

## EARLY SEASON PEST MANAGEMENT IN COTTON WITH ROUNDUP

### ULTRA-INSECTICIDE COMBINATIONS

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#### Abstract

Studies were conducted to evaluate Roundup Ultra-insecticide tank mixtures for insect and weed control in cotton. Based on total control of immature and adult thrips 7 days after treatment (DAT), addition of Roundup Ultra at 0.75 lb ai/A to the insecticides Orthene, Karate, Vydate, Regent, Bidrin, Dimethoate, or Provado was not antagonistic. However, thrips control was enhanced when Dimethoate or Provado were co-applied with Roundup Ultra. For only hemp sesbania did the addition of insecticides affect weed control. At 28 DAT, combinations of Regent or Karate with Roundup Ultra reduced hemp sesbania control whereas the combination with Dimethoate increased control. Regardless, hemp sesbania control was no more than 74%.

#### Introduction

Roundup Ready® (Monsanto Corp., St. Louis, MO) technology for cotton was approved by the EPA in 1996. Roundup Ready cotton was commercially introduced in 1997. As much as 32 oz product/A of Roundup may be applied over-the-top of Roundup Ready cotton through the four leaf stage of development. During this same time period, early season insect pests such as thrips, *Frankliniella* spp., and cotton aphids, *Aphis gossypii* Glover, may be present. By combining an insecticide with Roundup, producers are afforded the opportunity to control both insect and weed pests with a single application.

Previous research with herbicide-insecticide combinations has shown variable effects on performance. Jordan et al. (1993) found that addition of acephate, carbaryl, or dimethoate to pyriithiobac did not influence entire leaf morning-glory control. Insecticides co-applied with bromoxynil did not affect control of boll weevil, *Anthonomus grandis grandis* Boheman, tarnished plant bugs, *Lygus lineolaris* Palisot de Beauvois, or tobacco budworms, *Heliothis virescens* F. (Scott et al. 1996). Mascarenhas and Griffin (1997) reported that the addition of imidacloprid to Roundup Ultra reduced barnyardgrass control. Chlorpyrifos, fipronil, methamidophos, or imidacloprid co-applied with Roundup Ultra reduced pitted

morning-glory control. Aphid control was reduced by Roundup Ultra in a co-application with Metasystox-R.

The objective of these studies was to evaluate Roundup Ultra-insecticide tank mixtures for insect and weed control.

#### Materials and Methods

##### Insecticide Efficacy

A study was conducted in 1998 at the Macon Ridge location of the Northeast Research Station near Winnsboro, LA, to evaluate the effect of insecticide-Roundup Ultra combinations on thrips and cotton aphid control. Treatments included Roundup Ultra 4L (glyphosate) at 0.75 lb ai/A and the following insecticides: Bidrin 8EC (dicotophos) at 0.33 lb ai/A, Dimethoate 4EC (dimethoate) at 0.20 lb ai/A, Karate 1E (*lambda*-cyhalothrin) at 0.033 lb ai/A, Orthene 90SP (acephate) at 0.33 lb ai/A, Provado 1.6F (imidacloprid) at 0.047 lb ai/A, Regent 80WG (fipronil), and Vydate 3.7L (oxamyl) at 0.25 lb ai/A. Insecticides were applied alone and in combination with Roundup Ultra using a CO<sub>2</sub> backpack sprayer calibrated to deliver 15 gallons per acre. Insect control was measured 3 and 7 DAT using a whole plant washing procedure followed by counting the insects with the aid of a binocular microscope (Burris et al. 1990). Data were subjected to analysis of variance and means separated using contrast analysis.

##### Weed Control

Two experiments were conducted in 1998 in a fallow area at the Ben Hur Research Farm near Baton Rouge, LA, to evaluate weed control with Roundup Ultra-insecticide combinations. Treatments included Roundup Ultra (0.75 lb ai/A) alone or Roundup Ultra tank mixed with the insecticides and rates specified for the insect study. In addition, Thiodan 3E (endosulfan) at 0.375 lb ai/A was included. All treatments were applied using a CO<sub>2</sub> backpack sprayer calibrated to deliver 15 gallons per acre. Weed control was evaluated 14 and 28 DAT based on a visual rating scale of 0 (no weed control) to 100% (complete plant death). Weeds evaluated included hemp sesbania, *Sesbania exaltata* (Raf.) Rydb. ex A. W. Hill; northern jointvetch, *Aeschynomene virginica* L.; pitted morning-glory, *Ipomoea lacunosa* L.; and prickly sida *Sida spinosa* L. Data were subjected to analysis of variance and means separated using least significant differences.

#### Results and Discussion

##### Insecticide Efficacy

At 3 DAT, all insecticides and Roundup Ultra-insecticide combinations except Regent alone and Roundup Ultra+Vydate reduced number of immature thrips compared with the nontreated control (Table 1). Dimethoate alone controlled more immature thrips compared with Roundup Ultra+Dimethoate. Adult thrips were reduced by all insecticides applied alone compared with the nontreated

control. All Roundup Ultra-insecticide combinations, except Roundup Ultra+Orthene, reduced the number of adult thrips compared with the nontreated control. Orthene alone and Dimethoate alone controlled more adult thrips 3 DAT than the tank mixtures of these insecticides with Roundup Ultra. Total thrips were reduced by all treatments compared with the nontreated control. Total thrips numbers were lower where Roundup Ultra+Dimethoate was applied compared with Dimethoate alone.

At 7 DAT, none of the treatments reduced numbers of immature thrips compared with the nontreated control (Table 2). Except for Bidrin, all insecticides applied alone or in combination with Roundup Ultra significantly reduced adult thrips compared with the nontreated control. Dimethoate was the only insecticide in which the addition of Roundup Ultra improved control of adult thrips. Orthene, Karate, Vydate, Regent, and Dimethoate reduced total numbers of thrips compared with the nontreated control. The tank mixtures of Roundup Ultra with Orthene, Karate, Regent, or Dimethoate significantly reduced the total number of thrips compared with the nontreated control. The combination of Roundup Ultra, Provado, or Dimethoate improved thrips control 7 DAT compared with the insecticides alone.

Due to extremely low cotton aphid numbers (no more than 5 aphids/10 plants), differences among treatments were not observed at either rating date. Phytotoxicity was not observed with any of the treatments.

### Weed Control

At 14 DAT, control of hemp sesbania, northern jointvetch, pitted morning-glory, and prickly sida was not affected by addition of insecticides to Roundup Ultra (Table 3). Combinations of Regent or Karate with Roundup Ultra reduced control of hemp sesbania 28 DAT, but none of the treatments provided more than 74% control (Table 4). Control of hemp sesbania 28 DAT was enhanced when Roundup Ultra was co-applied with Dimethoate. The addition of insecticides other than Karate, Regent, or Dimethoate to Roundup Ultra did not enhance or decrease control of hemp sesbania. Control of northern jointvetch, pitted morning-glory, or prickly sida 28 DAT was equivalent for Roundup Ultra applied alone or in combination with an insecticide.

### References

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Table 1. Thrips control 3 days after application of Roundup Ultra insecticide tank mixtures.

Treatment <sup>1</sup>	Thrips/10 plants		
	Immatures	Adults	Total
Orthene	17.5*	1.3* +	18.8*
RU+Orthene	12.0*	4.8	16.8*
Karate	11.5*	2.0*	13.5*
RU+Karate	7.8*	3.0*	10.8*
Vydate	12.0*	1.8*	13.8*
RU+Vydate	20.0	2.3*	22.3*
Regent	20.5	1.5*	22.0*
RU+Regent	19.0*	2.3*	21.3*
Bidrin	11.5*	2.3*	13.8*
RU+Bidrin	12.8*	1.0*	13.8*
Dimethoate	5.8 * +	1.3* +	7.0* +
RU+Dimethoate	6.3*	1.8*	8.0*
Provado	16.3*	3.0*	19.3*
RU+Provado	9.8*	1.0*	10.8*
Control	36.0	7.7	43.7

<sup>1</sup>Roundup Ultra (RU) applied at 0.75 lb ai/A.

\*Treatment was significantly different from the non-treated control based on contrast analysis (P<0.10).

+Insecticide alone was significantly different from the RU-insecticide combination based on contrast analysis (P<0.10).

Table 2. Thrips control 7 days after application of Roundup Ultra insecticide tank mixtures.

Treatment <sup>1</sup>	Thrips/10 plants		
	Immatures	Adults	Total
Orthene	4.0	21.3*	25.3*
RU+Orthene	3.0	21.5*	24.5*
Karate	9.0	29.3*	38.3*
RU+Karate	6.5	35.5*	42.0*
Vydate	10.3	31.8*	42.0*
RU+Vydate	22.0	33.0*	55.0
Regent	11.3	25.8*	37.0*
RU+Regent	7.5	28.3*	35.8*
Bidrin	14.3	45.5	59.8
RU+Bidrin	7.5	39.5*	47.0
Dimethoate	6.0	26.5* +	32.5* +
RU+Dimethoate	6.0	20.0*	26.0*
Provado	39.0+	38.3*	77.3+
RU+Provado	12.5	32.0*	44.5
Control	12.8	60.5	73.3

<sup>1</sup>Roundup Ultra (RU) applied at 0.75 lb ai/A.

\*Treatment was significantly different from the non-treated control based on contrast analysis (P<0.10).

+Insecticide alone was significantly different from the RU-insecticide combination based on contrast analysis (P<0.10).

Table 3. Hemp sesbania (SEBEX), northern jointvetch (AESVI), pitted morning-glory (IPOLA), and prickly sida (SIDSP) control 14 DAT with Roundup Ultra-insecticide combinations<sup>1</sup>.

Treatment	SEBEX	AESVI	IPOLA	SIDSP
	%			
RU <sup>2</sup>	74	100	71	66
RU+Orthene	77	100	67	73
RU+Karate	75	100	63	71
RU+Vydate	76	100	61	73
RU+Regent	77	100	64	72
RU+Thiodan	76	100	62	70
RU+Dimethoate	79	100	67	72
RU+Bidrin	76	100	67	71
RU+Provado	72	100	71	70
LSD (0.05)	NS	NS	NS	NS

<sup>1</sup>Data averaged across two experiments.

<sup>2</sup>Roundup Ultra (RU) applied at 0.75 lb ai/A.

Table 4. Hemp sesbania (SEBEX), northern jointvetch (AESVI), pitted morning-glory (IPOLA), and prickly sida (SIDSP) control 28 DAT with Roundup Ultra-insecticide combinations<sup>1</sup>.

Treatment	SEBEX	AESVI	IPOLA	SIDSP
	%			
RU <sup>2</sup>	68	100	71	71
RU+Orthene	71	100	68	68
RU+Karate	49	100	68	66
RU+Vydate	67	100	68	72
RU+Regent	59	100	68	69
RU+Thiodan	64	100	71	68
RU+Dimethoate	74	100	71	67
RU+Bidrin	73	100	73	72
RU+Provado	63	100	71	70
LSD (0.05)	6	NS	NS	NS

<sup>1</sup>Data averaged across two experiments.

<sup>2</sup>Roundup Ultra (RU) applied at 0.75 lb ai/A.