

Diamondback Moth Management with Organic and Conventional Insecticides

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Introduction

The diamondback moth (DBM) *Plutella xylostella* (Linnaeus) is the most serious pest of Brassica crops. Controlling DBM is particularly challenging due to its propensity to develop insecticide resistance, which is caused by continuous exposure to insecticides with the same mode of action. Therefore, the rotational use of insecticides has become an indispensable tool in the long-term management of DBM and the viability of Brassica crops industries in Hawai'i. It is very important to incorporate new insecticides into the insecticidal rotations to avoid future DBM insecticide resistance. An insecticide trial was conducted in the Island of Maui to test conventional insecticides Harvanta and Spear-Leap, and the organic insecticide *Bacillus thuringiensis kurstaki* (Btk) for DBM control.



Figure 1. Diamondback Moth larvae feeding activity.

Methods

This trial was conducted on December 2022 through February 2023 at the Kula Agricultural Park in Maui. Insecticide dilutions were prepared following the label of each product and Phase was used as a surfactant for all the treatments. Treatments were applied every week for six consecutive weeks after 2 weeks of planting the cabbage in the field (var. Scorpio). The population of DBM was monitored a day before of each insecticide application. The number of undamaged and damaged head cabbages by DBM feeding activity were recorded to obtain the percentage of cabbage marketability. The treatments were as follow:

1. Harvanta

- 2. Spear-Leap
- . 3. BtK
- 4. Spear-Leap + BtK
- 5. Rimon/Movento (conventional spray schedule)
- 6. Untreated

Results

Very low numbers of DBM in Harvanta treatment were found with an average of 1 DBM per cabbage plant and Rimon/Movento treatment with an average of 2 DBM per cabbage. High numbers of DBM were found in Spear-Leap+Btk treatment with an average of 6 DBM per cabbage plant, Btk treatment resulted with 10 DBMs per cabbage plant, and in the untreated plots an average of 7 DBM per cabbage plant were found.



Figure 2. Average of diamondback moth abundance per cabbage plant for the treatments: Harvanta, Rimon/Movento, Spear-Leap+BtK, Spear-Leap, and Btk.



Figure 3. Example of damaged cabbage by DBM feeding activity.



Figure 4. Example of undamaged cabbage by DBM feeding activity.



Figure 5. Percent of cabbage marketability under the effect of Harvanta, Rimon/Movento, Spear-Leap+BtK, Spear-Leap, and Btk treatments.

Harvanta and Rimon/Movento treatments resulted in higher marketability cabbage with 87% and 83% respectively. Spear-Leap+Btk and Btk treatments results showed less than 50% of marketable cabbage and the untreated showed only 20% of marketability. Therefore, Harvanta showed the best control of DBM compared to all other treatments.

An insecticide cost evaluation was conducted for Harvanta, and it was compared to Exirel as they are in the same insecticidal group (Group 28) and have the same effect on DBM control. Application of Harvanta resulted in \$7.50 less than Exeril per acre.

Insecticide Cost Evaluation			
Product	Rate	Cost \$/ Gal	Cost \$/ A
Exirel (RUP)	13.5 oz/A	\$650	\$68.50
Harvanta	16.4 oz/A	\$478	\$61

Conclusion

The best insecticide to control DBM populations with the lowest number of DBM per cabbage and the highest percentage of cabbage marketability in this trial was Harvanta. In addition, Harvanta is less expensive than Exeril, thus Harvanta can potentially replace Exirel to control DBM populations.

Regrettably, BtK and Spear-Leap insecticides effect on controlling DBM populations in this trial were very low as well as on cabbage marketability percentage.