

Management of Corn Earworm in Organic Sweet Corn

Problem Description

Large scale production of organic sweet corn for processing is a relatively recent venture in eastern Washington, having first started in 1998. Currently, Washington is the leading producer of processed organic sweet corn. All major sweet corn processors currently contract and process organic sweet corn and production has not kept up with demand. According to the majority of sweet corn processors, management of corn earworm (CEW) is the single biggest pest management challenge to production of organic sweet corn.

Based on the previous two years of research growers have adopted Gemstar and Entrust as the standards for controlling corn earworm in organic sweet corn. Growers are resistant to the three to five day intervals recommended by the researchers. Growers would like to move to a longer period of residual control for CEW control. To be effective for insect control by chemigation, growers have to reduce the water volumes, this reduces the water available for irrigation. A short interval for insecticide application during a period of heavy water demand coincides with late season heavy corn earworm pressure. Growers want to have a longer period of residual control so they have time to fully irrigate their fields between insecticide chemigation applications.

There are no data available showing efficacy of products by aerial application.

The objective of this project is generate data on whether longer chemigation application intervals will still be as effective as the currently recommended shorter intervals and demonstrate whether organic insecticides are effective when applied by air.

1. Crop farmgate value stating the estimated per acre value of the site or crop.

In 2008 there were approximately 6,000 acres of sweet corn, up from 3,445 acres in 2004, indicating a rapid growth in the industry. Currently organic sweet corn represents 10% of all sweet corn in the state (pers. comm. David Grantanstein, WSU CSANR). At an average yield of 7 ton per acre and an average price of \$160 per ton, the per acre value of the crop is \$1,120 or \$6.7 million to Washington. Organic sweet corn grown in the Columbia Basin of Oregon also suffers from corn earworm. Data on sweet corn for 2009 is not yet available but industry experts believe production of organic sweet corn is the same in 2009 and will be the same in 2010 as in 2008.

2. Per acre/unit impact including potential monetary losses if appropriate.

One sweet corn processor indicated that conventionally produced sweet corn will commonly have a 2 to 4% loss due to CEW, while organic sweet corn will have losses of 10% to 14% due to the pest. Other processors have indicated lower levels of damage. We estimate that CEW could cost organic growers up to \$110 per acre in losses, not

including pest management expenses. The down stream value of this loss to processors is probably three times this amount.

3. Acres impacted.

Depending on the year, CEW infests between 75% and 100% of organic sweet corn at peak infection periods. The pest tends to be a more significant problem in the central and lower Columbia Basin.

4. Aggregate impact to the industry, including aggregate value of the site or crop in the state.

It is estimated that at the current size of the organic sweet corn industry, that this pest costs growers approximately \$600,000, not including cost of control. The cost of the processors is probably three times this amount.

5. Effect of the problem on the industry.

Control of CEW is limiting production of organic sweet corn. Control of this pest would help acreage of the crop to expand in Washington and Oregon. One industry representative estimates that a market exists for the production of 40,000 acres of organic sweet corn in the Columbia Basin.

6. Effect of the problem on consumers, society, environment, non-target species or human health.

Consumers who purchase organic food typically do so for their children. Organic sweet corn is popular with consumers because it is one of the few vegetables that children universally enjoy. Many consumers believe that production of crops organically is beneficial to human health and the environment. If this is so, expansion of organic sweet corn production would increase protection of human health and the environment.

Description of alternative control measures and why they are not effective or additional information on the specific need.

Until the WSCPR/industry funded research effort there was very little available information on control of CEW in organic sweet corn in Washington. Growers have recently gained access to Entrust (spinosad) and Gemstar, a virus, and are in the process of learning how to use them. Pyganic has no residual activity, but it is thought that Pyganic in combination with a Bt product could provide residual control. Bacillus thuringiensis and azadiractin are known to have activity against CEW. No data were available on rate response, intervals, tank mix combination, rotations and method of application prior to 2008. Significant preliminary research results were obtained from industry and WSCPR funded work in 2008 and 2009. A brief summary of information learned from the previous 2 years' research is included at the end of this report.

Products are applied by air and by chemigation. Prior to this research effort there were no data available demonstrating efficacy of organic CEW materials by chemigation. This research has conclusively demonstrated this method of application is effective.

Older varieties of sweet corn had some resistance due to physical impediment to CEW larvae entering the cob. The switch to new disease tolerant varieties has seen the elimination of these older varieties. Varieties of processing vegetables, such as sweet corn, is typically done by the processor, which leaves the farmer with no ability to choose varieties based on CEW resistance.

Funding Priority

Category C - Significance to Local or Regional Economy

III. Development of an integrated pest management tactic

IV. Registration of an additional pest control tactic

Project Description.

The research lead has several years experience conducting CEW trials in conventional sweet corn. This trial would be similar in design to a conventional CEW trial, except it would be located on certified organic ground (certification number 1789) at the ADG research farm. The trial would consist of products known to have efficacy to varying degrees against CEW. A list of treatments will be based on the results from 2008 and 2009. The list will be generated in consultation with representatives of pesticide companies and the sweet corn industry. Products likely to be included are Entrust, Gemstar, Dipel, azadiractin and Pyganic.

The plots will be planted with organic sweet corn seed in late May, late enough to ensure infestation by CEW. Based on historical trends, insect pressure should be more than adequate. There will be four replications in a randomized complete block design. Ground applications will be made with a back pack spray. Chemigation applications will be using sprinkler nozzles attached to a boom sprayer. Plots approximately 100 feet by 20 feet would be use for the aerial application.

Project Budget

This project originated from the processed sweet corn industry and we expect to have support from the industry again. We also expect to receive support from chemical companies.

Expenditure	WSCPR (Request)	Matching (CASH or IN-KIND)			TOTAL COST
		Processors	Registrants	Source:	
		Amount (CASH)	Amount (CASH)	Amount (IN-KIND TIME)	
Salaries ¹	6,000	6,000			12,000
Employee Benefits	1,500	1,500			3,000
Temporary or hourly workers	1,500	1,500			3,000
Travel					
Equipment					
Supplies ²	1,000	1,000			2,000
Other (specify)					
Total	10,000	10,000			20,000

1 This provides support for Research Technician and Farm Manager.

2 This covers the production and research costs of the organic sweet corn.

Has this budget been reviewed for accuracy? Yes By Whom? Stacey Hill

Projected Expenditures (by quarter)

Time Period	Jan-Mar 2010	Apr-Jun 2010	Jul-Sept 2010	Oct-Dec 2010	Jan-Mar 2011	Apr-Jun 2011
WSCPR Funds		2000	6000	2000		
Total Funds		4000	14000	2000		

Has this project been funded previously by WSCPR? Yes

Results Summary of 2008 and 2009 Organic Sweet Corn Earworm Project

1. Shorter intervals (3 to 5 days) improve efficacy; a 7 day interval is too long for Gemstar if corn earworm pressure is high.
2. Entrust, Gemstar, Dipel and Neemix all can significantly reduce corn earworm pressure.
3. A tank mix of Entrust and Gemstar may improve efficacy as compared to use of either product alone.