

## Hawai'i Diamondback Moth Insecticide Resistance Management Program

### The Situation

Management of the most serious threat to Hawai'i's cruciferous crops, the diamondback moth (DBM), *Plutella xylostella* (Linnaeus), is critical to the success of the Chinese and head cabbage industries, which are among Hawai'i's top vegetables by value and weight.

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. Other pest management strategies, including cultural practices and natural enemies, provide inadequate control.

Therefore, the rotational use of insecticides has become an indispensable tool in the long-term management of DBM and viability of crop industries in Hawai'i.

### Extension's Response

By 1990, Hawai'i DBM populations developed resistance to five insecticide groups. Through years of research, seven very effective insecticide groups were identified by Dr. Ronald Mau, but resistance to these effective products continued to develop across Hawai'i.

Recognizing a need for the sound management of DBM in Hawai'i, a statewide DBM resistance management program was developed through funding by the Hawai'i Department of Agriculture utilizing a multipronged approach of field monitoring, bioassay tests, and outreach to support farmers and their crop industries.



*Diamondback moth damage in head cabbage*

The statewide team collects and assesses DBM populations from major production areas to determine the levels of pesticide resistance through biannual bioassay tests, which facilitates the development of an insecticide class rotation system, thus achieving DBM control and maintaining efficacy of insecticides.

Growers are provided with insecticide rotation schedules every six months that are customized to the genetics and current insecticide resistance status of their local DBM populations. These follow regional insecticide resistance management programs.

### Impacts

#### Reduced Crop Loss

- Since the development of this program, crucifer crop growers' annual crop losses due to DBM reduced from 40-60% to just 0-5%, therefore severe crop losses due to DBM can now be effectively mitigated.

#### Protection of Important Vegetable Industries

- Insecticide rotation information helps protect more than \$6,000,000 worth of head cabbage and other crucifer crops in Hawai'i.

#### Improved Statewide Pest Management

- Increased grower knowledge of pesticide resistance management.
- Grower's adoption of regional insecticide resistance management programs by following insecticides spray rotation schedules.



- Grower’s behavior changes and adoption of practices recommended by this program prolong the effectiveness of insecticides allowing for long-term DBM management.



Diamondback moth bioassay test

Month	Rotation Product
January	Botanigard or Mycotrol
February	Xentari
March	Torac
April	*Movento
May	Dipel or Crymax
June	*Exirel <sup>(RUP)</sup> or Harvanta

O'ahu

Month of:	Rotation Product
January	Exirel
February	Movento
March	Torac
April	Rimon
May	Proclaim
June	Exirel

Maui

Insecticide rotation schedules for the diamondback moth

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Successful management of diamondback moth in cabbage crop

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