

Impact of Glyphosate-Resistant Alfalfa Seeding Rate and Herbicides on Stand Establishment and Yield

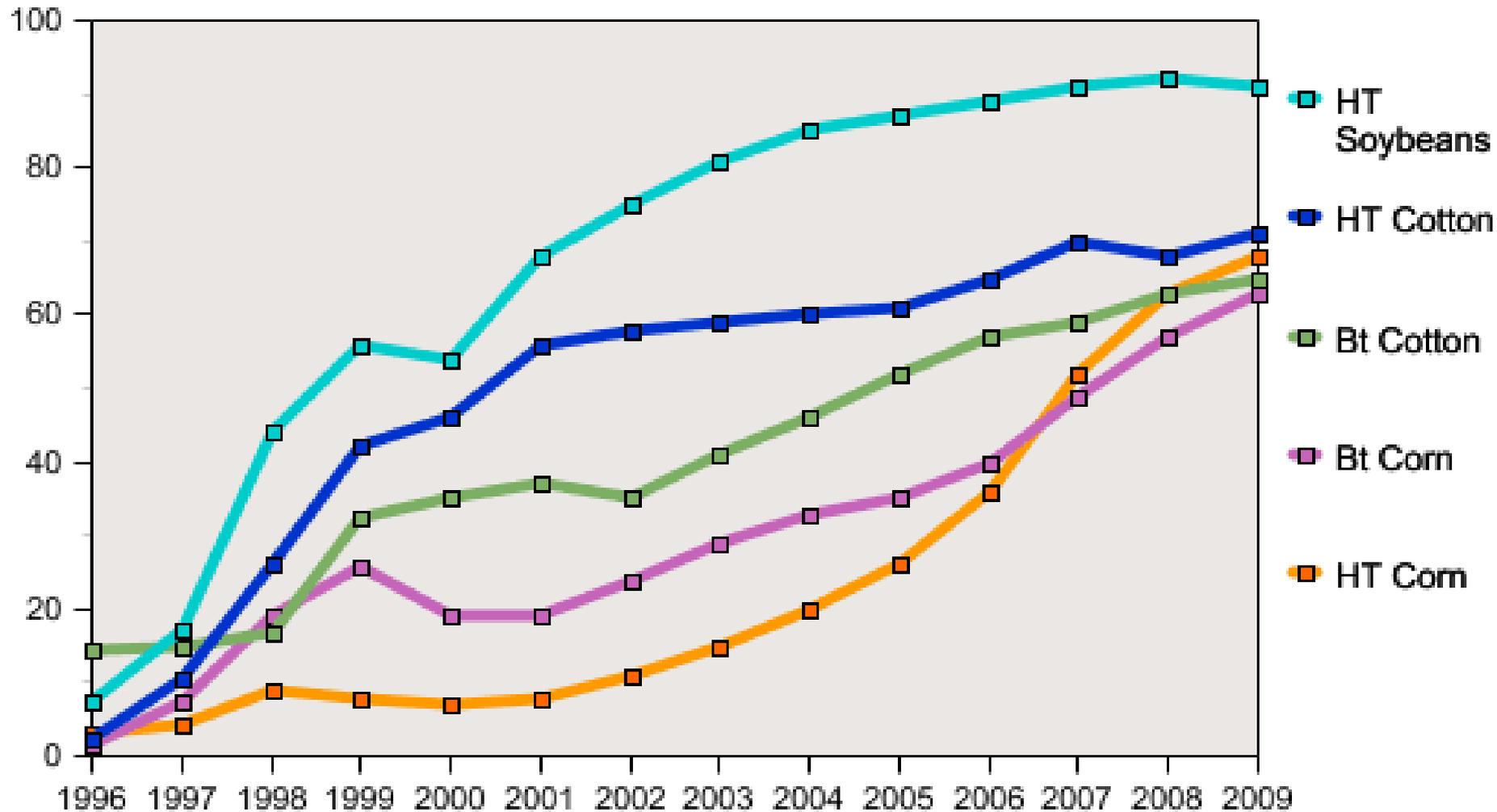
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History of RR Alfalfa

- ∞ Roundup Ready alfalfa deregulated in 2005
- ∞ Commercial field production initiated 2006
- ∞ Disputed and reversed deregulation in 2007 (re-regulated)
- ∞ No further plantings allowed after March 2007
- ∞ June 21, 2010 – U.S. Supreme Court rules in favor (7-1) of reversing lower court's ruling

Rapid growth in adoption of genetically engineered crops continues in the U.S.

Percent of acres



Source: USDA ERS

Alfalfa Seeding Rate

∞ University recommendations: 15-20 lbs/A

Why Do We Seed Alfalfa at High Rates?

- ∞ Make certain of acceptable stand
- ∞ Compete early with weeds
- ∞ Provide higher yields in seedling year
- ∞ Certified alfalfa seed – varies, can cost \$3/lb
- ∞ Roundup ready alfalfa seed - \$3/lb technology fee above the cost of seed

Multi-state Seeding Rate Project on RR Alfalfa

- ∞ Penn State Univ.
- ∞ Ohio State Univ.
- ∞ Univ. of Wisconsin
- ∞ South Dakota State Univ.
- ∞ Oklahoma State Univ.
- ∞ Utah State Univ.

Plots established in spring 2006

∞ Seeding rates

1. 8 lbs/A
2. 12 lbs/A
3. 16 lbs/A
4. 20 lbs/A

∞ Herbicides – applied at 3-5 leaf alfalfa

1. Roundup WeatherMax (glyphosate) @ 0.75 lb/A
2. “Local Standard” [UT – Raptor (imazamox) @ 5 oz/A]
3. Non-treated check



Data Collection

- ∞ Yields – 3 cuttings in 2006, 4 cuttings thereafter
- ∞ Visual evaluations at each cutting
- ∞ Plant counts at each cutting
- ∞ Weed separations where possible

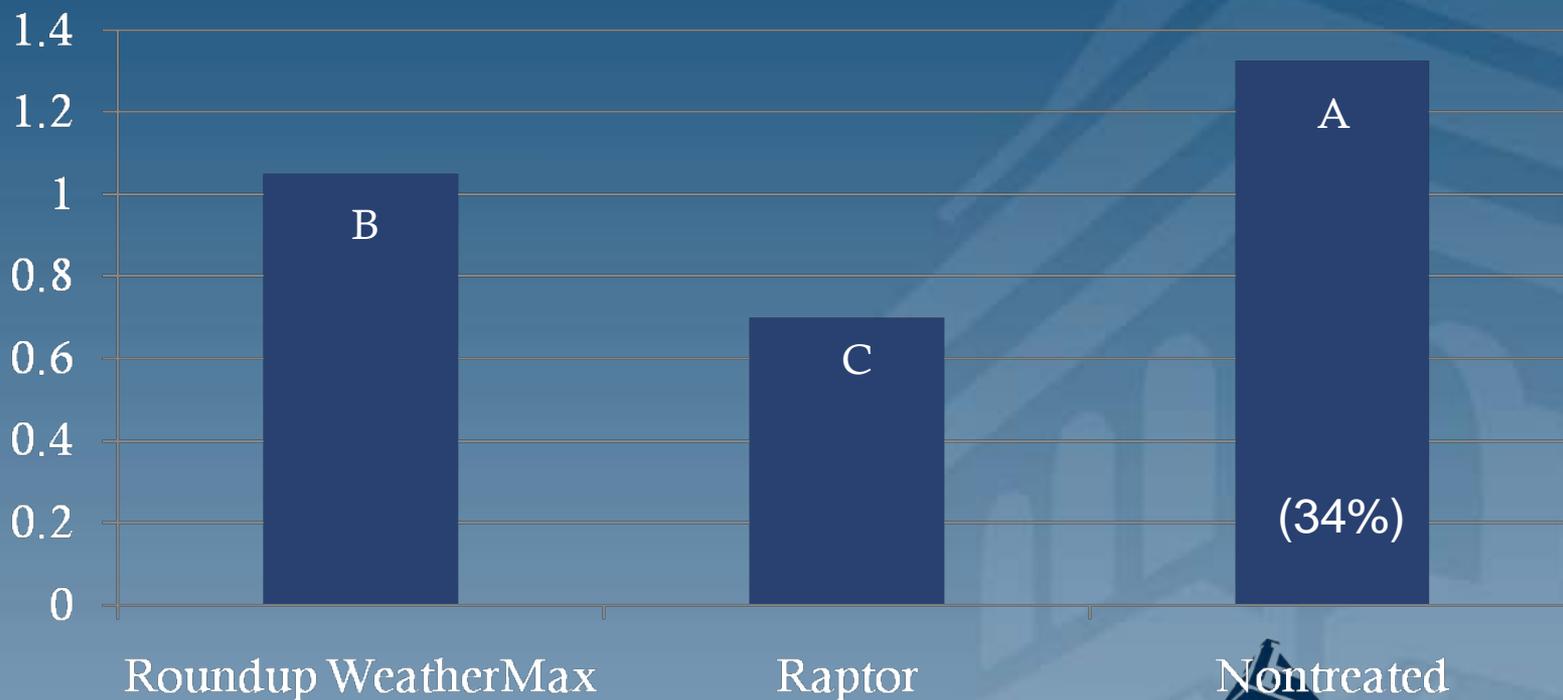
Weed Control and Alfalfa Injury (2006)

- ∞ Common lambsquarters, field bindweed (limited), prickly lettuce, green foxtail
- ∞ 100% control in herbicide treated plots; no effect due to seeding rate
- ∞ Alfalfa injury:
 - ∞ Roundup – none
 - ∞ Raptor – May 30 - 30% stunted, 10% chlorosis
 - ∞ June 6 – 60% stunted, 20-30% chlorosis
 - ∞ June 14 – 30% stunted, 10% chlorosis

Weed Control and Alfalfa Injury (2007-2009)

- ∞ All plots – near perfect weed control
- ∞ No visual injury to alfalfa

Seeding year (2006) 1st Cutting (tons/A)

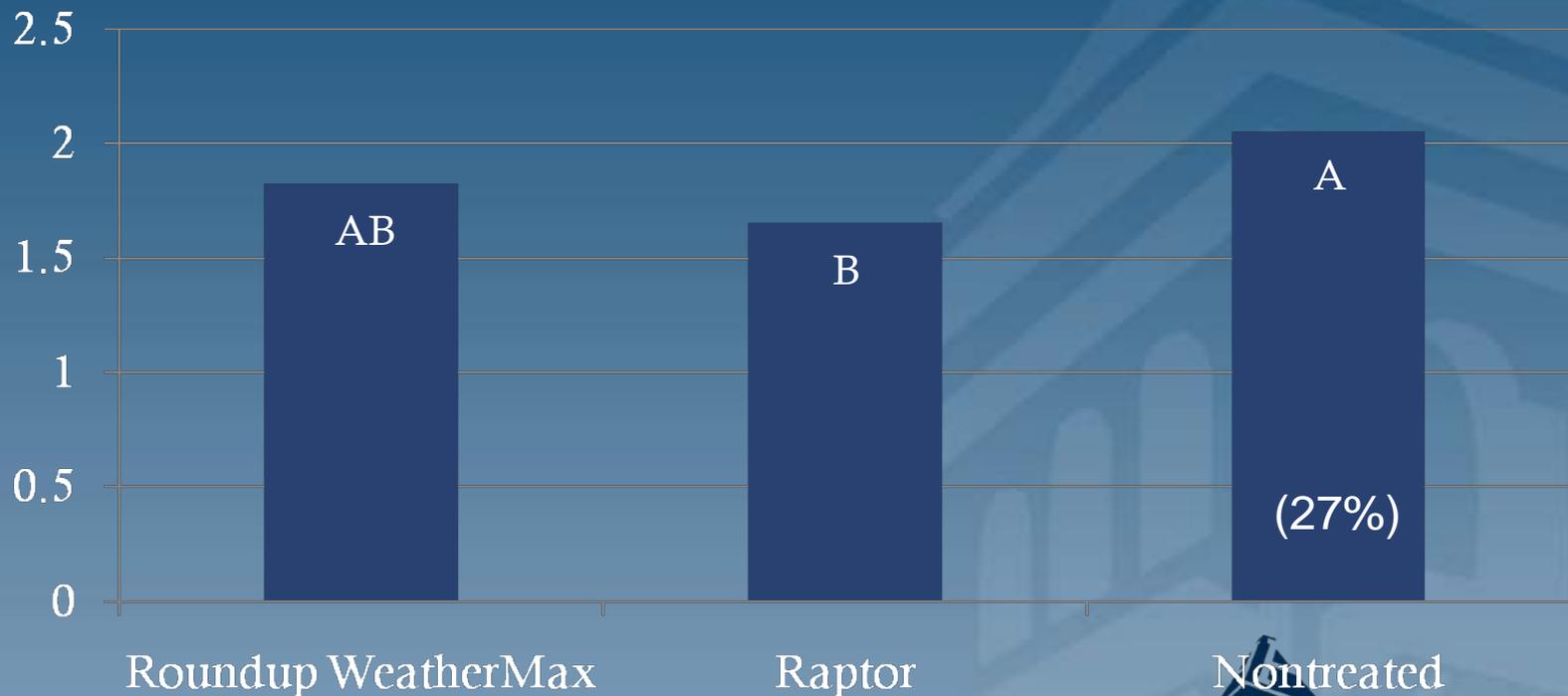


()=% of total weight that was weeds





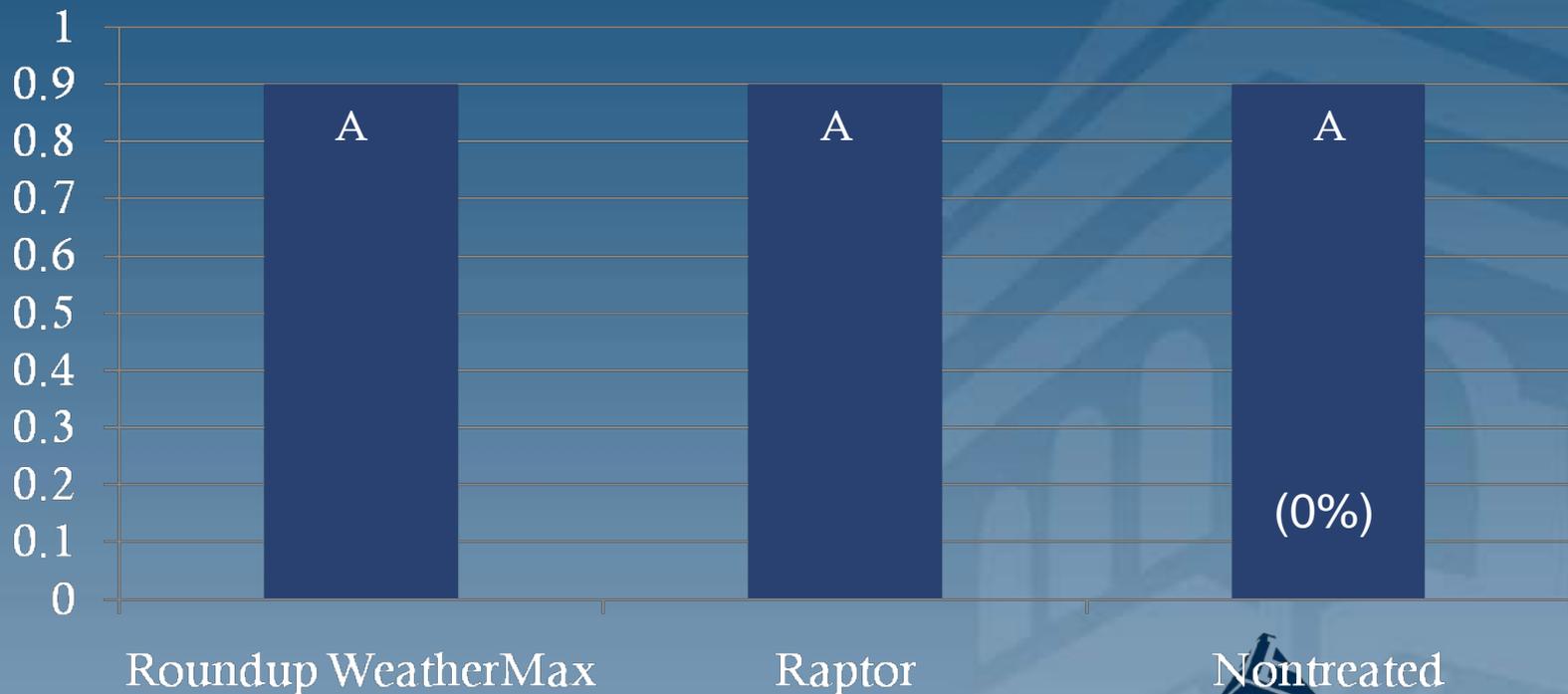
Seeding year (2006) 2nd Cutting (tons/A)



() = % of total weight that was weeds

Seeding year (2006)

3rd Cutting (tons/A)



()=% of total weight that was weeds

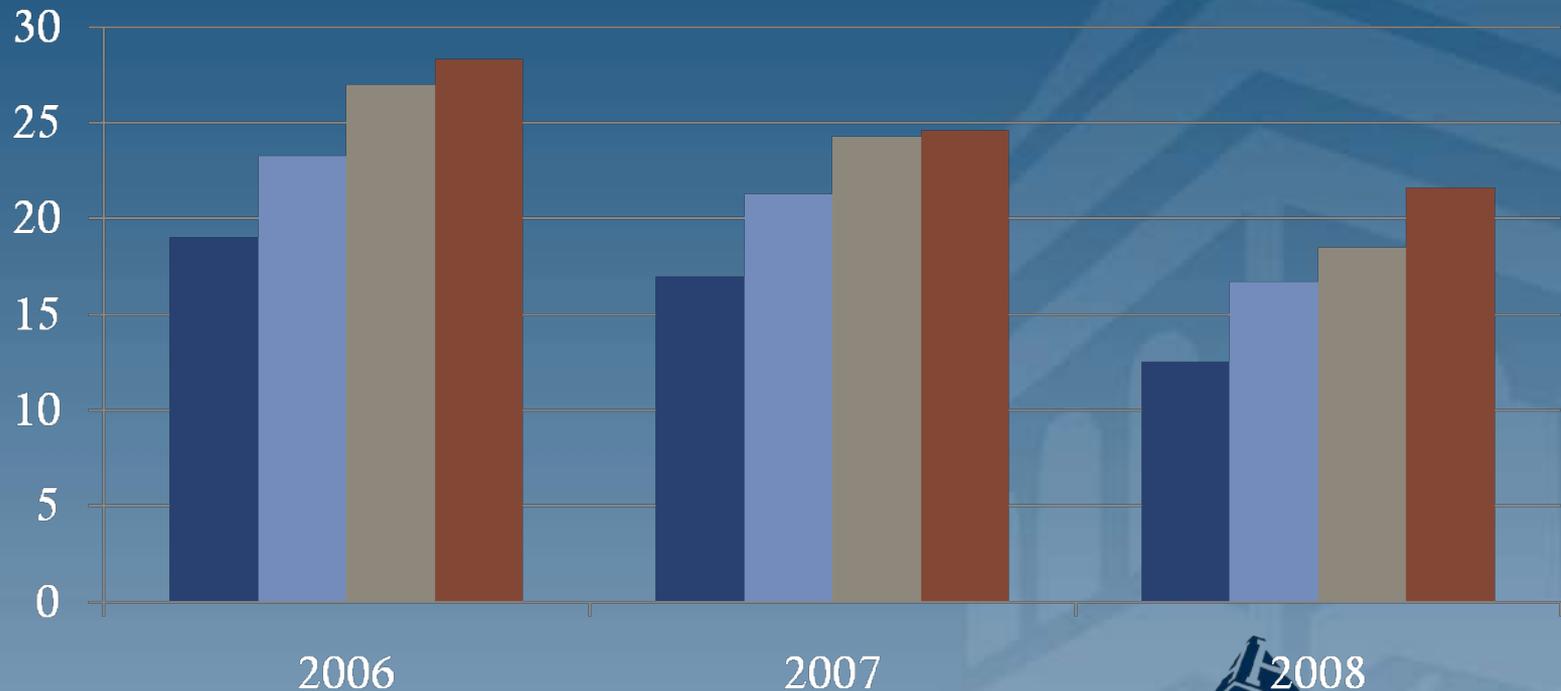
Alfalfa yield 2007-2009

∞ Seasonal yields were not statistically different





Alfalfa plants/sq ft



() = % of total weight that was weeds

Seeds planted per acre and per sq ft

Seeding rate	Seeds/A	Seeds/ft ²	% Establishment		
			2006	2007	2008
8 lb/A	1,800,000	41	46	41	29
12 lb/A	2,700,000	62	37	34	27
16 lb/A	3,600,000	83	33	29	22
20 lb/A	4,500,000	103	27	25	21

Summary

- ∞ Higher plant populations from higher seeding rates – NOT reflected in yield
 - ∞ Can probably seed at 8-12 lb/A
- ∞ Weed control did not improve establishment
- ∞ In seeding year, RR alfalfa had higher yields than conventional standard, no difference thereafter
- ∞ After seeding year, all plots were relatively weed free