

2006

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Recommended Citation

Hartzler, Robert G., "Role of Preemergence Herbicides in Roundup Ready® Soybeans" (2006). *Iowa State Research Farm Progress Reports*. 1121.

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Role of Preemergence Herbicides in Roundup Ready® Soybeans

Abstract

Roundup Ready® (RR) crops provide growers greater flexibility in weed management due to the ability of glyphosate to control larger weeds than other herbicides. Although this is advantageous, it can lead to yield losses if the glyphosate application is delayed too long. Another concern is the risk of selecting glyphosate-resistant weeds due to extensive use of glyphosate. Research was conducted to determine the value of preemergence herbicides in protecting crop yields and reducing selection pressure in Roundup Ready® soybeans.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

Role of Preemergence Herbicides in Roundup Ready[®] Soybeans

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Introduction

Roundup Ready[®] (RR) crops provide growers greater flexibility in weed management due to the ability of glyphosate to control larger weeds than other herbicides. Although this is advantageous, it can lead to yield losses if the glyphosate application is delayed too long. Another concern is the risk of selecting glyphosate-resistant weeds due to extensive use of glyphosate. Research was conducted to determine the value of preemergence herbicides in protecting crop yields and reducing selection pressure in Roundup Ready[®] soybeans.

Materials and Methods

Corn stalks were chisel plowed in the fall and final seedbed preparation was conducted with a field cultivator. Soybeans (Golden Harvest H-2162 RR) were planted on May 5. Plots were 10 ft × 50 ft with four replications.

INTRRO[®] (alachlor) was applied at 0, 1, or 2 qt/acre immediately after planting. Glyphosate was applied at the V2, V4, or V6 crop stage at a rate of 0.9 lb ae/acre with 8.5 lb AMS/100 gallon water. At the time of the postemergence application, weed densities and biomass were measured in each plot. A second glyphosate application was made at the V6 stage in plots sprayed at V2 or V4 to control weeds that emerged after the initial treatment.

Results and Discussion

INTRRO[®] reduced both weed density and biomass at the time of the glyphosate application, although weed density was reduced more than biomass (Table 1). INTRRO[®] reduced foxtail and waterhemp populations by at least 75%, but had no effect on common lamb's quarter, velvetleaf, or common ragweed densities (Table 2). Thus, in this study the use of INTRRO[®] only reduced the likelihood of selecting glyphosate resistance in foxtail and waterhemp.

Soybean yields were not affected by early-season competition when glyphosate was applied at V2 soybeans (Table 3). INTRRO[®] protected yields when glyphosate application was delayed until the V4 or V6 stage. At the time of the V6 application, soybean yielded 50.3, 54.0, and 59.5 bushels/acre with 0, 1, and 2 qt/acre INTRRO[®], respectively. Yields were correlated with the amount of weed biomass present at the time of postemergence application (Table 1). Similar experiments were conducted at two other Iowa locations (Figure 1). At those sites, weed densities were lower and yields were not affected by any of the glyphosate applications (data not shown).

Soybean yield losses due to full-season weed competition (no glyphosate application) were directly related to end-of-season weed biomass (Figure 1). Preemergence herbicides reduced weed-related yield losses due to full-season competition.

Table 1. Effect of INTRRO[®] applied preemergence on weeds present at the postemergence glyphosate application.

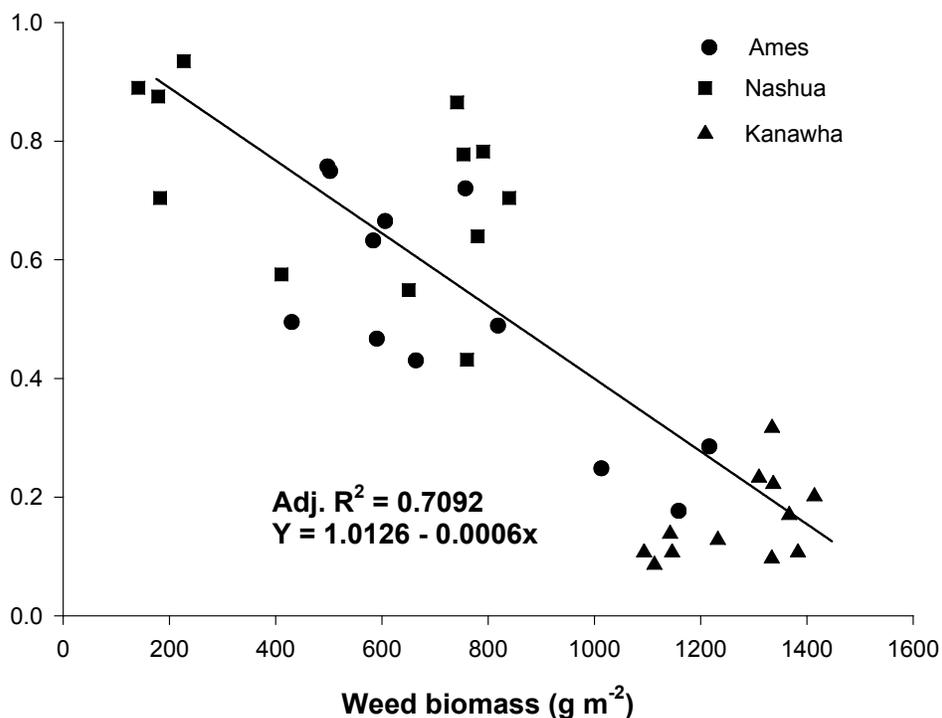
Preemergence rate	Soybean	
	Weed density (number/ft ²)	Weed biomass (g/ft ²)
Control	65a	22.0a
Low	25b	14.6b
High	22b	11.0b

Table 2. Effect of INTRRO[®] on weed populations exposed to postemergence glyphosate.

Harness Xtra	Weeds present postapplication				
	Foxtail	Waterhemp	Lamb's quarter (plants / ft ²)	Velvetleaf	Common ragweed
Control	15a	41a	5a	1a	22a
0.6 qt/acre	4b	9b	2a	1a	16a
1.2 qt/acre	2b	2b	3a	1a	20a

Table 3. Effect of INTRRO[®] and glyphosate application on soybean yield.

INTRRO	Glyphosate application timing			
	V2	V4	V6	No Post
Control	60.9 a	53.5 bc	50.3 c	11.0 d
1 qt/acre	60.9 a	59.3 a	54.0 b	6.9 e
2 qt/acre	60.2 a	57.4 ab	59.5 a	12.6 d

**Figure 1. Relationship between end-of-season weed biomass and soybean yields at three Iowa State University Research Farms, 2005.**