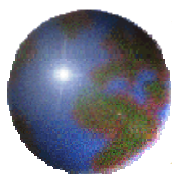
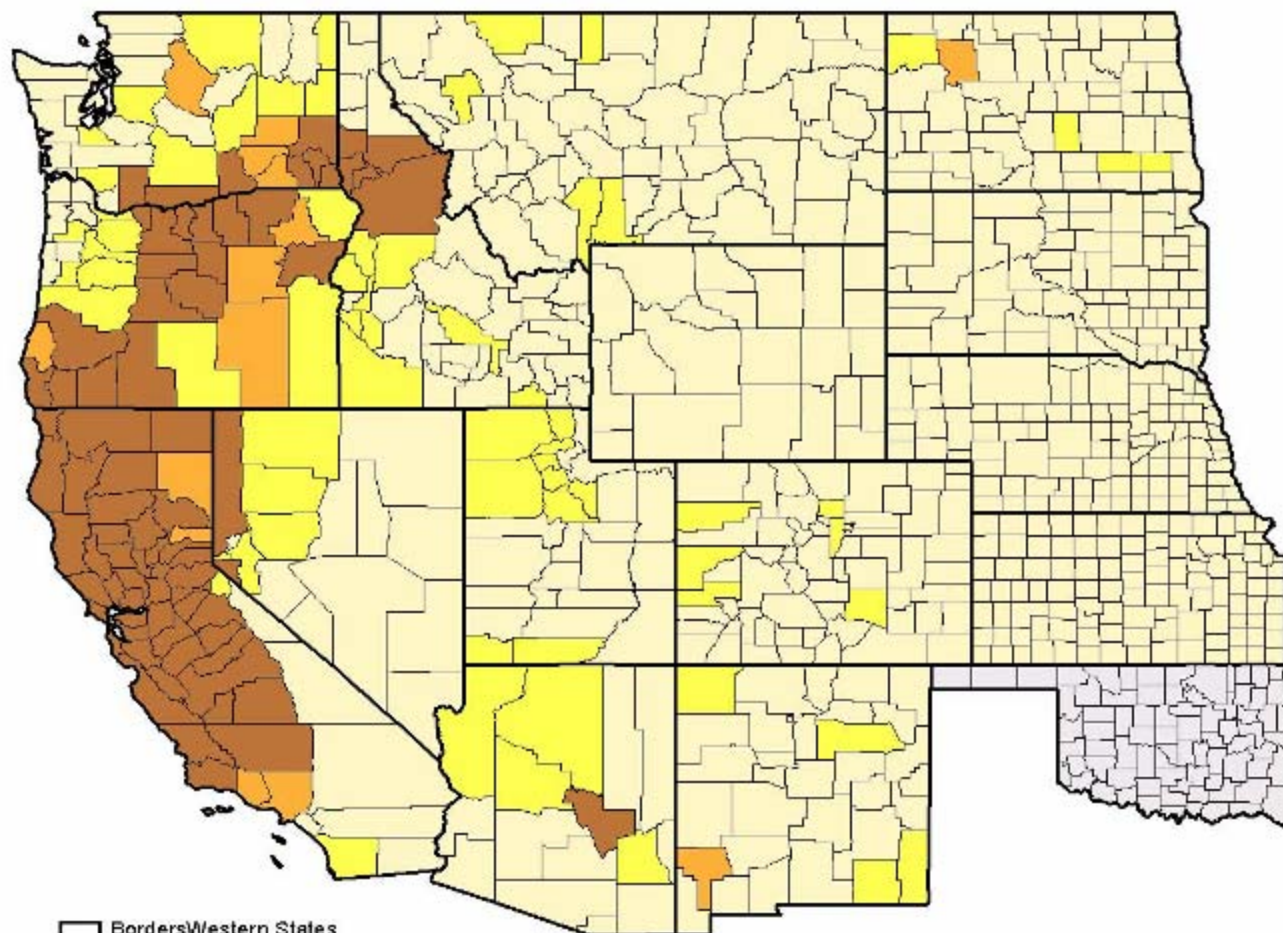


Yellow starthistle control

Joe DiTomaso
UC Davis

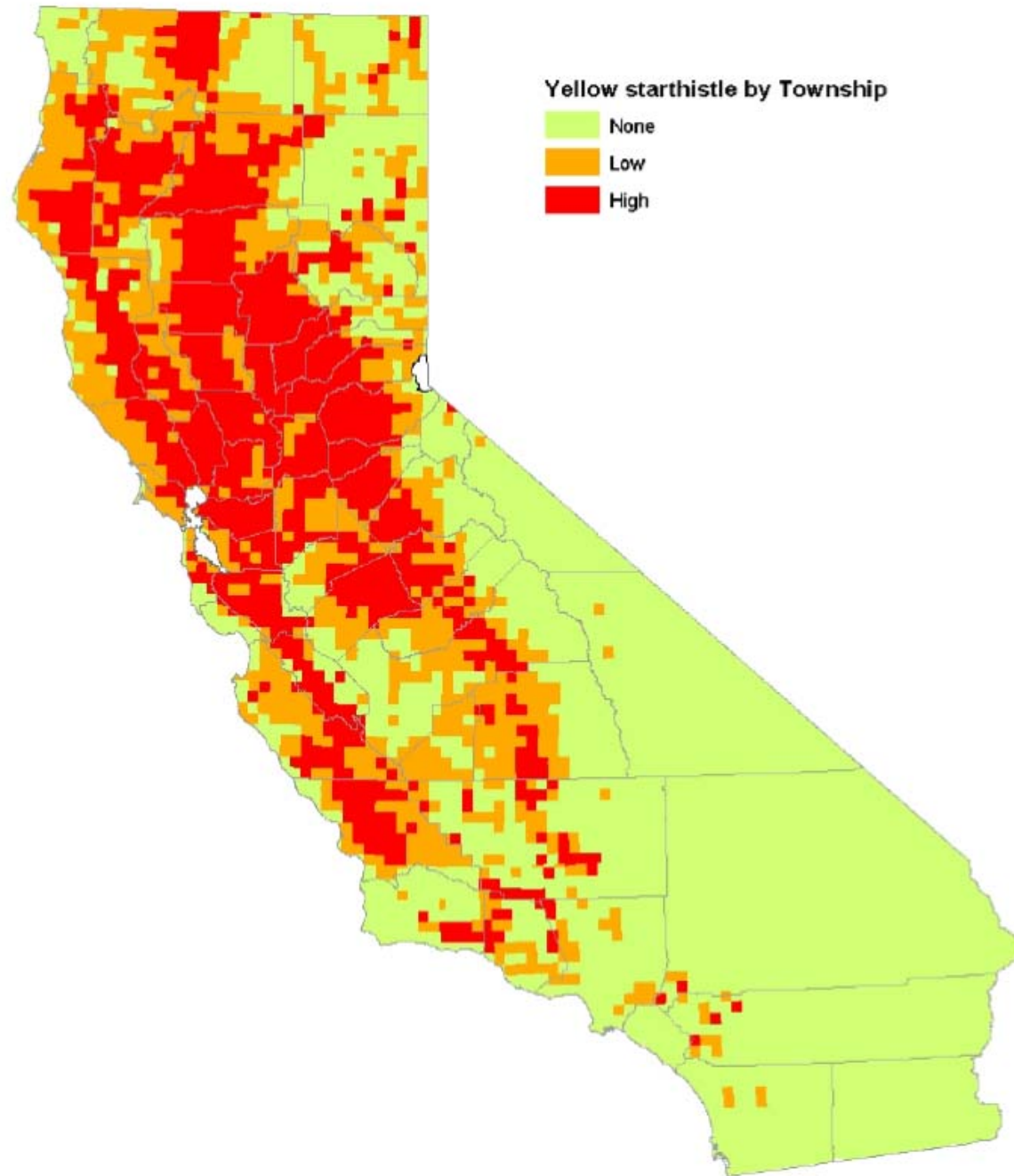
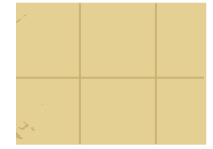
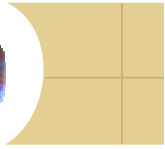
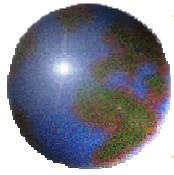


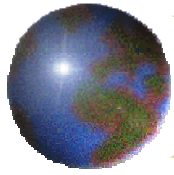
Distribution and Relative Abundance of Yellow Starthistle (*Centaurea solstitialis*) in the West - 2001 Survey



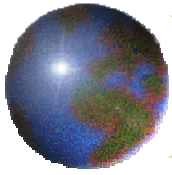
□ Borders Western States
Yellow Starthistle
□ Not Found
□ 1-100ac
□ 100-1000ac
□ >1000ac
□ Unreported

Data provided in 2001
by state weed coordinators
and compiled by Eric Lane,
Colorado Weed Coordinator





Yellow starthistle root biology



Root chamber



Root chamber dimensions: 1m wide X 1m deep X 2.4m tall

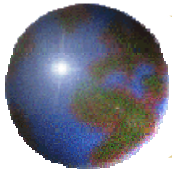


Root chamber

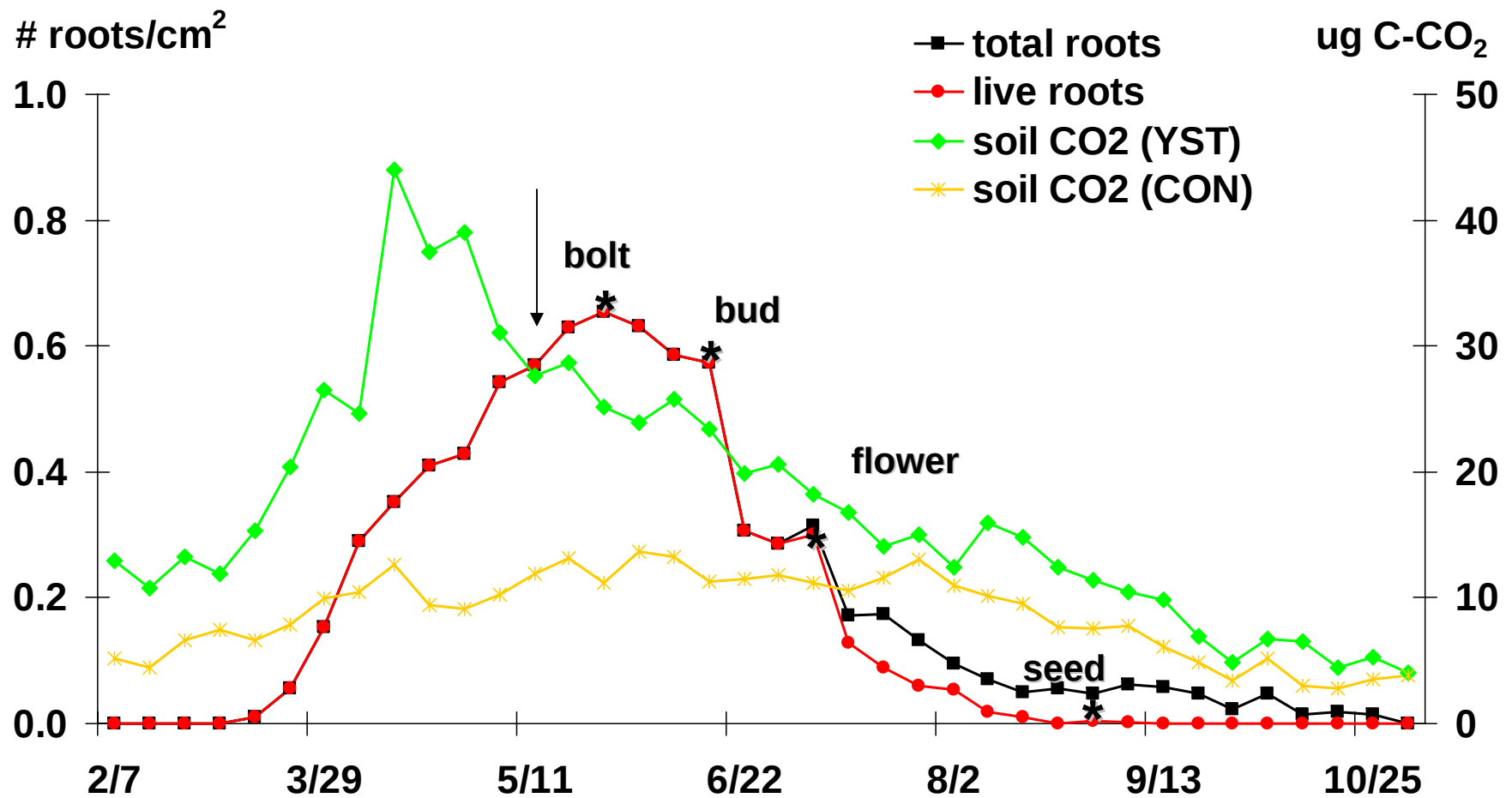


**June 3, 2005 – counting
yellow starthistle roots.**



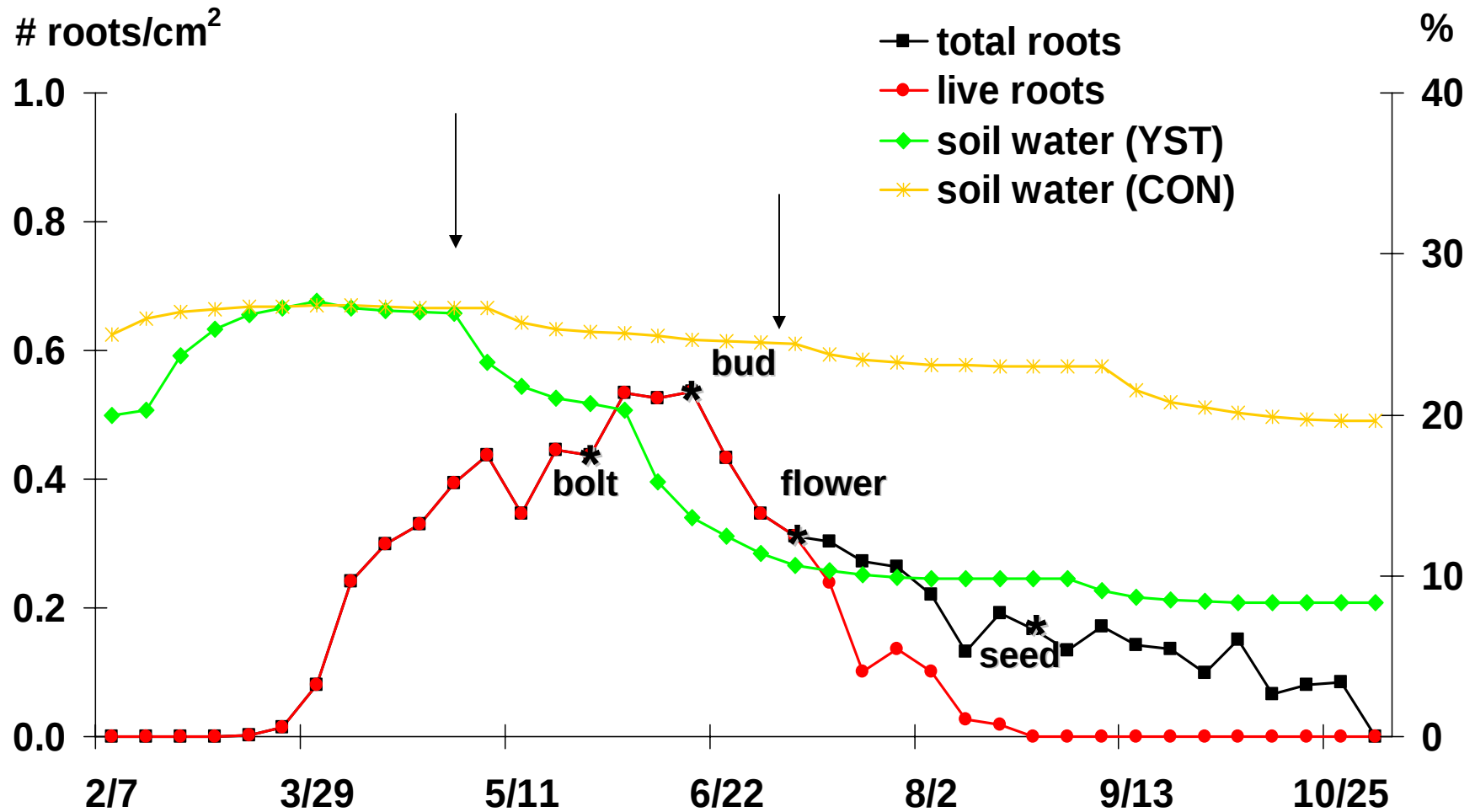


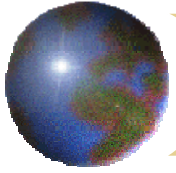
YST [CO₂] at 120 cm





YST soil water use at 180 cm





Control options

- Mechanical

- ▣ Handpulling, hoeing, weed whips
- ▣ Tillage
- ▣ Mowing

- Biological

- Cultural

- ▣ Grazing
- ▣ Prescribed burning

- Chemical

- Integrated approaches

- ▣ Burning and chemical
- ▣ Revegetation

Harrow



Disk

Mowing



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Photo by Joe DiTomaso*

Growth form of YST affects mowing success





Rotary mower



Flail mower

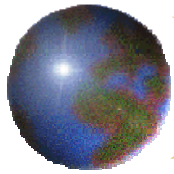


UC Davis Weed Science Program
copyright Regents, University of California
Photo by Jack Kelly Clark

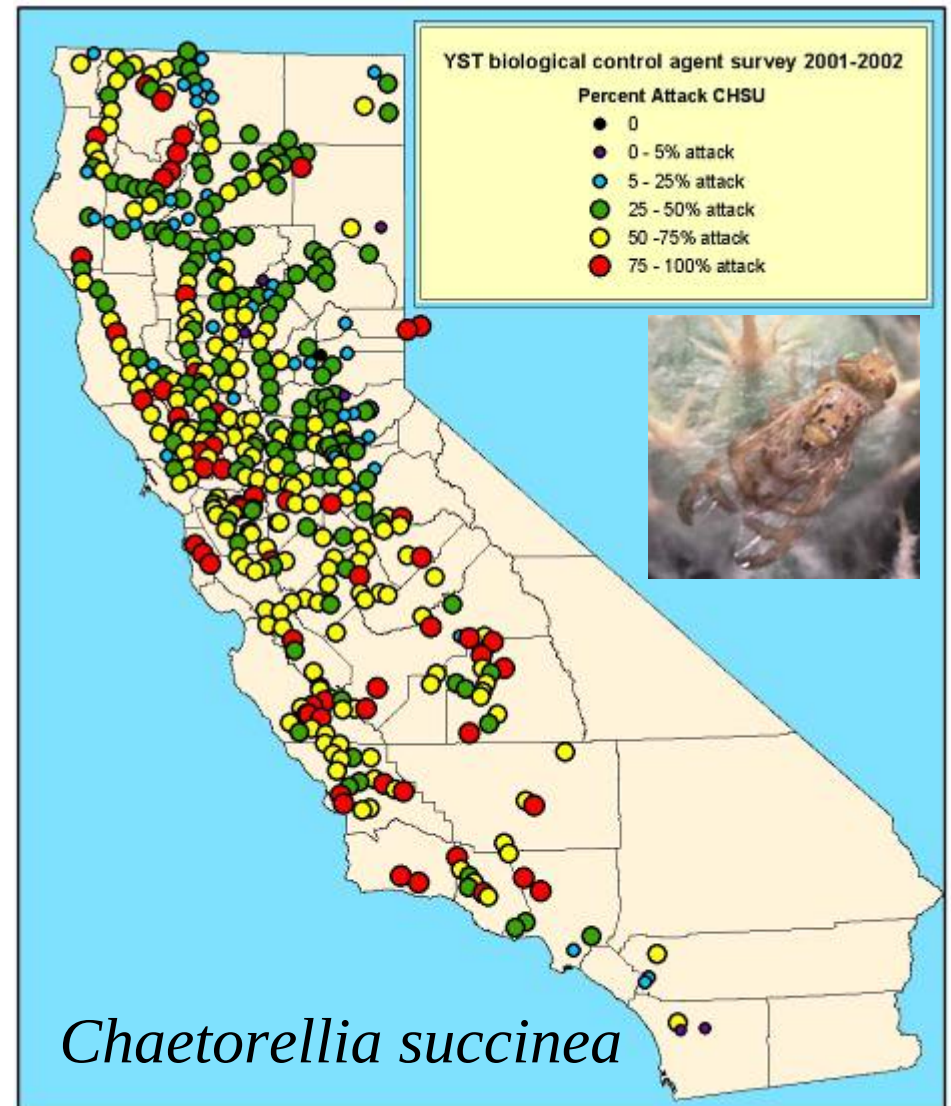
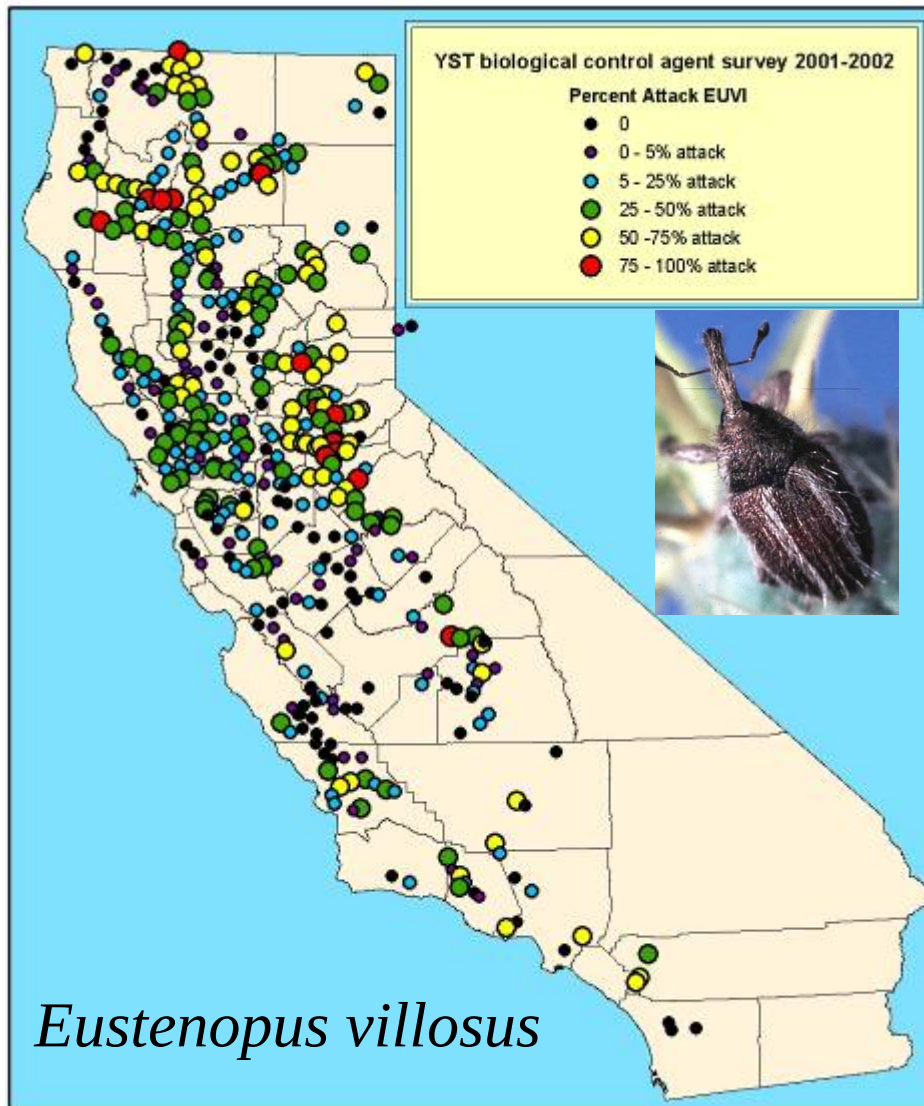
Hairy weevil
*Eustenopus
villosus*

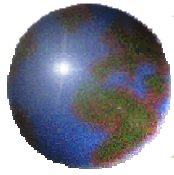
False
Peacock Fly
*Chaetorellia
succinea*





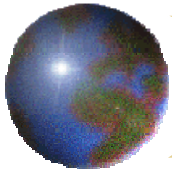
Biocontrol agent distribution and attack rates in California





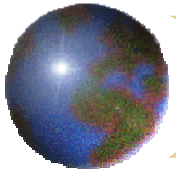
Impact of biocontrol agents on yellow starthistle seed production

Stage	Uninfested	Infested	% reduction
Early season	29	14	52
Mid-season	29	18	38
Total	29	16	45



Puccinia jacea infestation on YST leaves

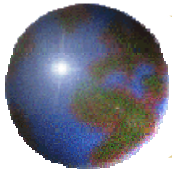




- *Puccinia jaceae* var. *solstitialis*
- Found in Turkey; Approved for released by CDFA in 2003
- Attacks vegetative part of plant

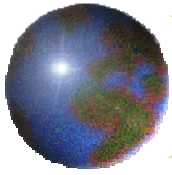
The Rust Fungus



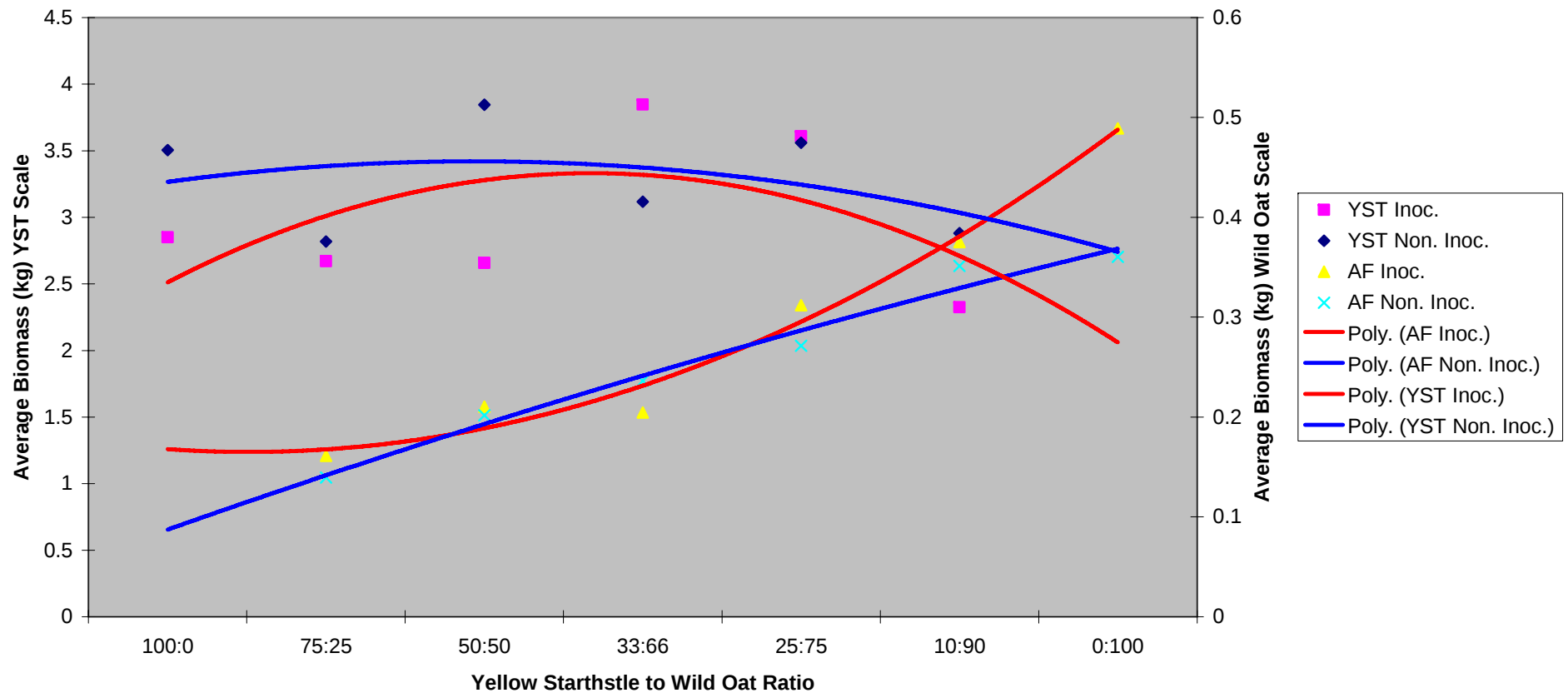


Field Site

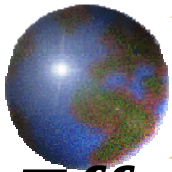




Replacement Series

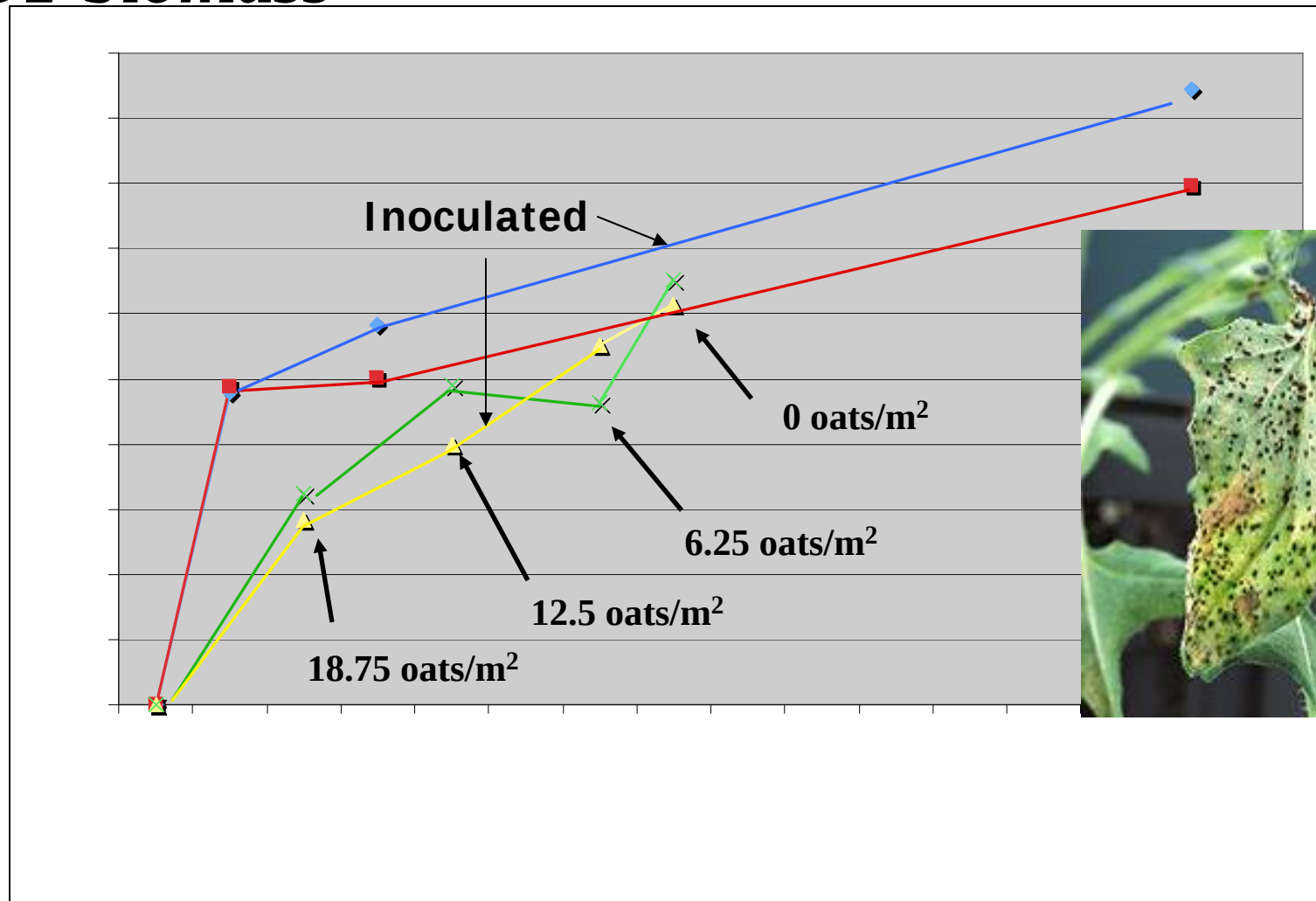


There is a shift in the graph, suggesting that the rust slightly affects YST's competitive advantage over wild oat.



Effect of wild oat, at high proportions, on YST biomass

Yellow starthistle biomass (kg / m²)





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Photo by Craig Thomson

Prescribed burning





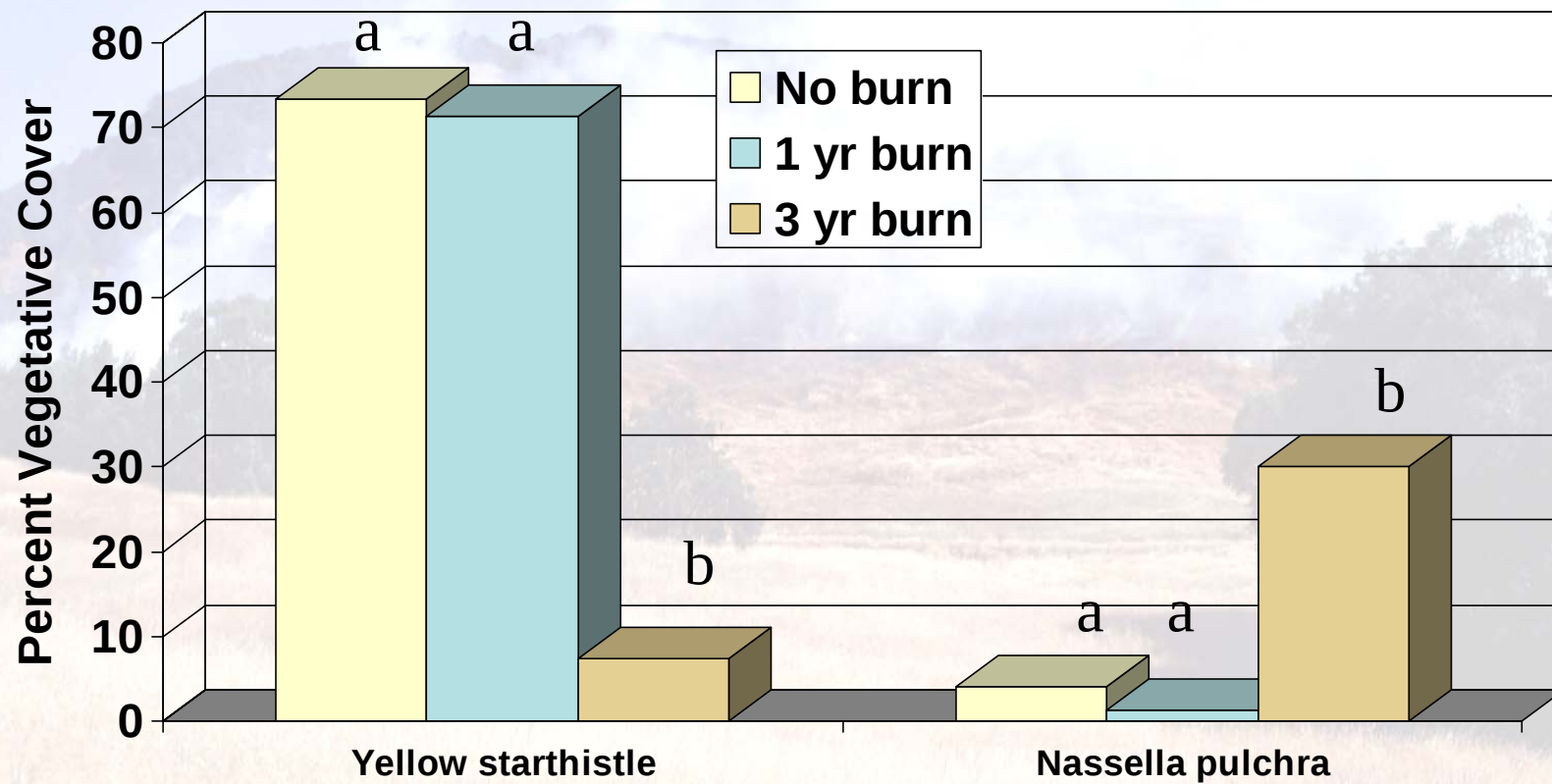
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Photo by Joe DiTomaso

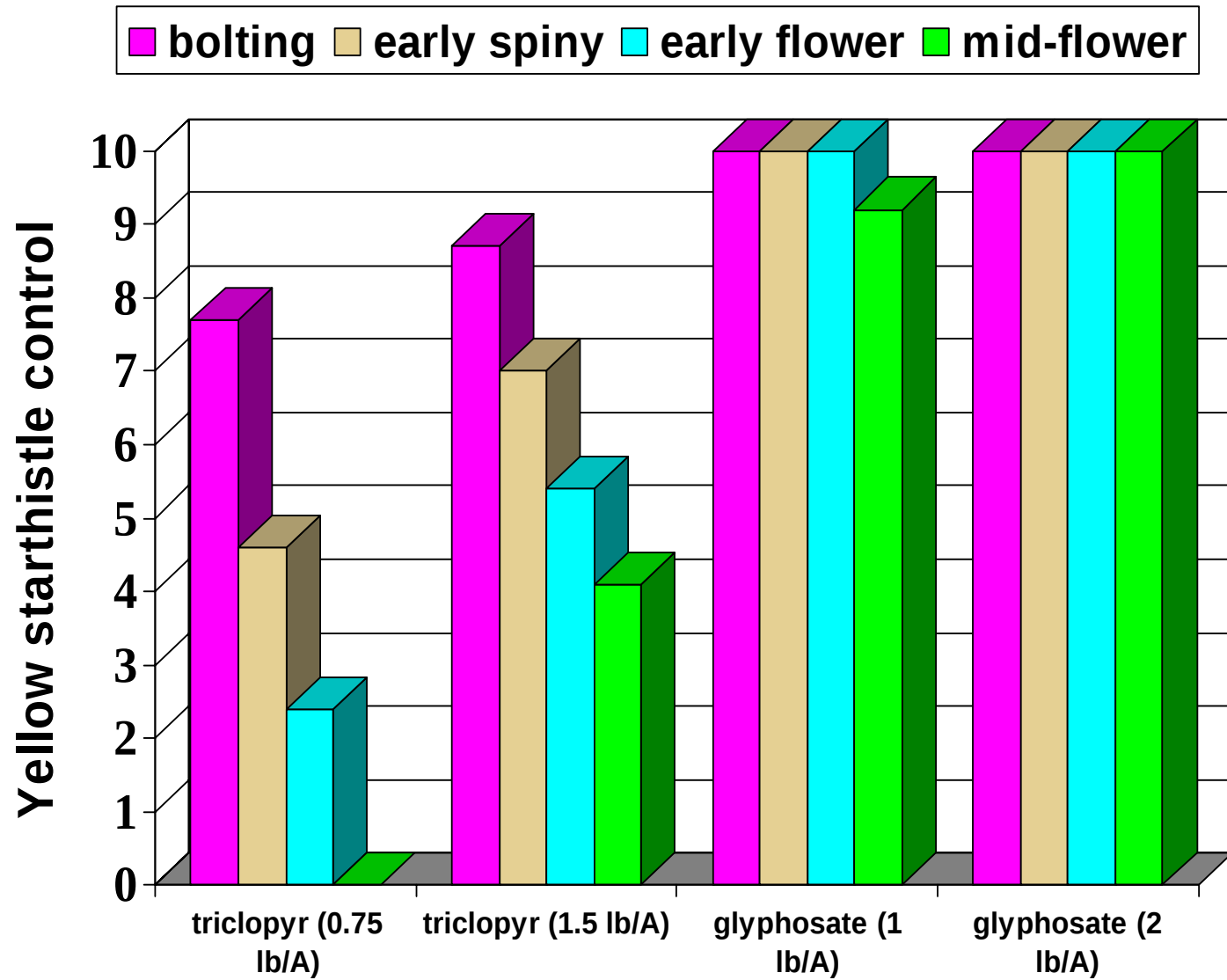
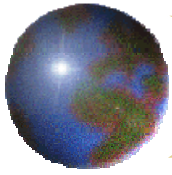
Vegetative cover in July





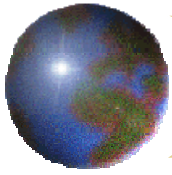


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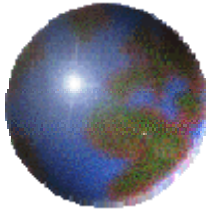
ATV Spray Rigs





Transline (clopyralid) treated rangeland on right

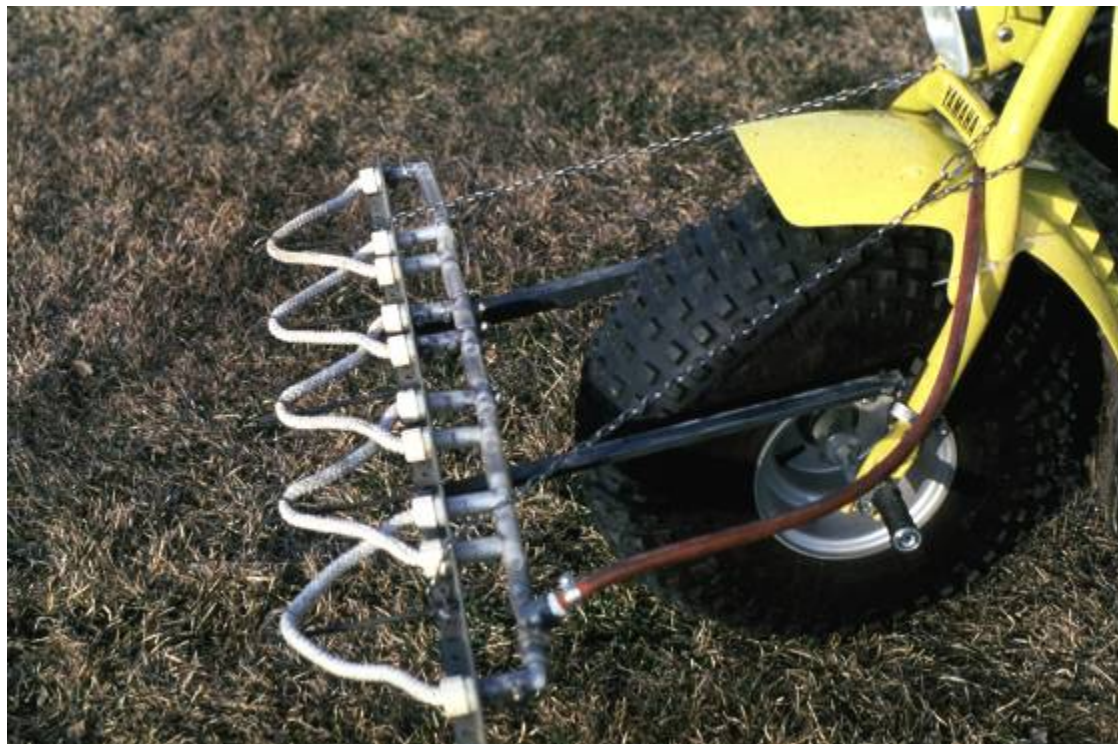




Selective way of using a non-selective herbicide

Rope wick application of Roundup
(glyphosate)

ATV or tractor
attachment with rope
wick applicator

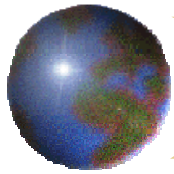


**Hand held rope
wick applicator**



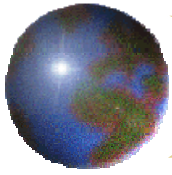


Treated with acetic/citric acid combination

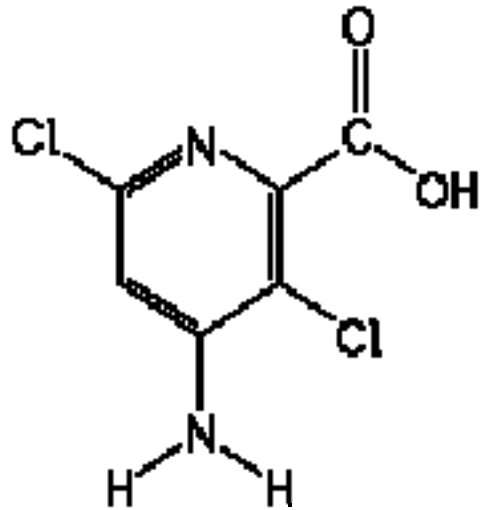


Aminopyralid *(MilestoneTM)*

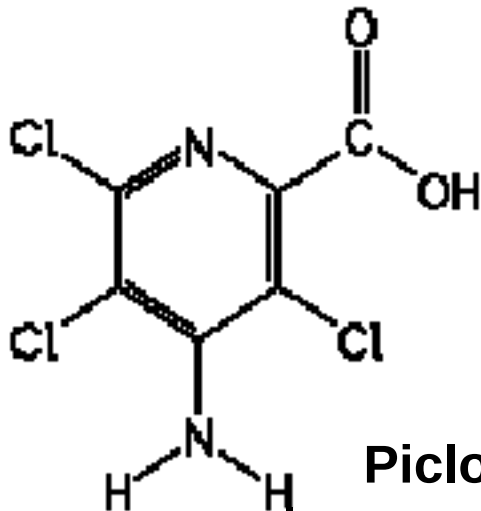
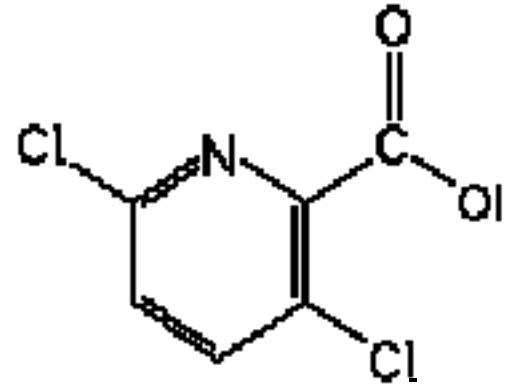
*A new picolinic acid (pyridine)
herbicide for control of invasive
thistles and other species in
wildlands, pastures and rangelands*



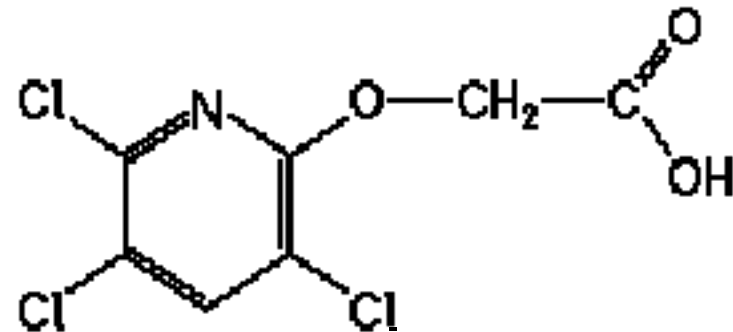
Aminopyralid



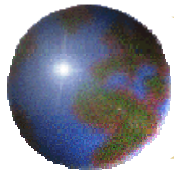
Clopyralid (Transline)



Picloram (Tordon)

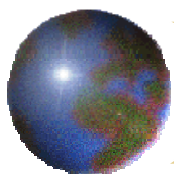


Triclopyr (Garlon)



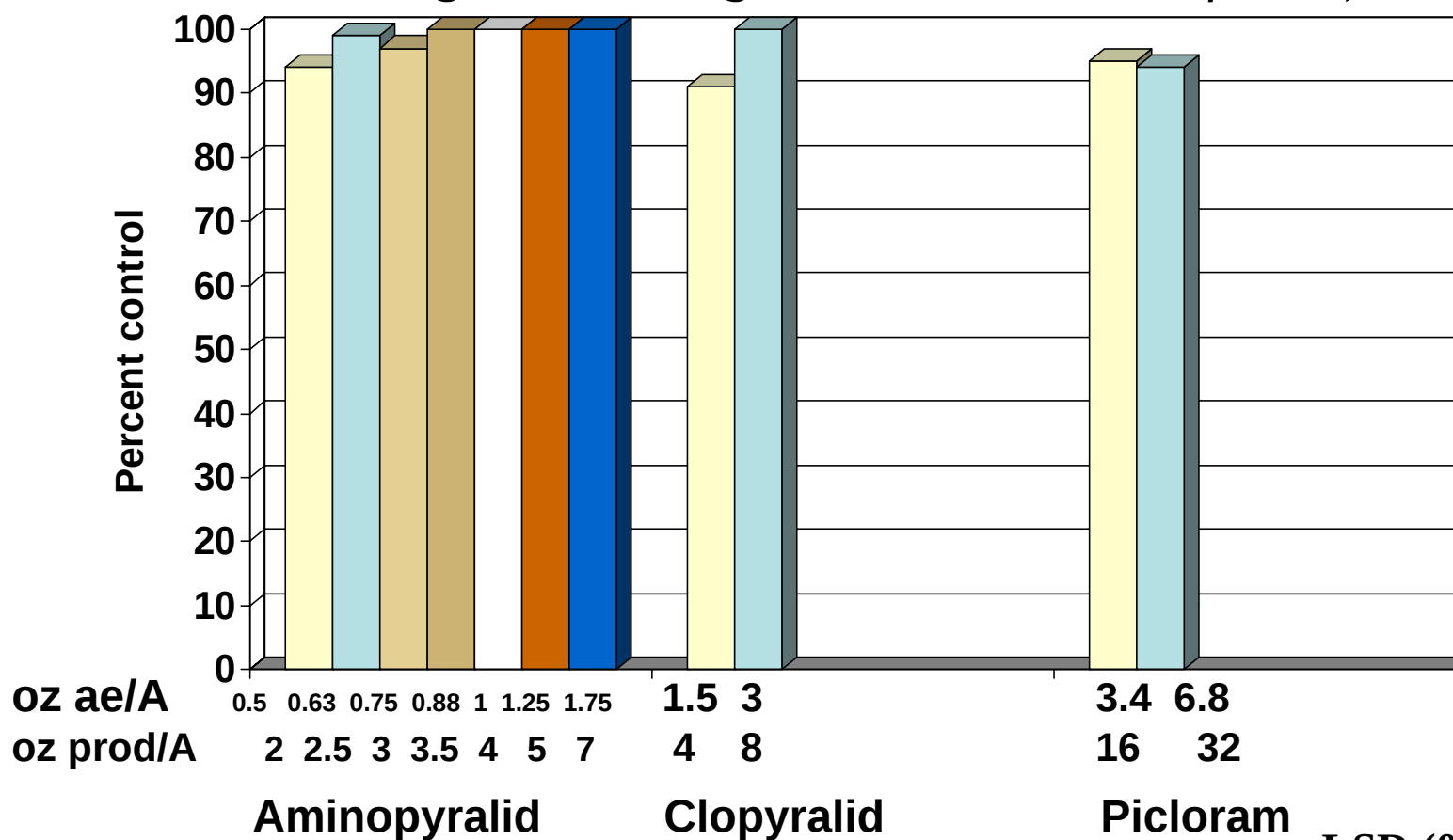
Herbicide	Solubility ppm	Soil Sorption Koc (ml/g)	Half Life (mean days)	Max Rate lb ae/acre
Aminopyralid	2480	10.8	34.5	0.1
2,4-D	311	41	10	2
Dicamba	4500	13.4	4.4	1
Picloram	560	12.41	90	0.5
Clopyralid	1000	4.6	10.75	0.5
Metsulfuron methyl	2790	90	169 (fall) 64 (spring)	0.15





Combined result of aminopyralid on yellow starthistle control in year of treatment

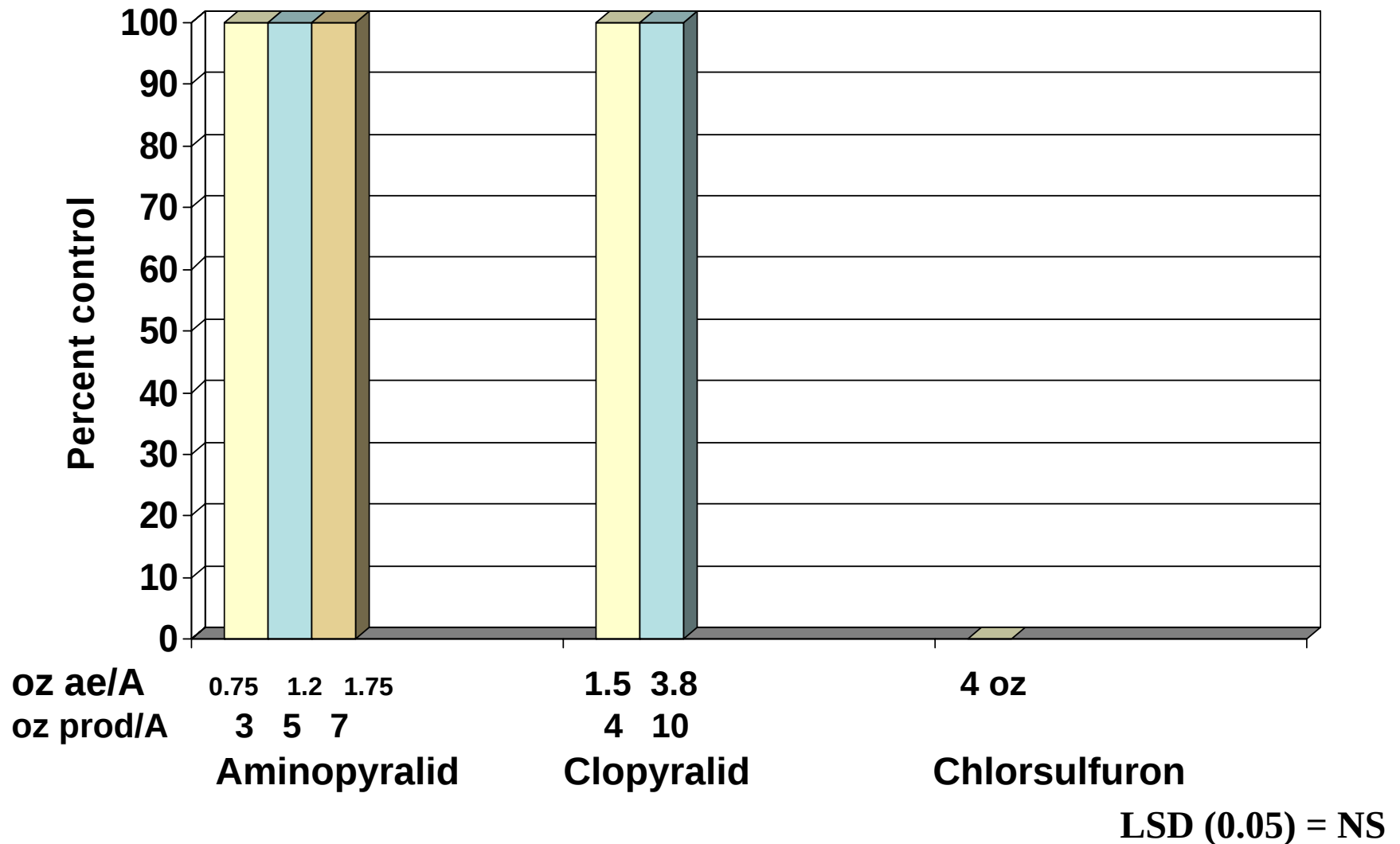
(from studies in Oregon, Washington, Idaho and California)



LSD (0.05) = NS

Control of yellow starthistle with aminopyralid in Yreka, CA

Treated on March 11, 2005, evaluated June 20, 2005

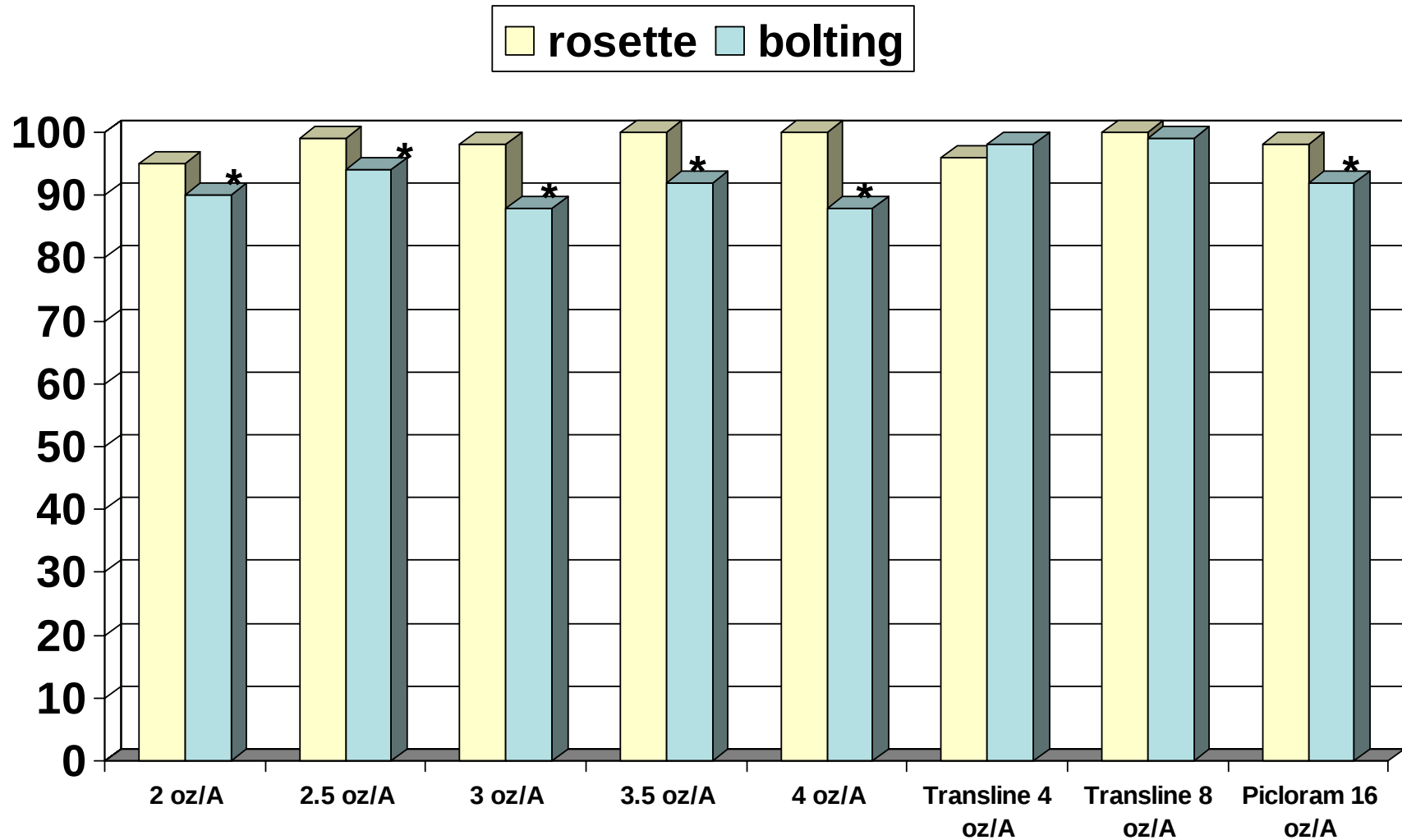


Aminopyralid 3 oz/A

Untreated



Effect of aminopyralid on yellow starthistle control in Davis, California



Evaluated on July 28, 2003

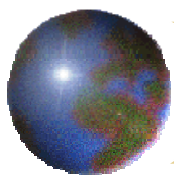
* LSD (P=0.05)



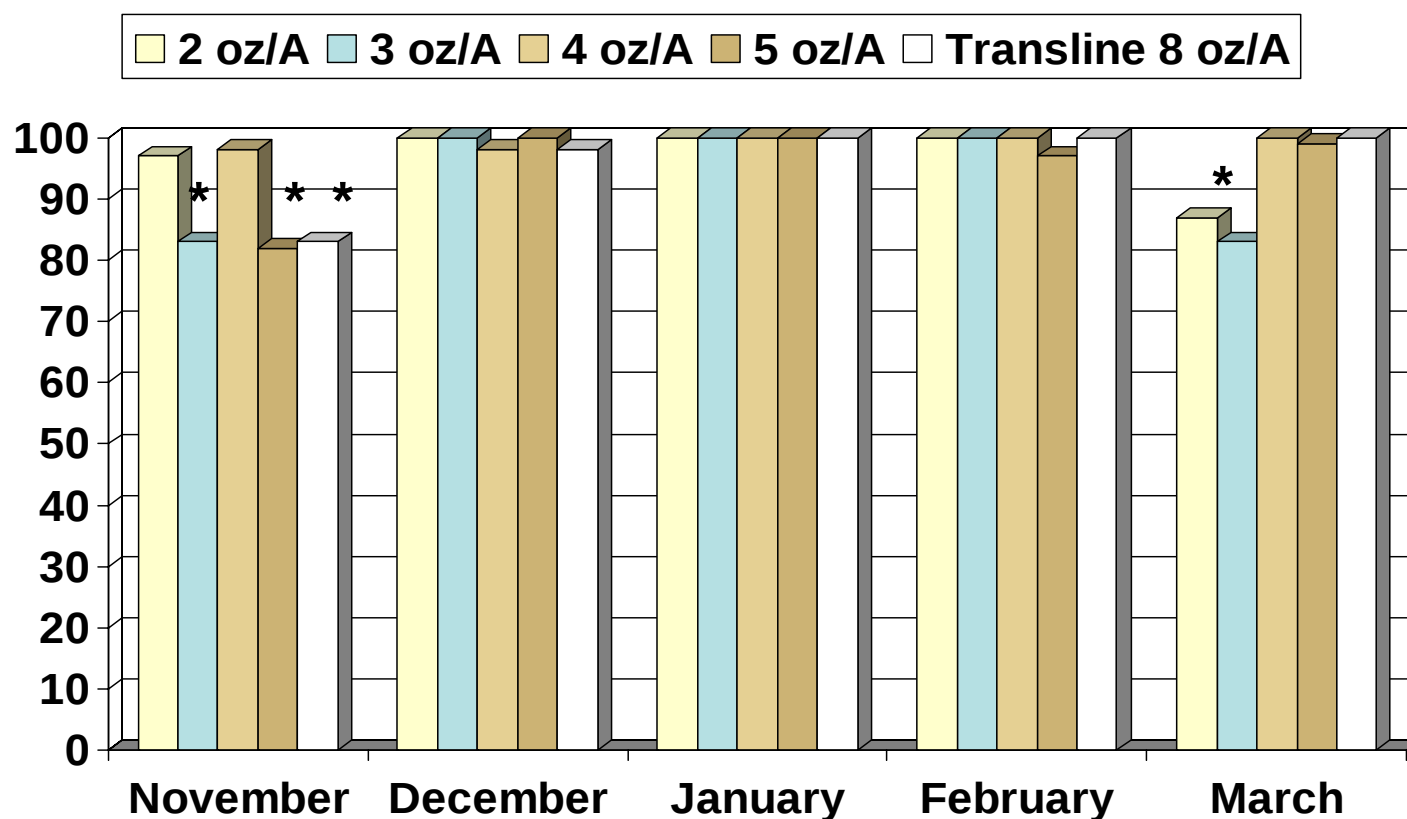
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Photo by Joe DiTomaso

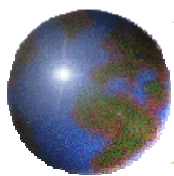


Effect of treatment timing on yellow starthistle control in Davis, California

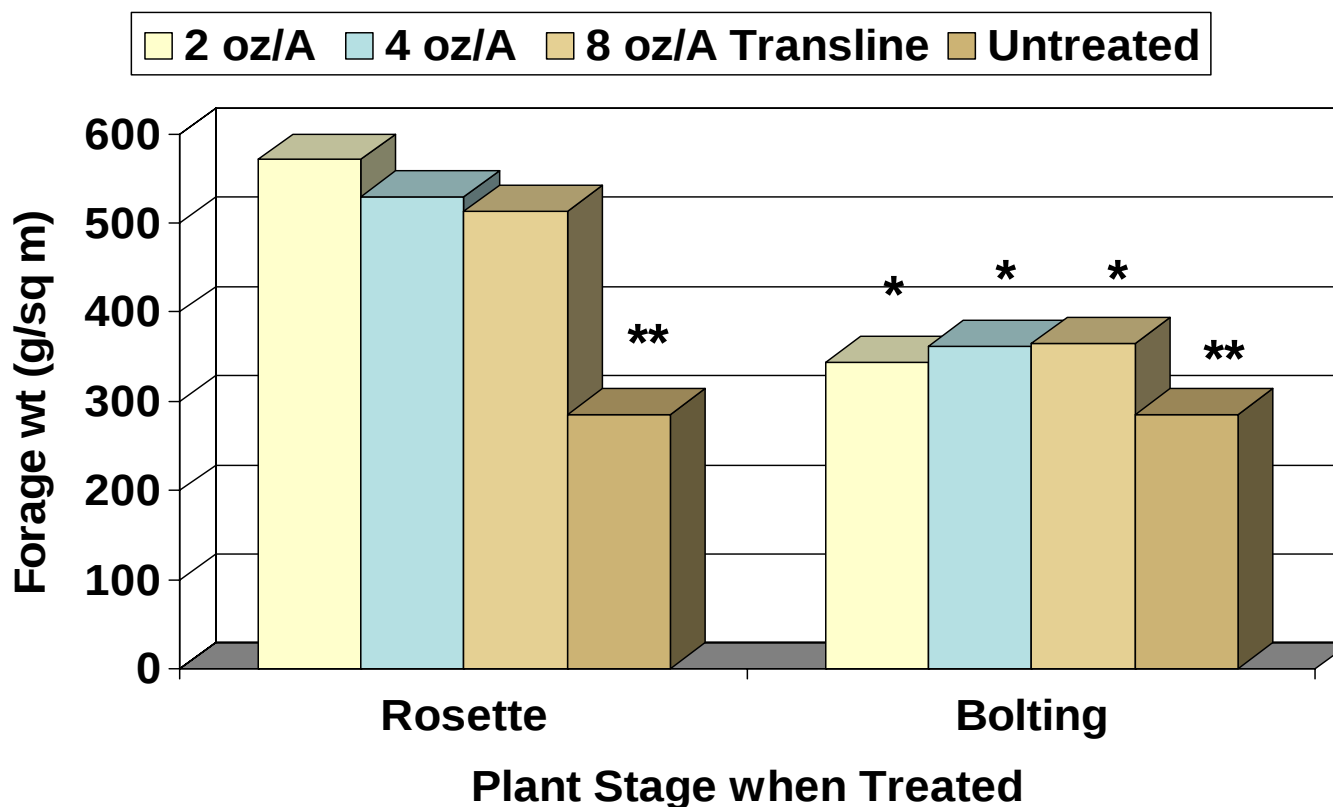


Treatments from Nov 2002 to March 2003, final evaluation in July 2003

* LSD (P=0.05)



Effect of aminopyralid and clopyralid on grass forage in following year

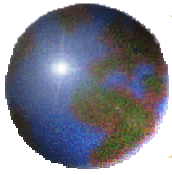


Treated in 2003
Evaluated in spring 2004

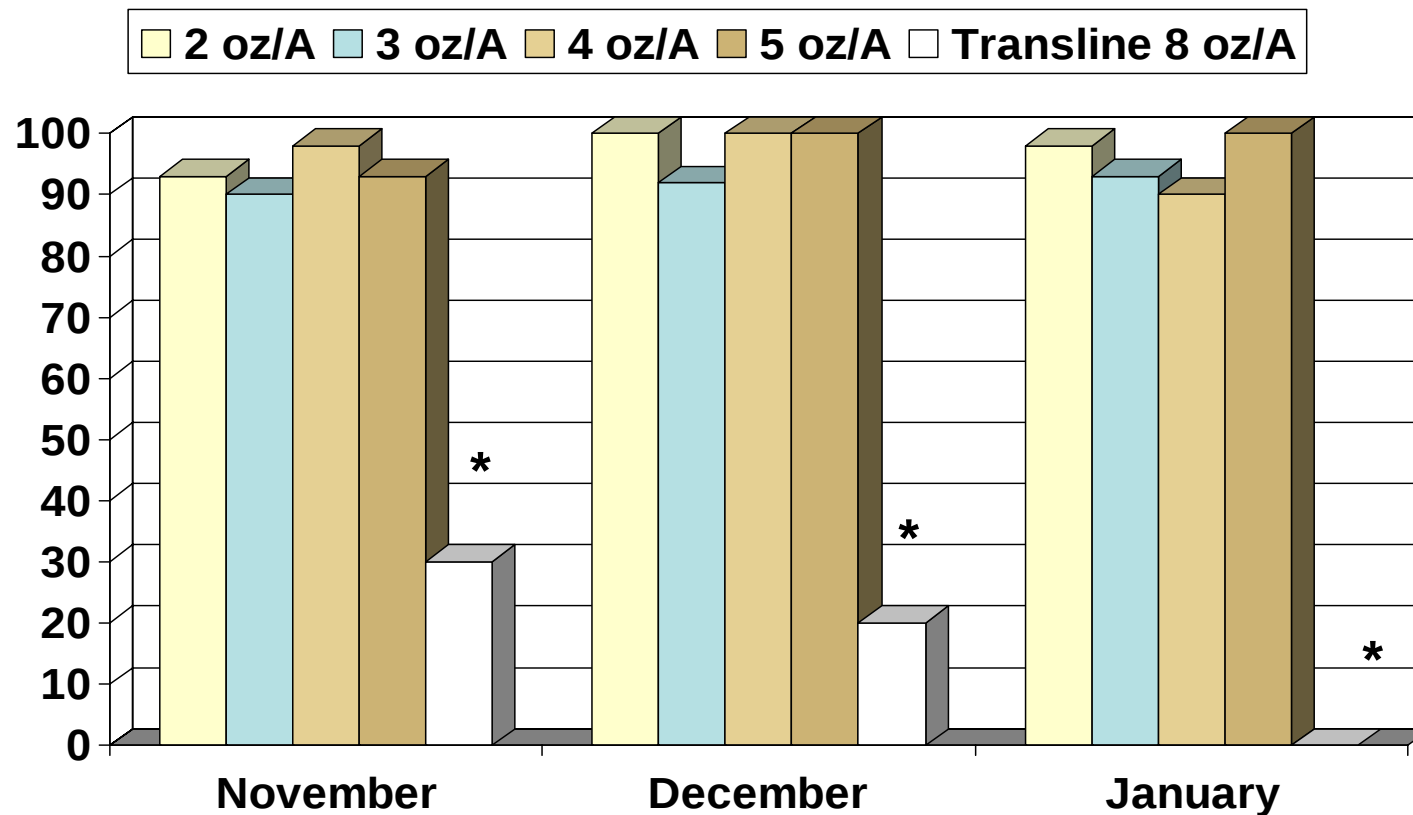
*LSD (P=0.05)
**LSD (P=0.01)



Fiddleneck
(*Amsinckia menziesii*)



Effect of treatment timing on coast fiddleneck (Amsinckia menziesii) control in Davis, California



Treatments from Nov 2002 to January 2003, final evaluation in March 2003

* LSD (P=0.05)

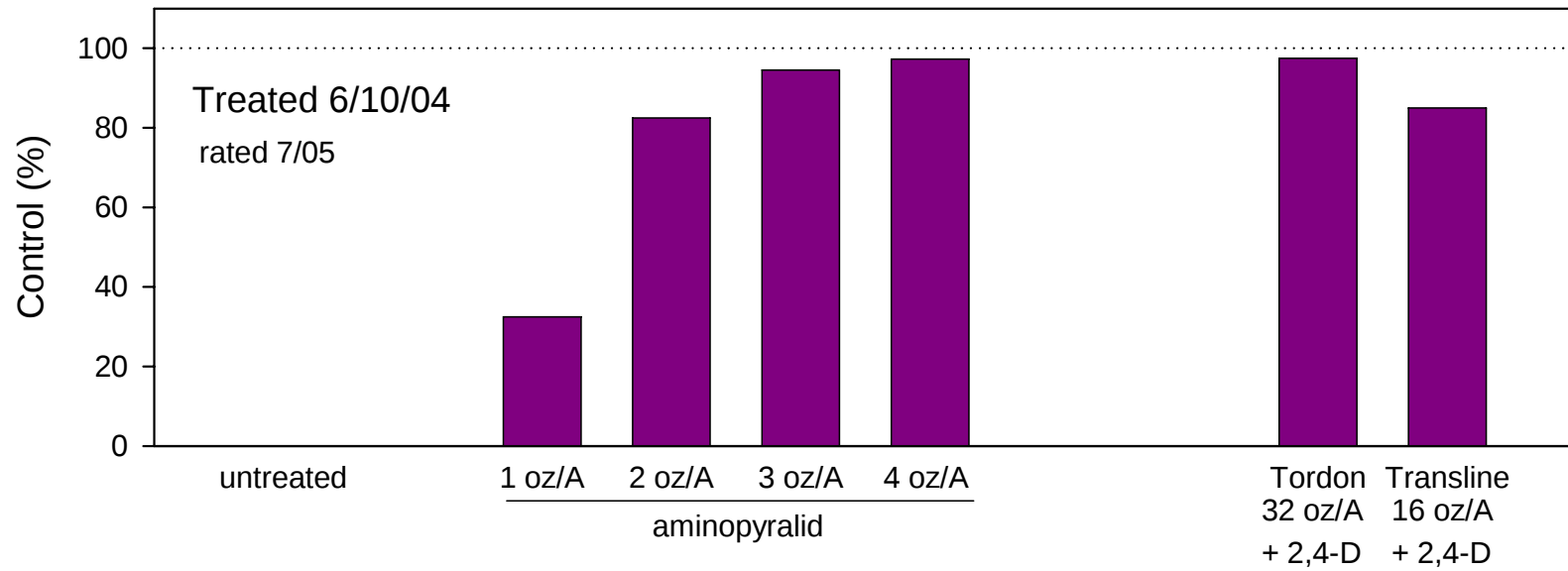
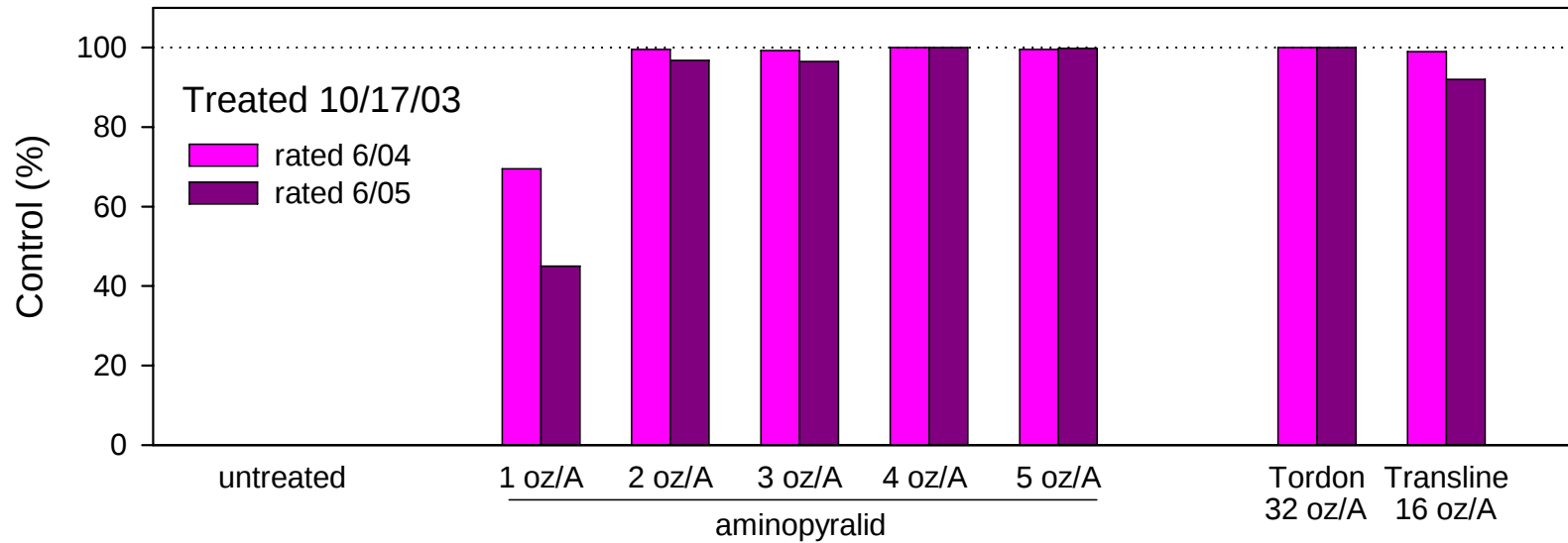
Russian knapweed (Acroptilon repens)



October treatment



Control of Russian knapweed at two sites in Lassen County



One year after treatment



October treatment

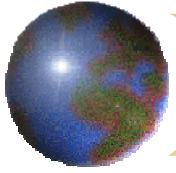


**Buds at base of
plant begin to
germinate in fall**



Conclusion

- **Milestone (aminopyralid)**
 - Will primarily target invasive thistles or knapweeds, but can also provide control of other species in the sunflower family, as well as legumes, solanaceous weeds, fiddleneck, etc.



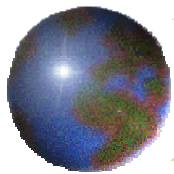
Integrated approaches

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



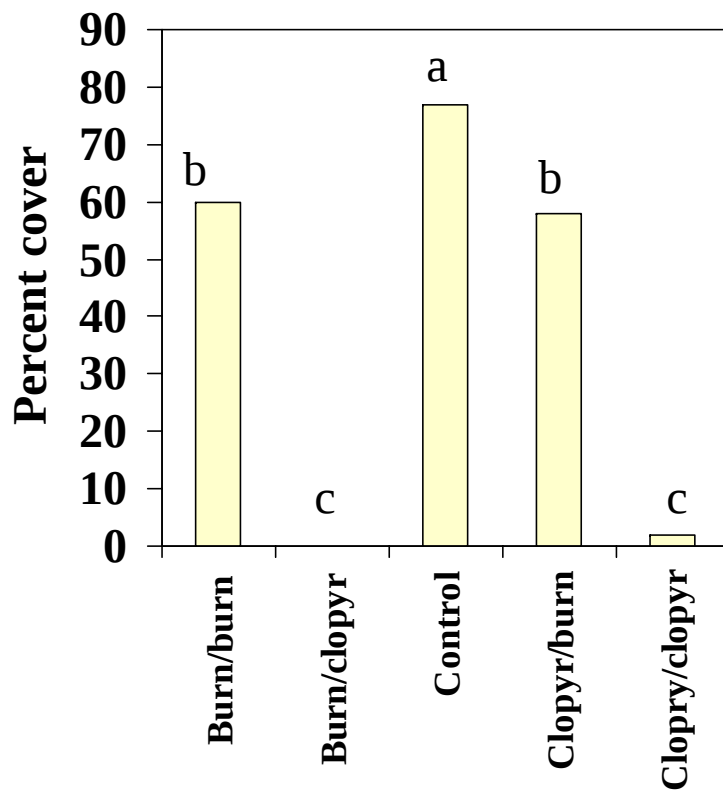
San Benito site following burn in 1999



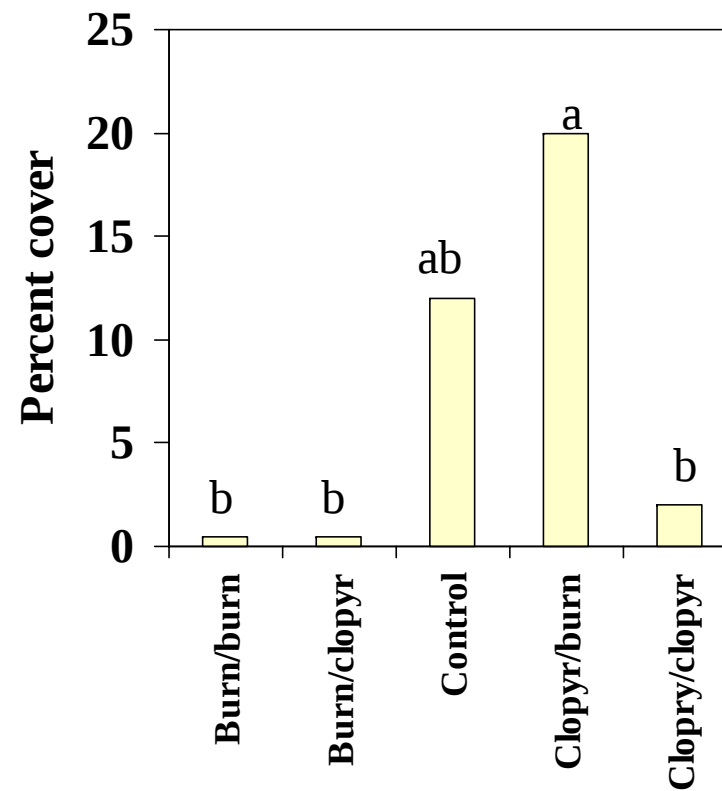


Yellow starthistle cover following two years of control

San Benito County



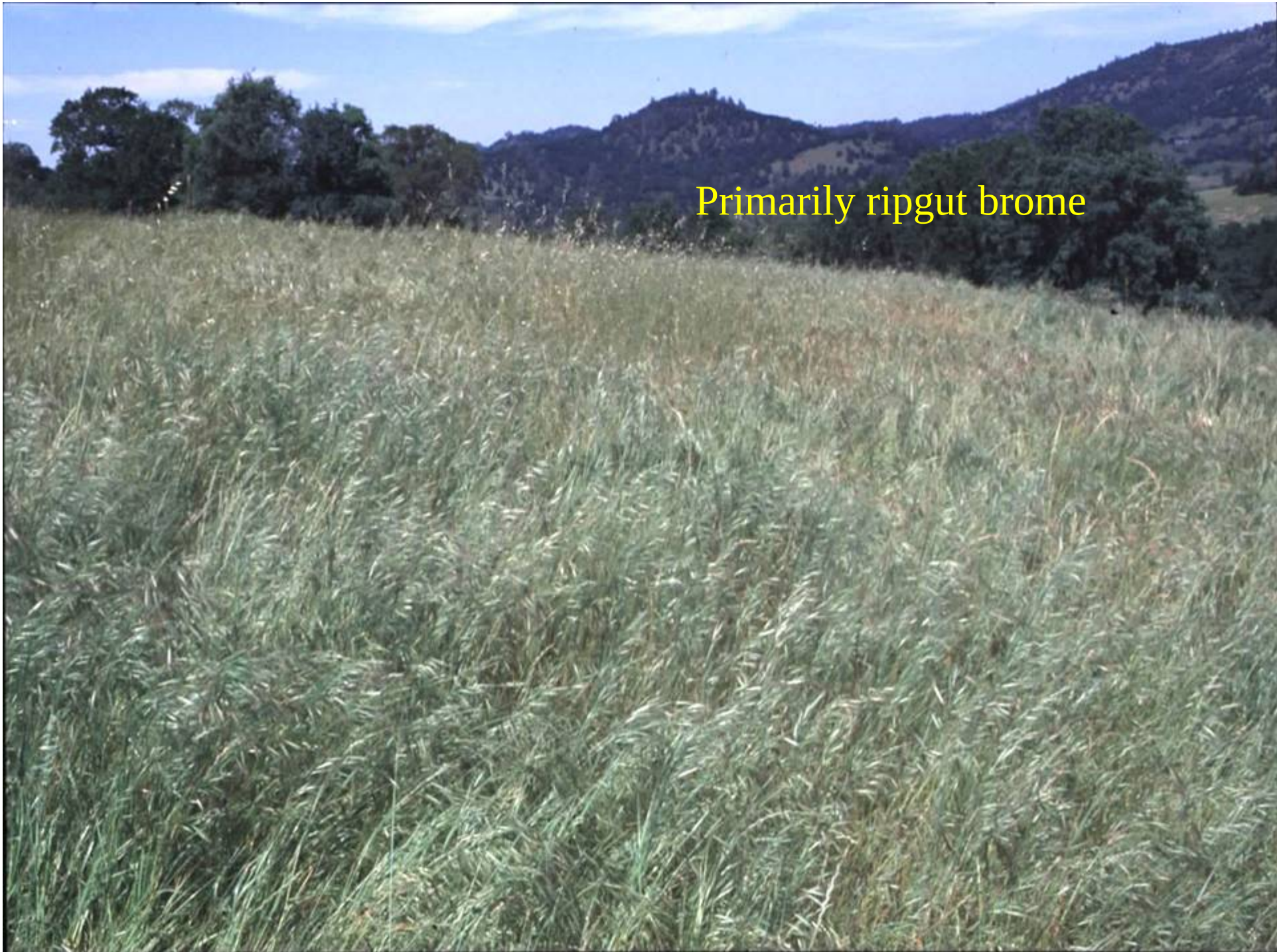
Yuba County





Ripgut brome (*Bromus diandrus*)

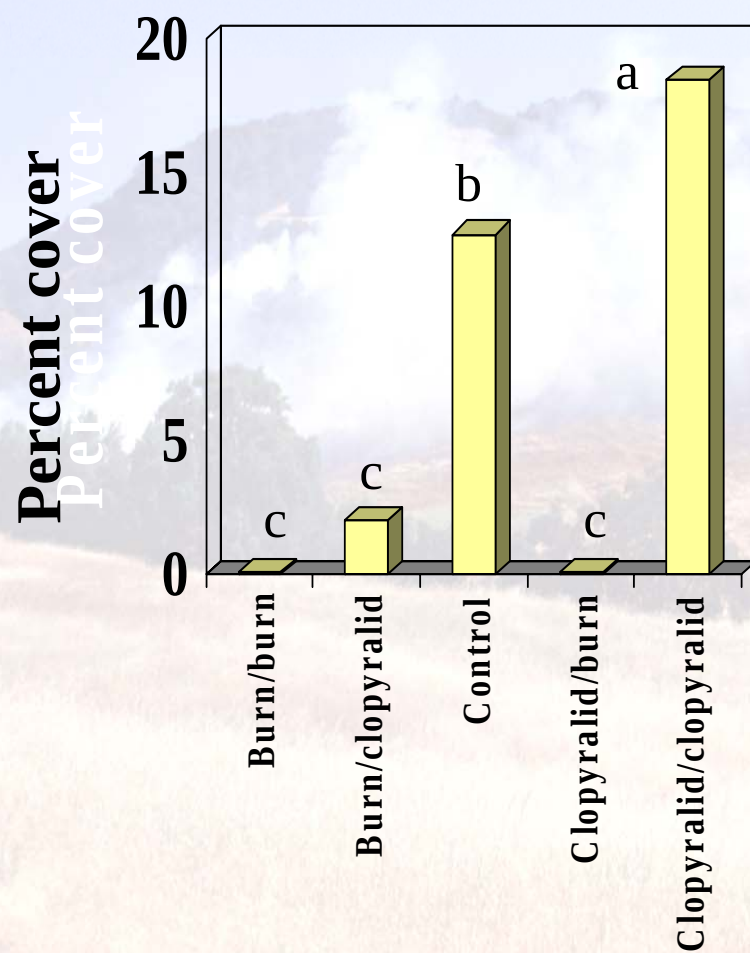
Primarily ripgut brome



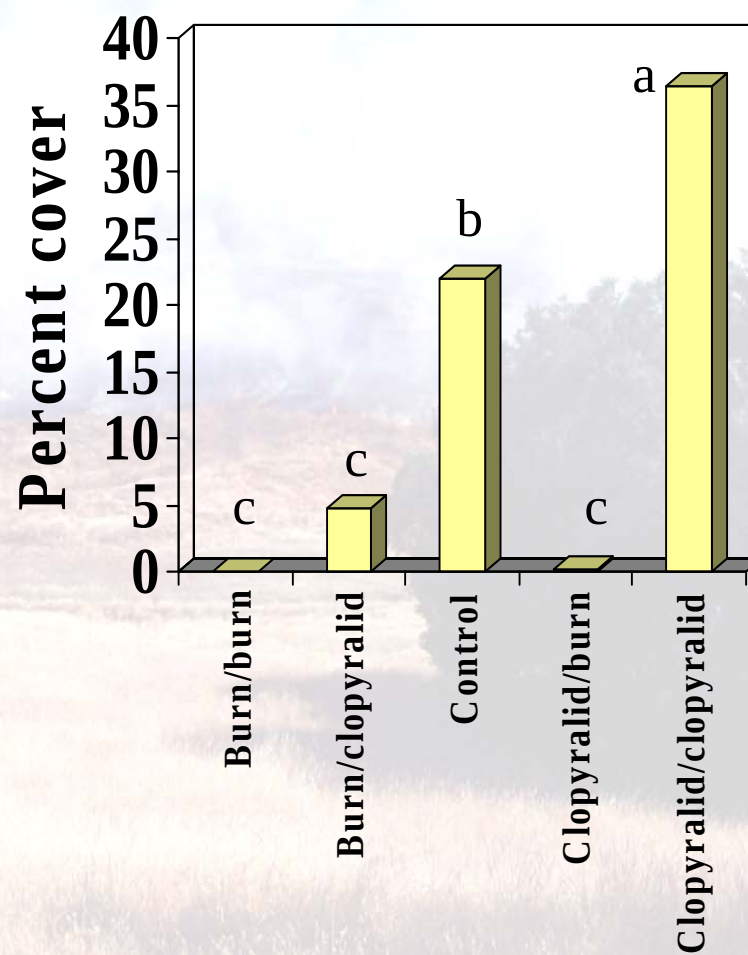
Medusahead
Taeniatherum caput-medusae

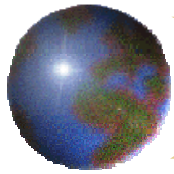


Medusahead



Ripgut brome





Integrated management of yellow starthistle at Ft. Hunter Liggett

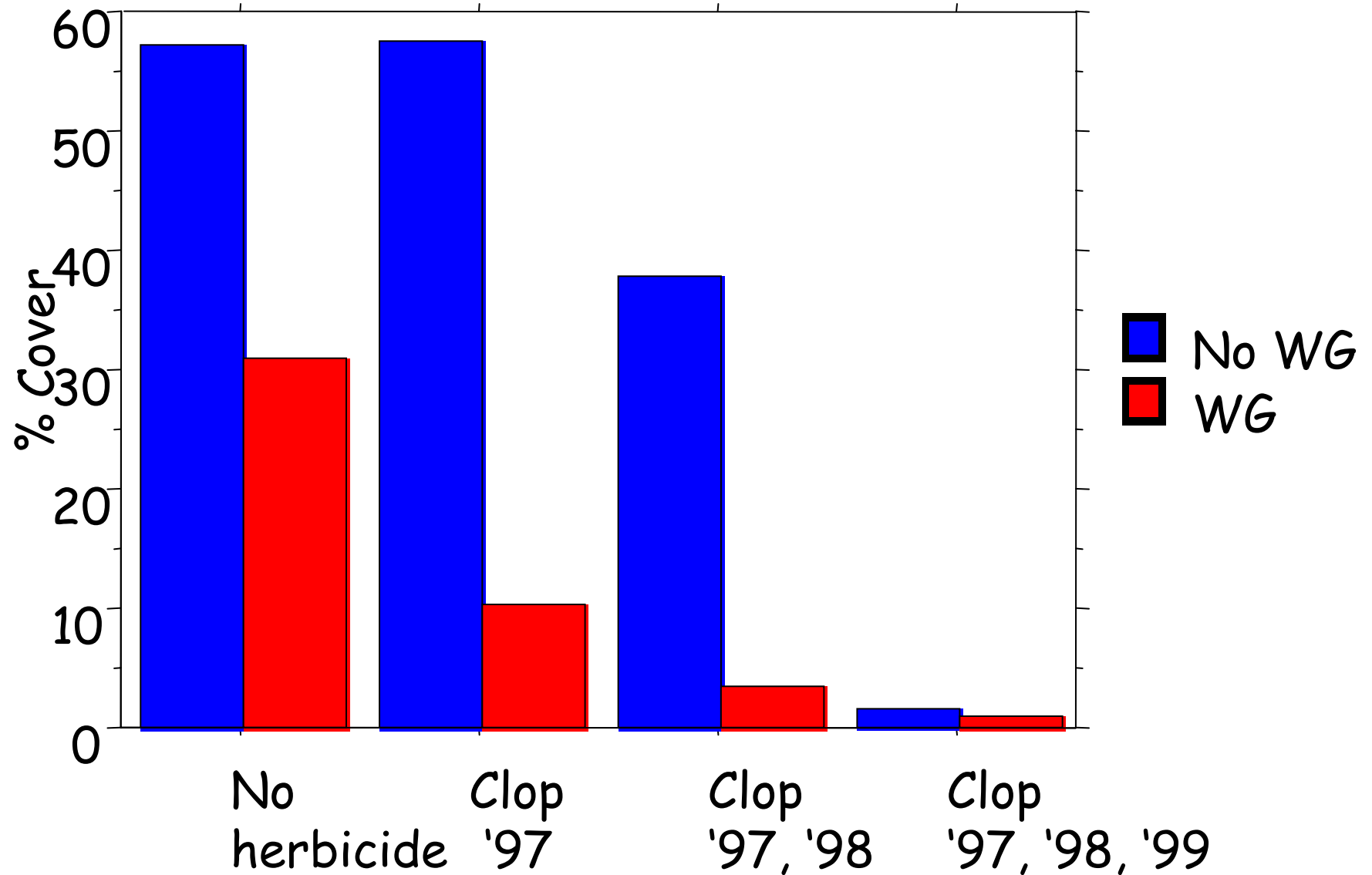
Site	Treatment	Seedlings/m ²	
		Untreated	Treated (% untreated)
Military use			
2000	Burned 1999	117	271 (232%)
	Clopyr. 2000		
2001		478	2 (0.4%)
Wildland site			
2000	Burned 1999	435	547 (126%)
	Clopyr. 2000		
2001	Burned 2001	1560	6 (0.4%)
2002	No treatment	987	45 (5%)

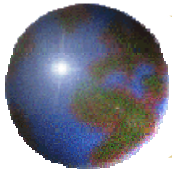
Foreground: Annual grass community
Background: Perennial grass community



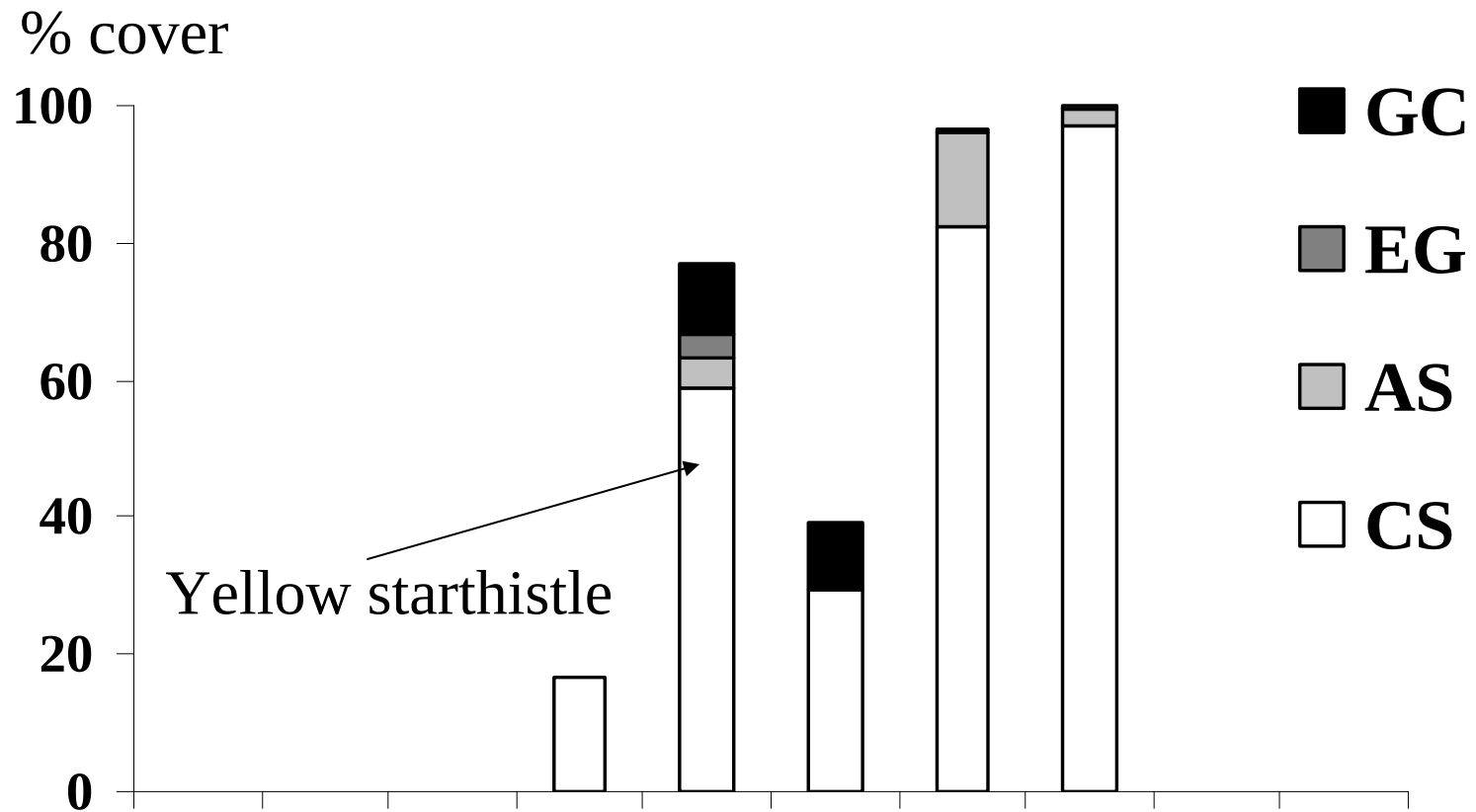
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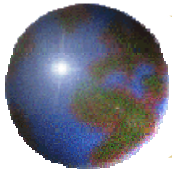
Late Season Yellow Starthistle Cover (summer 2000)



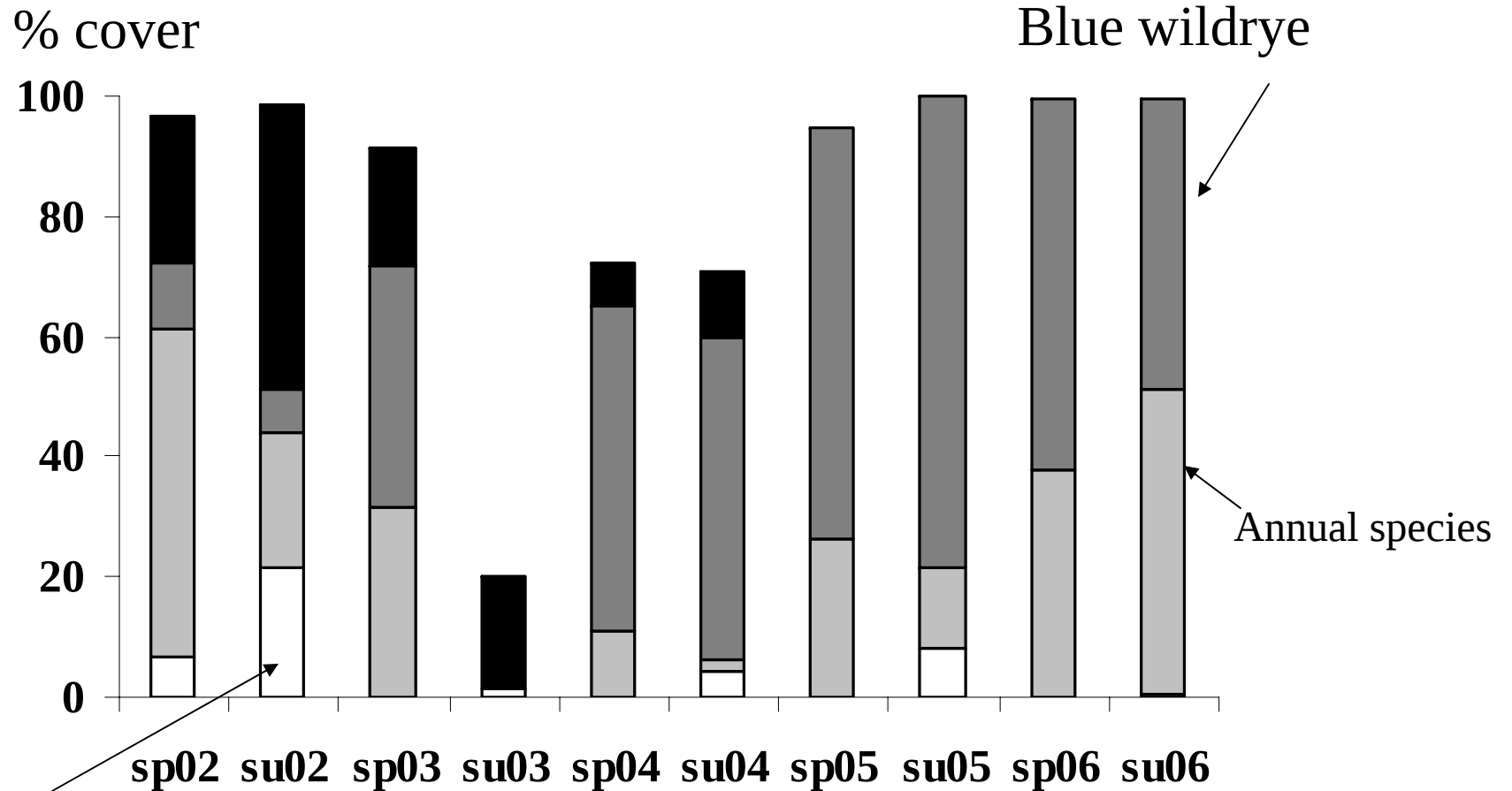


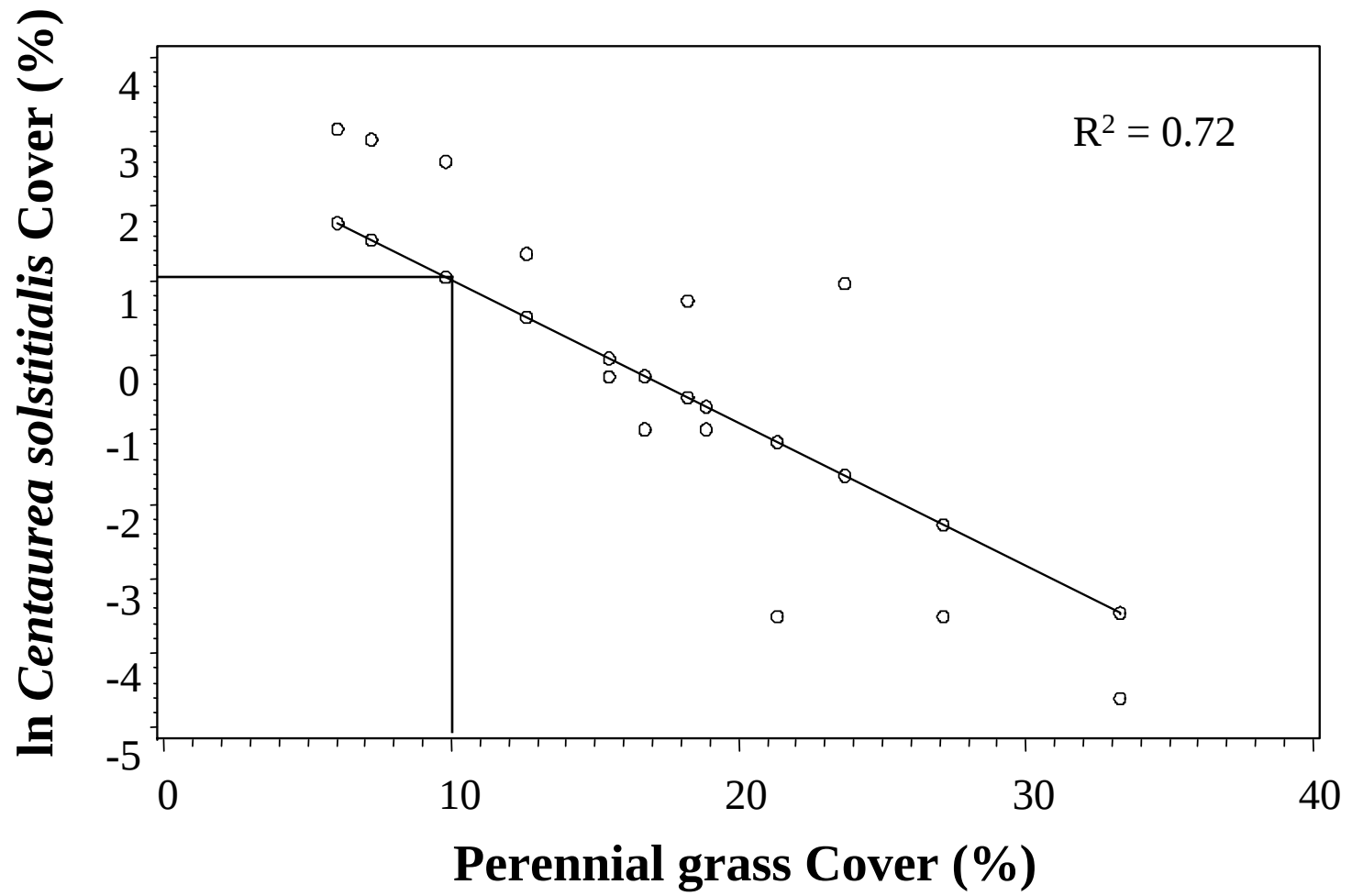
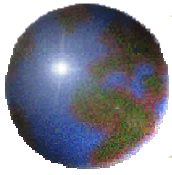
Native plant revegetation for yellow starthistle control





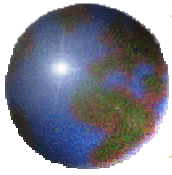
Plots planted to YST in 2001
after establishment of natives





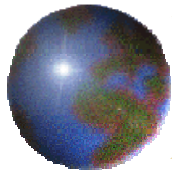


Brown Brush Monitor



Summary of yellow starthistle management

- Numerous successful control options
 - Transline, Milestone, burning, mowing, tillage
- 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
 - Monitor and detect new YST plants and populations
 - Spot treatment or follow-up program
 - Integrated program using competitive perennial grasses can be effective



CALIFORNIA Invasive Plant INVENTORY



Published by the
California Invasive Plant Council

February 2006



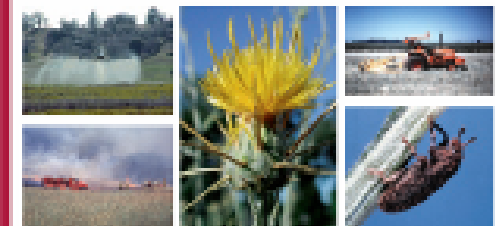
The Use of Fire as a Tool for Controlling Invasive Weeds

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Cal-ipc.org

Yellow Starthistle Management Guide



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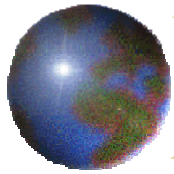
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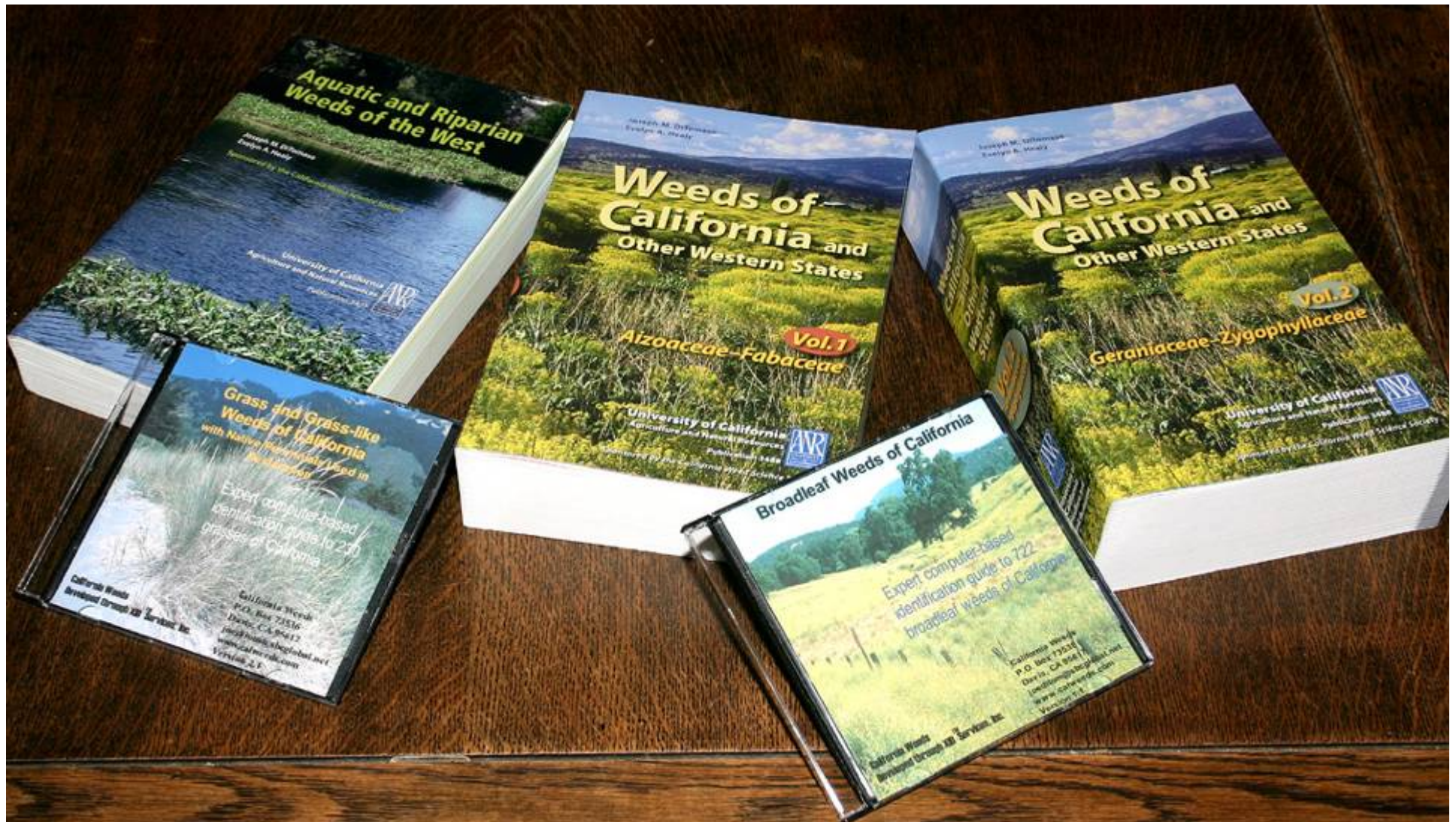
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Agrostemma githago
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