

TOLERANCE OF ROUNDUP READY COTTON TO ROUNDUP ULTRA APPLIED AT VARIOUS GROWTH STAGES IN THE SAN JOAQUIN VALLEY OF CALIFORNIA

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Abstract

Roundup Ready cotton is tolerant to Roundup Ultra when applied over the top of cotyledon to 4 leaf or node stage cotton. Field studies were conducted in 1997 to evaluate the tolerance of Roundup Ready, DP6100RR cotton to Roundup Ultra when applied at various rates and growth stages of cotton.

No visual injury symptoms were observed when Roundup was applied over the top at all rates and growth stages. Final plant mapping data did show a significant reduction of percent boll retention in the bottom 5 fruiting branches and in the 95 percent zone. Roundup Ultra applications at all rates significantly reduced retention levels at the 6, 9, and 12 node stage when compared to treatments made at the 2 node stage. Cotton yields were significantly lower at all Roundup rates applied at the 12 node stage, when compared to the single over the top applications at the two node stage. All other treatments produced numerically lower yields when compared to the two node stage application.

Introduction

With the development of biotechnology and transgenic herbicide tolerant cotton varieties Roundup Ready cotton has become a reality. The development and release of cotton varieties for grower use is controlled by California Department of Food and Agriculture and administered by the San Joaquin Valley Cotton Board. At present, three Roundup Ready cotton varieties are being tested and evaluated by the Board. If these varieties meet Board standards, during three years of testing, Roundup Ready varieties will be available to California growers in 2000.

Materials and Methods

A uniform stand of DP6100 Roundup Ready cotton, planted on April 29, 1997 was divided into 4, 40" rows by 60 feet plots and replicated four times in a randomized complete block design. Roundup Ultra at 1.0 lb ai/A was applied over the top, in a 12" band, to the entire study area, at the 2 leaf stage. 0.5, 0.75 and 1.0 lb of Roundup was applied over the top of cotton at the 6, 9, and 12 leaf or node stage. All herbicide applications were made with a tractor drawn

sprayer at 40 PSI with TwinJet 60-4003 nozzles, delivering 22 gallons of spray solution per acre.

In a second study, a uniform stand of DP6100 Roundup Ready cotton planted on April 29, 1997 was divided into 4, 40" rows by 60 feet plots and replicated four times in a randomized complete block design. Roundup Ultra at 1.5 lb ai/A was applied over the top, in a 12" band, to the entire study area at the 4 true leaf stage. 1.5 lb of Roundup was applied at the following growth stages: 7- 8 nodes above white flower (NAWF), 5 NAWF (cutout), 8 nodes above cracked boll (NACB) and 4 NACB. The later Roundup applications were made with a Hagie Highcycle sprayer with TXVS-10 nozzles at 55 PSI, delivering 20 gallons of spray solution per acre.

Discussion

No visual injury symptoms were noted when Roundup Ultra was applied over the top of 2, 6, 9, or 12 leaf cotton at all rates tested (0.5, 0.75 and 1.0 lb ai/A). Final plant mapping data indicated no significant differences in number of fruiting branches, number of vegetative nodes, height to node ratio, percent bolls in first, second, third position and vegetative nodes, and bolls per plant. Retention levels were significantly lower in most treatments when compared to the untreated control and Roundup Ultra applied only at the 2 node stage. Cotton yields (Table 1) were numerically less with all Roundup Ultra treatments at the 6, 9, and 12 leaf stage. Roundup Ultra at 0.5, 0.75, and 1.0 lb ai/A produced significantly lower yields applied at the 12 leaf stage when compared to the 2 leaf stage application.

When Roundup Ultra was applied at 1.5 lb ai/A over the top of cotton at 8 nodes above white flower (NAWF), 5 NAWF, 8 nodes above cracked boll (NACB) and 4 NACB significant differences were noted at the 8 NAWF application (Table 2). Final plant mapping data indicated no significant differences in any parameter measured except for percent retention in the 95 percent zone. Cotton yield data indicated a significant reduction in lint per acre when Roundup Ultra was applied at 8 NAWF. There were no significant differences between all other treatments.

Summary

Roundup Ready cotton, if properly managed, will provide California cotton growers with a viable weed management strategy for effective and economic weed control. Based on the results of these studies, it is clear that over the top applications of Roundup Ultra to Roundup Ready cotton is limited up to the 4 leaf stage. Over the top applications at the 6, 9, and 12 leaf stage will reduce lint yield.

Table 1. The effect of Roundup Ultra applied at various rates and cotton growth stages on lint yield.

Treatment	Rate	Timing	Yield
	lb ai/A		lbs/lint
1 UTC	--	--	1226 bc
2 Roundup Ultra	1.0	2 node	1479 a
3 Roundup Ultra	1.0	2 node	1370 ab
B Roundup Ultra	0.5	6 node	
4 Roundup Ultra	1.0	2 node	1379 ab
B Roundup Ultra	0.75	6 node	
5 Roundup Ultra	1.0	2 node	1273 ab
B Roundup Ultra	1.0	6 node	
6 Roundup Ultra	1.0	2 node	1360 ab
B Roundup Ultra	0.5	9 node	
7 Roundup Ultra	1.0	2 node	1412 ab
B Roundup Ultra	0.75	9 node	
8 Roundup Ultra	1.0	2 node	1253 ab
B Roundup Ultra	1.0	9 node	
9 Roundup Ultra	1.0	2 node	1209 bc
B Roundup Ultra	1.0	12 node	
10 Roundup Ultra	1.0	2 node	1196 bc
B Roundup Ultra	0.75	12 node	
11 Roundup Ultra	1.0	2 node	990 c
B Roundup Ultra	1.0	12 node	
lsd @ .05			245.02
Percent CV			13.19

Table 2. The effect of Roundup Ultra applied at various cotton growth stages on lint yields.

Treatment	Rate	Yield	
	lb ai/A	Timing	lbs/lint
1 UTC	--	--	1918 a
2 Roundup Ultra	1.5 lb	7-8 NAWF	1496 b
3 Roundup Ultra	1.5 lb	5 NAWF	1859 a
4 Roundup Ultra	1.5 lb	8 NACB	1873 a
5 Roundup Ultra	1.5 lb	4 NACB	1851 a
6 Roundup Ultra	1.5 lb	4 TL	1919 a
lsd @ .05			97.05
Percent CV			3.54