Performance of Novaluron (Rimon®) Insect Growth Regulator in Burley and Dark Tobacco

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Introduction

Novaluron (Rimon®) insecticide is a novel insect growth regulator currently registered for use in apples, Irish and sweet potatoes, and several *Brassica* head and stem vegetables for control of several troublesome insect pests including codling moth, leaf miner, fruit moth, and several *Lepidoptera* insect pests, along with suppression of thrips. Novaluron belongs to a class of insecticides known as benzoylphenyl ureas. Novaluron is a chitin inhibitor that interferes with development of immature insects by preventing successful molting. Novaluron acts by ingestion mainly, along with some contact activity. Novaluron has been granted organophosphate (OP) replacement status by EPA and can be an important component of integrated pest management (IPM) programs in the crops where it is currently registered (Rimon Label and Technical Bulletin).

Based on its effectiveness to control *Lepidoptera* insects in other crops, novaluron could also be effective in control of troublesome *Lepidoptera* insects such as budworm and hornworm in tobacco, as well as providing some suppression of thrips transmitting tomato spotted wilt virus to tobacco.

Objective

The objective of this research was to evaluate the performance of novaluron (Rimon 0.83EC) for control of hornworm and budworm as well as crop safety in burley and dark tobacco.

Research Methods

Research trials were conducted at the University of Kentucky Research & Education Center in Princeton, KY and at the Murray State University West Farm in Murray, KY in 2008 and 2009. An experiment conducted in 2008 at Princeton evaluated budworm and hornworm control and crop safety in dark tobacco. 2009 experiments evaluated tobacco variety response to sequential novaluron applications in five popular burley varieties (Princeton) and three popular dark varieties (Murray). Experimental design for all trials was randomized complete block with 4 replications.

In the 2008 experiment, PD 7302LC dark tobacco was transplanted on June 2 at 4,900 plants per acre. Treatment applications were made broadcast with 10X hollow cone nozzles delivering 15 gal/A spray volume. Four applications were made on June 30, July 14, August 1, and August 26. Worm counts on 30 plants per plot were made at 7 to 14 day intervals throughout the season. Treatments included an untreated control, novaluron (Rimon 0.83EC) at 6, 9, 12, or 24 oz/A, and a local standard treatment which was Orthene 97 (0.77 lb/A) in applications 1 and 2, Tracer SC (2 oz/A) in application 3, and Dipel DF (1 lb/A) in application 4.

2009 experiments focused only on crop safety across popular burley and dark tobacco varieties. A burley variety response trial at Princeton included KT 206LC, KT 204LC, NC 7, KY 14xL8, and TN 90LC. A dark variety response trial at Murray included PD 7318LC, Narrowleaf Madole LC, and KY 171. The burley variety response trial at Princeton was transplanted on June 11 while the dark variety response trial at Murray was transplanted on June 9. Plant population in both trials was 4,900 plants/A. Treatments applied to all varieties in both trials included an untreated control and novaluron (Rimon 0.83EC) at 9, 12, or 24 oz/A. Five treatment applications were made in both trials. Treatment dates in the burley trial were July 10, July 24, August 11, August 18, and August 27. Treatment dates in the dark trial were July 1, July 24, August 4, August 12, and August 25. All applications made in 2009 to both trials were broadcast with hollow cone nozzles at 15 gal/A for the first two applications and at 30 gal/A for the remaining 3 applications.

Table 1. **Counts of hornworm and budworm per plot, and total dark-fired yield and quality grade index from Rimon and registered insecticides at Princeton, KY 2008.**

Treatment (No. of App.)	Rate /A	Count 1 July 14 14 DAT-1	Count 2 July 21 7 DAT-2	Count 3 August 1 14 DAT-2	Count 4 August 5 4 DAT-3	Count 5 August 22 21 DAT-3	Count 6 Sept 3 7 DAT-4	Count 7 Sept 11 14 DAT-4	Total Dark-Fired Yield	Total Dark-Fired Grade Index
		----------Worms/plot----------							Lbs/A	0-100
Untreated	0	0.25	1	4.25	10.75	12.75	6.75	2.75	3039	33.4
Rimon 0.83EC (4)	6 oz/A	0	0.25	3	6.75	3	0.50	0	3154	42.0
Rimon 0.83EC (4)	9 oz/A	0	0.25	2.25	5.50	2.50	0	0	2920	41.6
Rimon 0.83EC (4)	12 oz/A	0	0.50	2.50	3.50	1.75	0.25	0	2842	33.0
Rimon 0.83EC (4)	24 oz/A	0.25	0.25	0.75	3.25	1	0	0	2925	39.3
Local Standard: Orthene 97 (2) Tracer SC (1) Dipel DF (1)	0.77 lb/A 2 oz/A 1 lb/A	0.25	0.25	3.50	0.50	3.25	0	0	3008	59.3
	$LSD_{0.05}$	0.57	0.94	2.99	4.70	4.84	4.2	0.59	324	19.4

Table 2. **Yield response of popular burley varieties to Rimon applications at Princeton, KY 2009.**

		Burley Variety					
Treatment	Rate/A	KT 206LC	KT 204LC	NC 7	KY 14xL8	TN 90LC	Treatment Mean
		----------Total Yield (lbs/A)----------					
Untreated	0	2335	2348	2465	2197	1942	2244
Rimon 0.83EC	9 oz/A	2152	2380	2312	2017	2408	2254
Rimon 0.83EC	12 oz/A	2265	2259	2238	1905*	2374	2209
Rimon 0.83EC	24 oz/A	2142	2183	2086	1773*	1780	2000*
Variety Mean		2223	2293	2275	1966*	2126	$LSD_{0.05}$ variety means = 213
$LSD_{0.05}$ trt (var)		369	417	399	191	656	$LSD_{0.05}$ treatment means = 190

Table 3. **Yield response of popular dark varieties to Rimon applications at Murray, KY 2009.**

		Dark Variety			
Treatment	Rate/A	PD 7318LC	Narrowleaf Madole LC	KY 171	Treatment Mean
		----------Total Yield (lbs/A)----------			
Untreated	0	2929	3019	2676	2875
Rimon 0.83EC	9 oz/A	2752	2880	2961	2864
Rimon 0.83EC	12 oz/A	2767	2871	2797	2812
Rimon 0.83EC	24 oz/A	2678	3043	2776	2832
Variety Mean		2781*	2953	2803	$LSD_{0.05}$ variety means = 161
$LSD_{0.05}$ trt (var)		274	285	453	$LSD_{0.05}$ treatment means = 186

Results and Discussion

2008 Experiment

Results of the 2008 experiment at Princeton (Table 1) show that control of hornworm and budworm from Rimon at 6, 9, 12, or 24 oz/A was comparable to control from local standard treatments of Orthene 97, Tracer SC, and Dipel DF. Although there was some very minor phytotoxicity in dark variety PD 7302LC when treated with Rimon at 24 oz/A (data not shown), total dark-fired yield was not affected by treatment. However, quality grade index of untreated tobacco and tobacco treated with Rimon at 12 and 24 oz/A was significantly lower than tobacco treated with the local standard Orthene 97/Tracer SC/Dipel DF program.

2009 Experiments

Results of the 2009 burley variety response trial at Princeton (Table 2) show that there was some differential response to Rimon between burley varieties. The early-maturing KY 14xL8 was the most sensitive to Rimon applications. The later-maturing KT 206LC, KT 204LC, NC 7, and TN 90LC responded similarly to Rimon applications. KY 14xL8 had significantly lower average yield across all treatments than the other varieties tested. KY 14xL8 treated with Rimon at 12 or 24 oz/A had total yield that was significantly less than untreated KY 14xL8. Average total yield across all 5 varieties from tobacco treated with Rimon at 24 oz/A was significantly less than untreated average total yield across the 5 varieties. Quality grade index was not influenced by treatment in any burley variety tested (data not shown).

Results of the 2009 dark variety response trial at Murray (Table 3) suggest that dark tobacco varieties were generally less sensitive to Rimon applications than burley tobacco varieties. Of the 3 dark varieties tested, phytotoxicity data showed that PD 7318LC was the most sensitive to Rimon application and Narrowleaf Madole LC was the least sensitive (data not shown). Averaged over all treatments, total yield of PD 7318LC was significantly less than total average yield of Narrowleaf Madole LC. Quality grade index was not influenced by treatment in any dark variety tested (data not shown).