

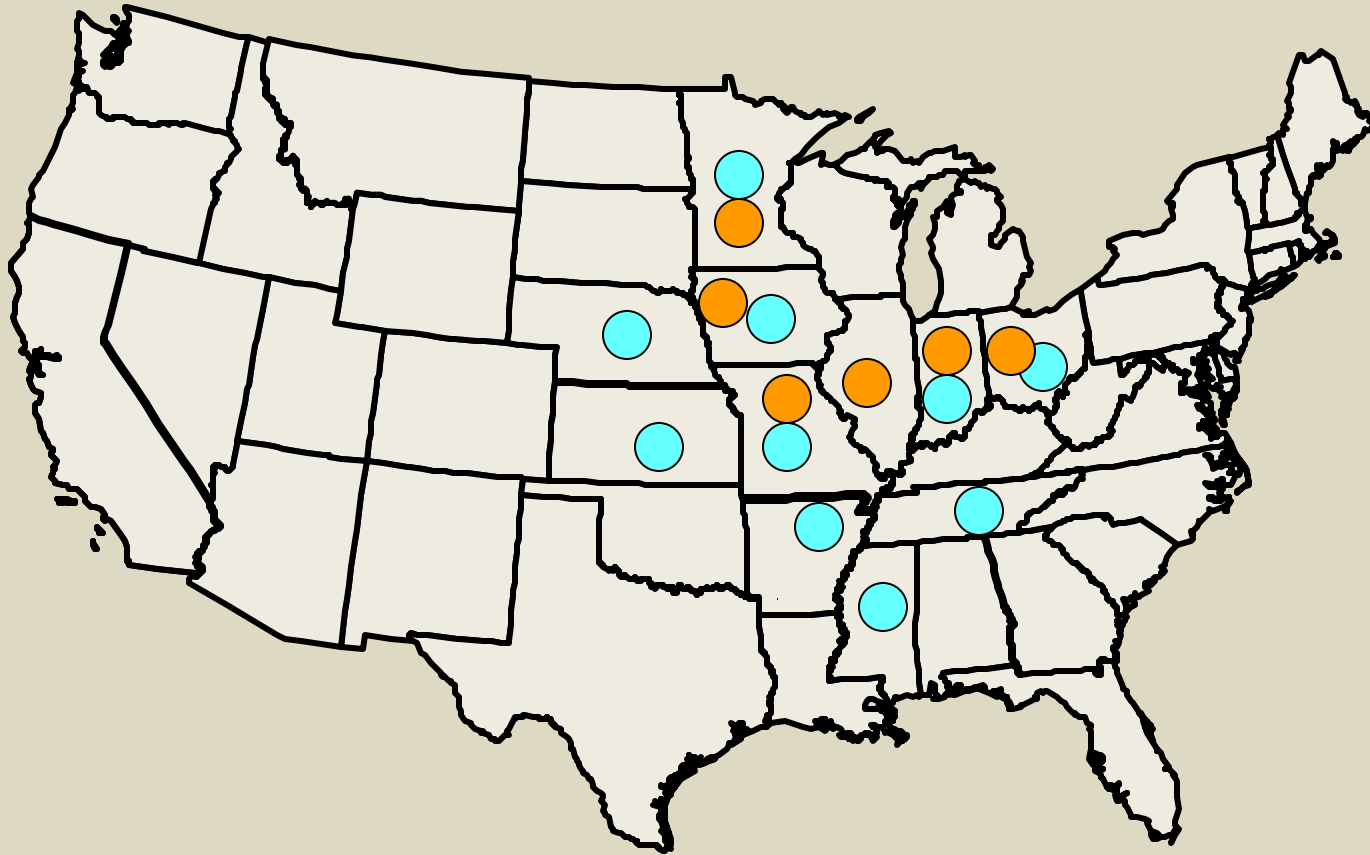
# Evaluation of Glyphosate-Resistant Giant Ragweed (*Ambrosia trifida*) Management in Soybeans



Eric Riley\*, Doug Spaunhorst, Brett Craigmyle, Travis Legleiter, Jim Wait, and Kevin Bradley





# Herbicide Resistance in Giant Ragweed



-  Glyphosate-resistance
-  ALS-resistance



# Materials and Methods

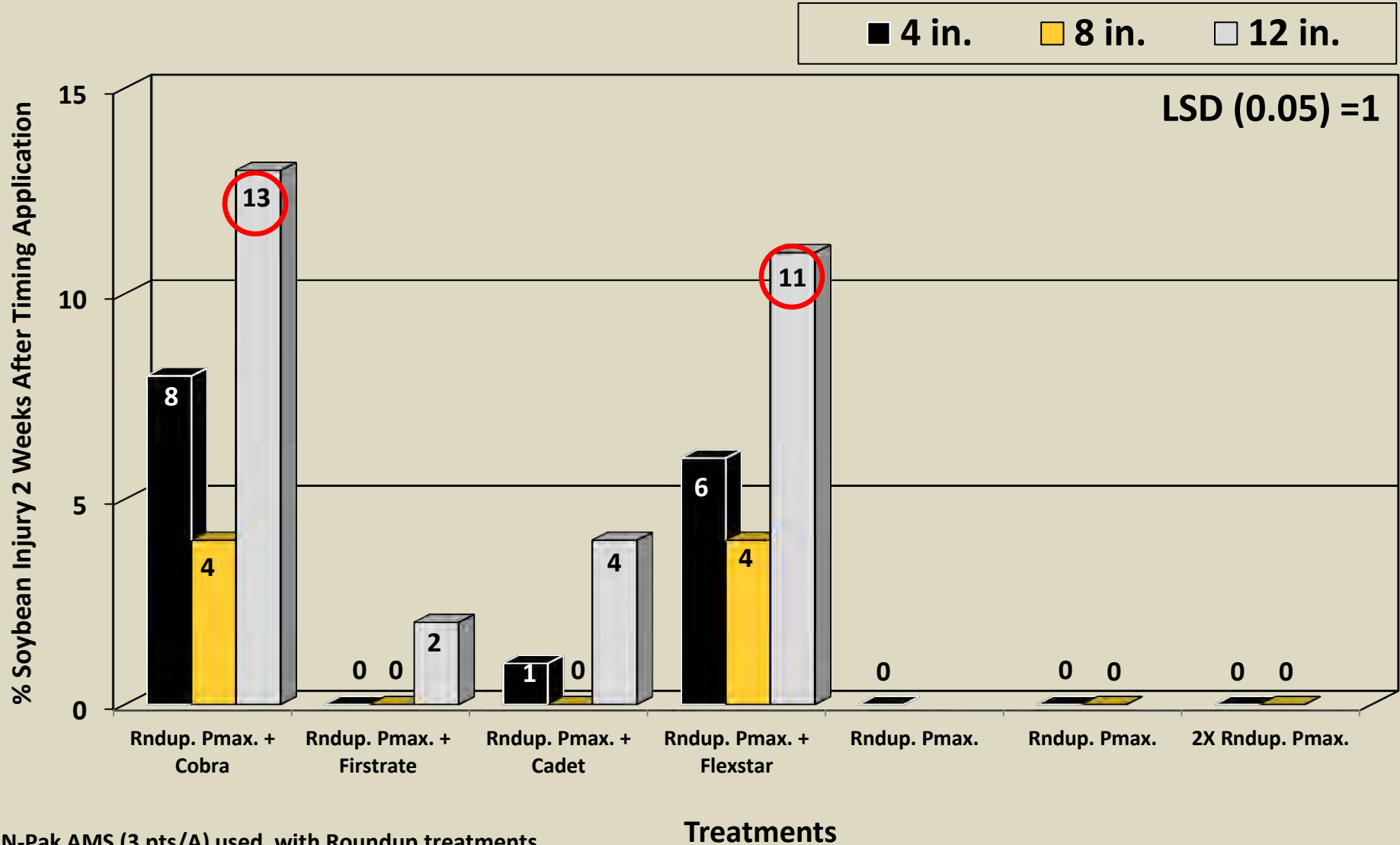
## Treatments

Herbicide Treatment	Rate (product/A)	Application Timing
Rndup PowerMax + Cobra fb Rndup PowerMax	22 fl ozs + 12.5 fl ozs 22 fl ozs	4-,8-,12-in. 4-in. Regrowth
Rndup PowerMax + Firstrate fb Rndup PowerMax	22 fl ozs + 0.3 oz 22 fl ozs	4-,8-,12-in. 4-in. Regrowth
Rndup PowerMax + Cadet fb Rndup PowerMax	22 fl ozs + 0.9 fl oz 22 fl ozs	4-,8-,12-in. 4-in. Regrowth
Rndup PowerMax + Flexstar fb Rndup PowerMax	22 fl ozs + 1.3 pts 22 fl ozs	4-,8-,12-in. 4-in. Regrowth
Rndup PowerMax fb Rndup PowerMax	22 fl ozs 22 fl ozs	4-,8-in. 4-in. Regrowth
Rndup PowerMax fb Rndup PowerMax	44 fl ozs 22 fl ozs	4-,8-in. 4-in. Regrowth
Rndup PowerMax fb Rndup PowerMax + Flexstar	22 fl ozs 22 fl ozs + 1.3 pts	4-in. 4-in. Regrowth





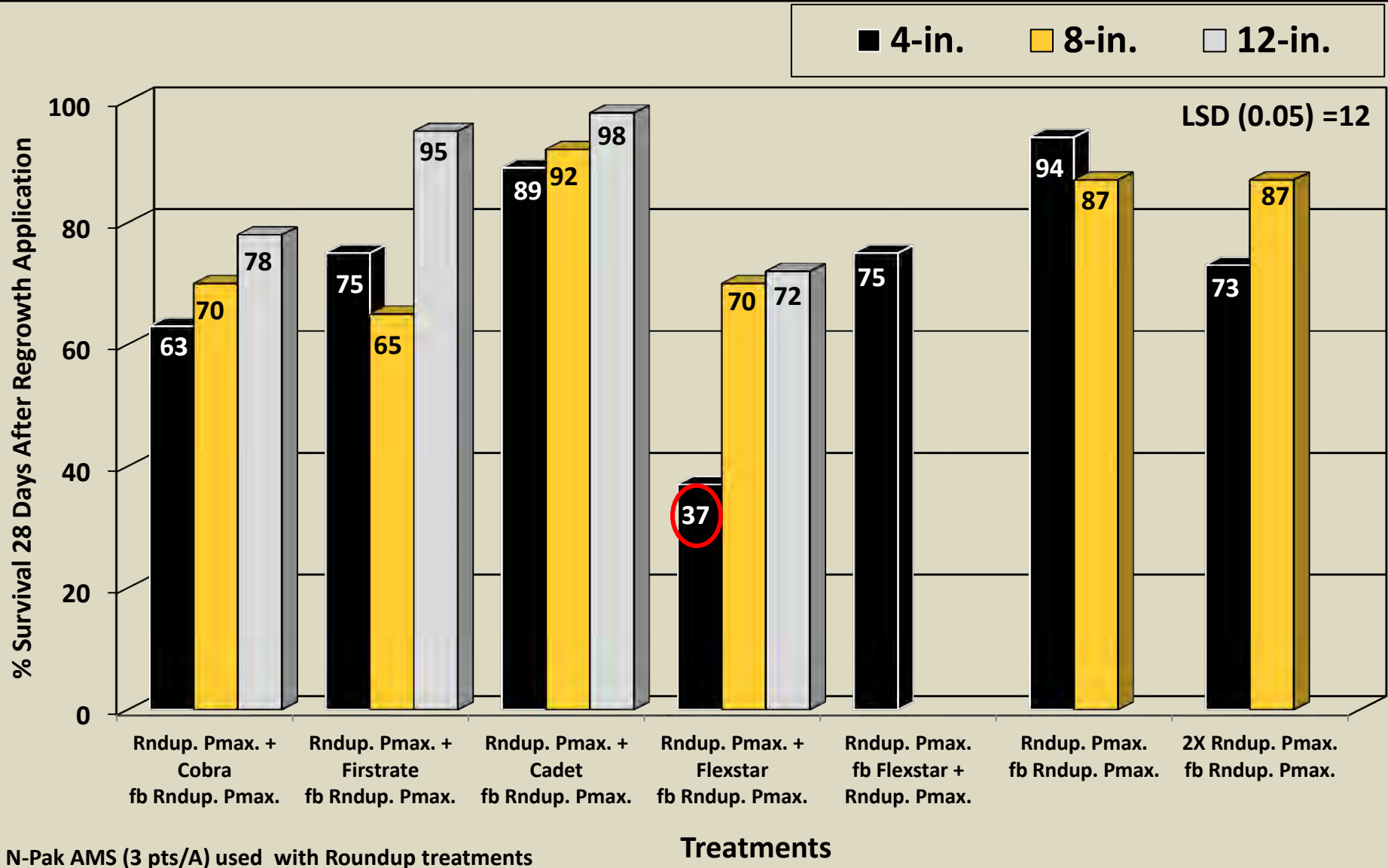
# Influence of Herbicide Treatments on Soybean Injury Two Weeks After each Application Timing



\* N-Pak AMS (3 pts/A) used with Roundup treatments



# Evaluation of % Giant Ragweed Survival 28 Days After Regrowth Applications



Treatments





**37 %**

**4-in.; Rndup Pmax.+ Flexstar fb  
Rndup Pmax.**



**75 %**

**4-in; Rndup Pmax. fb  
Rndup Pmax. + Flexstar**



**Untreated**





**4-in.; Rndup Pmax.+ Cobra fb  
Rndup Pmax.**



**8-in.; Rndup Pmax.+ Cobra fb  
Rndup Pmax.**



**12-in.; Rndup Pmax.+ Cobra fb  
Rndup Pmax.**





# Results and Conclusions

## Giant Ragweed Survival

- > 73% GR giant ragweed survival was observed with Roundup alone, regardless of rate or application timing
- When averaged across application timings, GR giant ragweed survival was lowest with the following Roundup tank-mix partners:  
**Flexstar (60%) < Cobra (70%) < Firstrate (78%) < Cadet (93%)**
- Roundup + Flexstar at the 4-in application timing resulted in the lowest survival (37%) of GR giant ragweed





# Results and Conclusions

## Soybean Injury and Yield

- Highest visual injury observed with Cobra and Flexstar tank-mix combinations
- Highest visual injury occurred in response to the 12- compared to the 4- or 8-in. application timings
- Few differences in soybean seed yield were observed within application timings in either year (data not shown)
- Soybean seed yields were reduced by 24% with herbicide applications made to 12- compared to 4-in. GR giant ragweed plants in 2011

# Influence of Pre-plant Herbicide Treatments on Glyphosate-Resistant Giant Ragweed Control in Roundup Ready Soybeans (Monroe County, MO 2011)

Pre-plant Herbicide Treatment	Rate	Gly-R Gt Ragweed Control 5 Weeks After Application
	-----product/A-----	-----%-----
Roundup PowerMax	22 fl ozs	28
Roundup PowerMax + 2,4-D Ester	22 fl ozs + 1 pt	95
Roundup PowerMax + Clarity	22 fl ozs + 8 fl ozs	97
Roundup PowerMax + Sharpen	22 fl ozs + 1 fl oz	93
Roundup PowerMax + 2,4-D Ester + Valor XLT	22 fl ozs + 1 pt + 4 ozs	98
Roundup PowerMax + 2,4-D Ester + Authority 1 <sup>st</sup>	22 fl ozs + 1 pt + 3.2 ozs	98
Roundup PowerMax + 2,4-D Ester + Authority 1 <sup>st</sup>	22 fl ozs + 1 pt + 6.4 ozs	99
Roundup PowerMax + 2,4-D Ester + Valor SX	22 fl ozs + 1 pt + 2 ozs	98
	LSD (0.05):	4



# Influence of Pre-plant Herbicide Treatments on Glyphosate-Resistant Giant Ragweed Control in Roundup Ready Soybeans (Monroe County, MO 2011)



22 fl ozs Roundup PowerMax



22 fl ozs Roundup PowerMax  
+ 8 fl ozs Clarity



22 fl ozs Roundup PowerMax  
+ 1 pt 2,4-D + 4 ozs Valor XLT



# Influence of Pre-plant Herbicide Treatments on Glyphosate-resistant Giant Ragweed Control in Liberty Link Soybeans (Monroe County, MO 2011)

Pre-plant Herbicide Treatment	Rate	Gly-R Gt Ragweed Control 5 Weeks After Application
	-----product/A-----	-----%-----
Roundup PowerMax + 2,4-D Ester	22 fl ozs + 1 pt	<b>94</b>
Roundup PowerMax + Clarity	22 fl ozs + 8 fl ozs	97
Roundup PowerMax + 2,4-D Ester + Authority 1 <sup>st</sup>	22 fl ozs + 1 pt + 3.2 ozs	99
Roundup PowerMax + 2,4-D Ester + Authority 1 <sup>st</sup>	22 fl ozs + 1 pt + 6.4 ozs	100
Roundup PowerMax + Sharpen	22 fl ozs + 1 oz	96
Roundup PowerMax + FirstRate	22 fl ozs + 0.6 oz	98
Roundup PowerMax + 2,4-D Ester + Valor XLT	22 fl ozs + 1 pt + 4 ozs	99
Roundup PowerMax + 2,4-D Ester + Valor SX	22 fl ozs + 1 pt + 2 ozs	97
	LSD (0.05):	3



# Influence of Pre-plant Herbicide Treatments on Glyphosate-resistant Giant Ragweed Control in Liberty Link Soybeans (Monroe County, MO 2011)



22 fl ozs Roundup PowerMax + 8 fl ozs Clarity



22 fl ozs Roundup PowerMax + 1 pt 2,4-D + 3.2 ozs Authority 1st



22 fl ozs Roundup PowerMax + 1 fl oz Sharpen



# Influence of Herbicide Programs on the Survival of Glyphosate-resistant Giant Ragweed Control in Liberty Link Soybeans (Monroe County, MO 2011)

Pre-plant Herbicide Treatment	Rate	Gly-R Gt Ragweed Survival at Canopy Closure
	-----product/A-----	---% of Untreated---
Roundup PowerMax + 2,4-D Ester	22 fl ozs + 1 pt	0
Roundup PowerMax + Clarity	22 fl ozs + 8 fl ozs	0
Roundup PowerMax + 2,4-D Ester + Authority 1 <sup>st</sup>	22 fl ozs + 1 pt + 3.2 ozs	0.1
Roundup PowerMax + 2,4-D Ester + Authority 1st	22 fl ozs + 1 pt + 6.4 ozs	0
Roundup PowerMax + Sharpen	22 fl ozs + 1 oz	0
Roundup PowerMax + FirstRate	22 fl ozs + 0.6 oz	0
Roundup PowerMax + 2,4-D Ester + Valor XLT	22 fl ozs + 1 pt + 4 ozs	0
Roundup PowerMax + 2,4-D Ester + Valor SX	22 fl ozs + 1 pt + 2 ozs	0
	LSD (0.05):	0.13

\*All treatments followed by two POST, in-crop applications of Ignite at 22 fl ozs/A



# Influence of Herbicide Programs on Glyphosate-resistant Giant Ragweed Survival in Liberty Link Soybeans (Monroe County, MO 2011)

Herbicide Program	Rate	Timing	Gt Ragweed Survival at Canopy Closure
	-----product/A-----		--- % of Untreated---
Roundup PowerMax + 2,4-D Ester + Valor Ignite	22 fl ozs + 1 pt + 2 ozs 29 fl ozs	Pre-plant 4-6 inch	0
Roundup PowerMax + 2,4-D Ester + Valor Ignite + Flexstar	22 fl ozs + 1 pt + 2 ozs 22 fl ozs + 1.3 pts	Pre-plant 4-6 inch	0
Roundup PowerMax + 2,4-D Ester + Valor Flexstar + Select Max	22 fl ozs + 1 pt + 2 ozs 1.3 pts + 16 fl ozs	Pre-plant 4-6 inch	0
Roundup PowerMax + 2,4-D Ester + Valor Ignite + FirstRate	22 fl ozs + 1 pt + 2 ozs 22 fl ozs + 0.3 oz	Pre-plant 4-6 inch	0
Roundup PowerMax + 2,4-D Ester + Valor FirstRate + Select Max	22 fl ozs + 1 pt + 2 ozs 0.3 oz + 16 fl ozs	Pre-plant 4-6 inch	0.1
Roundup PowerMax + 2,4-D Ester + Valor Ignite	22 fl ozs + 1 pt + 2 ozs 22 fl ozs	Pre-plant 10-12 inch	0.1
Roundup PowerMax + 2,4-D Ester + Valor Ignite	22 fl ozs + 1 pt + 2 ozs 29 fl ozs	Pre-plant 10-12 inch	0.1
Roundup PowerMax + 2,4-D Ester + Valor Ignite	22 fl ozs + 1 pt + 2 ozs 36 fl ozs	Pre-plant 10-12 inch	0
		LSD (0.05):	0.13

\*All treatments followed by another POST, in-crop application of Ignite at 22 ozs /A for other weeds present.

# Evaluation of Preplant Burndown Treatments for the Mgmt. of Glyphosate-Resistant Giant Ragweed on a \$/A Basis

Pre-plant Herbicide Treatment	Rate	Price	Modes of Action (excluding Roundup)
	-----product/A-----	----\$/A----	-----#-----
Rndup PMax + 2,4-D Ester	22 fl ozs + 1 pt	5.65	1
Rndup PMax + 2,4-D Ester + Auth. 1 <sup>st</sup>	22 fl ozs + 1 pt + 3.2 ozs	20.59	3
Rndup PMax + 2,4-D Ester + Auth. 1 <sup>st</sup>	22 fl ozs + 1 pt + 6.4 ozs	35.53	3
Rndup PMax + Sharpen	22 fl ozs + 1 oz	8.00	1
Rndup PMax + FirstRate	22 fl ozs + 0.6 oz	25.05	1
Rndup PMax + 2,4-D Ester + Valor XLT	22 fl ozs + 1 pt + 4 ozs	21.72	3
Rndup PMax + 2,4-D Ester + Valor SX	22 fl ozs + 1 pt + 2 ozs	16.65	2



# Evaluation of Libery Link Soybean Programs for the Mgmt. of Glyphosate-Resistant Giant Ragweed on a \$/A Basis

Pre-plant Herbicide Treatment	In –Crop Mgmt	Total Price	Modes of Action (excluding Roundup)
		----\$/A----	-----#-----
Rndup PMax + 2,4-D Ester	2-PASS POST Ignite	24.03	2
Rndup PMax + 2,4-D Ester + Auth. 1 <sup>st</sup>	2-PASS POST Ignite	38.97	4
Rndup PMax + 2,4-D Ester + Auth. 1 <sup>st</sup>	2-PASS POST Ignite	53.91	4
Rndup PMax + Sharpen	2-PASS POST Ignite	26.38	2
Rndup PMax + FirstRate	2-PASS POST Ignite	43.43	2
Rndup PMax + 2,4-D Ester + Valor XLT	2-PASS POST Ignite	40.10	4
Rndup PMax + 2,4-D Ester + Valor SX	2-PASS POST Ignite	35.03	3

\*In-Crop Mgmt of a 2-PASS POST Ignite was applied at 22 fl oz/A for each application.



# Results and Conclusions

## Management in RR or LL Soybean Systems

- All treatments that contained an additional mode-of-action in the burndown provided  $\geq 93\%$  GR giant ragweed control in either RR or LL soybeans
- Just using Roundup as the burndown and then relying on a glyphosate tank-mix partner (Flexstar) in RR soybeans resulted in poor control of GR giant ragweed and a 21% soybean yield loss
- Ignite and the Liberty Link soybean system provides a mode-of-action that can be effective on any survivors or late-emerging GR giant ragweed, but the success of the system depends on an effective burndown program



A photograph of a field of dry, brown vegetation, possibly a field of dead grass or weeds, under a blue sky with scattered white clouds. The text "Questions?" is overlaid in the center of the image.

Questions?