

# **Effect of Glyphosate and Sulfosate on Weeds and Roundup Ready Cotton**

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## **Abstract**

Weeds present major problems for cotton culture. Studies were conducted in Riata cotton with glyphosate and sulfosate to evaluate control of field bindweed (*Convolvulus arvensis*), yellow nutsedge (*Cyperus exculentus*), and redroot pigweed (*Amaranthus retroflexus*). Cotton injury related to timing and type of herbicides was also evaluated. Early broadcast applications of glyphosate or sulfosate provides good to excellent control of weeds. Sulfosate can produce major injury to the cotton. Later applications of glyphosate enhances weed control but adversely affects yield.

## **Introduction**

Weeds can present a major problem in cotton culture by competing with the crop and increasing cost to the grower. Transgenic cotton such as Riata have been developed to allow treatment over the top of cotton for control of broadleaf and other weeds. The ability to apply herbicides at an early stage can greatly enhance control of problem weeds.

## **Materials and Methods**

Uniform fields of Acala Riata cotton planted in April, 2001 were divided into four replications of 5 to 12 treatments in a randomized complete block design (RCBD). Treatments were applied over the top of the cotton at 2, 4, 6, 8 and 12 nodes with a backpack or tractor pulled sprayer. Weed control and cotton injury were evaluated during the season. Trials were hand and machine harvested for yield.

## **Results**

### **Glyphosate Timing Study**

There was slight injury with the glyphosate tank mixes with either Goal (oxyfluorfen) or Staple (pyrithiobac sodium) at the directed application which was no longer evident at harvest time. All treatments provided good to excellent control of field bindweed at harvest except the 1 lb ai/A at 2 node treatment. Applications of glyphosate beyond four nodes significantly reduced yield up to 2400 lbs of seed cotton/Acre (Table 1).

### **Nutsedge Control Study**

At 14 days after treatment (DAT), MSMA exhibited the greatest control of yellow nutsedge. At 35 DAT, sulfosate at 2 lb at 2 and 4 nodes exhibited the greatest nutsedge control. However, this sulfosate treatment also exhibited the greatest injury to the cotton and the greatest reduction in

yield. Glyphosate effectively controlled nutsedge and did not cause any significant injury to the cotton at any time (Table 2).

### Annual Weed Control Study

The only cotton injury at all evaluations was in the sulfosate treatments. There was no indication of injury to the cotton by any application of glyphosate. All treatments provided complete control of pigweed at 7 DAT. There were not enough weeds to evaluate later in the season (Table 3).

### Conclusions

Early applications of glyphosate over the top of glyphosate tolerant cotton can provide good to excellent control of a variety of weeds. Later applications of glyphosate while enhancing weed control, also adversely affect boll retention and yield. Sulfosate can provide excellent weed control, however, it can produce major injury to the cotton even if the cotton is a glyphosate resistant variety. This will result in major reductions in crop yield.

Table 1. Glyphosate Timing Study

| Treatment                  | Rate<br>lb ai/A    | Timing<br>TL | Cotton Phyto |        | Field Control |         | lb/A<br>Seed<br>cotton |
|----------------------------|--------------------|--------------|--------------|--------|---------------|---------|------------------------|
|                            |                    |              | 7 DAT        | 21 DAT | 21DAT         | 147 DAT |                        |
| 1. RUM                     | 1/2                | 2/6          | 0            | 0 c    | 89 ab         | 100 a   | 5335 ab                |
| 2. RUM                     | 1/2                | 2/8          | 0            | 0 c    | 82 bcd        | 100 a   | 4842 bc                |
| 3. RUM                     | 1/1.5 <sup>2</sup> | 2/4/8        | 0            | 0 c    | 82 bcd        | 95 ab   | 4884 bc                |
| 4. RUM                     | 1/1.5 <sup>2</sup> | 2/6/12       | 0            | 0 c    | 85 bcd        | 96 a    | 3265 d                 |
| 5. RUM                     | 1.5                | 4/8          | 0            | 0 c    | 80 de         | 95 ab   | 4437 c                 |
| 6. RUM                     | 2                  | 4/8          | 0            | 0 c    | 82 bcd        | 96 a    | 4609 c                 |
| 7. RUM                     | 1.5                | 4/6/8        | 0            | 0 c    | 81 cd         | 95 ab   | 4862 bc                |
| 8. RUM                     | 1.5                | 4/6/12       | 0            | 0 c    | 88 abc        | 98 a    | 3628 d                 |
| 9. RUM<br>B. RUM + Goal    | 1.5<br>1.5 + 1.5   | 2<br>Dir     | 0            | 25 a   | 94 a          | 95 ab   | 5719 a                 |
| 10. RUM<br>B. RUM + Staple | 1.5<br>1.5 + 1oz   | 2<br>Dir     | 0            | 15 b   | 82 bcd        | 85 ab   | 5649 a                 |
| 11. TD IQ                  | 1                  | 2            | 0            | 0 c    | 82 bcd        | 66 c    | 5507 ab                |
| 12. TD IQ                  | 1                  | 4            | 0            | 0 c    | 74 e          | 80 bc   | 5714 a                 |

Table 2.

### Nutsedge Control Study

| Treatment      | Rate<br>lb ai/A | Timing | Cotton Phyto | Nutsedge Control |          | lb/A<br>Seed<br>Cotton |
|----------------|-----------------|--------|--------------|------------------|----------|------------------------|
|                |                 |        | 35 DAT       | 20 DAT           | 35 DAT   |                        |
| 1. TD5         | 1               | 2      | 8 d          | 55 de            | 55 cde   | 4645 ab                |
| 2. TD5         | 1               | 2/4    | 14 d         | 49 e             | 66 abcde | 4203 abc               |
| 3. TD5 + AMS   | 1 + 10          | 2      | 11 d         | 52 de            | 54 de    | 4348 abc               |
| 4. TD5 + AMS   | 1 + 10          | 2/4    | 41 c         | 78 abc           | 75 abc   | 3693 bcd               |
| 5. RUM         | 1               | 2      | 0 d          | 50 e             | 48 e     | 4793 a                 |
| 6. RUM         | 1               | 2/4    | 0 d          | 65 bcde          | 65 bcd   | 4048 abc               |
| 7. RUM         | 1               | 2      | 0 d          | 70 abcd          | 71 abcd  | 4145 abc               |
| 8. RUM         | 1               | 2/4    | 11 d         | 80 ab            | 78 ab    | 4103 abc               |
| 9. TD5         | 2               | 2      | 58 b         | 60 cde           | 50 e     | 4110 abc               |
| 10. TD5        | 2               | 2/4    | 90 a         | 86 a             | 86 a     | 2925 d                 |
| 11. MSMA       | 1.5             | 2      | 11 d         | 62 bcd           | 56 cde   | 3848abcd               |
| 12. MSMA + RUM | 1.5 + 1         | 2      | 4 d          | 76 abc           | 65 bcde  | 3508 cd                |

Table 3 Annual Weed Control Study

| Treatment    | Rate<br>lb ai/A | Cotton Phyto         |      |      |       | Pigweed | Seed<br>Cotton<br>lb/A |
|--------------|-----------------|----------------------|------|------|-------|---------|------------------------|
|              |                 | Days After Treatment |      |      |       |         |                        |
|              |                 | SOG                  | 8/1  | 12/5 | 21/14 | 8/1     |                        |
| 1. TD5       | 1               | 2                    | 59 a | 52 b | 35 bc | 100     | 5058 cd                |
| 2. TD5       | 1               | 2/4                  | 51 a | 81 a | 59 a  | 100     | 4728d                  |
| 3. TD5 + AMS | 1 + 5           | 2                    | 45 a | 45 b | 22 c  | 100     | 5405 abc               |
| 4. TD5 + AMS | 1 + 5           | 2/4                  | 44 a | 75 a | 50 ab | 100     | 5128 bcd               |
| 5. RUM       | 1               | 2                    | 0 b  | 0 c  | 0 d   | 100     | 5661 a                 |
| 6. RUM       | 1               | 2/4                  | 0 b  | 0 c  | 0 d   | 100     | 5670 a                 |
| 7. RUM + AMS | 1 + 5           | 2                    | 0 b  | 0 c  | 0 d   | 100     | 5558 ab                |