Determination of Residual Control of Commonly used Insecticides in Soybean and Cotton, 09-2020

Annual Report 2020-2021

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Background and Objectives

Due to increased costs of insecticides, particularly newer products, the most asked question by growers is length of control. This drives many decisions on product choice. For example, if product A is $10.00/Acre and provides 5 days of control, the grower is essentially spending $2.00/day for insect control compared to insecticide B that cost $15.00/Acre and provides 10 days of control. Product B is costing the grower $1.50/day for insect control and is a better investment. Most estimates of residual control with currently used insecticides are non-scientific best guesses and are generally wrong. This experiment will address true residual control (and examine systemic uptake) producers can expect in both soybean and cotton with commonly used insecticides targeting several key pests in each crop. This research will be jointly funded by both commodities.

Objective 1: Determine insecticidal residual of commonly used insecticides in soybean and cotton.

Objective 2: Systemic quantification of diamides in soybean and cotton

Objective 3: Validate mortality of systemic concentrations on mortality of Corn Earworm and Soybean Looper

Report of Progress/Activity

Objective 1: All treatments out to 21 days after application (DAA) significantly reduced stink bug numbers below the untreated check (Table 1). At 28 DAA, there was not a significant interaction

between treatment and DAA. Data from this study is currently preliminary.

Objective 2. Chlorantraniliprole concentrations in soybean flowerets and cotton flowers have been quantified. Results from the chemical analysis showed concentrations of chlorantraniliprole in trace amounts in soybean flowerets and cotton flowers out to 14 days after application (DAA) (Figure 1,2). In soybean leave tissue, chlorantraniliprole concentrations decrease moving from the top to the bottom of the plant. Expectedly, these concentrations decrease over time measured out to 28 days after application (Figure 3,4,5). There were no significant interactions between treatment and position in soybean leaves at 14, 21, 28 days after application. Date from this study is currently preliminary.

Objective 3. This spring additional lab bioassays will be conducted to supplement the field bioassays. These bioassays will be diet incorporated bioassays using data generated from the chemical concentrations of the infield flower and leave samples sent to chemical analysis lab at Mississippi State University. Once the bioassays have been completed, this data will be stand alone data.

Impacts and Benefits to Mississippi Soybean Producers

With the increase cost of insecticides, the data in the study has allowed for a better understanding on insecticide residual and the approximate length of control targeting either stink bugs or corn earworm in Mississippi soybean production systems. With an average of two foliar insecticide applications annually targeting either stink bugs or corn earworm, this data will be applicable to all acres that might receive in insecticide application.

End Products–Completed or Forthcoming

Data has been presented at two regional meetings in 2021. There are plans to present data at least one local and national meeting in 2021. In addition to data presentations at local, regional, and national meetings, there are plans to use this data for blog articles on the Mississippi State Crop Situation Blog and at the conclusion of the second year, all data will be published in a referred journal.

Graphics/Tables

Table 1. Impact of selected insecticides targeting stink bugs in soybeans

Treatment	Rate/acre	Average stink bugs/25 sweeps				
		3 DAA	7 DAA	14 DAA	21 DAA	28 DAA
Untreated Control	-	5.8a	5.2a	10.5a	18.2a	12.1a
Orthene 90S	.75[a]	.66b	2.2b	4.7b	11.8b	12.5a
Brigade 2EC	6.4[b]	2.16b	2.7b	5.6b	7.8b	6.02a
Orthrene 90 + Brigade 2EC	.75[a] +6.4[b]	.833b	1.3b	3b	7.7b	7.1a
Belay	6[b]	1.9b	2.4b	5.1b	7.3b	10.1a
P>F		0.0009	0.0008	0.0006	<0.0001	.1039

Means within a column followed by a common letter are not significantly different (FPLSD 0.05).

[a] lbs/ac

[b] oz/ac

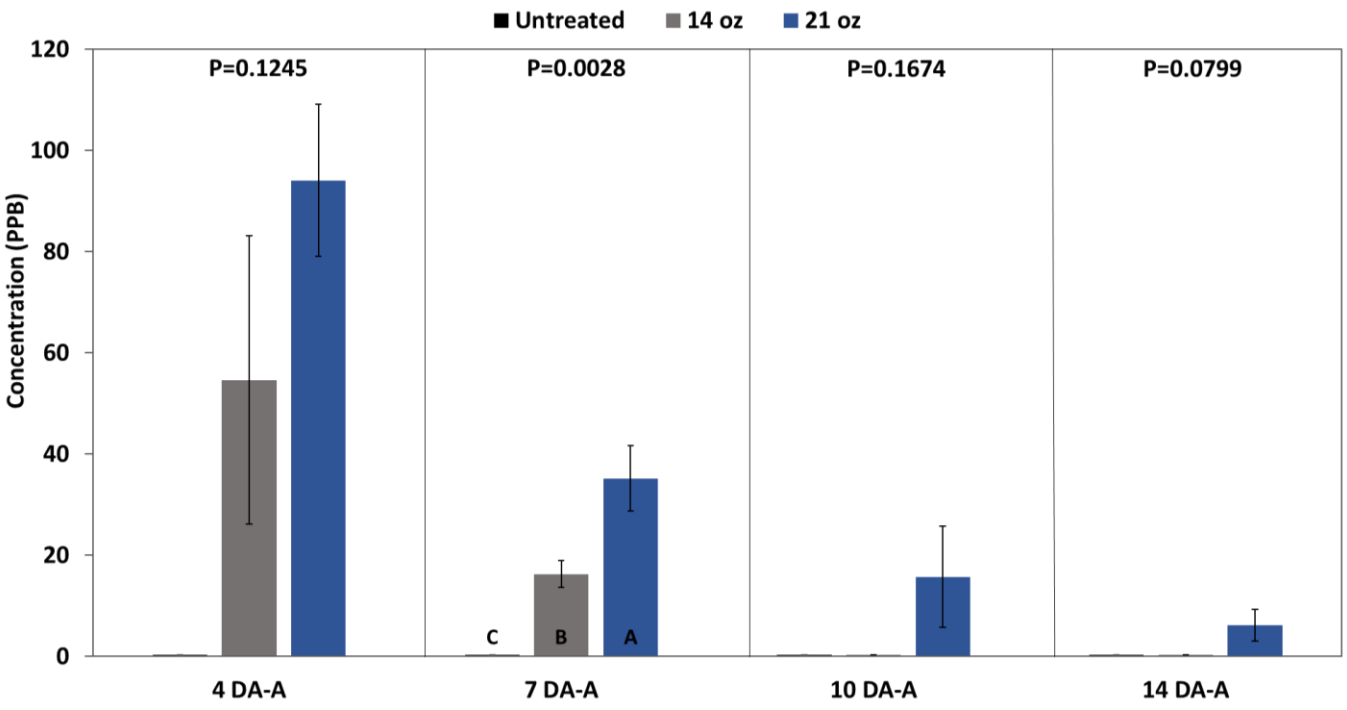

Figure 1: Chlorantraniliprole Concentrations in Soybean Flowerets
(P≥0.05, Fisher's PLSD)

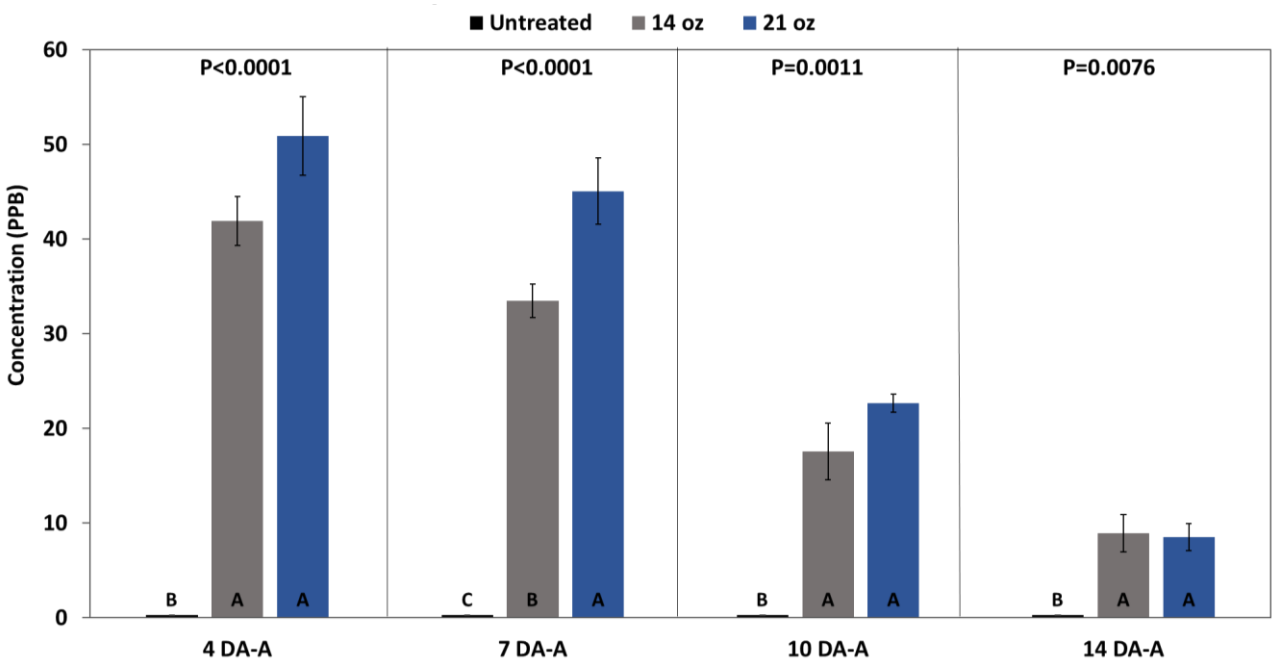

Figure 2: Chlorantraniliprole Concentrations in Cotton Flowers
(P≥0.05, Fisher's PLSD)

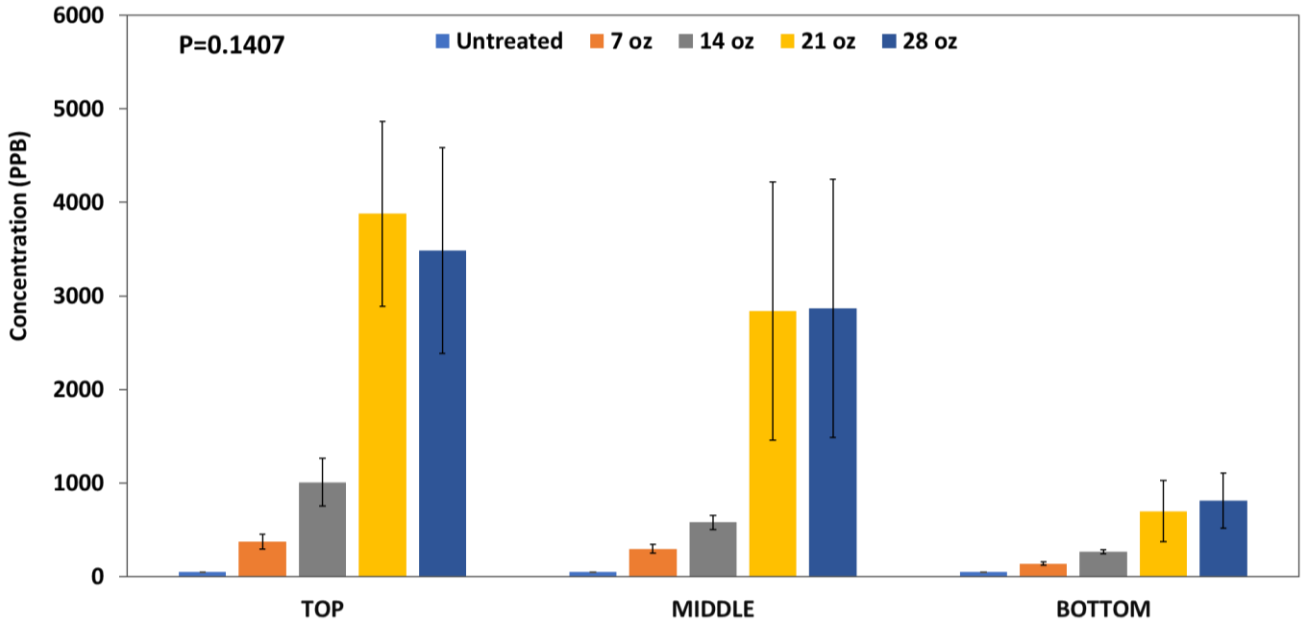

Figure 3: Chlorantraniliprole Concentrations in Soybean Leaves
14 Day After Application
(P≥0.05, Fisher's PLSD)

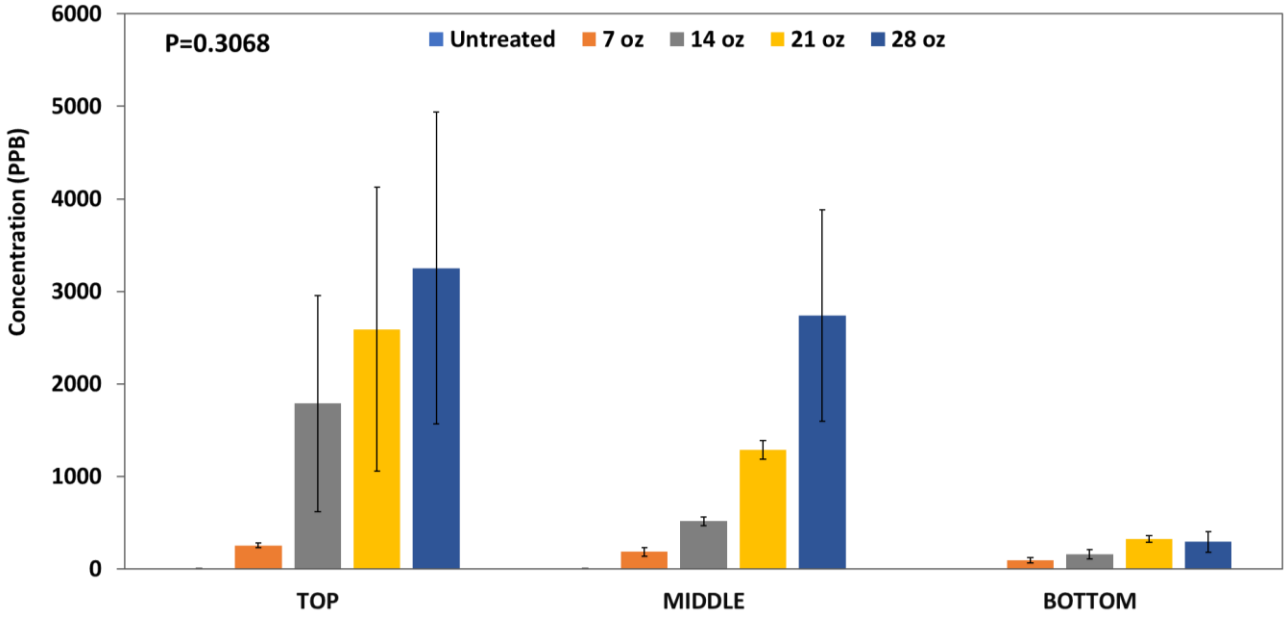

Figure 4: Chlorantraniliprole Concentrations in Soybean Leaves
21 Day After Application
(P≥0.05, Fisher's PLSD)

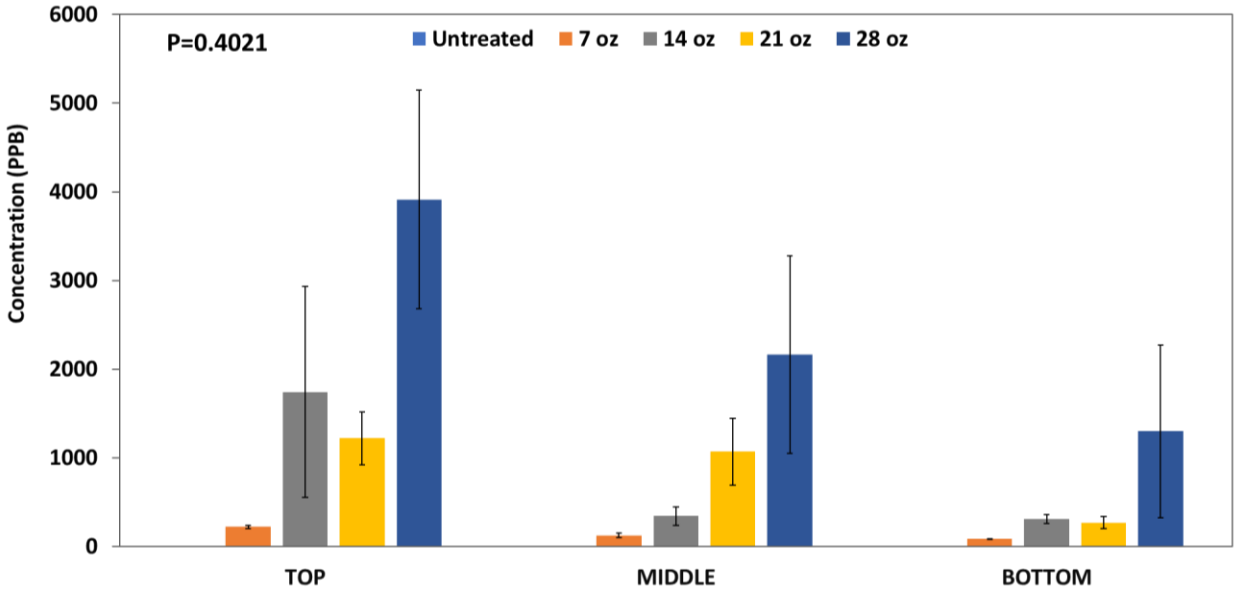

Figure 5: Chlorantraniliprole Concentrations in Soybean Leaves
28 Day After Application
(P≥0.05, Fisher's PLSD)