

Is Giant Ragweed Becoming Resistant to Glyphosate?

(and won't we be having fun if it is!)

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Giant ragweed - characteristics

- Summer annual
- Adapted to tillage/no-tillage
- Plasticity in emergence
 - multiple herbicide treatments required
- Extremely competitive with crop
 - Shade avoidance and tolerance
- Rapid growth
 - problems with POST herbicide management
- Outcrosses = genetic variability
- Resistance to ALS inhibitors
- Tolerance/resistance to glyphosate

1



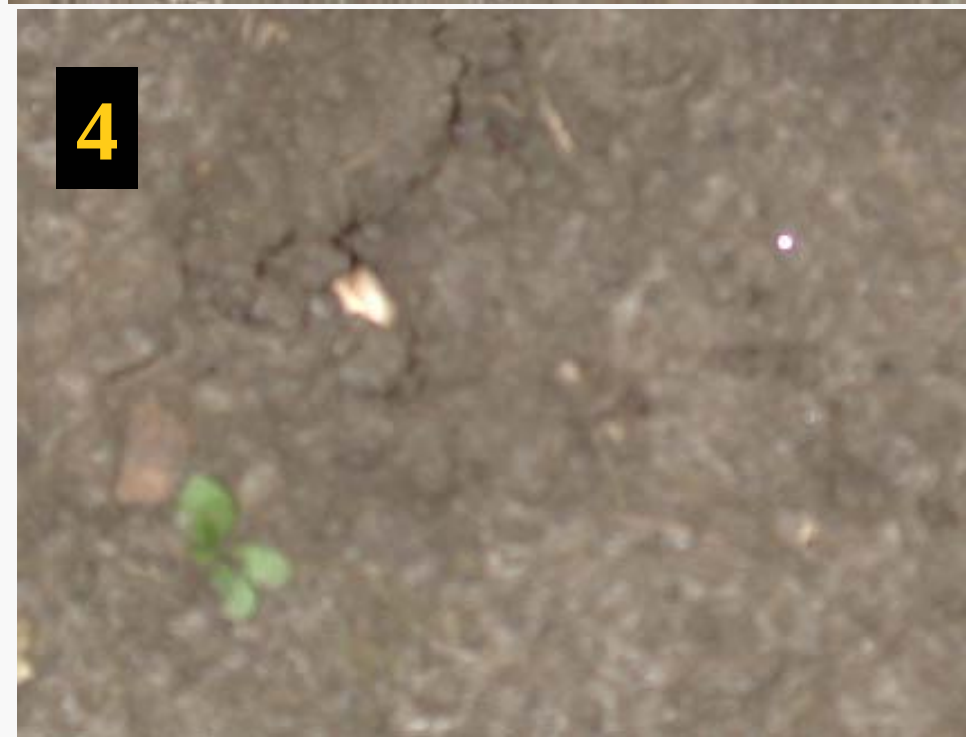
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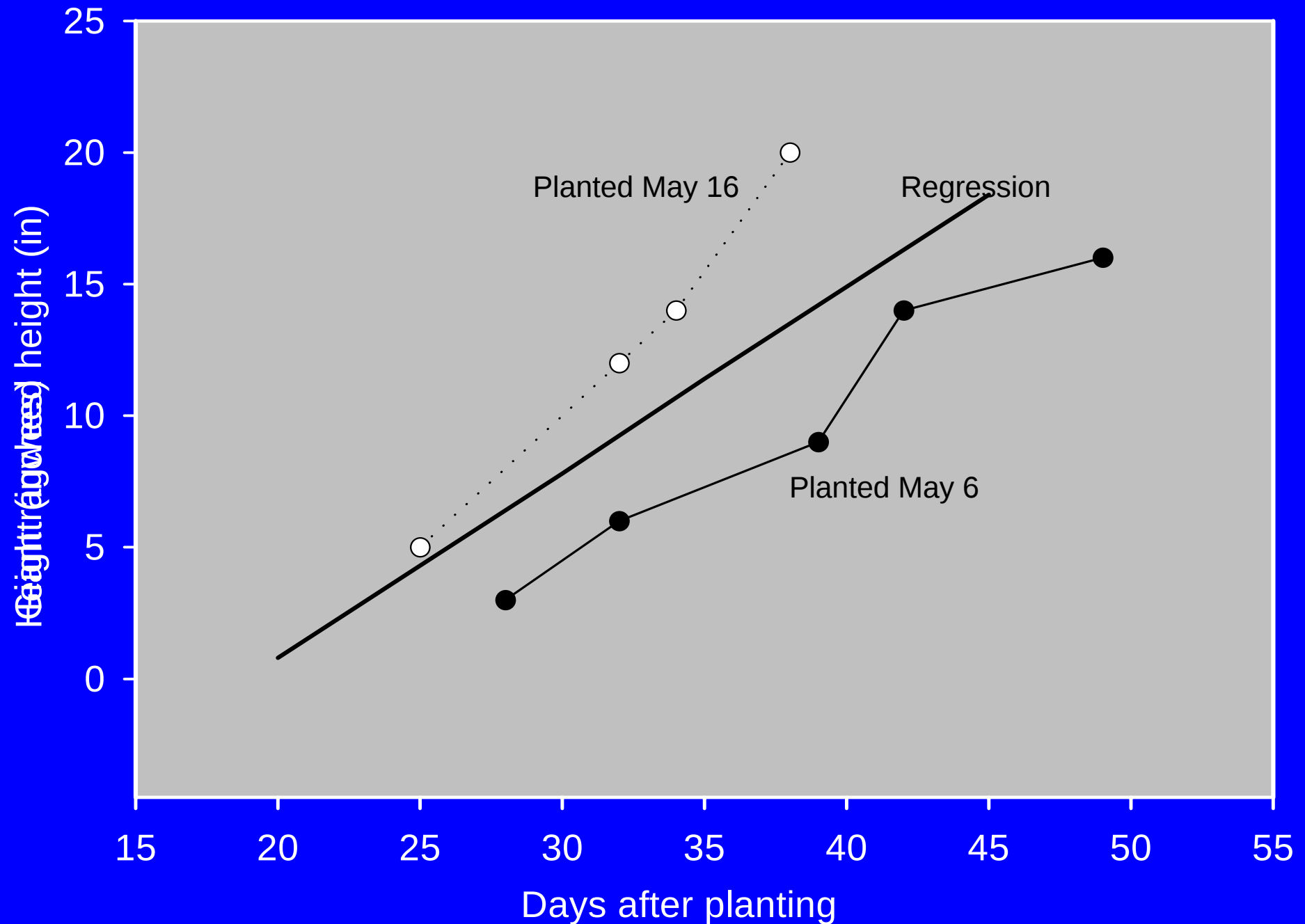
Giant ragweed interference in soybeans

- Webster et al, 1994
 - 1 plant/sq m
 - 45 to 77% yield loss
- Baysinger and Sims, 1991
 - 1 plant/sq m
 - 70% yield loss

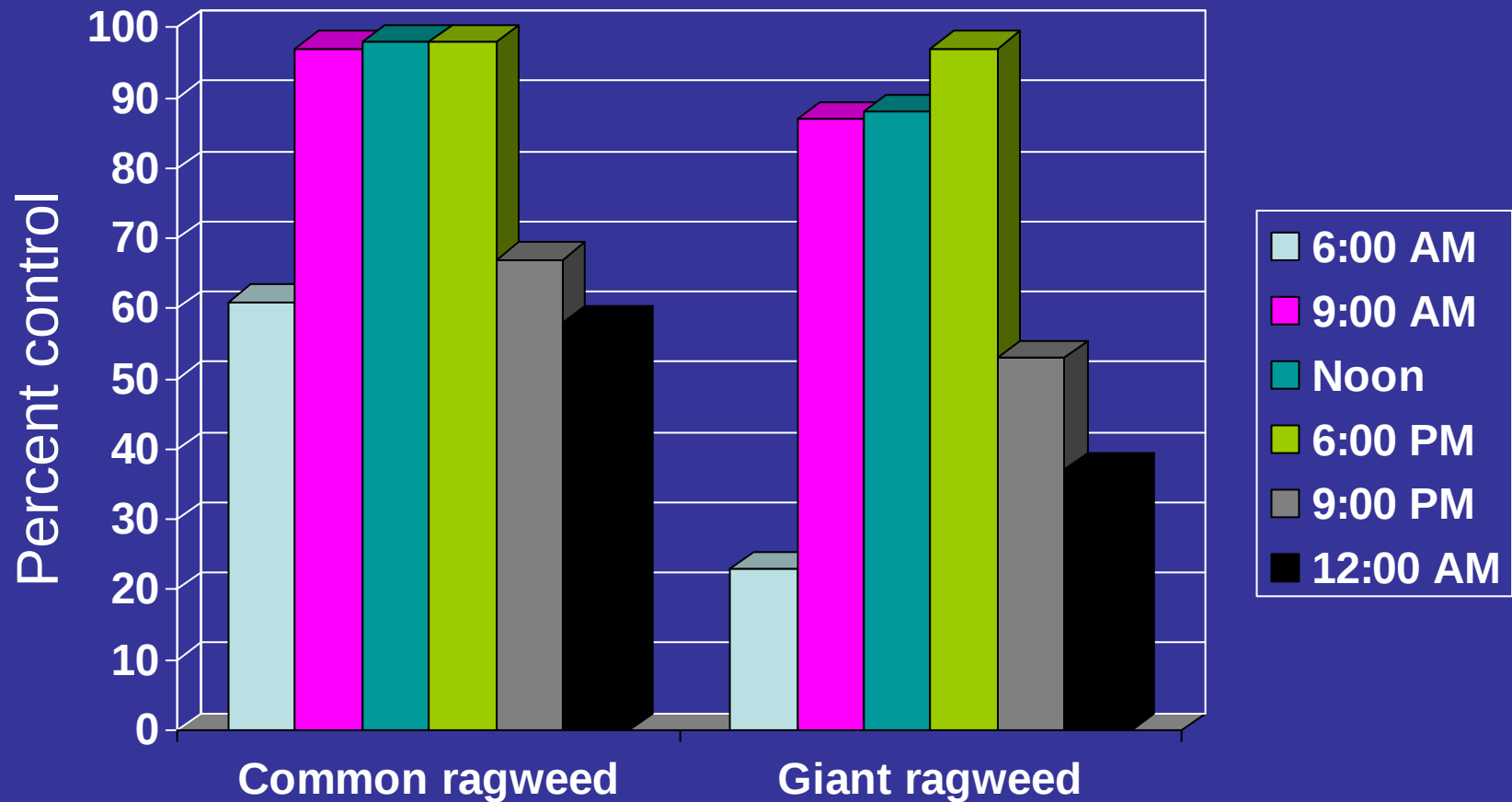


10% yield loss threshold in corn = 0.8 giant ragweed plants/10-m²

Rate of Giant Ragweed Growth in Corn

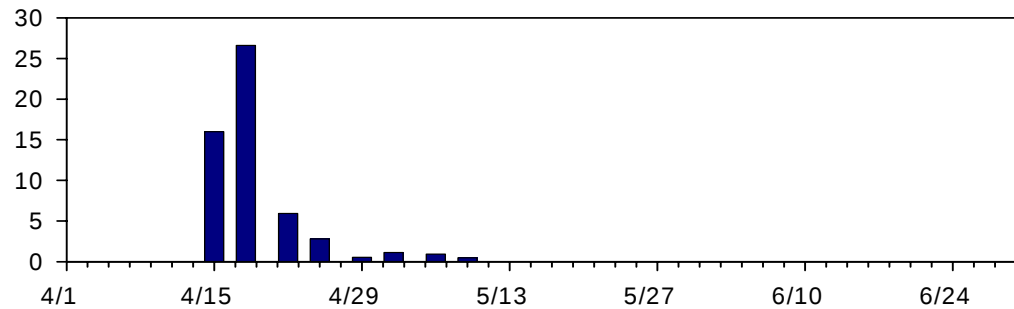


2001 POST – Western OH
6-inch weeds - Roundup UltraMax – 20 oz

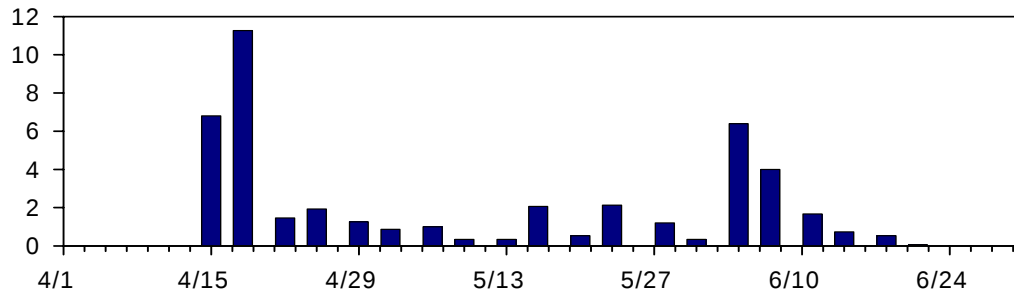


Emergence patterns

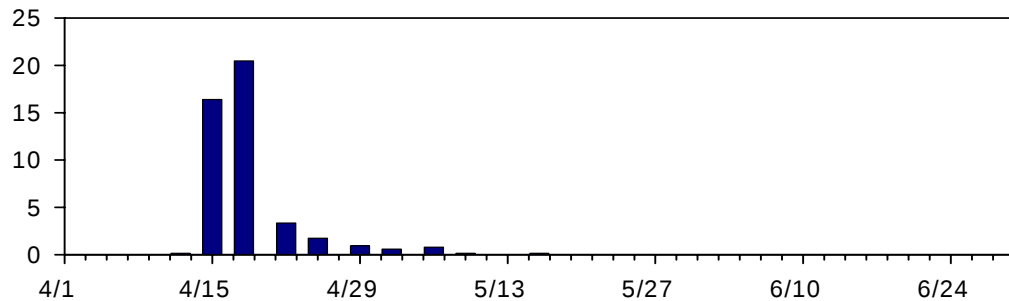
emerged seedlings



Iowa ag



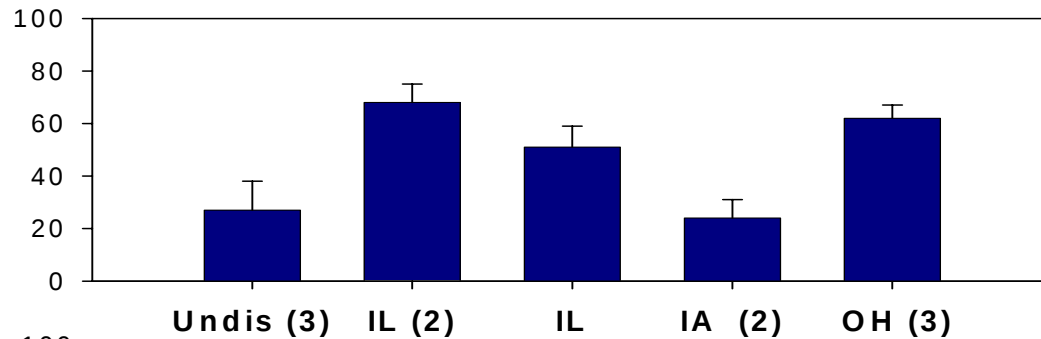
Ohio ag



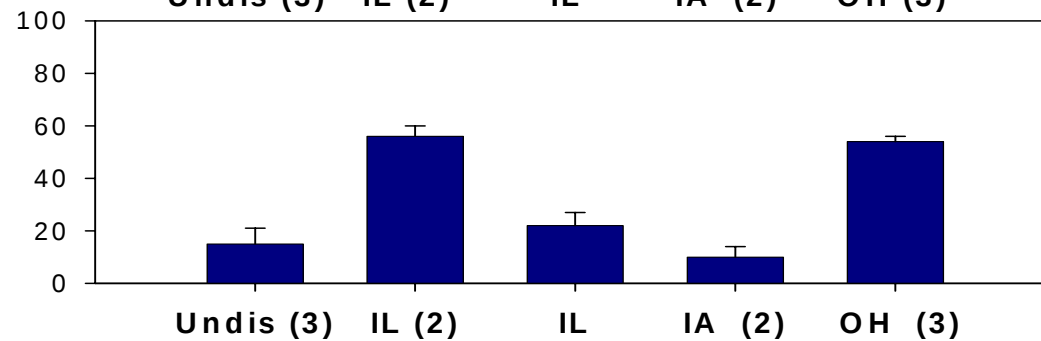
Iowa undis

Days to reach 95% emergence

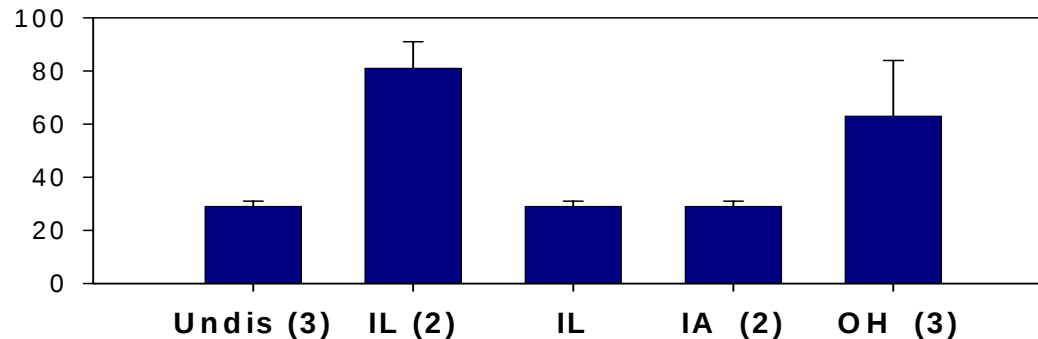
Days



Illinois

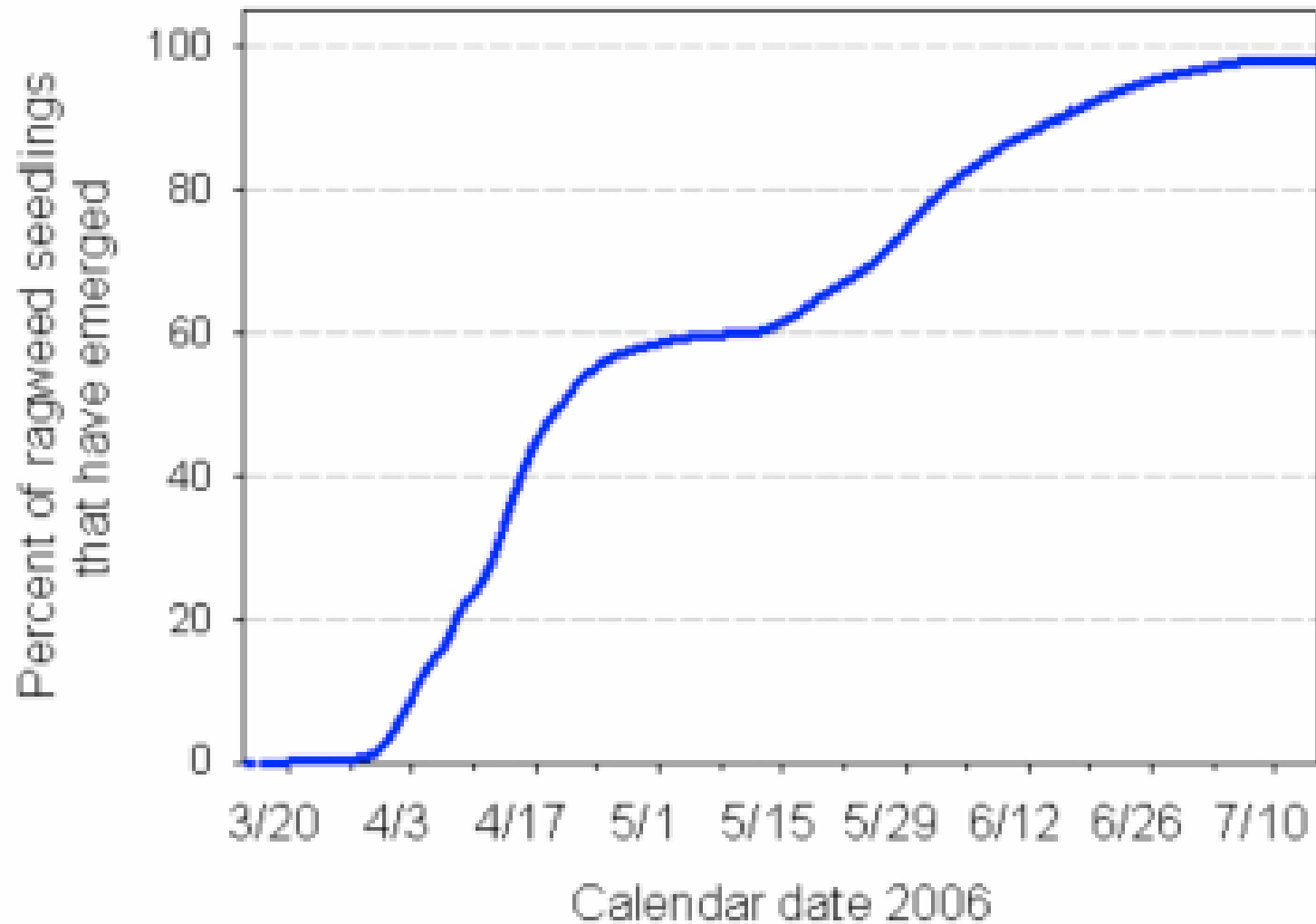


Iowa



Ohio

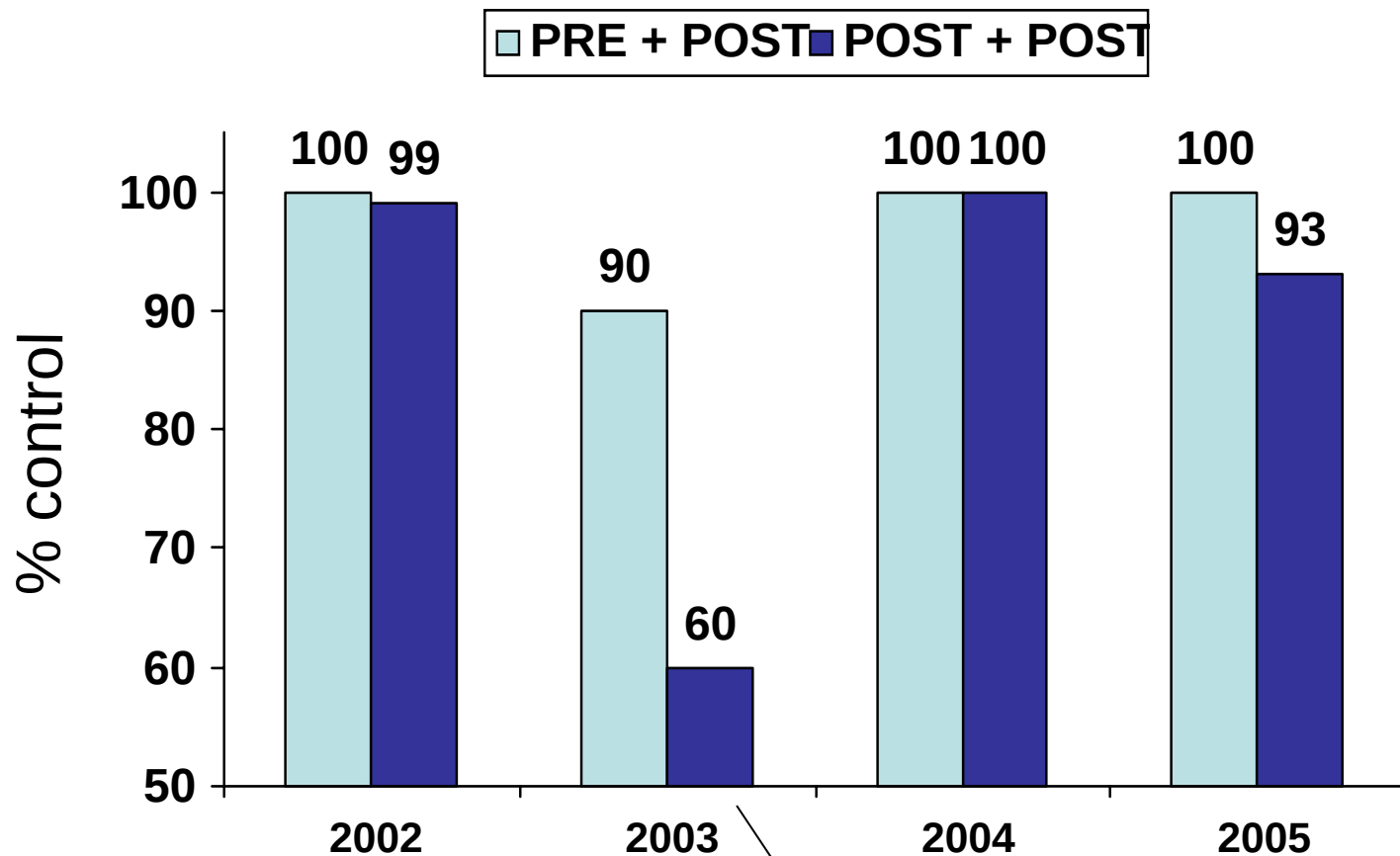
Giant ragweed emergence - 2006 - Western OH



Control of giant ragweed in Roundup Ready soybeans

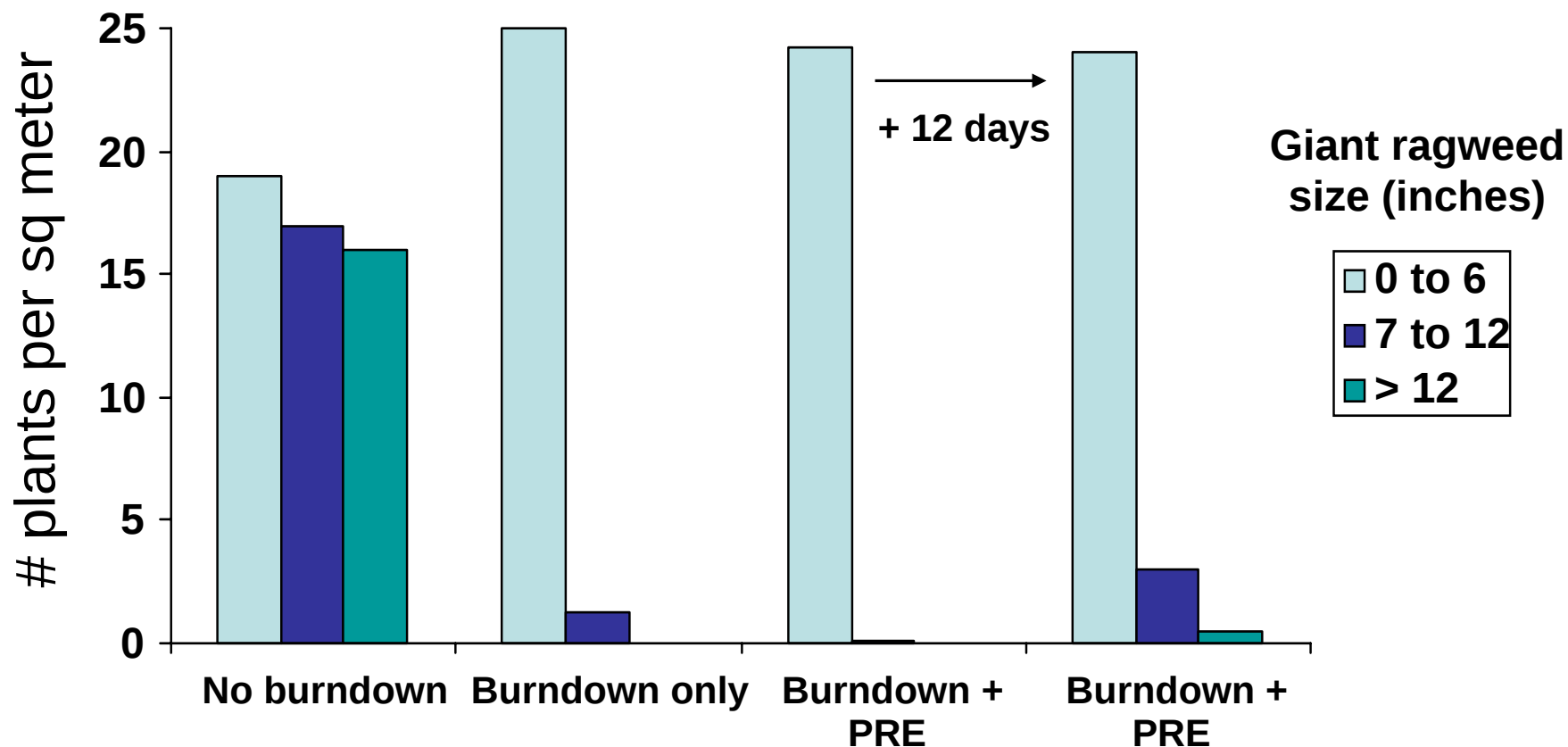
PRE = Canopy

POST = glyphosate - 0.75 lb ae/A



POST Glyphosate applied only once in 2003

Giant ragweed size distribution
Average of 4 glyphosate-resistant sites



OSU - PRE/POST corn - 2006

Weed control - late July

Grag Velv LBQ

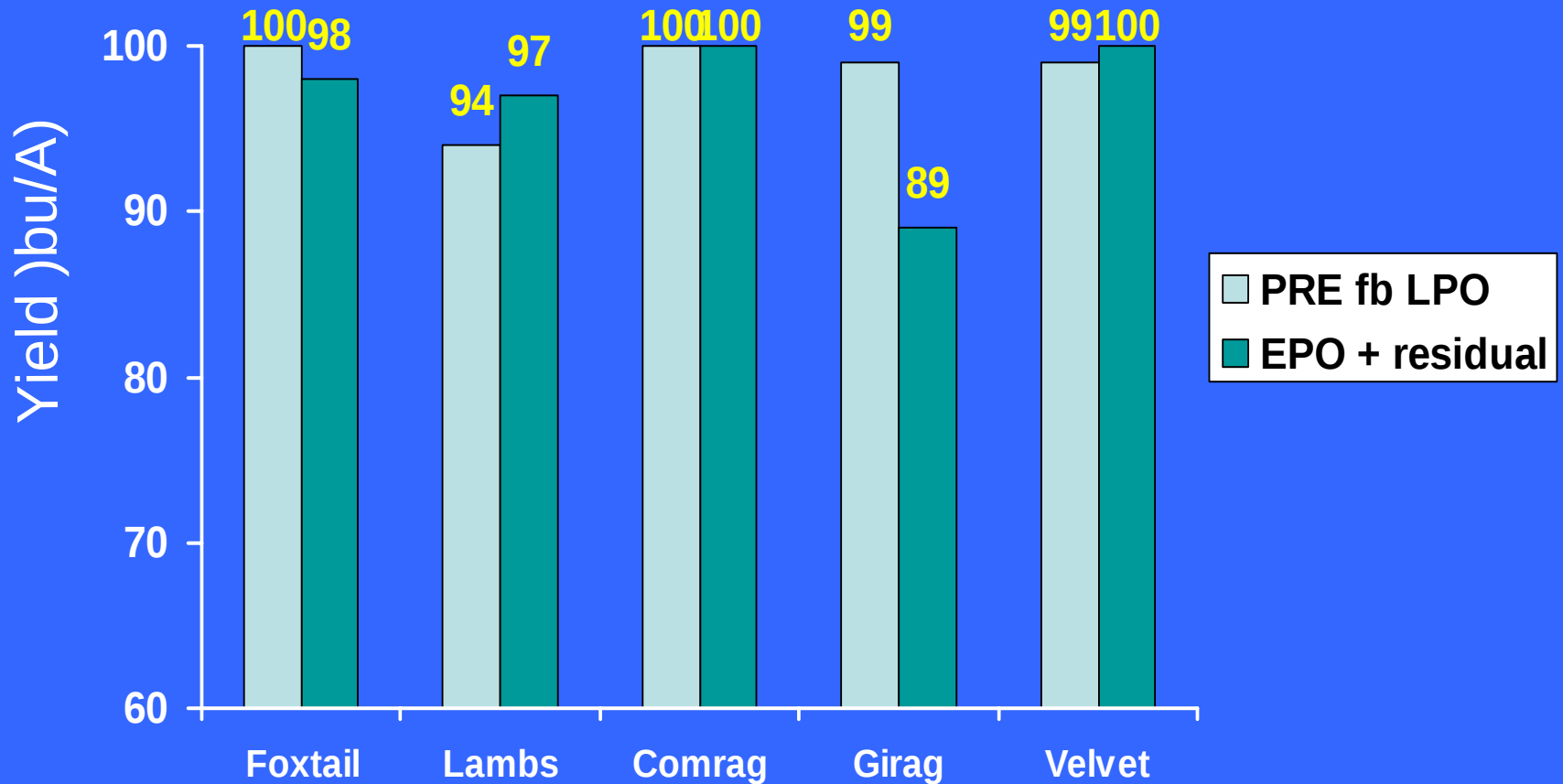
PRE

Lexar	65	98	96
Keystone+Hornet	74	100	100
Harness Xtra+Balance	78	100	100

PRE fb POST

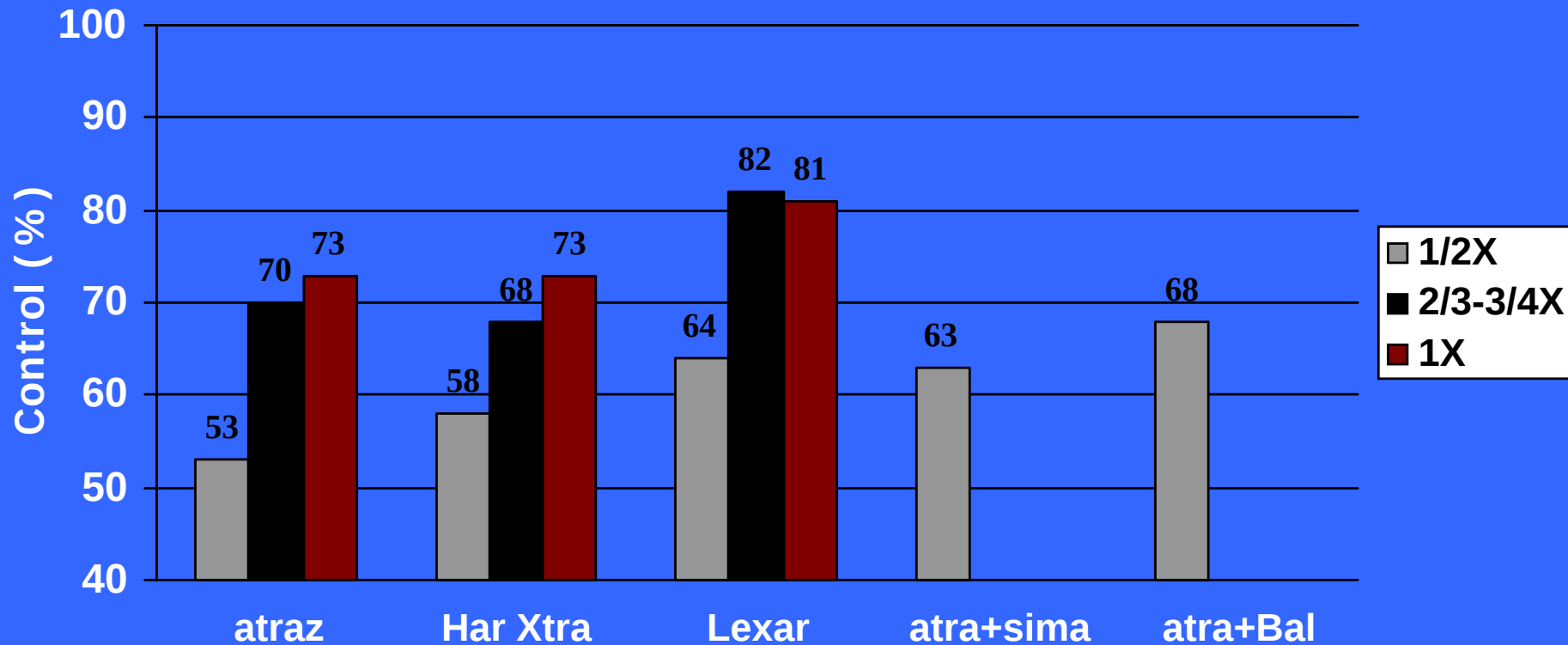
Dual II fb Distinct	90	100	100
Dual II fb Callisto/atrazine	90	100	100

OSU - 2006 - RR corn weed control
PRE fb LPO vs EPO + residual
Stalwart Xtra - 0.75X rate



Giant Ragweed - OSU - 2006

Control from PRE herbicides at V6



Evaluations taken at time of late POST timing (V6)

Ohio Counties with ALS-Resistant Ragweed

common ragweed (20)

Auglaize (4 of 6)
Brown (2 of 2)
Clark (1 of 1)
Crawford (1 of 1)
Darke (11 of 14)
Defiance (16 of 23)
Fulton (3 of 4)
Greene (2 of 2)
Hancock (3 of 3)
Henry (1 of 1)
Madison (1 of 1)
Marion (2 of 5)

Mercer (4 of 5)
Morrow (1 of 1)
Paulding (10 of 20)
Putnam (8 of 8)
Sandusky (1 of 2)
Union (1 of 1)
Van Wert (2 of 2)
Wood (1 of 1)

- 64% of 86 pop. (Resis.)
- 16% of 86 pop. (Susc.)
- 2000 = 82% of 17 pop. (Resis.)

giant ragweed (11)

Auglaize (1)
Clinton (1)
Crawford (2)
Delaware (2)
Greene (1)
Hancock (2)
Madison (6 of 7)
Seneca (2)
Pickaway (1)
Union (2)
Wyandot (3)

- 22% of 60 pop. (Resis.)
- 45% of 60 pop. (Susc.)
- 2000 = 64% of 14 pop. (R)

2005 - Butler Co., OH

10 years continuous no-tillage glyphosate-resistant soybeans

Glyphosate used exclusively, except 2,4-D in preplant app last two seasons



2006 End of season weed survey
9 Ohio counties - 959 soybean fields

Weed Species	Total	Few Plants	Few Patches	Many Plants
	% of Fields			
Giant ragweed	42	24	8	10
Marestail/horseweed	19	12	3	4
Common lambsquarters	15	8	2	5
Common ragweed	9	5	1	3
Giant foxtail	9	5	3	1
Velvetleaf	8	6	0.3	1
Pigweed	4	3	1	0.3
Volunteer corn	3	3	0.5	0.1
Pokeweed	2	2	0.2	0.1



Results – Greenhouse Study

Untreated

glyph. 0.75 lb

glyph. 3.0 lb



Lic 01 O

S2 - Dar



Sensitive

0.75 lb – 21 DAT

Noble Co, IN

glyphosate (2.25 lb ae/A)
photo taken 42 DAT

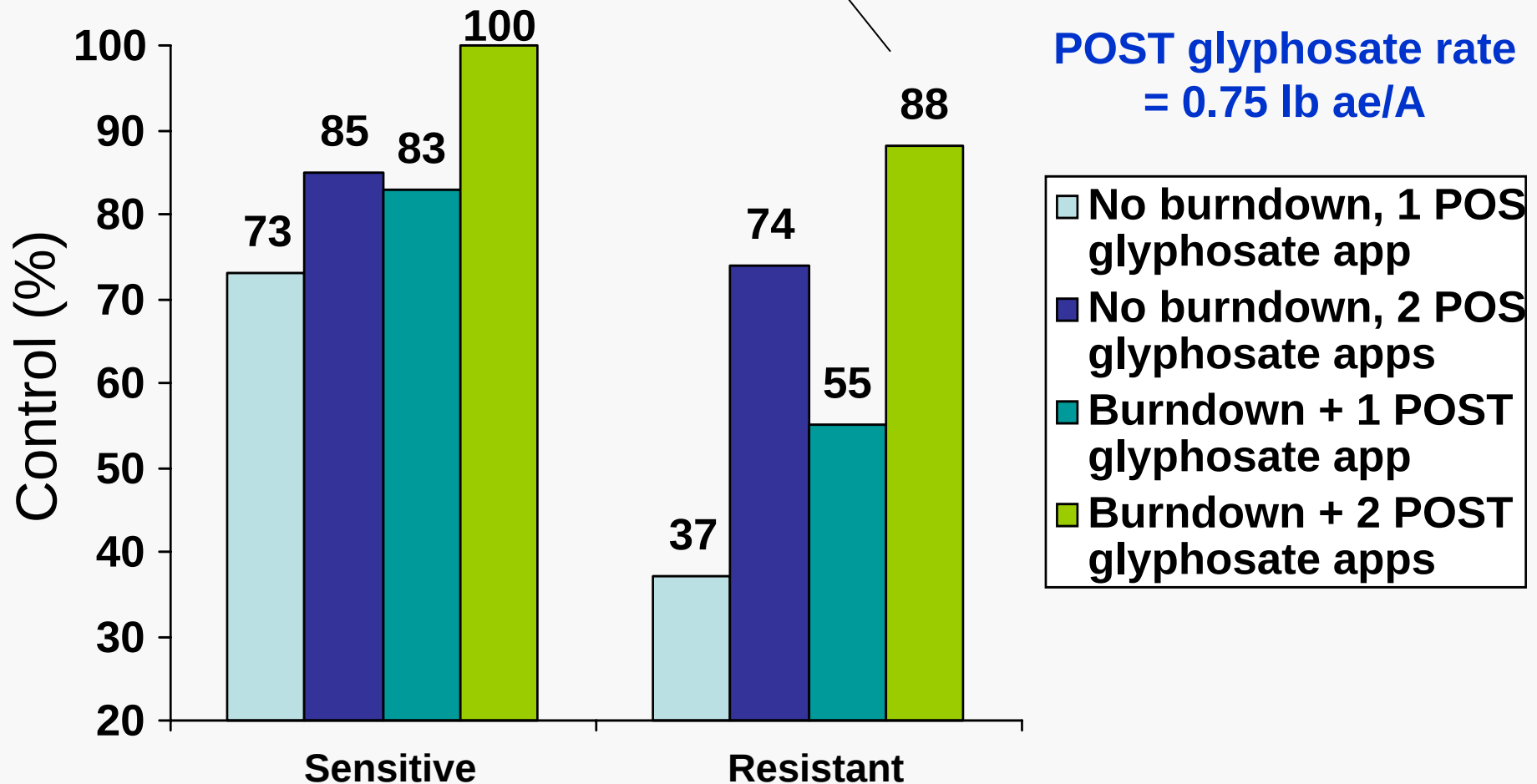


Sample: Noble Co., IN

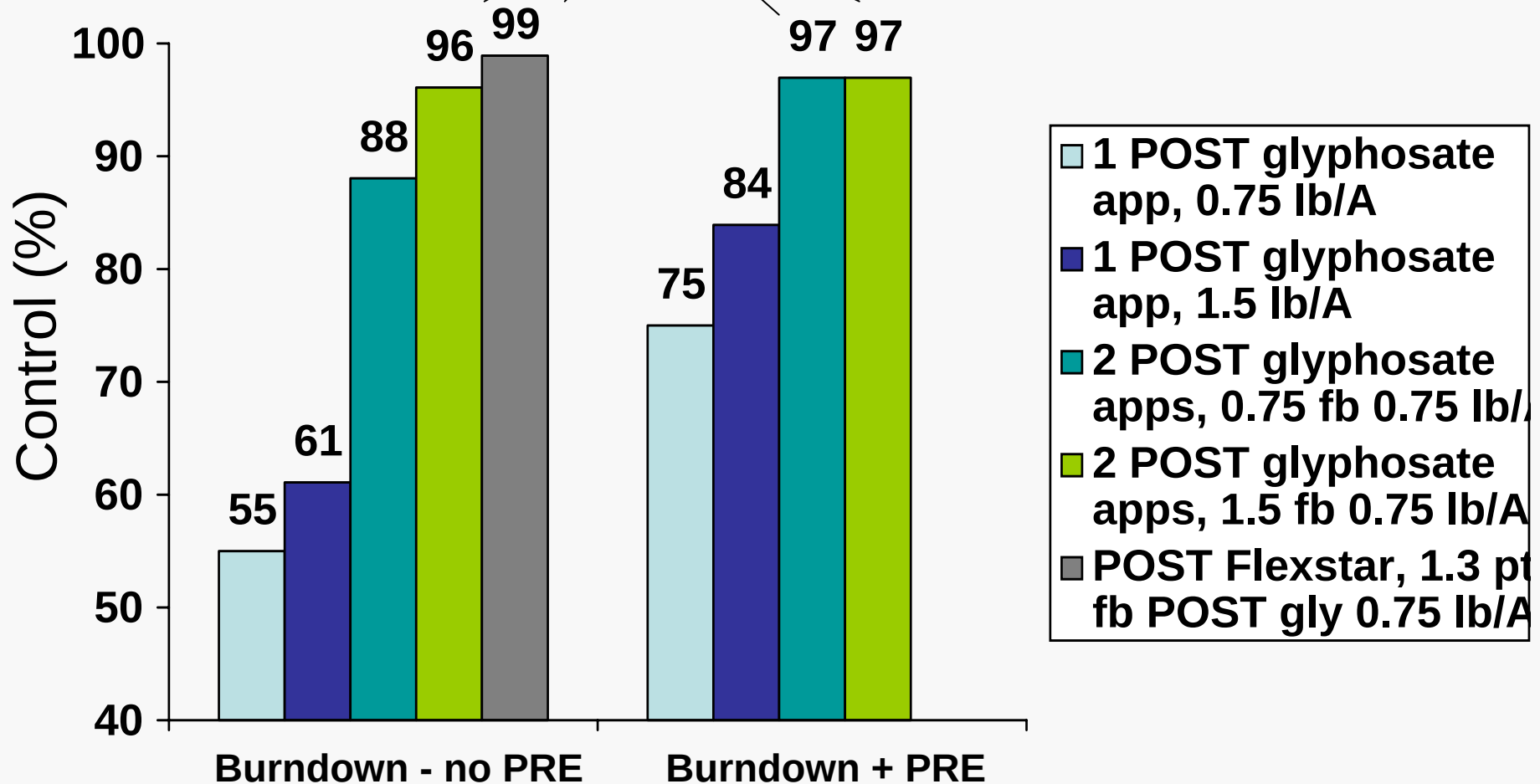


Sample: Butler Co., OH

Glyphosate-sensitive giant ragweed plants completely controlled, but glyphosate-resistant plants not adequately controlled

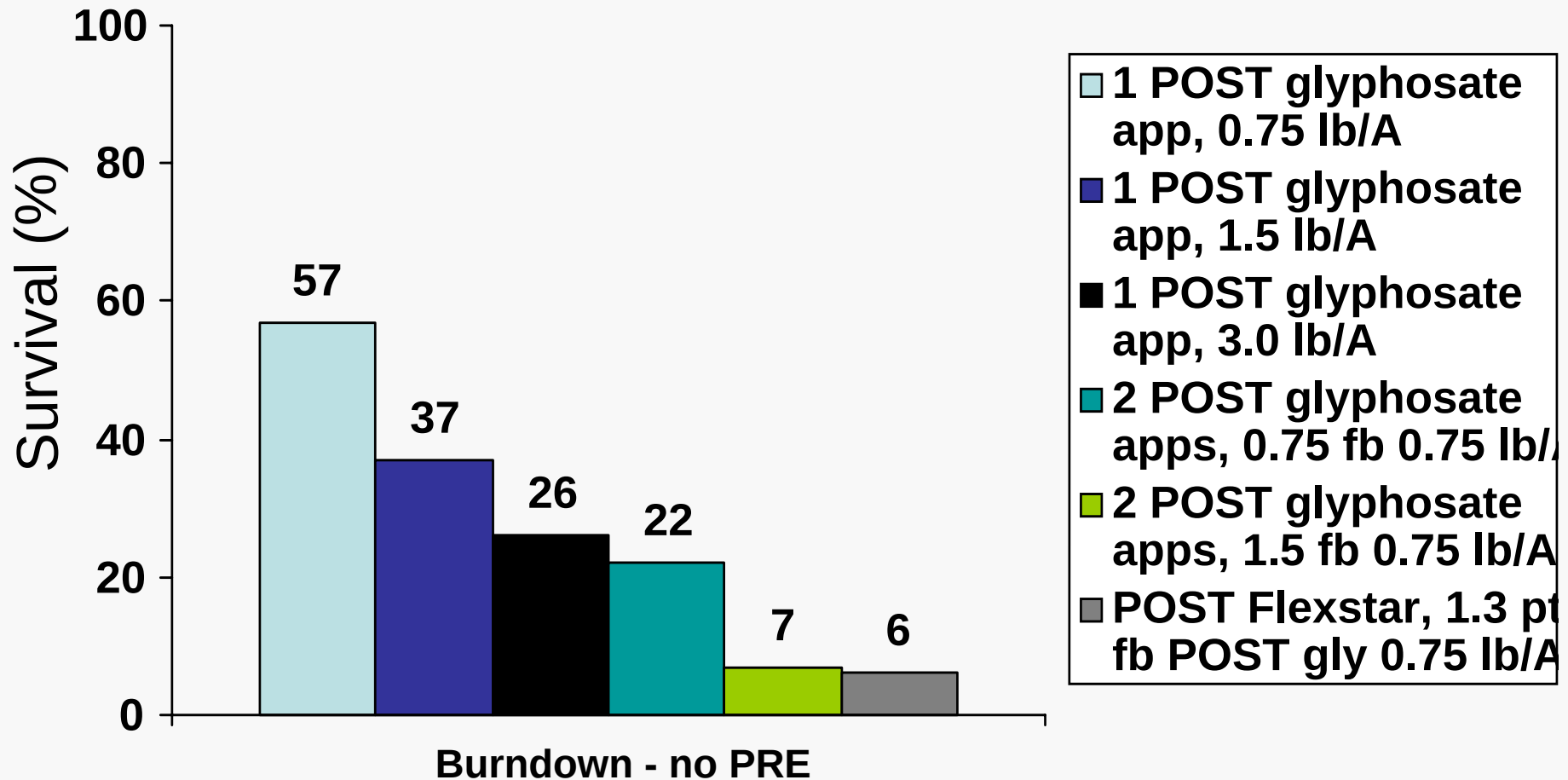


ADEQUATE control of glyphosate-resistant giant ragweed from these 4 treatments



Glyphosate-resistant sites

Survival of Flagged Plants (%)





Burndown fb EPO
Glyphosate @ 3.0 lb/A



Burndown fb EPO fb LPO
Glyphosate @ 1.5 fb 0.75 lb/A

Solutions for giant ragweed

What to do prior to planting

- Weed-free start at planting
 - Tillage
 - Preplant burndown - 2,4-D + paraquat or glyphosate
 - Even where fall herbicide treatment used
- Use residual herbicides
 - Scepter
 - Canopy EX/DF, Synchrony
 - FirstRate
 - Gangster (FirstRate + Valor)
 - Sonic, Authority First (FirstRate + Spartan)

Solutions for giant ragweed

Managing POST glyphosate applications

First POST application

- 6 to 10 inch ragweed plants
- Glyphosate - 1.5 lbs ae/A

OR

- Flexstar (1.3 pts/A) + POST grass herbicide

OR

- Cobra/Phoenix (12.5 oz/A) + POST grass herbicide

OR

- FirstRate (0.3 oz/A) + POST grass herbicide
(not on ALS-resistant populations)

Solutions for giant ragweed

Managing POST glyphosate applications

Second POST application

- Must do in any field with history of problems
- Apply 3 to 4 weeks after 1st POST app
 - Do not wait until plants regrow above soybeans
- Glyphosate - 0.75 lbs ae/A

Management of Giant Ragweed in Roundup Ready Soybean Fields with a History of Poor Control

Giant ragweed biology and herbicide resistance

- Giant ragweed is one of the most problematic weeds in the eastern corn belt, and is increasing as a problem westward into Iowa and Minnesota. It can germinate from late March through July. It is one of the first summer annuals to emerge in the spring and is often present before crops are planted.
- Corn and soybean yield losses as high as 30 to 50% can occur with season-long interference.
- ALS-resistant biotypes were becoming widespread in Ohio and Indiana in the late 1990's, and are still a problem in many non-GMO soybean fields.
- Giant ragweed biotypes with a low level of resistance to glyphosate have been identified in Ohio and Indiana. These biotypes have initially developed in continuous Roundup Ready soybean fields in response to repeated use of glyphosate exclusively. This resistance appears to be the cause of poor control in some fields.



Top - giant ragweed control failure in RR soybeans.

Bottom - glyphosate-resistant giant ragweed.



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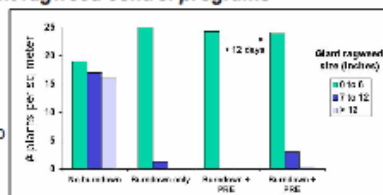
Bill Johnson
Glenn Nice
Purdue Extension Weed Science
www.bfnj.purdue.edu/weedscience

For Free Herbicide Labels Go to
www.cdms.net
or
www.greenbook.net

Information listed here is based on research and outreach Extension programming at Purdue University, Ohio State University, and elsewhere. The use of trade names is for clarity to readers of this publication and does not imply endorsement of a particular brand nor does exclusion imply non-approval. Always consult herbicide labels for the most current and up-to-date precautions and restrictions. Copies, reproductions, or transcriptions of this document or its information must bear the statement "Produced and prepared by Purdue University or Ohio State University Extension Weed Science" unless approval is given by the author.

The value of PRE herbicides in giant ragweed control programs

- PRE herbicides can reduce the giant ragweed population and slow the growth of emerging plants, which creates a wider window of time of POST application and increases POST herbicide effectiveness. Glyphosate is more effective on small plants. PRE herbicides also reduce yield loss from early-season weed interference.
- In chart at right, use of a PRE herbicide resulted in the following at time of POST glyphosate application:
 - without a burndown, 63% of giant ragweed plants were more than 6 inches tall, and 31% were more than 12 inches tall.
 - with burndown only (no PRE), 95% of the plants were less than 6 inches tall.
 - with burndown + PRE, 99% of the plants were less than 6 inches tall. After another 12 days, 87% of the plants were still less than 6 inches tall.



Results shown are the average of data from 4 glyphosate-resistant sites in OH and IN. Burndown = glyphosate + 2,4-D ester; PRE = Gangster.

2007 Weed Control Guide

for Ohio and Indiana



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OSU Weed Science Website

agcrops.osu.edu/weeds

Weed Control Guide for OH / IN

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