Field Evaluation of Registered Insecticides for Managing Caterpillars on Cabbage

Zsofia Szendrei (szendrei@msu.edu) and Adam M. Byrne
Department of Entomology, Michigan State University, East Lansing, MI, 48824
Lab website: http://vegetable.ent.msu.edu/

Cabbage has one of the longest developmental times among annual vegetable crops, with seeds planted indoors in March and harvest occurring in late Fall. During this time period in Michigan there are numerous insect pests that feed on cabbage, but because of low consumer tolerance for damage, stringent pest control tactics need to be in place to provide a high quality product. The cabbage insect pest complex consists of sporadic pests such as root maggots, thrips, aphids, flea beetles, cabbage loopers, and annual pests such as the imported cabbage worm and diamondback moth. Management strategies usually focus on the lepidopteran pests (loopers, imported cabbage worm, and diamondback moth), as they are consistently present and carry out multiple generations per season.

Natural enemies also contribute to pest control, however, broad-spectrum insecticides negatively impact beneficial insects, as well. The use of selective insecticides can contribute to an increase in biological control efficiency; therefore these two methods can be used simultaneously in an integrated pest management program to strengthen pest suppression. Thus, our objective was to compare a variety of registered insecticides that differ in their overall impact on beneficial insects.

METHODS

Four insecticide treatments and an untreated check (Table 1) were tested at the MSU Horticulture and Teaching Research Center, Holt, MI for control of caterpillars. Cabbage seeds, variety 'Blue Dynasty', were planted into 98-well flats on 12 April 2012. Baythroid XL was chosen as a disruptive product that would negatively impact beneficial insects; unlike other treatments, Baythroid XL was applied every two weeks. The remaining treatments were designed to be rotations between low- to moderately disruptive products that would be applied based on thresholds, however, low insect pressure resulted in only one of the treatments needing a second application during the season. Thresholds, measured in larval units, were derived using the system presented in the 2010 Ohio Vegetable Production Guide. Treatments were replicated four times in a randomized complete block design. Plots were 30 ft. long and four rows wide. Insecticides were applied using a single-nozzle hand-held boom (40 gallons/acre and 30 psi). All treatments were applied with Silwet L-77 at 0.25% v/v.

Number and size (small vs. large larvae) of caterpillars was recorded by species weekly from 10 randomly chosen plants in the middle two rows of each plot. On 30 August, a total of 20 cabbages from the two center rows of each plot were harvested, sorted as marketable (>4 inches in diameter) or non-marketable (diameter < 4 inches), and weighed. Data was log (x+1) transformed prior to analysis. Analysis of variance was used for data analysis and ad-hoc Tukey means separation was used to compare treatment means ($P < 0.05$).

RESULTS

All treatments significantly lowered caterpillar seasonal mean numbers compared to the untreated control (Fig. 1). Baythroid XL and Coragen resulted in the fewest number of caterpillars, while Avaunt was significantly outperformed by all the other insecticide treatments. Not surprising, the mean number of caterpillars was inversely related to the number of insecticide applications made during the season. Unfortunately, though, the low caterpillar pressure required only one application for the Avaunt treatment, while Coragen and Intrepid/Coragen treatments needed only two applications.

The seasonal mean number of beneficial insects also differed significantly between treatments (Fig. 2). The untreated control and Avaunt treatment resulted in significantly more beneficial insects compared to all other treatments. The treatments applied only twice (Intrepid/Coragen and Coragen treatments) had significantly more beneficial insects compared to the Baythroid XL treatment (which entailed five applications).

There were no differences between treatments for either the number of or weight of marketable cabbage. This could be due to the low caterpillar pressure, but it is also possible that increase in beneficial insects in untreated plots was able to keep pest pressure below economic threshold. Further work is needed to help determine the optimal number of insecticide applications, and the type of insecticides, in order to produce high quality marketable cabbage while also promoting an increase in beneficial insects in the field.

Table 1. Treatment list with impacts on beneficial insects, rates, and application dates for a cabbage trial conducted at the MSU Horticulture and Teaching Research Center, Holt, MI, summer 2012.

Treatment*	**Impact on beneficials**	**Rate**	**Application dates**
Baythroid XL	Disruptive	3.2 fl oz/A	25 Jun, 9 & 24 Jul, 6 & 21 Aug
Avaunt	Low/moderate	3.5 oz/A	25 Jun
Intrepid 2F Coragen	Low Low	16 fl oz/A 5 fl oz/A	25 Jun 24 Jul
Coragen	Low	3.5 fl oz/A	25 Jun & 24 Jul
Untreated			

*all treatments were applied in conjunction with Silwet L-77 at 0.25% v/v

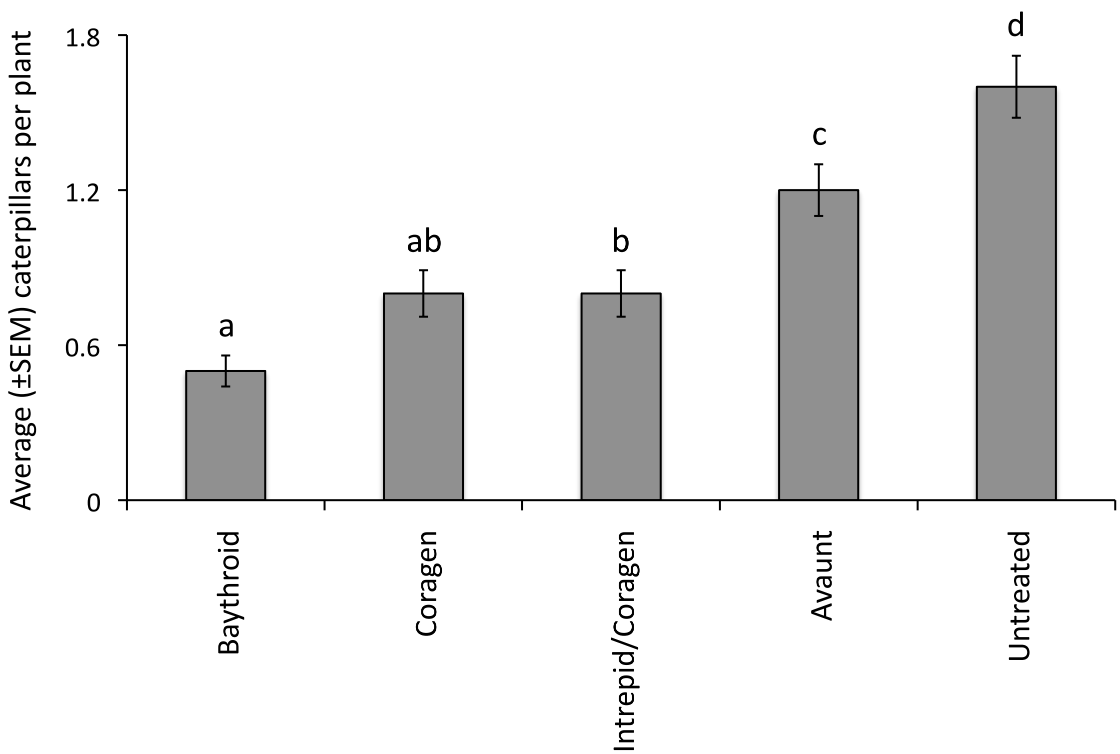

Figure 1. Impact of insecticide treatments on caterpillar numbers in a cabbage insecticide field-trial conducted by the MSU vegetable entomology laboratory. All products were applied in conjunction with the surfactant Silwet L-77 at 0.25% v/v. Bars with the same letter are not significantly different (α= 0.05).

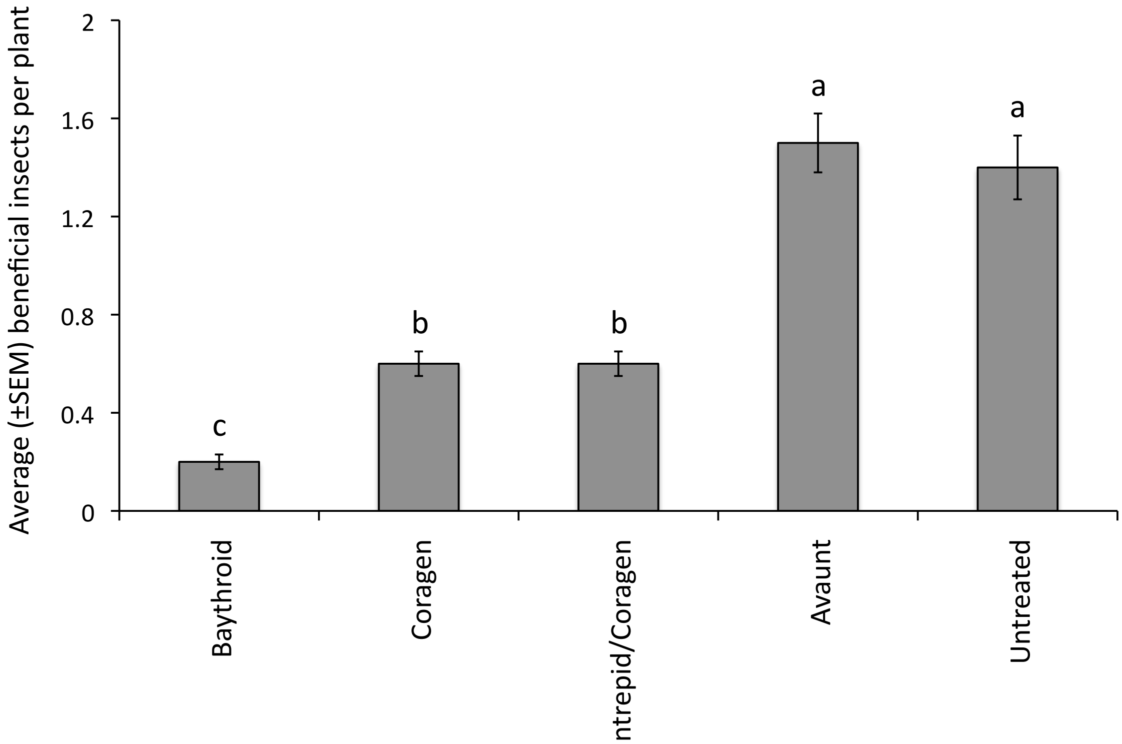

Figure 2. Impact of insecticide treatments on beneficial insect numbers in a cabbage insecticide field-trial conducted by the MSU vegetable entomology laboratory. All products were applied in conjunction with the surfactant Silwet L-77 at 0.25% v/v. Bars with the same letter are not significantly different (α= 0.05).