Potato Insecticide Evaluation

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Introduction

The Colorado potato beetle (CPB) and the potato leafhopper (PLH) are two important insect pests that need to be managed for profitable potato production. The CPB, in particular, is troublesome because it has developed resistance to insecticides in the carbamate, organophosphate, and pyrethroid chemical groups. Currently, insecticides in the neonicotinoid group provide effective control of CPB, but there are concerns that with continued use of neonicotinoids this resilient pest also will develop resistance to this group of insecticides. The objective of this study was to evaluate a new insecticide called cyantraniliprole, trade marked Cyazypyr™ by Dupont, for its effectiveness against our common insect pests and its usefulness in a CPB insecticide resistance management program.

Materials and Methods

Potato seed, cultivar Atlantic, was planted on April 25, 2013, in Schmidt Field 3 at the ISU Muscatine Island Research Farm, Fruitland, Iowa. Except for the insecticide treatments, normal cultural practices for commercial potato production were followed during the season. Trial design was a randomized complete block with three replications. A plot consisted of 3 rows × 25 ft long. Trial data were collected from the center row of each plot. Insecticide treatments (Table 1) were applied with a CO_2 pressurized backpack sprayer. Planting time treatments were applied with single nozzle boom spraying in the furrow over the seed pieces right before hilling on April 25. Foliar treatments were applied on June 13 with a 4-nozzle boom set at 25 psi and delivering spray material at 20 gallon/acre rate. Effect of insecticide treatments on PLH were determined by randomly selecting three leaves from center row of each plot and counting number of nymphs (juvenile PLH without wings). Treatment yield was determined on July 17 by harvesting the center row of plots, then grading and weighing harvested tubers.

Results and Discussion

Cyantraniliprole insecticide is currently not registered for use on potatoes in the United States but is expected to receive EPA approval in the future for use as an in-furrow treatment (formulated as Verimark) or foliar treatment (formulated as Benevia). It was selected for this evaluation because it has been reported to be highly effective at controlling CPB and has a mode of action (group 28) that is different from that of our currently used neonicotinoid insecticides (group 4A). Unfortunately, we were not able to evaluate the effectiveness of cyantraniliprole against CPB because the pest never appeared in numbers large enough to be a problem this year. Evidently the local CPB population has been dramatically reduced by recent and widespread use of neonicotinoid insecticides. Local potato growers would say this is a good outcome but it was disappointing from a research result point of view. However, our efforts were not wasted as the trial was infested with PLH by late June and did generate good information related to controlling this important pest.

Foliar insecticide treatments were applied on June 13 after the first sightings of PLH adults and nymphs on foliage. Table 2 presents tuber yields for the different insecticide treatments and the average number of PLH nymphs per leaf on June 20 and July 3. Treatments 2, 4, 8, and 9 dramatically reduced numbers of PLH nymphs and produced greater total and A-size tuber yields over Treatment 1 (control, no

insecticide). Treatments 3, 5, 6, and 7 did not reduce the number of PLH nymphs on the foliage and tuber yields were similar to untreated plots.

These results indicate that when and if cyantraniliprole insecticide (Dupont Cyazypyr™ to be formulated and marketed as Verimark and Benevia) are used in a CPB resistance management plan, the potato crop still needs to be scouted for PLH, and an appropriate insecticide for this pest also applied when needed. For example, both Treatments 3 and 4 received Verimark insecticide at planting but Treatment 4 had higher yield because it also received a foliar application of Mustang Max providing improved control of PLH.

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Table 1. Insecticide treatment descriptions, application method and rate, and group number.

Treatment (active ingredient)	Company	Application method, rate/acre	Group
1 Control, no insecticide		Untreated	---
2 Admire Pro (imidacloprid)	Bayer	In-furrow at planting, 8 fl oz/acre	4A
3 Verimark (cyantraniliprole)	Dupont	In-furrow at planting, 13.5 fl oz/acre	28
4 Verimark (cyantraniliprole)	Dupont	In-furrow at planting, 13.5 fl oz/acre	28
Mustang Max (zeta cypermethrin)	FMC	Foliar spray, 4 fl oz/acre	3
5 Benevia (cyantraniliprole)	Dupont	Foliar spray, 5 fl oz/acre	28
6 Radiant (spinetoram	Dow	Foliar spray, 8 fl oz/acre	5
7 Rimon (novaluron)	Chemtura	Foliar spray, 12 fl oz/acre	15
8 Actara (thiamethoxam)	Syngenta	Foliar spray, 3 oz/acre	4A
9 Mustang Max (zeta cypermethrin)	FMC	Foliar spray, 4 fl oz/acre	3

Table 2. Insecticide treatment total yield, A-size yield, tuber specific gravity and average number of potato leafhopper (PLH) nymphs per leaf on June 20 and July 3.

	Total Yield	A-size yield[a]	Specific	PLH nymphs[b]	
Treatment	Cwt/acre	Cwt/acre	gravity	June 20	July 3
2 Admire Pro	254.6	214.0	1.090	0.0	0.1
8 Actara	253.4	212.3	1.088	0.1	0.0
9 Mustang Max	252.1	218.3	1.089	0.0	0.0
4 Verimark + Mustang Max	242.8	197.3	1.089	0.0	0.1
5 Benevia	207.5	165.0	1.085	3.9	4.6
3 Verimark	203.8	158.8	1.088	4.3	5.3
7 Rimon	199.2	159.2	1.091	3.6	4.8
1 Control, no insecticide	191.6	137.9	1.089	4.7	4.6
6 Radiant	184.1	149.9	1.087	5.0	4.2
LSD 5%	36.8	38.0	n.s.	1.5	1.7

[a]Tuber diameter larger than 1 7/8 in.
[b]Average number of PLH nymphs on compound leaf taken from middle of canopy.