PEST MANAGEMENT OPTIONS IN PROCESSING SNAP BEANS

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Abstract. Effective, economical, and efficient season-long management of key insect pest species in commercial, succulent snap bean continues to be a challenge for many locales in the Midwest. Much of the processing snap bean crop in the upper Midwest is now treated with an at-plant, seed treatment including thiamethoxam, (Cruiser® 5FS). This prophylactic approach is designed to mitigate risk of damage by both seed corn maggot (SCM), *Delia platura*, and the potato leafhopper (PLH), *Empoasca fabae*. Cruiser applied at the labeled rates of 1.28 fl oz / 100 lb of seed, has been demonstrated to protect the crop from the early season seed maggot pressure as well as the damage resulting from immigrant potato leafhopper populations for nearly 50 days. Unfortunately, the Cruiser seed treatments will not protect the crop against infestation by the European corn borer. As a result, if degree day accumulations are favorable for a flight of European corn borer at a vulnerable stage of snap bean development (e.g. flowering to pin bean stage), a foliar spray of insecticide continues to be warranted. The current project proposes to continue with these evaluations and compare an experimental and a commercially registered anthranilic diamide, cyazypyr (HGW86 20SC), and rynaxypyr (Coragen® 1.67SC), respectively, as both in-furrow and seed treatment applications for the control of European corn borer in succulent snap beans.

Introduction. We continue to work in this area of investigation (seed and in-furrow treatments) and add insecticide applications with the starter and side-dress fertilizer application. European corn borer (ECB), *Ostrinia nübilalis*, is a perennial pest of snap bean in the Great Lakes region of North America, areas throughout the Midwest and also in the Mid-Atlantic States. Although ECB infestations in snap bean fields are typically low, this insect is considered a major threat to the processing industry because larvae may be processed and packaged in cans with the beans, thereby contaminating the product. Consequently, the threshold for ECB-contaminated beans in cans is very low. Despite a wealth of information for managing ECB in snap bean, this insect continues to threaten processing snap bean production in the areas mentioned above. Investigating approaches to improve insect pest management and integrate reduced-risk pest management options into snap bean pest management is among the Midwest Food Processor Association's highest priorities for research in 2009.

Insecticide control is the best option for managing ECB infestations in snap bean. ECB only threatens the snap bean crop during an approximately 14-day window, from bud stage (26 days before harvest) to the pod formation stage (12 days before harvest). Thus, only 1 to 2 applications are generally needed to manage this pest. Control of ECB before bud stage or within 12 days of harvest is rarely needed because larvae that hatch from eggs laid during

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these periods will not bore into market-sized pods. Every season, fields are sprayed 1 to 3 times with an insecticide application proven to provide adequate control of ECB. Yet, ECB larvae continue to be detected in beans that come through processing plants as internal contaminants. Based on spray records, many fields that had ECB-contaminated beans were sprayed one time, approximately 30 days before harvest. This approach is taken so that the insecticide can be tank mixed with a fungicide for white mold control. Unfortunately, timing of this tank mix is likely too early for effective ECB control and reduced contamination.

Research is needed to identify (1) insecticides that have longer residual activity to provide more flexibility in timing sprays for ECB control, and (2) alternative delivery systems such as in-furrow or side-dress applications plus seed treatments of systemic insecticides for ECB control that could replace the need for multiple foliar sprays. Reducing this need for sequential foliar sprays would minimize the number of require passes over the production field and ultimately reduce control costs. Fortunately, two novel insecticides from the diamide class of insecticides (Group 28; Insecticide Resistance Action Committee; http://www.irac-online.org) have emerged with systemic activity against ECB, corn earworm, beet armyworm, as well as several other Lepidopteran insect pests. The active ingredients include rynaxypyr and cyazypyr, but only rynaxypyr has a federal label. In January 2010, DuPont received an amendment from EPA that adding snap bean to its current rynaxypyr (Coragen) label. Both Coragen and HGW 86 (cyazypyr) were considered very effective against both SCM and ECB in recent snap bean trials conducted in.

The purpose of this project is to evaluate rynaxypyr and cyazypyr applied via different methods for controlling ECB in processing snap bean. The expected outcome of this research is that we will identify an approach for ECB control that will be more effective and easier to use than relying on multiple, well-timed foliar sprays. One potential outcome may be developing an insecticide seed treatment that provides season-long protection against ECB which could be coupled with existing seed treatment technologies. The benefits of this project are obvious, especially if a seed treatment is effective. Even an in-furrow or foliar application of one of these new systemic insecticides could provide major benefits in increasing the flexibility of timing applications to obtain better control (i.e., a tank mix with a fungicide for white mold control may be more effective). Despite the systemic nature of this new chemistry, EPA has viewed its environmental and toxicological profiles very favorably.

Table 1. Damage estimates of stems and pods, and total pod weights harvested.

			19 July		
Treatment	**Rate**	**Application Type[1]**	**Proportion of Damaged Stems**	**Proportion of Damaged Pods**	**Pod weights (lbs)**
Untreated	-	-	0.15 a	0.05 a	5.13 b
Coragen 1.67 SC	3.5 fl oz/a	IF	0.07 b	0 b	6.05 ab
Coragen 1.67 SC	5 fl oz/a	IF	0.02 b	0 b	6.08 ab
Coragen 1.67 SC	7 fl oz/a	IF	0.01 b	0 b	6.3 ab
Verimark 20 SC	10 fl oz/a	IF	0 b	0 b	6.03 ab
Verimark 20 SC	13.5 fl oz/a	IF	0 b	0 b	6.8 ab
Coragen 1.67 SC	5 fl oz/a	F-Pre	0.01 b	0 b	6.8 ab
Coragen 1.67 SC	7 fl oz/a	F-Pre	0.01 b	0 b	5.8 ab
Verimark 20 SC	10 fl oz/a	F-Pre	0 b	0 b	6 ab
Verimark 20 SC	13.5 fl oz/a	F-Pre	0 b	0.002 b	7.13 a
Coragen 1.67 SC	5 fl oz/a	F	0.02 b	0 b	6.4 ab
Benevia 10 SE	13.5 fl oz/a	F	0.01 b	0 b	6.85 ab
		P	0.004	0.089	0.62
		LSD	0.07	0.003	1.76

[1]IF = In-Furrow; F-Pre = fertilizer pre-mix; F = foliar