## IVYLEAF MORNINGGLORY CONTROL WITH POSTEMERGENCE DIRECTED AND OVER-THE-TOP ROUNDUP APPLICATIONS H.R. Hurst Delta Research and Extension Center Stoneville, MS

## **Abstract**

Morningglory continues to be one of the weeds Mississippi cotton farmers have trouble controlling. The availability of pyrithiobac (Staple®) and glyphosate (Roundup®) for over-the-top application has improved potential early season morningglory control but late season control is not readily accomplished in many fields. This research was designed to investigate ivyleaf morningglory control with glyphosate applied both as directed postemergence and over-the-top applications at various times in a sequential manner to measure cotton and morningglory response. The Monsanto Company has indicated a desire to develop cotton plants for non-restrictive over-the-top Roundup treatments, so an additional weekly over-the-top low-rate treatment was included to measure cotton response and late season morningglory control.

Roundup Ready® cotton (DP 451B/R) was planted May 9, 2000 and April 30, 2001 on a silt loam soil without irrigation with a large, natural population of ivyleaf morningglory [Ipomoea hederacea (L.) Jacq.]. Treatments (Table 1) were made to the same areas both years. Individual plots were four 40-inch wide rows 40 feet long. Data were obtained from the two center rows of each plot and analyzed with an ANOVA. Means were separated using DMRT with P=.05. Cotton stand was determined by counting plants in each plot from one predetermined row. Seed cotton yield was calculated from yield harvested with a 2-row spindle picker from the center rows of each plot. Morningglory plants were counted on each date from a previously marked area of 40 inches wide and 20 feet long in each plot. Morningglory plant counts were separated into two categories: "new" (newly emerged plants) and "old" (established plants) in early season and into three categories: newly emerged plants, plants without re-growth and plants with re-growth in middle- to late-season. In addition, morningglory control was visually estimated at appropriate dates after application with 0 = no control and 100 = complete control. The area had minimum preplant tillage which included subsoiling at a 45° angle to the row direction and hipping each fall. A bed conditioner was operated over the field shortly afterward to assist drainage leaving beds approximately three to four inches in height. Winter vegetation was controlled with pre-plant applications of glyphosate (Roundup or Touchdown®). All herbicides were applied with 4-row tractor mounted equipment. Directed postemergence treatments were made broadcast with an "S and N" wheel application device. This device has one nozzle mounted at 30° to horizontal to overlap the crop row on each side and one nozzle mounted vertically to spray between each two crop rows. Over-the-top applications were made with a 4-row boom sprayer. As cotton plants were taller with later over-the-top applications, the nozzles were positioned a few inches above the cotton plant terminals. All applications were made in 10 gallons total spray volume per acre.

Cotton stand in 2000 was low (20.6 to 30.2 thousand plants/A) resulting from errors at the late (6/19) count date. Stand differences were not attributed to treatment effects. In 2001 stand was at a level for optimum yield (37.2 to 43.5 thousand plants/A). Again, stand differences were not attributed to treatment effects.

The numbers of newly-emerged ivyleaf morningglory plants were considerably less after June 23 in the year 2000 but did not drop in number in 2001 until after the July 3 count date. In 2000 the numbers of ivyleaf morningglory plants without regrowth (severely injured, but alive) ranged from 7.0 to 55.5 plants/67 ft<sup>2</sup> (average 27.9) on July 3 but a subsequent count on July 21 ranged from 0 to 5.3 plants/67 ft<sup>2</sup> (averaged 1.90). Probably many of these plants died from the very dry conditions. The number of morningglory plants without re-growth were lower in 2001 on all count dates probably reflecting the excellent rainfall pattern which allowed recovery. In 2000 the numbers of ivyleaf morningglory plants with re-growth were lower for multiple low-rate treatments than for single treatments. For single treatments at the high rate of Roundup, in 2000, the average number of morningglory plants with re-growth in late July was 11.1 plants/67 ft<sup>2</sup> while in 2001 the numbers of ivyleaf morningglory plants with re-growth were very high in late-season (August 20) with single treatments (average 101.5 plants/67 ft<sup>2</sup>) especially when Roundup was applied in a directed manner (average 151.2 plants/67 ft<sup>2</sup>). A visual estimate of ivyleaf morningglory control was made in July each year. The multiple low-rate treatments of Roundup resulted in higher control values than single treatments both years. In 2001, the over-the-top multiple application treatments resulted in higher control values than single treatments both years. In 2001, the over-the-top multiple application treatments resulted in higher control than directed treatments.

The lowest seed cotton yield in 2000 was the no-Roundup control treatment. Among Roundup treatments, the 0.5 lb over-the-top sequential treatment applied 6/9 + 6/23 + 6/27 was lowest in yield. The directed treatment of 0.5 lb applied 6/1 + 6/16 + 6/30 had the greatest yield. In 2001, the greatest yield was from the 0.25 lb Roundup treatment applied over-the-top 5/14 + 5/21 + 5/29 + 6/27

6/5 + 6/12 + 6/20. Single over-the-top Roundup treatments at 1.0 lb in 2001 had higher yields than directed treatments at the same rate. This was probably due to the rainfall pattern before and after application (compared with 2000) that provided greater recovery of morningglory plants. Also, directed treatments provided less sufficient weed spray coverage on the larger weeds and the numbers of morningglory plants with re-growth were greater about 3 weeks after this treatment date.

In 2001 during a season of high rainfall, morningglory control was more consistent and seed cotton yields were greater with multiple low-rate applications of Roundup when compared with the year 2000, a season of very low rainfall, especially after mid-season.

	Roundup Ultra Application				
-	Early ove	er-the-top			
Trt.	5/29/2000	5/10/2001			Sequential
No.	3-leaf cotton	1-leaf cotton	Rate	Year	Mo/day
	(lb/A ai)		(lb/ai)		(over-the-top)
$1.^{1/}$	None	None			
2.	0.5	0.5	0.5	2000	6/9, 6/23, 7/7
				2001	5/21, 6/5, 6/20
3.	0.5	0.5	1.0	2000	6/23
				2001	6/15
4.	0.5	0.5	0.5	2000	6/1, 6/16, 6/30
				2001	5/14, 5/29, 6/12
5.	0.5	0.5	1.0	2000	6/16
				2001	5/29
					(directed)
6.	0.5	0.5	0.5	2000	6/12, 6/23, 7/7
				2001	5/21, 6/5, 6/20
7.	0.5	0.5	1.0	2000	6/23
				2001	6/5
8.	0.5	0.5	0.5	2000	6/1, 6/16, 6/30
				2001	5/14, 5/29, 6/12
9.	0.5	0.5	1.0	2000	6/16
				2001	5/29
					(over-the-top)
10.	0.5	0.5	0.25	2000	6/1, 6/9, 6/16, 6/23, 6/30, 7/7
				2001	5/14, 5/21, 5/29, 6/5, 6/12, 6/20

Table 1. Sequential treatments for ivyleaf morningglory control in transgenic cotton.

<sup>1</sup>/No Roundup In-Season

2000 PRE Cotoran 1.25 + Cy-Pro 0.5 Band

2001 PRE Cotoran 1.25 + Dual 1.0 + Gramoxone 0.63 Band

- 2000 PODIR Meturon 1.0 + Herbicide 912 1.5 5/29 Band
- 2001 PODIR Meturon 1.0 + MSMA 6 Plus 1.5 5/30 Band
- 2000 OT Fusilade DX 0.19 + Agri-Dex 1% 7/7
- 2001 OT Select 0.094 + Agri-Dex 1% 6/20
- 2001 Lay-by Roundup 0.75 + Harvade 0.38

2000 Cultivate (Trts. 1-10) 5/16 12-inch undisturbed area centered on row

2000 Cultivate (Trt. 1) 5/29 12-inch undisturbed area centered on row