Managing Weeds, Timing, and Risk

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Risk: *the possibility of loss or injury* (Webster)

- Does a total post weed program increase risk?
- How much early season yield protection do soil-applied herbicides provide?
- How long can the sequential post application be delayed before yield loss?

Purpose

- Investigate the benefits of sequential herbicide applications on weed competitive loads and corn yield
- Compare the effect of soil-applied herbicides on weed competitive loads
- Compare actual corn yield losses to those predicted by WeedSOFT

WeedSOFT Yield Loss Prediction

- Total competitive load (TCL) integrates weed density (*D*), competitive ability (*CI*), and size (*ACI*) to predict crop yield loss
- Competitive load (CL)

$$CL = D_{bi} \, x \, ACI_i$$

- Summed over weed species

$$TCL = \Sigma(D_{bi} \, x \, ACI_i)$$

WeedSOFT Yield Loss Prediction

- Weeds differ in the ability to compete against the crop
  - WeedSOFT ranks giant foxtail (CI=2) less competitive than common lambsquarters (CI=3)
- WeedSOFT factors the relationship of crop height to weed height at application

Materials and Methods

Timing of weed removal:

	Postemergence timing (glyphosate @ 0.75 lb ae/a)			
	None	Early	Mid	Late
Outlook/G-Max Lite	April 30			
Outlook/G-Max Lite		June 13		
Outlook/G-Max Lite			June 17	
Outlook				June 20
glyphosate		June 13		
glyphosate			June 17	
glyphosate				June 20
Preemergence treatment: Outlook and G-Max Lite applied at one-half recommended rates of 10 fl oz/a and 1.5 pt/a, respectively.				

Materials and Methods

- Dekalb 50-20 planted on April 26
- 10 by 25 foot plots
- 2 0.25-m^2 quadrats/plot

Effect of Weed Removal Timing on Total Competitive Load at Postemergence Glyphosate Application

Treatment	Application timing	Competitive load		TCL
		Giant foxtail	Lambsquarters	
Nontreated		2471	3121	5592[a]
Outlook	Pre	65	1338	1403[a]
Outlook fb	Pre			
glyphosate	early	0	223	223
glyphosate	mid	26	223	249
glyphosate	late	0	279	279
glyphosate	early	4734	1672	6406
glyphosate	mid	1769	2648	4417
glyphosate	late	1040	3790	4830

[a] assessed at June 30

Total Competitive Load Comparison Between Outlook and G-Max Lite

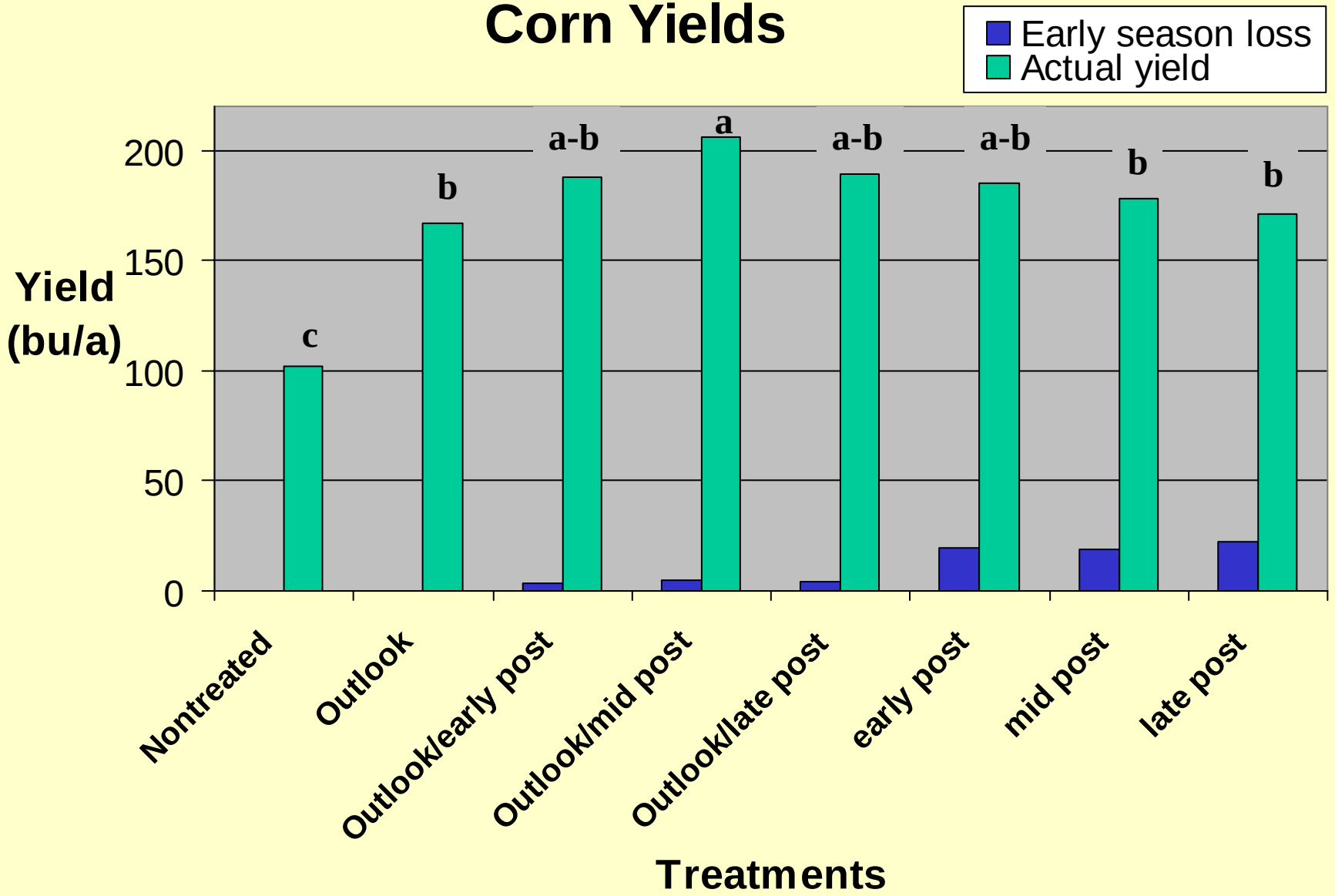
Treatment	Application timing	Competitive load		TCL
		Giant foxtail	Lambsquarters	
Nontreated		2471	3121	5592 [a]
Outlook	Pre	65	1338	1403 [a]
G-Max Lite	Pre	33	0	33 [a]
Outlook fb	Pre			
glyphosate	early	0	223	223
glyphosate	mid	26	223	249
glyphosate	late	0	279	279
G-Max Lite fb	Pre			
glyphosate	early	0	0	0
glyphosate	mid	33	0	33
glyphosate	late	52	0	52

[a] assessed at June 30

TCL and Prediced Early Season Yield Loss

Treatment	Application Timing	TCL	Pred. early season yield loss	Cost at $2/bu
			— (bu/a) —	
Nontreated		5593		
Outlook	Pre	1403	7	14
G-Max Lite	Pre	33	1	2
Outlook fb	Pre			
glyphosate	early	223	5	10
glyphosate	mid	249	5	10
glyphosate	late	279	5	10
G-Max Lite fb	Pre			
glyphosate	early	0	0	0
glyphosate	mid	33	0	0
glyphosate	late	52	1	2
glyphosate	early	6406	20	40
glyphosate	mid	4416	19	38
glyphosate	late	4831	22	44

Effect of Weed Removal Timing on Predicted Early Season Yield Loss and Corn Yields



Summary

- TCLs with Outlook applied preemergence were 68% lower than glyphosate alone
- TCLs were equal at the three postemergence timings following Outlook and predicted early season yield loss was 2% or less
- Sequential glyphosate applications following Outlook increased corn yield more than Outlook applied alone
- TCLs were reduced more with half rates of G-Max Lite than Outlook

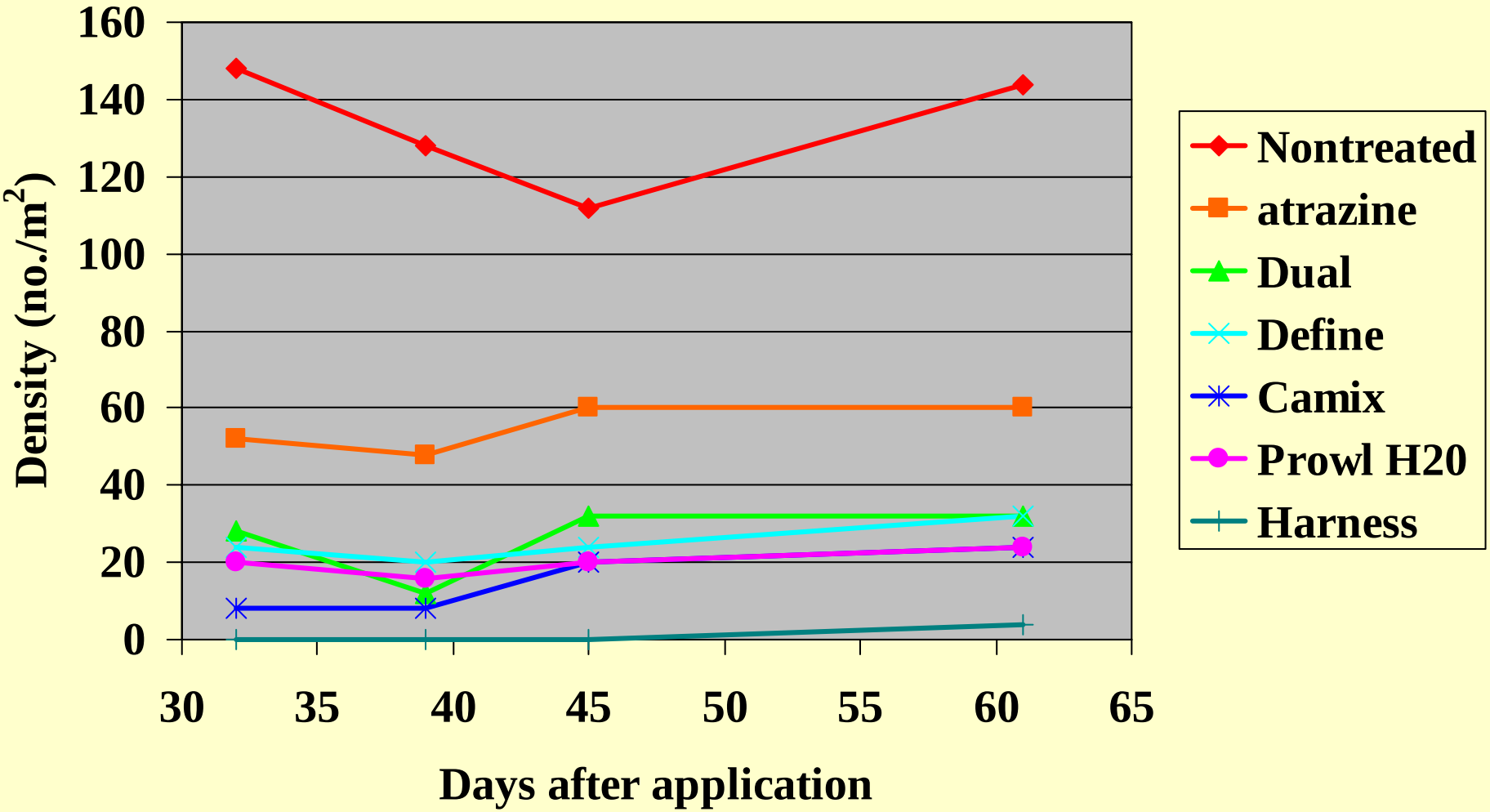
Materials and Methods

- Compare the effect of half-rates of various soil-applied herbicides on TCL:

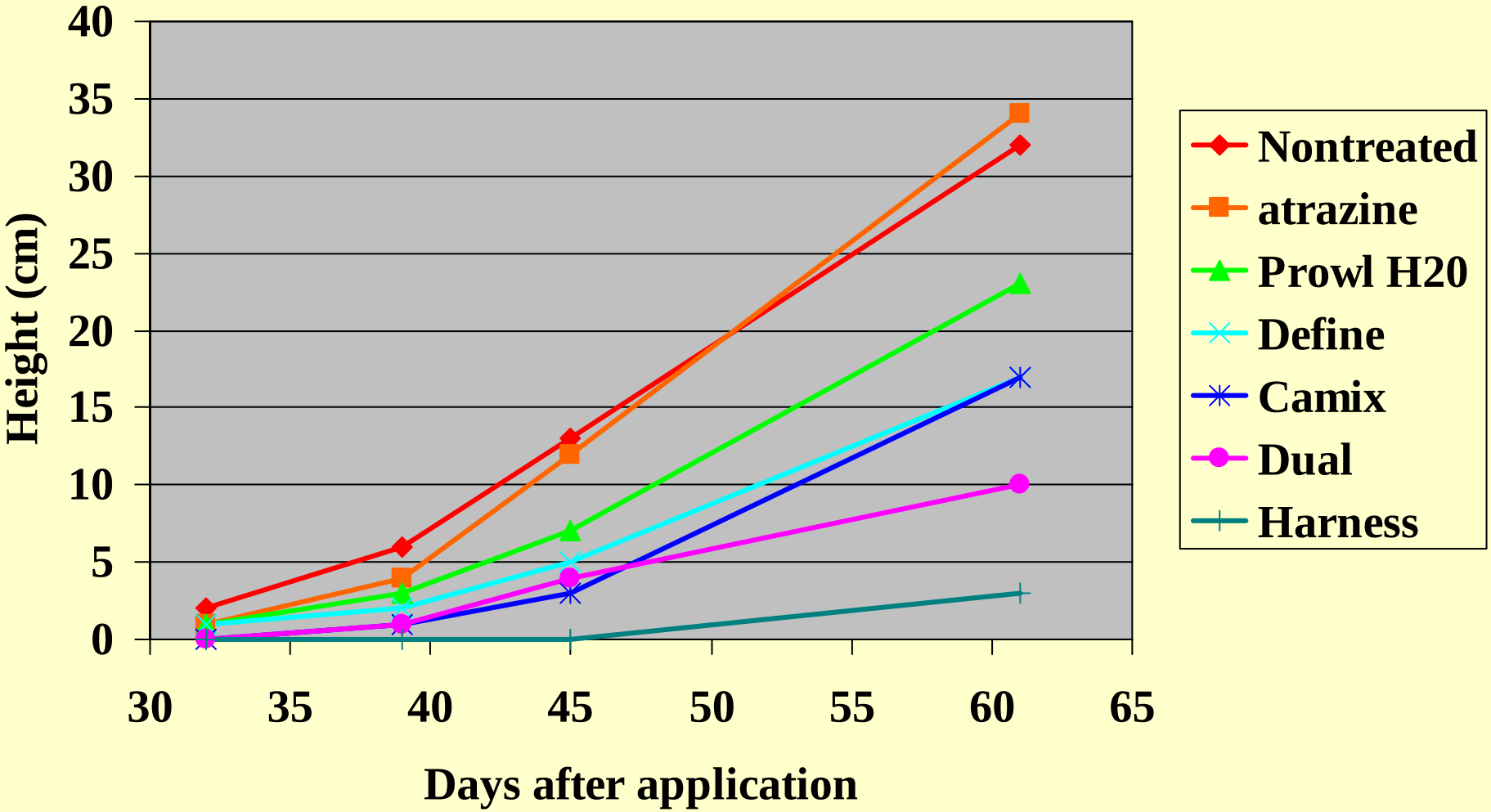
Harness	1.1 pt/a	Define	10 fl oz/a
atrazine	1.5 pt/a	Dual II Mag.	0.8 pt/a
Prowl H_20	1.25 pt/a	Camix	1.2 qt/a

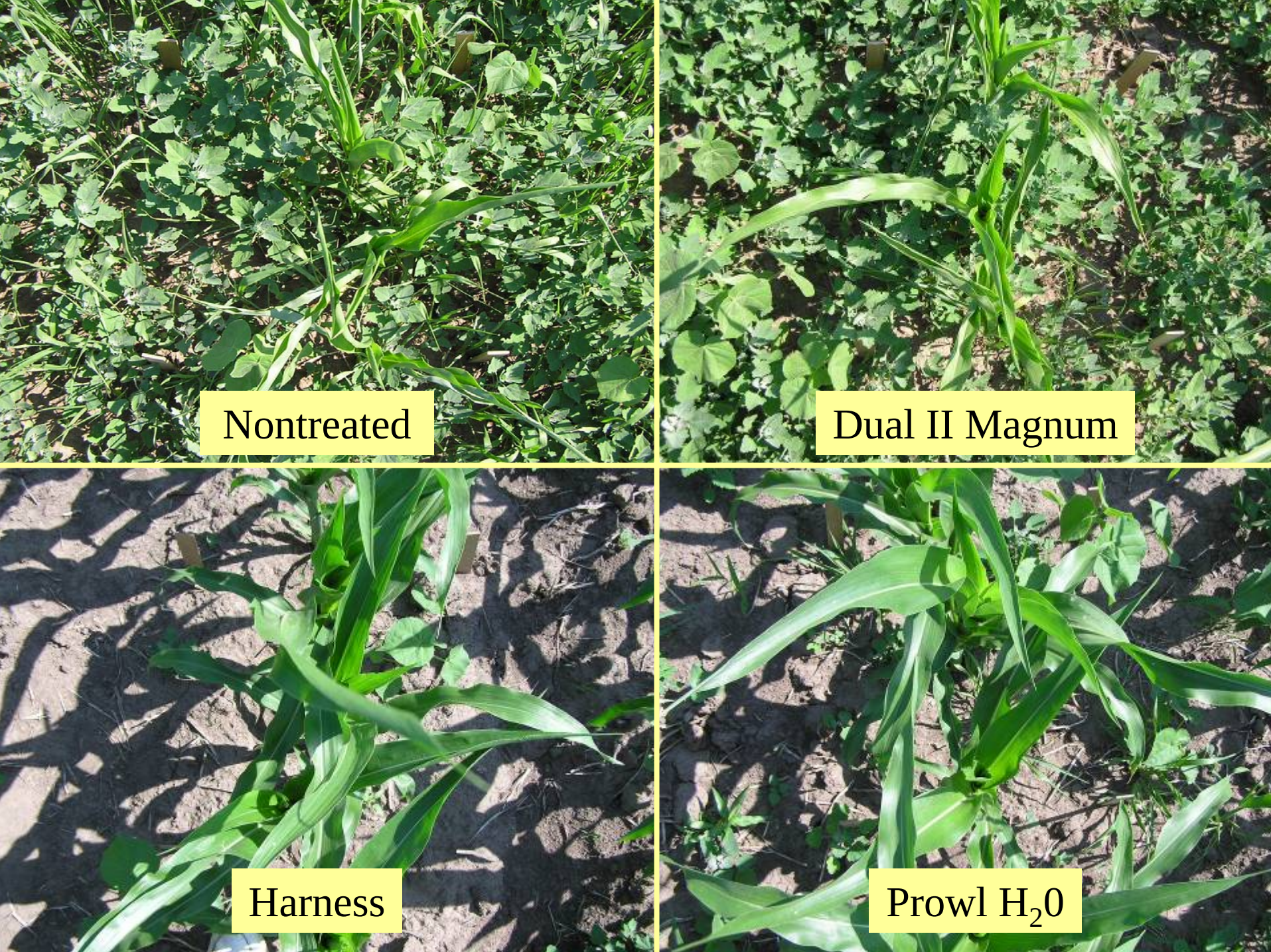
  – Applied preemergence alone and followed by glyphosate at 0.75 lb ae/a

Effect of Preemergence Herbicides on Giant Foxtail Density

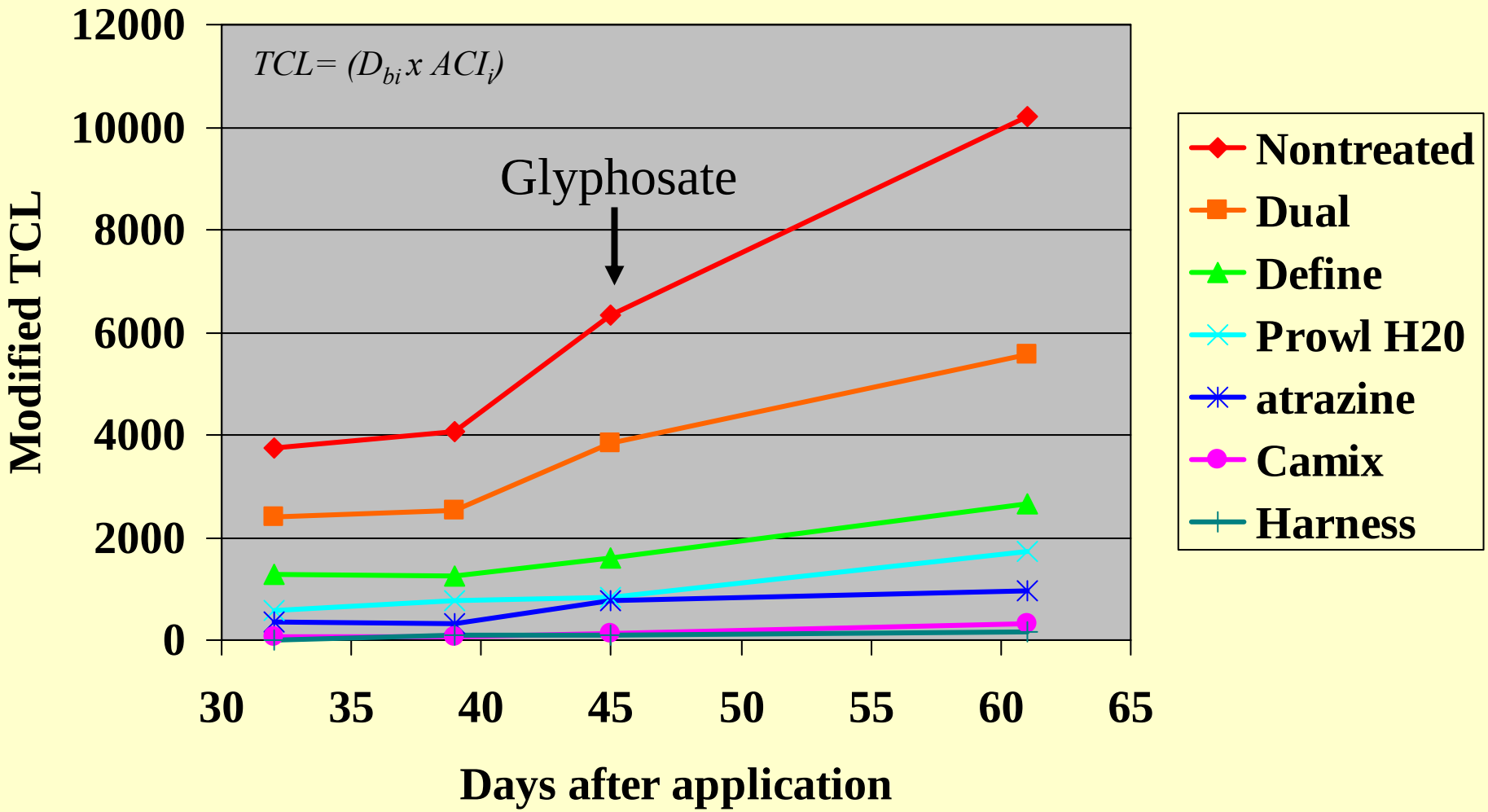


Effect of Preemergence Herbicides on Giant Foxtail Height

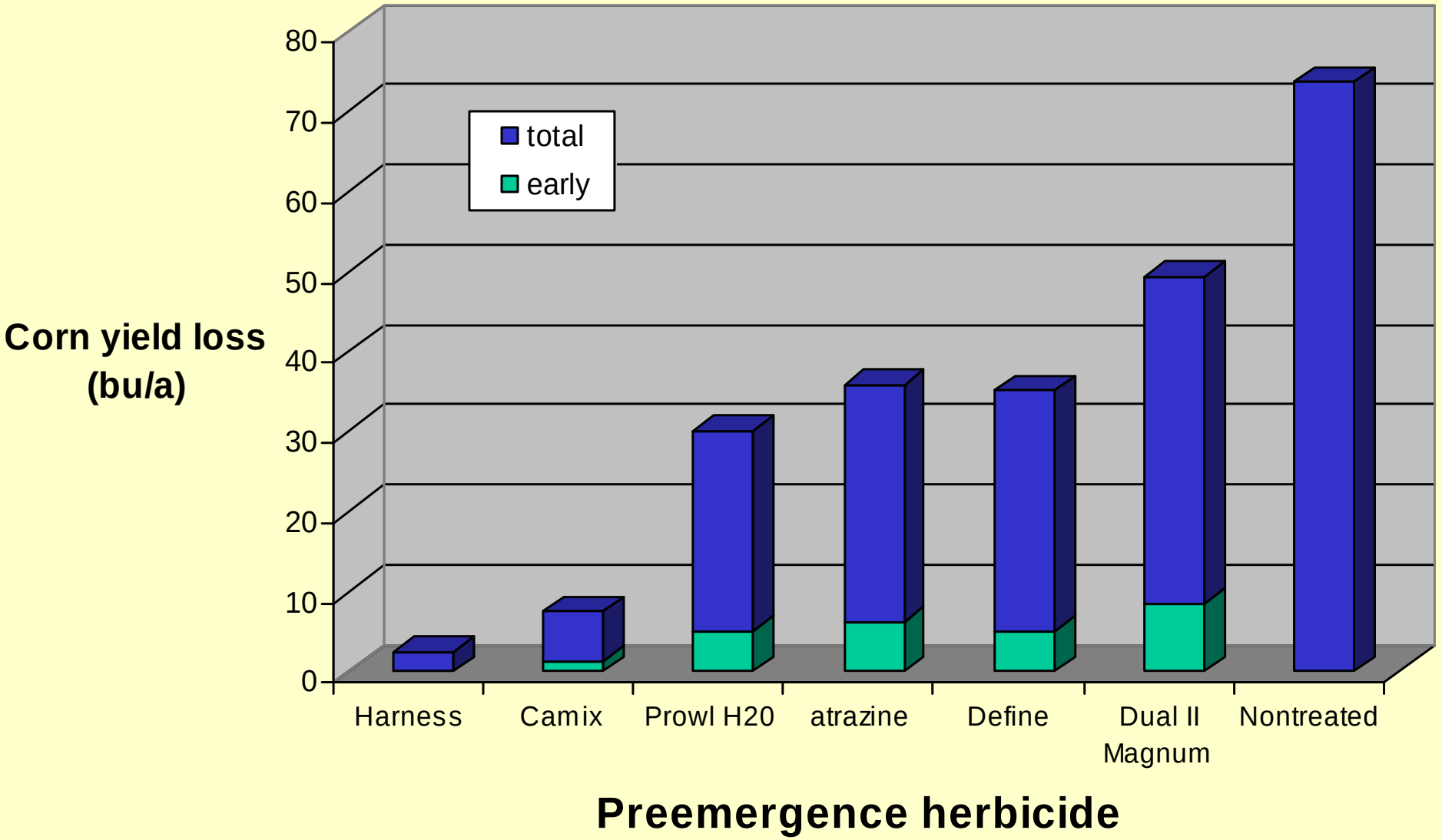



Nontreated
Dual II Magnum
Harness
Prowl H_20

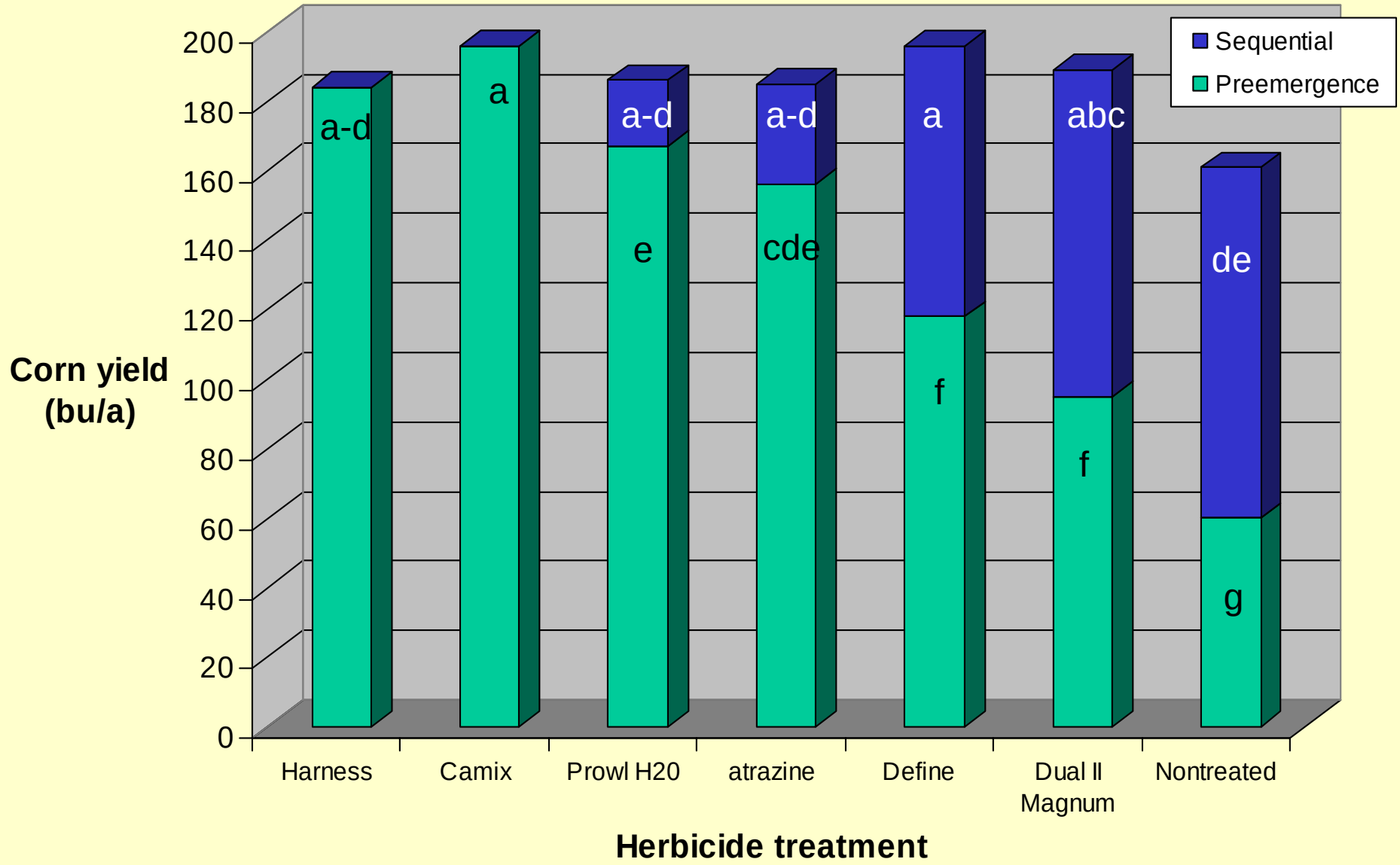
Effect of Preemergence Herbicides on "Modified" Weed Competitive Load



Effect of Preemergence Herbicides on Predicted Early Season and Total Corn Yield Losses by WeedSOFT



Effect of Preemergence Herbicides and Sequential Treatment on Actual Corn Yields



Summary

- At half rates, preemergence herbicides reduced the TCL by 40 to 98% at the time glyphosate was applied
- Rankings from the least to greatest TCL:
  - Harness, Camix, atrazine, Prowl H_20, Define, and Dual II Magnum
- Corn yields did not differ between Harness and Camix applied preemergence or sequentially with glyphosate
- Increasing TCLs with the other preemergence herbicides lowered corn yields

Conclusions

- TCLs measured the risk of early season weed competition
- WeedSOFT correctly ranked corn yields after preemergence herbicide treatments
- Preemergence herbicides differ in their ability to extend postemergence herbicide applications
  - Weed spectrum, weather conditions
- The use of preemergence herbicides can reduce weed density and height
  - Delay postemergence herbicide applications without increasing the risk of corn yield loss from early season weed competition