

2001

Roundup Ready vs. Conventional Soybean Yield Comparison

John Lundvall
Iowa State University

Keith Whigham
soy@iastate.edu

Mark E. Westgate
Iowa State University, westgate@iastate.edu

Dale E. Farnham
Iowa State University

Follow this and additional works at: http://lib.dr.iastate.edu/farms_reports

 Part of the [Agricultural Science Commons](#), [Agriculture Commons](#), and the [Agronomy and Crop Sciences Commons](#)

Recommended Citation

Lundvall, John; Whigham, Keith; Westgate, Mark E.; and Farnham, Dale E., "Roundup Ready vs. Conventional Soybean Yield Comparison" (2001). *Iowa State Research Farm Progress Reports*. 1834.
http://lib.dr.iastate.edu/farms_reports/1834

This report is brought to you for free and open access by Iowa State University Digital Repository. It has been accepted for inclusion in Iowa State Research Farm Progress Reports by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.

Roundup Ready vs. Conventional Soybean Yield Comparison

Abstract

Many Iowa soybean producers have adopted Roundup Ready (RR) technology on their farms in recent years. Reduced weed control costs, greater flexibility in herbicide application timing, and the potential for “cleaner” soybean fields are often cited as reasons for using RR technology; however, questions remain about potential profit-robbing yield reductions associated with RR varieties.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

Roundup Ready[®] vs. Conventional Soybean Yield Comparison

John Lundvall, ag specialist, agronomy

Keith Whigham, professor and
extension agronomist

Mark Westgate, associate professor, agronomy

Dale Farnham, assistant professor and
extension agronomist

Introduction

Many Iowa soybean producers have adopted Roundup Ready[®] (RR) technology on their farms in recent years. Reduced weed control costs, greater flexibility in herbicide application timing, and the potential for “cleaner” soybean fields are often cited as reasons for using RR technology; however, questions remain about potential profit-robbing yield reductions associated with RR varieties.

A soybean yield performance comparison of adapted, elite RR varieties and elite conventional varieties was initiated in 1998. Our research objective was to compare genetic yield potential of commercial varieties, not to analyze the economics of one soybean variety-herbicide program versus another. Establishment of similar studies at four other university research farms statewide afforded yield response comparisons of adapted varieties from five unique soil associations and environments. Soils at the Southeast Research and Demonstration Farm are typical of the Taintor-Mahaska soil association.

Materials and Methods

Four seed companies were contacted to recommend their best RR variety and best conventional, high-yield variety adapted for southeast Iowa. In no instance were varieties from a single company identified as “sister lines” (varieties with identical genetic makeup except for the herbicide-resistance gene). A total of 12 treatments were compared, with two RR variety “blocks” per replication. One RR variety herbicide treatment block received a postemergence

Roundup Ultra[™] herbicide application (RR+). The other RR variety block was treated with a postemergence selective herbicide application (RRS). A third block of four conventional varieties (CN) was treated with the same postemergence selective herbicides. Experimental plots were planted at 178,000 seeds per acre on May 19 (1998), May 25 (1999) and May 5 (2000), using a John Deere 7100 planter with 30-inch row spacing. Herbicide treatments and varieties were included in a split-plot design with four replications. Main plot treatments were herbicide treatments, and subplot treatments were varieties. Herbicide treatments were applied four to five weeks after soybean emergence. Experimental plots in RR+ treatment blocks received a one-time application of Roundup Ultra[™] herbicide at a rate of 32 ounces per acre; the RRS and CN treatment blocks received one-time applications of broadleaf (Pursuit[®]) and grass (Poast Plus[®] in 1998-99, Fusion[®] in 2000) herbicides at labeled rates. Plots were machine harvested on October 23 (1998), October 9 (1999), and October 3 (2000). Grain yields (adjusted to 13% moisture) are summarized in Tables 1 and 2.

Results and Discussion

Three years of data suggest that the yield potential of elite conventional varieties remains higher than that of elite RR varieties. Averaged across varieties, yields of CN plots were statistically greater ($P < 0.05$) than those of RR+ and RRS plots over three years and in all single-year tests; yields of RR+ plots trended higher than those of RRS plots, although yield differences were significant ($P < 0.05$) only in 1998 (Table 1). Yield performance of individual RR varieties averaged 1.4 bushels/acre (bu/A) greater in RR+ treatment blocks than in RRS treatment blocks (Table 2); however, yield differences between RR+ and RRS treatments were never statistically significant ($P < 0.05$). Properly-timed

herbicide application minimized soybean “stunting” symptoms in both CN and RRS-treated plots; moreover, weed pressure was not a yield-determining factor, because all experimental plots were maintained relatively weed-free.

Our results suggest that the yield potential of RR varieties remains less than that of CN varieties of similar maturity; however, the “yield gap” seems to be closing as new RR varieties are released each year. Producers are advised to review unbiased, replicated yield comparisons from multiple environments when

making RR or conventional soybean variety selections.

Acknowledgments

Our thanks to Iowa soybean producers, whose soybean check-off dollars support this research. Thanks also to Matt Hunt and Kevin Van Dee for their assistance in conducting this research. Roundup Ready® and Roundup Ultra™ are trademarks of the Monsanto Company. Pursuit® and Poast Plus® are registered trademarks of the BASF Corporation. Fusion® is a registered trademark of Syngenta Corporation. No endorsement is intended of herbicides used in this study, nor is criticism implied of herbicides not used.

Table 1. Effect of herbicide treatment on soybean yield in 1998, 1999, and 2000 at Crawfordsville, IA.

Herbicide treatment	Mean yield performance			
	1998	1999	2000	1998-2000
	------(Bushels/acre)-----			
RR+	52.4 b ¹	48.7 b	43.6 b	48.2 b
RRS	50.3 c	49.2 b	42.3 b	47.2 b
CN	55.7 a	50.9 a	45.9 a	50.8 a
L.S.D. (P=0.05)	1.9	1.6	2.0	1.3

¹ Within columns, herbicide treatment mean yields followed by different letters are statistically different (P<0.05).

Table 2. Soybean yield performance by company (1998-2000) at Crawfordsville, IA.

Year	Treatment	Company			
		Company 1	Company 2	Company 3	Company 4
		------(Bushels/acre)-----			
1998	“RR+”	51.7 ab ²	53.9 a	56.0 b	47.8 b
	“RRS”	49.5 b	50.7 a	53.5 b	47.5 b
	“CN”	55.8 a	52.8 a	59.9 a	54.4 a
	Mean	52.3	52.5	56.5	49.9
	L.S.D. (P=0.05)	5.3	NS	3.8	4.4
1999	“RR+”	47.6 a	50.8 a	46.9 a	49.4 b
	“RRS”	48.0 a	50.3 a	48.5 a	49.9 b
	“CN”	49.0 a	51.6 a	48.6 a	54.3 a
	Mean	48.2	50.9	48.0	51.2
	L.S.D. (P=0.05)	NS	NS	NS	4.1
2000	“RR+”	46.0 ab	41.7 a	45.0 a	41.6 b
	“RRS”	42.9 b	41.2 a	45.0 a	39.9 b
	“CN”	47.2 a	44.4 a	44.7 a	47.3 a
	Mean	45.4	42.4	44.9	42.9
	L.S.D. (P=0.05)	3.4	NS	NS	3.6

² Within each company comparison, yields followed by the same letter are statistically similar (P>0.05).