

WEED CONTROL INTERACTIONS ASSOCIATED WITH ROUNDUP™ AND INSECTICIDE MIXTURES

V. J. Mascarenhas and J. L. Griffin
Louisiana Agricultural Experiment Station
Louisiana State University Agricultural Center
Baton Rouge, LA

Abstract

Field experiments were conducted in 1996 at three locations in Louisiana to evaluate potential weed control interactions when Roundup Ultra was applied with several insecticides. With respect to barnyardgrass, only the Roundup Ultra-Provado mixture in one experiment reduced weed control 4 weeks after treatment (WAT) when compared with Roundup Ultra applied alone (56 vs. 96% control). Hemp sesbania control observed with the Roundup-insecticide mixtures was equivalent to that obtained with Roundup Ultra alone, which provided 75% control 4WAT. Lorsban, Fipronil, Monitor, or Provado in combination with Roundup Ultra controlled pitted morningglory 2 WAT no more than 80%, which was less than when Roundup Ultra was applied alone (91%).

Introduction

During the 1995 growing season, barnyardgrass (*Echinochloa crus-galli* L. Beauv.), hemp sesbania (*Sesbania exaltata* (Raf.) Rydb. Ex A. W. Hill), and morningglory (*Ipomoea* spp.) infested over 300,000, 80,000, and 400,000 acres of cotton in Louisiana, respectively (Byrd 1996). These weeds were responsible for 24% of the total crop loss attributed to weeds in the state resulting in a yield loss of ca. 32,500 bales of cotton. Many studies have evaluated the effectiveness of Roundup (glyphosate) on morningglory species. Murdock et al. (1996) observed 71 to 100% control of entireleaf (*I. hederacea* var. *integriuscula* Gray) and ivyleaf (*I. hederacea* (L.) Jacq.) morningglory with Roundup, while Elkins et al. (1996) reported only 40% control of morningglory species with a single Roundup application. Sequential applications of Roundup when cotton was 3 and 6 inches tall controlled morningglory species 88% (Elkins et al. 1996). A single Roundup application controlled of hemp sesbania 76%.

Currently in Louisiana cotton, Roundup is used preplant in stale seedbed weed control programs (Sanders et al. 1995). Roundup can also be applied postemergence utilizing shielded sprayers to prevent crop injury (Vencill 1996). The development of Roundup Ready cotton may provide growers with a cost-effective, broad spectrum weed control alternative (Vidrine et al. 1996). The ability to apply herbicides over-the-top of cotton will create an opportunity

for growers to reduce production costs by the combination of Roundup and insecticides in a single operation. This practice would be especially important when early season application of Roundup would coincide with necessary early season insecticide applications. This study evaluated weed control interactions associated with tank mixtures of Roundup Ultra and selected insecticides.

Materials and Methods

Experiments were conducted at three locations in Louisiana to evaluate weed control with tank mixtures of Roundup Ultra and insecticides. Barnyardgrass control was evaluated at the Macon Ridge location of the Northeast Research Station, Winnsboro in Experiment 1 and in Experiment 2 at the Northeast Research Station, St. Joseph. In Experiment 3 at the Ben Hur Research Farm, Baton Rouge, barnyardgrass, hemp sesbania, and pitted morningglory (*Ipomoea lacunosa* L.) were evaluated. Treatments in all tests were applied with a CO₂ backpack sprayer equipped with 8002 flat fan nozzles calibrated to deliver 10 gallons/A spray volume at ca. 20 PSI. Treatments included Roundup Ultra (0.75 lb ai/A) alone and Roundup Ultra (0.75 lb ai/A) tank mixed with each of the following insecticides: Fipronil 80WG at 0.04 lb ai/A, Orthene 90S (acephate) at 0.2 lb ai/A, Bidrin 8EC (dicofthos) at 0.2 lb ai/A, Karate 1EC (*lamda*-cyhalothrin) at 0.02 lb ai/A, Lorsban 4 EC (chlorpyrifos) at 0.25 lb ai/A, Provado 1.6F (imidacloprid) at 0.05 lb ai/A, Vydate 3.77L (oxamyl) at 0.25 lb ai/A, Phaser 3EC (endosulfan) at 0.38 lb ai/A, Monitor 4EC (methamidophos) at 0.2 lb ai/A, and Lannate 2.4L (methomyl) at 0.25 lb ai/A. Weed control was visually rated on a scale of 0 to 100% where 0 = no control and 100 = all weeds dead as compared with a non-treated check. Ratings were made 2 and 4 weeks after treatment (WAT). In Experiment 1, plots were arranged in a completely randomized design and in Experiments 2 and 3, a randomized block design was used. All experiments were replicated 4 times. Data were analyzed by ANOVA and means were separated according to Fisher's protected LSD (PRM, Gylling Data Management 1996).

Results and Discussion

In Experiment 1, barnyardgrass control ranged from 45 to 70% at 2 WAT and 58 to 85% at 4 WAT (Table 1). Control with Roundup Ultra-insecticide mixtures was equivalent to that of Roundup Ultra alone at both rating dates. In Experiment 2, differences in barnyardgrass control among the Roundup Ultra and the Roundup Ultra-insecticide mixtures were not noted (Table 1). The higher barnyardgrass control observed at 2 WAT in Experiment 2 (83 to 90%) may be attributed to applications of Roundup Ultra to 3-leaf barnyardgrass in contrast with application at tillering in Experiment 1.

In Experiment 3, a single application of Roundup Ultra or Roundup Ultra-insecticide mixtures controlled

barnyardgrass at least 93% at 2 WAT (Table 2). No interaction between Roundup Ultra and insecticides was noted with respect to barnyardgrass control at 2 WAT. However, significantly lower barnyardgrass control was observed 4 WAT when Roundup Ultra was mixed with Provado relative to Roundup Ultra alone. This antagonistic interaction between Roundup Ultra and Provado, however, must be interpreted with caution, since no interaction was observed in the other experiments (Table 1).

In Experiment 3, hemp sesbania control 2 WAT was equivalent for all treatments, but none provided control greater than 48% (Table 2). At 4 WAT, hemp sesbania control ranged from 53 to 85%, but no differences among treatments were noted. Pitted morningglory control in Experiment 3 ranged from 75 to 91% 2 WAT (Table 2). Morningglory control with Roundup Ultra mixed with Fipronil (75%), Lorsban (78%), Provado (79%), and Monitor (80%) was significantly less than when Roundup Ultra was applied alone (91%). Since pitted morningglory was present in only one of three experiments, results should be considered preliminary. This research, however, is of importance since morningglory is a major weed problem in cotton and Roundup Ultra has provided variable morningglory control. Further research is necessary before definitive conclusions can be made.

References

Byrd, Jr., J. D. 1996. Report of the cotton weed loss committee, pp. 1513-1516. *In* Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Elkins, W. C., R. D. Shaw, and C. E. Snipes. 1996. Broadleaf weed control systems in Roundup Ready™ cotton, p. 1530. *In* Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Gylling Data Management. 1996. Pesticide Research Manager users guide, version 5, [ed.] Gylling Data Management, Brookings, SD.

Murdock, E. C., A. Keeton, and T. D. Isgett. 1996. Weed control in Roundup Ready™ cotton, p. 1531. *In* Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Sanders, D., E. Puls, Jr., T. Koske, J. M. Cannon, J. E. Boudreaux, and A. D. Owings. 1995. Louisiana's suggested chemical weed control guide. Cooperative Extension Service, Louisiana State University Agricultural Center. Pub. 1565.

Vencill, W. K. 1996. Weed management using herbicide resistant cotton, pp. 1532-1533. *In* Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Vidrine, P. R., D. B. Reynolds, and J. M. Beauboeuf. 1996. Weed control in Roundup Ready™ cotton in Louisiana, pp. 1516-1517. *In* Proc. Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Table 1. Percent barnyardgrass control 2 and 4 weeks after treatment (WAT) with Roundup applied alone and in combination with insecticides at Winnsboro (Experiment 1) and St. Joseph, LA (Experiment 2).

Treatment	Rate lb ai/A	Experiment 1		Experiment 2	
		2 WAT	4 WAT	2 WAT	4 WAT
Fipronil 80WG + Roundup Ultra	0.04 0.75	70 a	63 a	90 a	58 a
Orthene 90S + Roundup Ultra	0.2 0.75	47 a	65 a	88 a	60 a
Bidrin 8EC + Roundup Ultra	0.2 0.75	58 a	75 a	88 a	63 a
Karate 1EC + Roundup Ultra	0.02 0.75	48 a	60 a	90 a	54 a
Lorsban 4EC + Roundup Ultra	0.25 0.75	58 a	58 a	88 a	60 a
Provado 1.6 F + Roundup Ultra	0.05 0.75	68 a	85 a	85 a	51 a
Vydate 3.77L + Roundup Ultra	0.25 0.75	68 a	73 a	83 a	70 a
Phaser 3EC + Roundup Ultra	0.38 0.75	65 a	63 a	90 a	63 a
Monitor 4EC + Roundup Ultra	0.2 0.75	45 a	70 a	83 a	49 a
Lannate 2.4L + Roundup Ultra	0.25 0.75	60 a	75 a	85 a	61 a
Roundup Ultra	0.75	70 a	73 a	88 a	54 a
P > F		0.47	0.63	0.35	0.52

Table 2. Hemp sesbania (HS), pitted morningglory (PMG), and barnyardgrass (BG) control 2 and 4 weeks after treatment (WAT) with Roundup applied alone and combination with insecticides at Baton Rouge, LA.

Treatment	Rate lb ai/A	Weed Control					
		2 WAT			4 WAT		
		HS	PMG	BG	HS	PMG ^a	BG
Fipronil 80WG + Roundup Ultra	0.04 0.75	40 a	75 d	94 a	63 a	----	85 a
Orthene 90S + Roundup Ultra	0.2 0.75	43 a	84 a-d	95 a	85 a	----	90 a
Bidirin 8EC + Roundup Ultra	0.2 0.75	43 a	86 a-c	94 a	70 a	----	93 a
Karate 1EC + Roundup Ultra	0.02 0.75	43 a	83 a-d	93 a	81 a	----	78 a
Lorsban 4EC + Roundup Ultra	0.25 0.75	40 a	78 cd	95 a	85 a	----	93 a
Provado 1.6 F + Roundup Ultra	0.05 0.75	38 a	79 cd	95 a	53 a	----	56 b
Vydate 3.77L + Roundup Ultra	0.25 0.75	44 a	82 a-d	95 a	84 a	----	86 a
Phaser 3EC + Roundup Ultra	0.38 0.75	46 a	81 a-d	95 a	78 a	----	93 a
Monitor 4EC + Roundup Ultra	0.2 0.75	43 a	80 b-d	95 a	83 a	----	91 a
Lannate 2.4L + Roundup Ultra	0.25 0.75	44 a	90 ab	94 a	85 a	----	94 a
Roundup Ultra	0.75	48 a	91 a	95 a	75 a	----	93 a
P > F		0.35	0.04	0.43	0.21		0.02

^a Insufficient population to make ratings