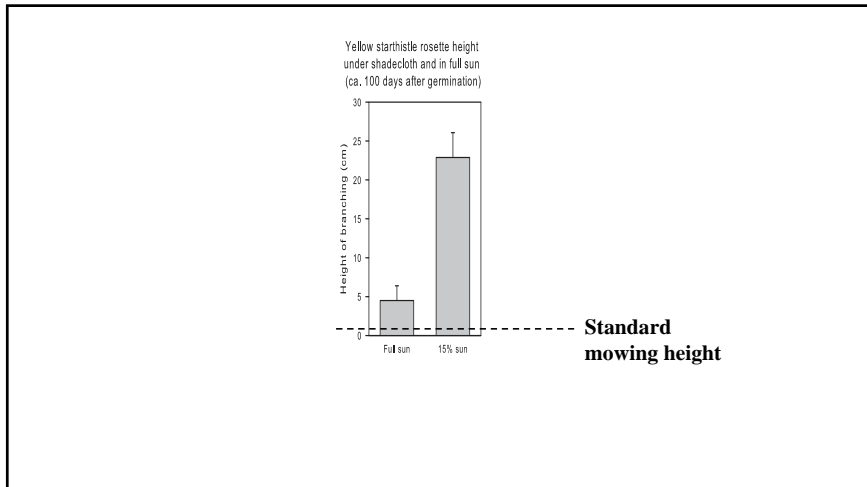


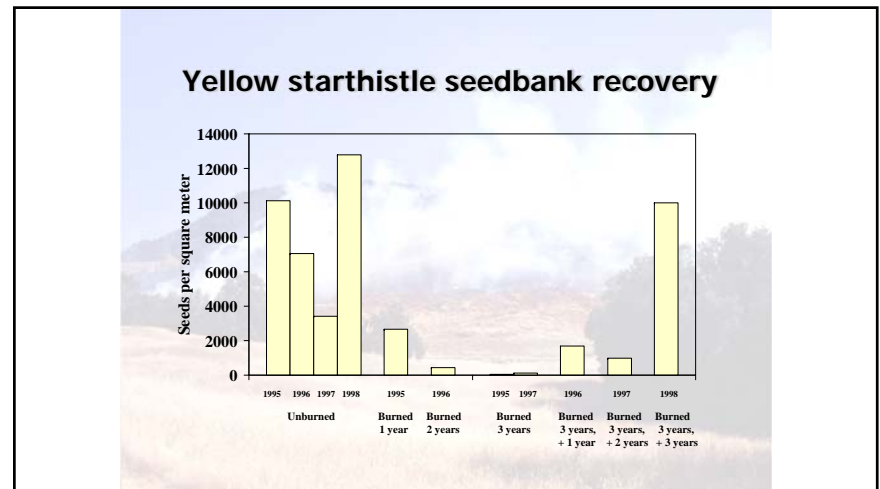
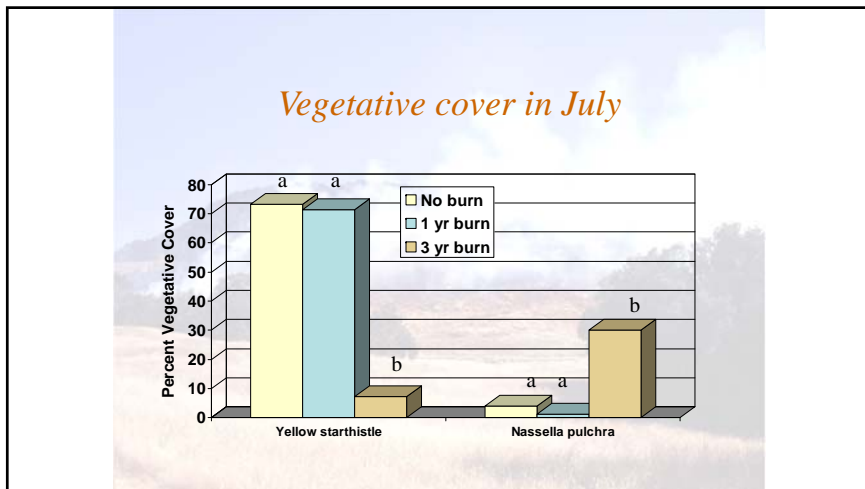


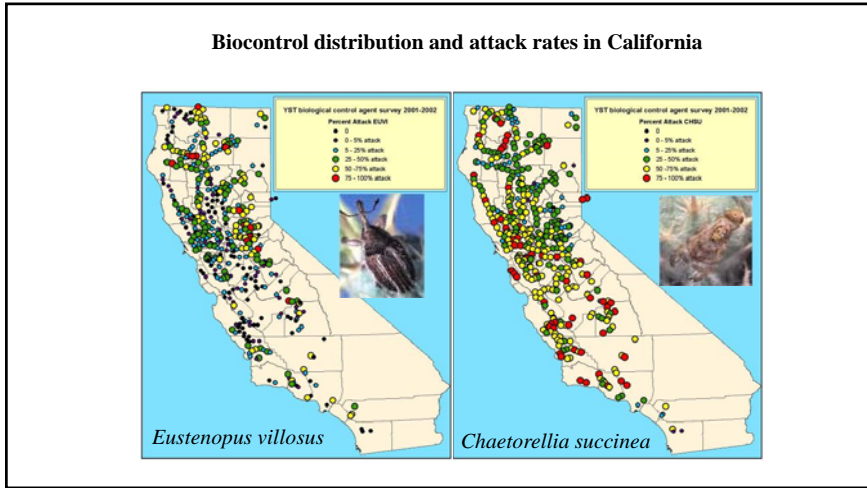
Control options

- ✦ Mechanical
 - ☒ Handpulling, hoeing, weed whips
 - ☒ Tillage
 - ☒ Mowing
- ✦ Biological
- ✦ Cultural
 - ☒ Grazing
 - ☒ Prescribed burning
- ✦ Chemical
- ✦ Integrated approaches
 - ☒ Burning and chemical
 - ☒ Revegetation



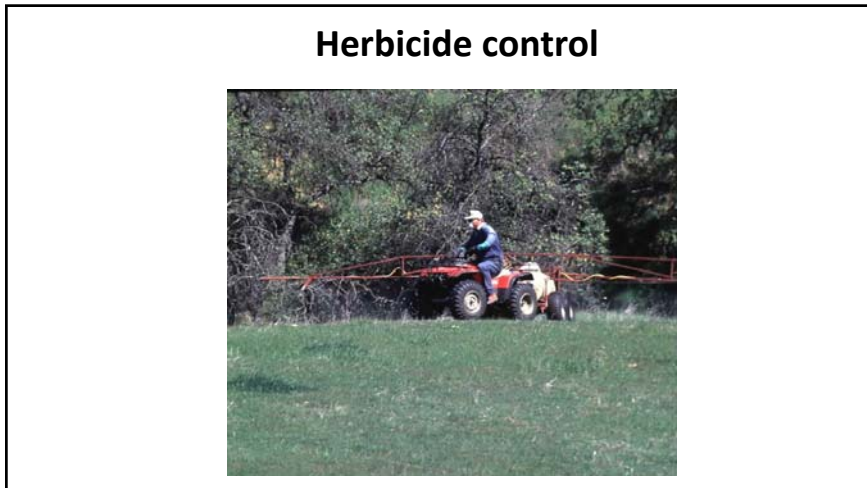


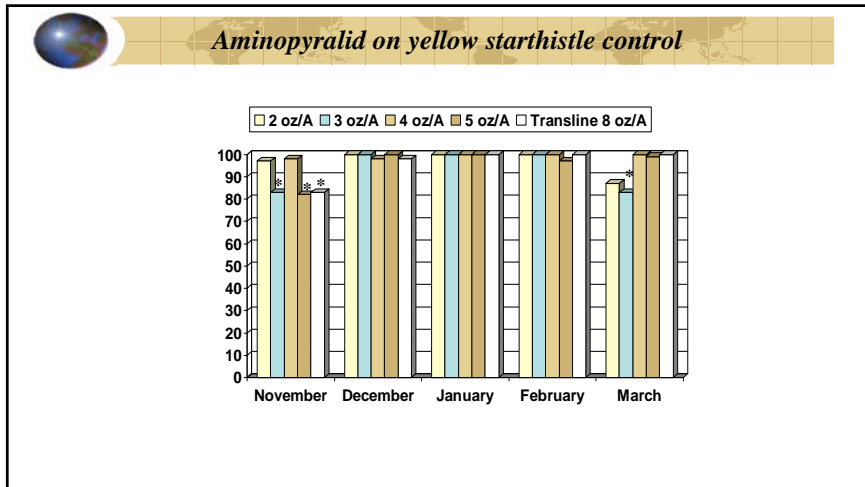
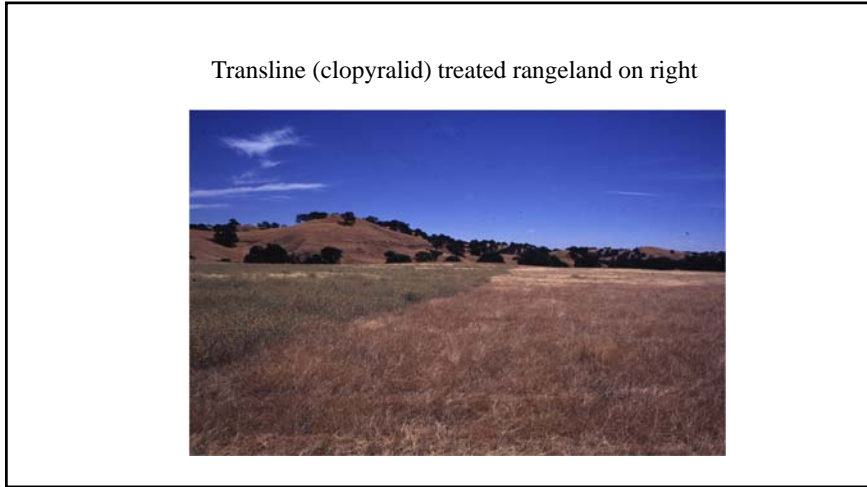


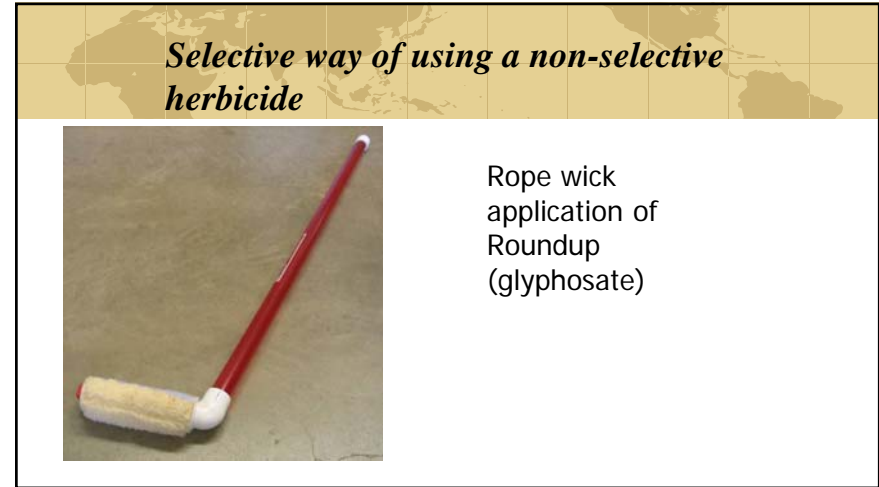



Effect of insect bioagents on YST

Insect spp.	Cause of damage	Percentage of Heads	
		Early season	Mid-season
		N=229	N=231
<i>Eustenopus villosus</i>	Feeding/ovipos.	72	9
	Larvae	17	3
<i>Chaetorellia succinea</i>	Larvae	26	41

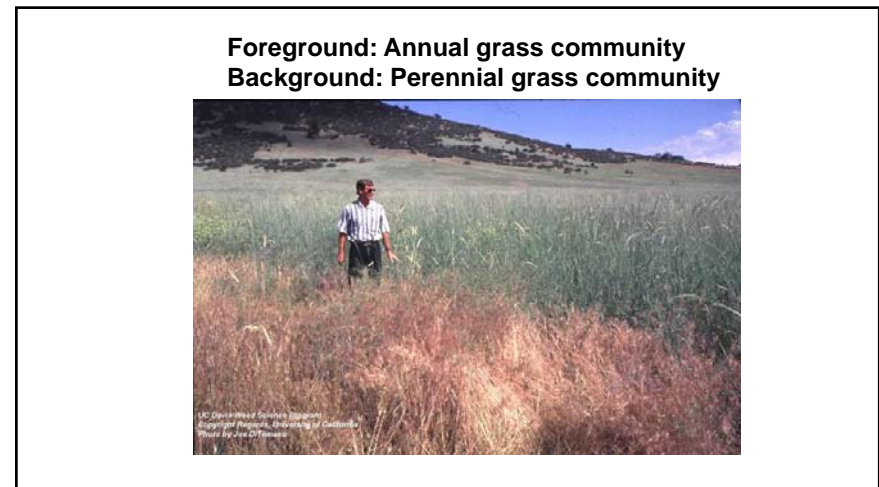


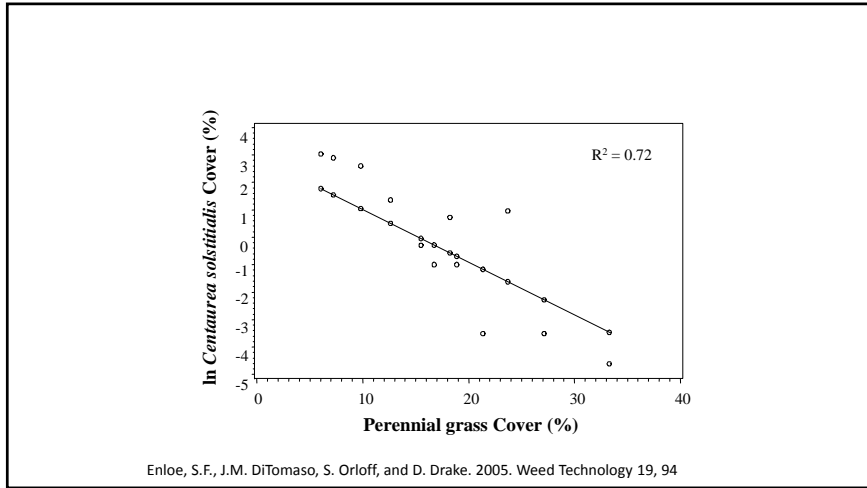


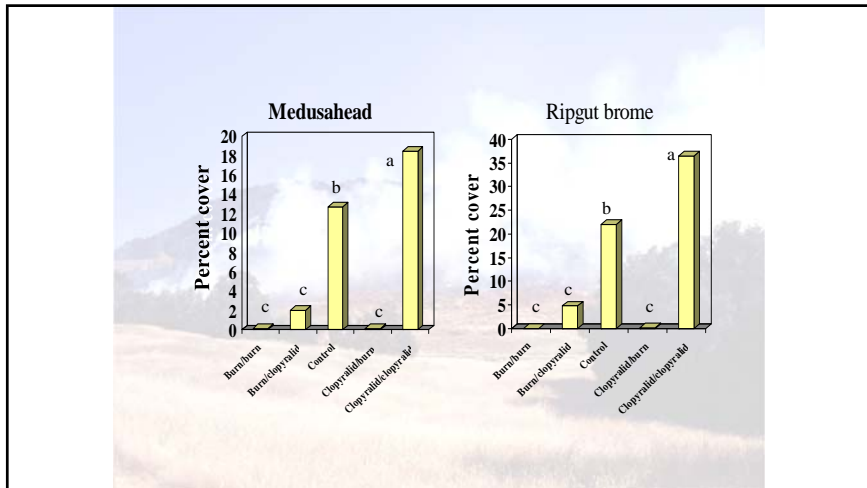
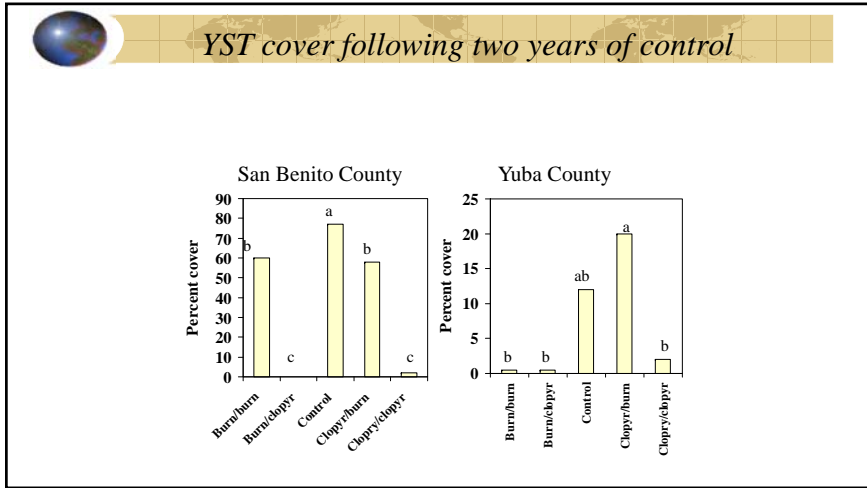
Integrated approaches

- ✦ Burning and chemical
- ✦ Revegetation and chemical
- ✦ Mowing and chemical





Enloe, S.F., J.M. DiTomaso, S. Orloff, and D. Drake. 2005. Weed Technology 19, 94



Ripgut brome (*Bromus diandrus*)



Summary of YST management

- ✦ Numerous successful control options
 - ☒ Timely mowing, grazing, burning, herbicides
 - ☒ IPM strategies
- ✦ Keys to long term success
 - ☒ Deplete the seedbank
 - ☒ Prevent new seed recruitment
 - Off site recruitment
 - Livestock, vehicles, wind
 - On site escapes
 - Skips, fringe areas, fencelines, satellite populations
 - ☒ Monitoring and detection of YST
 - ☒ Spot treatment or follow-up program

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Yellow Starthistle Management Guide

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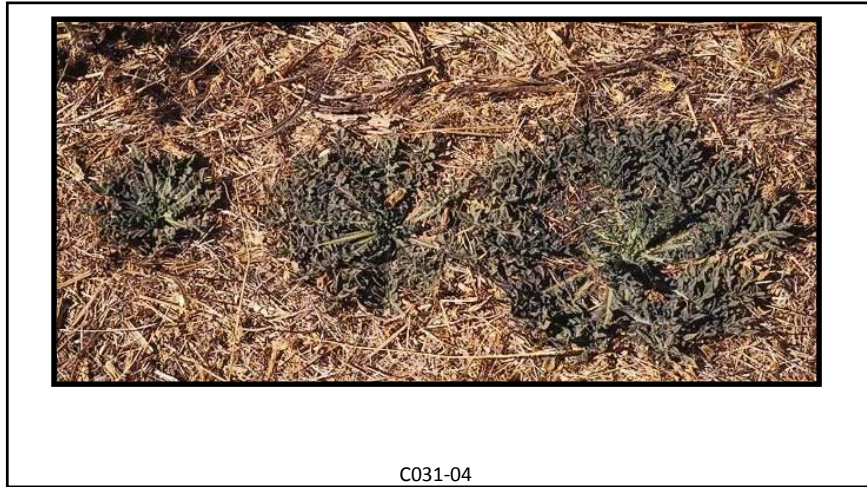
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**Purple starthistle
(*Centaurea calcitropa*)**

**Iberian thistle
(*Centaurea iberica*)**



C031-04



Milestone (aminopyralid)

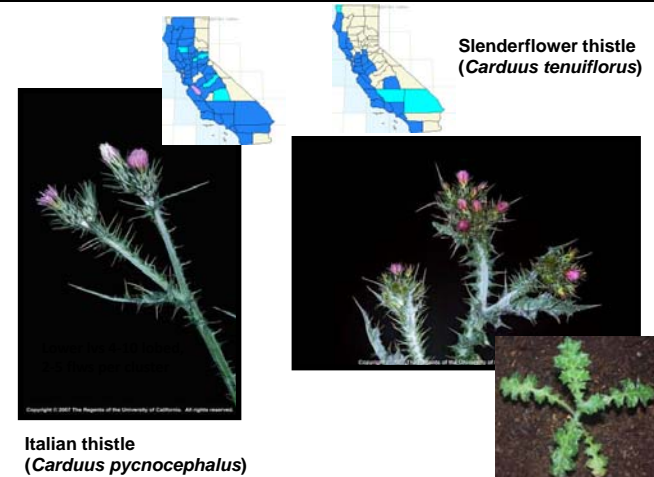
Herbicide	Rate (oz ac ⁻¹)	Dates timing	Stage at application	Control (%)	Seedling or rosette # per plot	% grass cover	
Aminopyralid	3	winter	Pre-rosettes	96	---	79	
		winter	Pre-rosettes	100	0.5	---	
		winter	<15 cm diam rosettes	100	0.3	---	
		spring	< 15 cm diam rosettes	93	---	---	
		spring	Bolted,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

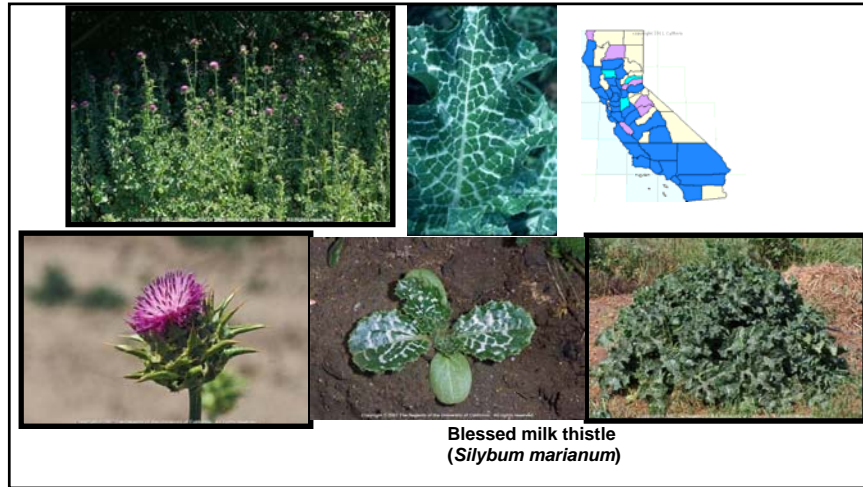
Method (aminocyclopyrachlor)

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	---
		winter	Pre-rosettes	99	6.8	---
	4.5	winter	<15 cm diam rosettes	100	0.5	---
		winter	Seedlings and <15 cm diam rosettes	100	0	---
		spring	Bolted, spiny to early heading	98	1.0	---
		spring	Bolted, spiny to early heading	97	3.0	---
		winter	Pre-rosettes	95	---	96
		spring	<20 cm diam rosettes, some bolted with spiny heads	100	---	98
8	winter	Pre-rosettes	100	---	95	
	spring	<20 cm diam rosettes, some bolted with spiny heads	100	---	93	
	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	88 (1.25)	spring	< 15 cm diam rosettes	69	---	---
		spring	< 15 cm diam rosettes	64	---	---
		spring	< 15 cm diam rosettes	231 (3.3)	---	---
	130 (1.86)	winter	Seedlings and <15 cm diam rosettes	100	0	---
		spring	Bolted, spiny to early heading	96	2.5	---
		spring	Bolted, spiny to early heading	100	0	---
	462 (6.6)	winter	Seedlings and <15 cm diam rosettes	100	0	---
		spring	Bolted, spiny to early heading	100	0.5	---
		spring	Bolted, spiny to early heading	100	0	---
	560 (8)	winter	Pre-rosettes	99	10.5	---
		winter	<15 cm diam rosettes	100	1.3	---
		spring	Bolted, spiny to early heading	98	0.5	---
1121 (16)	winter	Pre-rosettes	98	5.5	---	
	winter	<15 cm diam rosettes	100	0.3	---	
	spring	Bolted, spiny to early heading	100	0	---	





Many thistles can be controlled by mowing...

- Bud to early bloom stage
- Reduces seed production

Pre- and post- emergence activity for early season use

Product	Residual	Good for	Best timing
<i>Milestone</i>	3-6 months	Most thistles (not strong for stinkwort, artichoke thistle)	Mid to late winter
<i>Transline</i>	2-3 months	Annual thistles (also good for purple starthistle)	Late winter to spring
<i>Milestone VM+</i>	1-2 months	Most thistles	Spring
<i>Method</i>	3-6 months	Most thistles	Mid to late winter

Post- emergence activity for late season use only

Product	Residual	Good for	Best timing
<i>Roundup</i>	None	Most plants	Late spring to summer
<i>Garlon</i>	None	Most broadleaves	Late spring to summer

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