

EVALUATION OF SURFACTANT EFFECTS ON EFFICACY OF CORAGEN AGAINST LEPIDOPTEROUS PESTS AND WHITEFLIES ON COLLARDS AND SQUASH

Alton N. Sparks, Jr., Georgia Cooperative Extension, University of Georgia, Tifton Campus, P.O. Box 748, Tifton, GA 31793

Introduction

Coragen is a new insecticide being developed by DuPont. This product represents a new chemistry and has shown activity against a variety of caterpillar pests and silverleaf whiteflies. Coragen has shown excellent systemic activity when applied in the root zone. Foliar activity has not been as strong in some tests, and addition of a surfactant has been proposed to aid foliar applications. These tests were conducted to evaluate the effects of the addition of Dyne-Amic on efficacy of Coragen. One test was conducted to evaluate effects on efficacy against lepidopterous pests on collards, and a second test evaluated the effects on efficacy against sweetpotato whitefly on squash.

Materials and Methods

Both tests were conducted at the UGA Horticulture Farm in Tifton, Georgia. Both tests were established as RCB designs with four replications. Both crops were grown with a single row on a six foot bed, but were treated as a three foot row for insecticide applications. Collards (var. Flash) were transplanted on 2 Aug., 2007. Squash (var. Destiny III) was direct seeded. Experimental plots were one row by 20 feet in the collards, and one row by 25 feet in squash.

Treatments in the squash trail included Coragen alone at 0.044 and 0.088 lb AI/ac and Coragen at 0.044 lb AI/ac plus Dyne-Amic at 0.5% v/v. The insecticide standard treatment for this test consisted of a single foliar application of Venom at 3 oz/ac pre-bloom, followed by foliar applications of Warrior at 0.03 lb AI/ac. A non-treated check was also included. The collards trail consisted only of the 0.044 lb AI/ac rate of Coragen with and without the Dyne-Amic, and a non-treated check. All foliar applications were applied with a CO₂ pressurized backpack sprayer (60 PSI) in 40 GPA with three hollow-cone nozzles per row (one nozzle over-the-top and two on drops).

The collards test was treated on 5 and 25 Sept. Caterpillar densities were monitored by visual examination of 5 randomly selected plants per plot and identifying and counting all caterpillars present. Additionally, plot damage ratings were conducted on two dates, with plots rated as follows: 0 = no damage, 1 = light damage on < 1/2 of plants in the plots, 2 = light damage on > 1/2 of plants, 3 = moderate damage on < 1/2 of plants, 4 = moderate damage on > 1/2 of plants, 5 = heavy damage on < 1/2 of plants, and 6 = heavy damage on > 1/2 of plants.

The squash trail was treated on 24 Sept (Venom in the venom/warrior treatment), and 1, 9 and 16 Oct. (Warrior in the venom warrior treatment). The check was treated with Venom on 25 Sept to maintain live plants in these plots. The entire squash test was treated with Venom at 6 oz/ac through the drip system on 10 Sept, and was treated with bifenthrin+orthene on 14, 20 and 27 Sept to aid in whitefly control (although resistance appears to have made these treatments futile). Plots were rated for silverleaf (but data is not shown as no effects were detected). Vigor ratings were conducted based on relative growth of plants within a plot, with vigor rated as follows: 1 = largest plants in test, 2 = intermediate, 3 = severely stunted plants, 4 = most plants dead. Yields were collected by harvesting all fruit of marketable size.

All data were analyzed with the PROC-ANOVA procedure of PC-SAS. Where significant differences ($P < 0.05$) occurred, means were separated with LSD ($P = 0.05$).

Results and Discussion

In the squash test, silverleaf symptoms were severe and fairly uniform throughout the test and are not reported. Plant vigor ratings and yields (Table 1) reflect impacts on whitefly, which were severe enough to actually kill plants. Only minor differences occurred through 4 Oct. (whitefly treatments were applied uniformly across the entire test through 27 Sept.). On 12 Oct., plant growth differences were obvious. Those treatments receiving Venom foliar applications (Check and Venom/Warrior treatments) and the Coragen+DyneAmic treatment showed much less stunting than the Coragen treatments without surfactant. Yields showed the same trends as plant vigor ratings. Thus, these data clearly show increased efficacy of Coragen against whiteflies in squash with the addition of Dyne-Amic.

Results in the collards trail show no effect of the addition of Dyne-Amic to Coragen (Tables 2 and 3). Coragen did provide reduction in caterpillar densities and damage in the collards trail, but no difference was detected between the Coragen alone and Coragen plus Dyne-Amic.

These two test clearly show different results. While several factors may have influenced the results, the simplest explanation lies in the purpose of the surfactant and the insects feeding habits. The surfactant is intended to aid penetration into the leaf. The caterpillar pests consume large sections of the leaf (including the surface) and thus consume the pesticide even if it is primarily on the surface. However, whiteflies feed on plant sap within the leaf tissue and addition of a surfactant to aid leaf penetration exposes this pest to a greater concentration of insecticide.

Table 1. Plant vigor ratings yields, Coragen surfactant test in squash, UGA, Horticulture Farm, Tifton, GA, 2007.

Treatment	Vigor Ratings			No. of fruit harvested per plot	
	28 Sept.	4 Oct.	12 Oct.	15 Oct.	Total
Check	2.00 a	1.25 a	1.50 b	12.25 a	15.25 a
Venom/ Warrior	1.63 a	1.75 a	1.63 b	9.50 a	10.75 ab
Coragen 0.044	2.00 a	1.88 a	3.00 a	2.50 b	3.50 b
Coragen 0.088	2.38 a	2.25 a	3.25 a	2.75 b	4.25 b
Coragen 0.044 +DyneAmic	2.00 a	1.88 a	1.88 b	11.25 a	17.50 a

Numbers within columns followed by the same letter are not significantly different (LSD; P=0.05)

* Differences were detected at P=0.1

Table 2. Coragen foliar treatments in collards, with and without surfactant. UGA Horticulture Farm, 2007.

Treatment	Average number of caterpillars per plot (primarily cabbage looper)					
	7 Sept.	11 Sept.	14 Sept.	18 Sept.	24 Sept.	28 Sept.
	2 DAT-1	6 DAT-1	9 DAT-1	13 DAT-1	19 DAT-1	3 DAT-2
Check	0.75 a	1.75 a*	5.50 a*	4.25 a*	3.00 a	1.75 a
Coragen	0.00 b	0.00 a	0.00 a	0.25 a	2.75 a	1.00 a
Coragen+ DyneAmic	0.00 b	0.00 a	0.25 a	0.00 a	1.50 a	0.50 a
	2 Oct.	5 Oct.	8 Oct.	12 Oct.	15 Oct.	22 Oct.
	7 DAT-2	10 DAT-2	13 DAT-2	17 DAT-2	20 DAT-2	27 DAT-2
Check	3.00 a	2.50 a	1.50 a	3.00 a	6.75 a	5.00 a
Coragen	0.75 b	0.50 b	1.25 a	1.00 a	1.50 b	4.25 a
Coragen+ DyneAmic	0.25 b	0.25 b	0.00 a	1.50 a	1.50 b	6.75 a

Numbers with species and column followed by the same letter are not significantly different (LSD; P=0.05).

*ANOVA results indicated P>0.1 for the model, but treatment effect P<0.05.

Table 3. Plot damage ratings, Coragen surfactant test in collards, UGA Horticulture Farm, Tifton, GA, 2007.

Treatment	Average plot damage rating	
	24 Sept.	22 Oct.
	19 DAT-1	27 DAT-2
Check	4.50 a	5.67 a
Coragen	0.75 b	5.00 b
Coragen+ DyneAmic	1.25 b	4.75 b

Numbers within columns followed by the same letter are not significantly different (LSD; P=0.05).