

**Verimark®** Insect Control Powered by Cyazypyr® active

**Exirel®** Insect Control Powered by Cyazypyr® active



## TECHNICAL INFORMATION UPDATE

# Diamondback moth control best management practices.

## Introduction

- Diamondback moth (DBM) is a pest of brassica crops present everywhere those crops are grown in the United States.
- DBM is a highly prolific pest, able to complete a life cycle from egg to adult in 27 days at 60 F, but in as few as 11 days at 80 F. On average, females live 16 days and can lay 150 eggs. Under the right weather conditions, this rapid development results in many generations per crop, making timely control measures very important.
- In places where DBM is prevalent, multiple insecticide applications are usually needed to keep it from causing unacceptable crop damage. Due to its rapid reproduction and exposure to insecticides, DBM has been reported to develop resistance to practically every insecticide that has been used for its control.
- Verimark® and Exirel® insect control powered by Cyazypyr® active are groundbreaking products that provide cross-spectrum control of chewing and sucking pests and have been shown to be among the best available tools to manage this prolific pest.

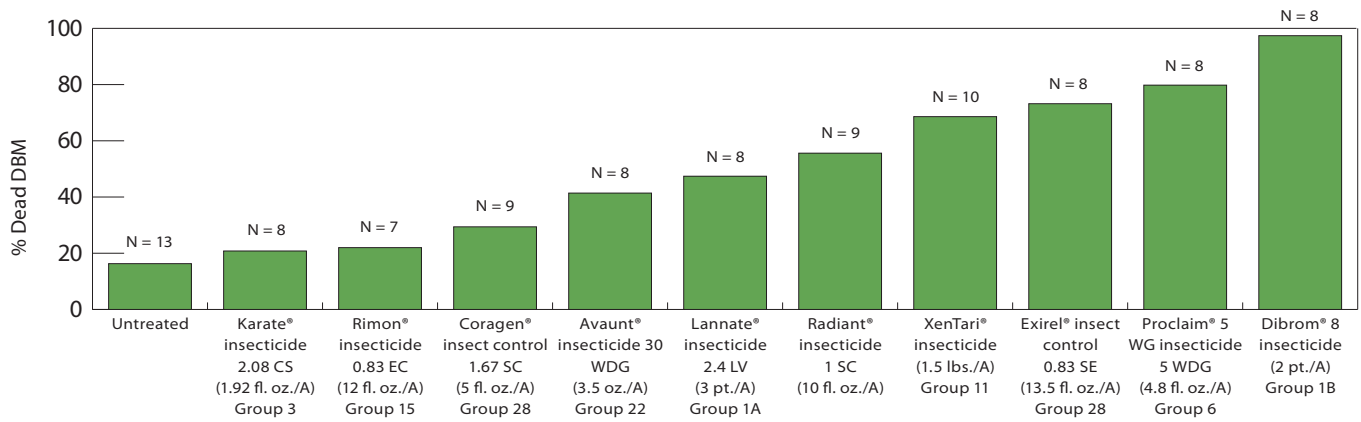
## Benefits of Exirel and Verimark insect control

- **Unique mode of action (MOA):** impairs insect muscles, resulting in rapid feeding cessation and reduced feeding damage.
- Nondisruptive i.e., does not cause secondary pest flares such as mites; low impact on key natural enemies, including predators such as flower bugs, lady beetles, predatory mites, parasitic wasps and others.
- **Resistance management:** Its use in rotation with existing MOAs helps reduce resistance selection to other pest management products, preserving the long-term viability of available tools.
- **Favorable environmental profile:** Has a favorable mammalian toxicological profile, features an improved worker protection standard profile and allows a short REI and PHI.
- Granted reduced-risk classification by EPA.
- MRLs established in Canada and many other export countries.<sup>1</sup>

<sup>1</sup> Consult with your local FMC representative for the latest MRL status.



## Summary of 2016 Critical Dose Bioassays



Monitoring of highly resistant DBM populations in Georgia indicates that Cyazypyr® active works best among the Group 28 insecticides. N=number of bioassays from DBM populations collected in Colquitt County, Georgia. Lab bioassay conducted using concentration based on the highest labeled field rate diluted

in 100 gallons per acre. Collard leaf disks were dipped in the insecticide solutions and placed in a petri dish to dry. After they were dried, 10 diamondback moth larvae were placed in the dish, and mortality was assessed 73 hours later.

Source: Dr. David Riley, University of Georgia.

## Verimark® insect control designed for soil applications

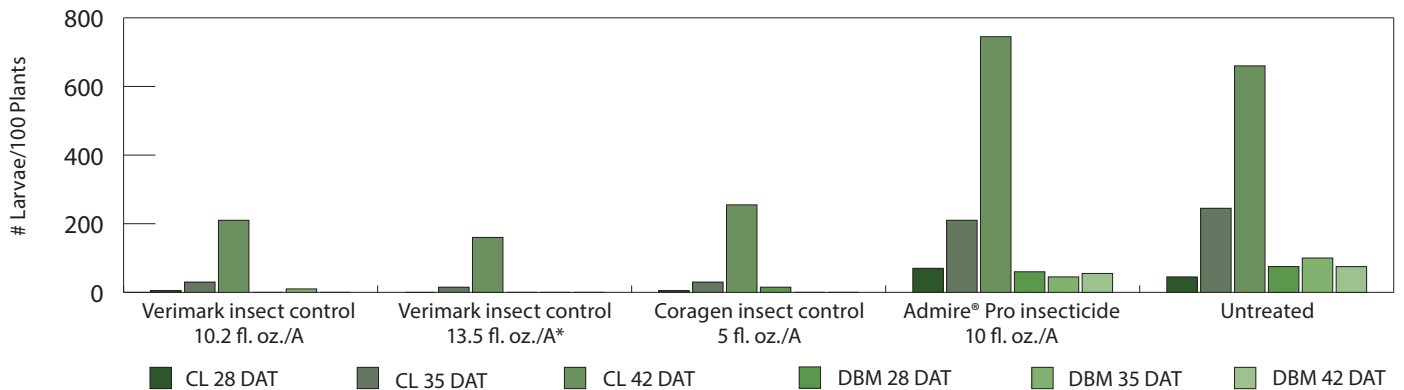
Verimark insect control powered by Cyazypyr active promotes optimized root uptake and crop safety to tender roots and shoots, protecting both older leaves and new growth from a cross spectrum of pests and helping provide consistently better yields and quality results at harvest.

## A Strong Start With Verimark insect control in Brassica Crops by Reducing Stress From Pest Feeding



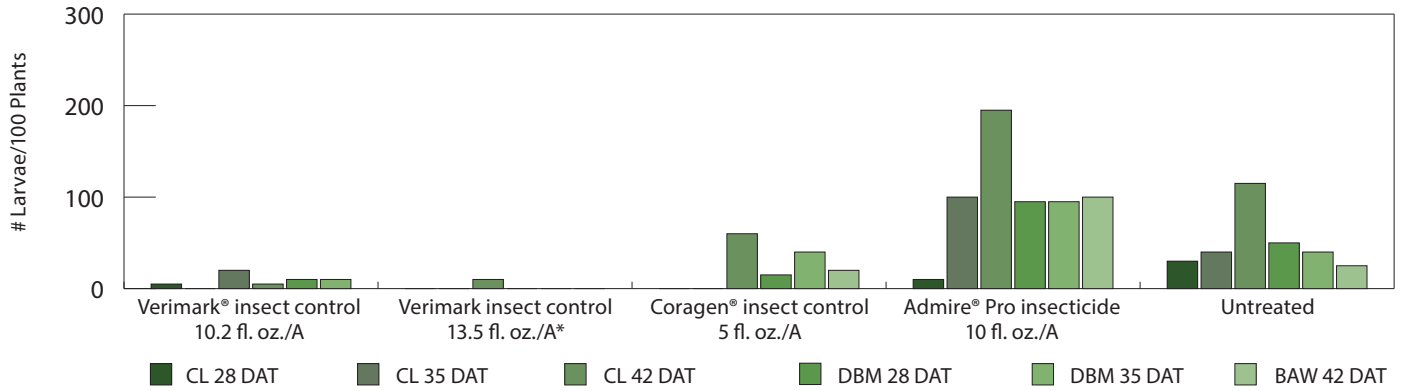
Verimark insect control program on the left (larger cabbage) and standard program on the right.

## Cabbage Looper (CL) and Diamondback Moth (DBM) Control in Cabbage



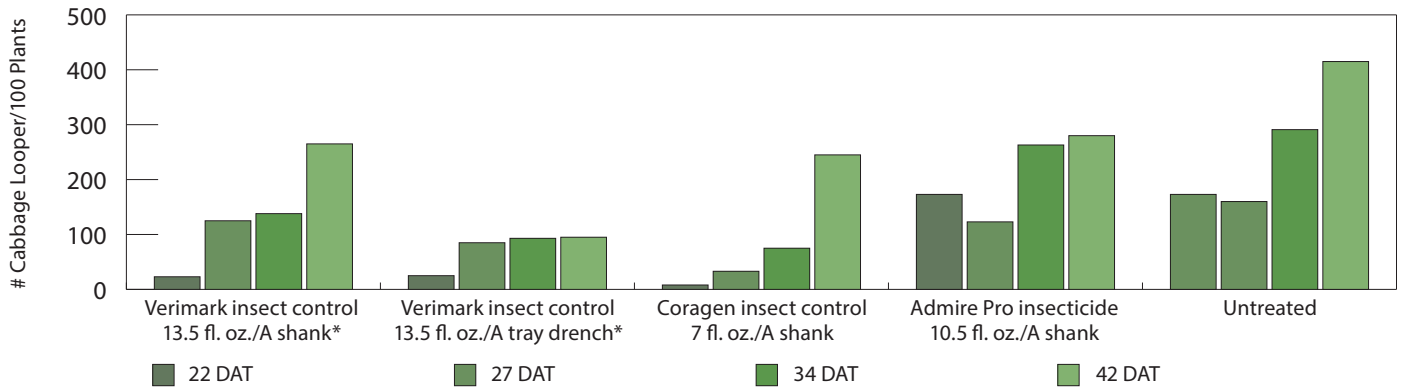
Source: FMA-08-038, Madera, Calif., transplant water application.

### Cabbage Looper (CL), Diamondback Moth (DBM) and Beet Armyworm (BAW) Control in Cabbage



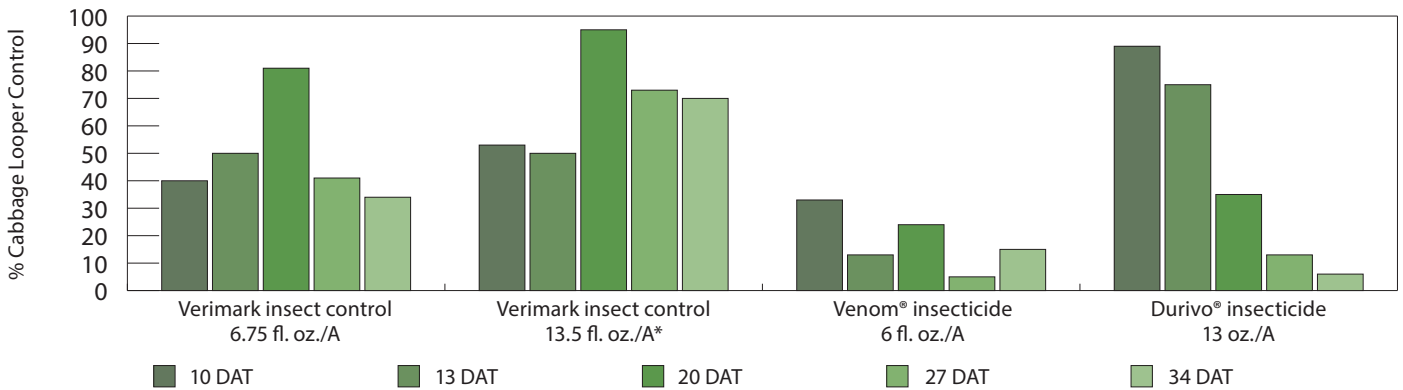
Source: FMA-08-090, Madera, Calif. Shank injection at planting application.  
 \* Refer to the Verimark insect control label for applicable rates.

### Cabbage Looper Control in Cauliflower



Source: WET-06-303, Yuma, Ariz.

### Cabbage Looper Control in Broccoli



Source: WET-09-112, Yuma, Ariz., shank injection.  
 \* Refer to the Verimark label for applicable rates.

### Exirel® insect control designed for foliar applications

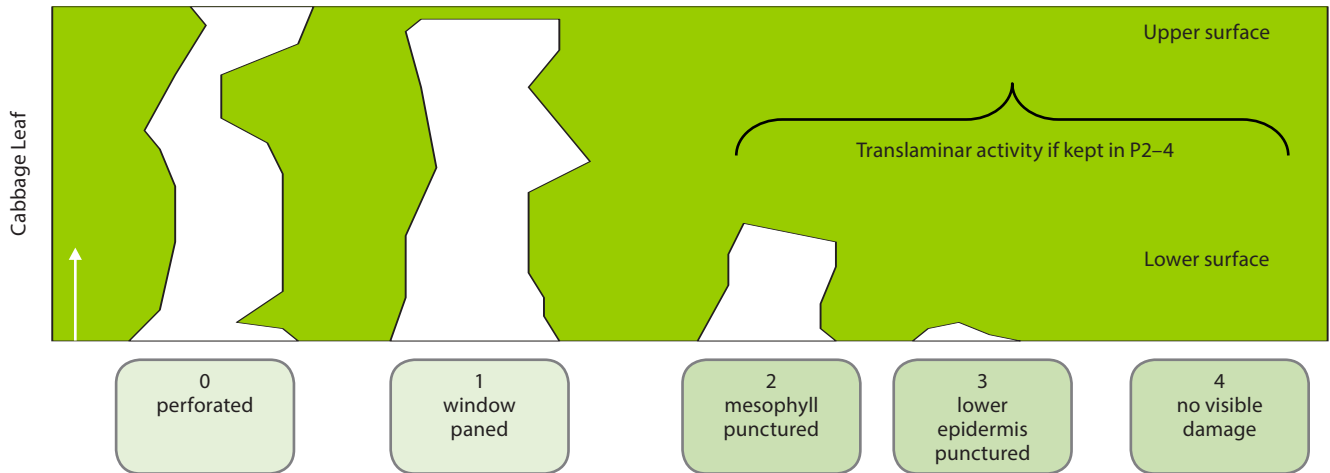
Optimized formulation (suspo-emulsion) for improved leaf penetration and locally systemic movement improves coverage and provides excellent translaminar activity and rainfastness.

Provides outstanding and extended crop protection from a cross spectrum of pests and potentially improves a plant's resilience to stress.

## Methods to Study Translaminar Activity in Cabbage for Control of Diamondback Moth



Upper surface — coated with insecticide  
Lower surface — infested with five second-instar diamondback moths

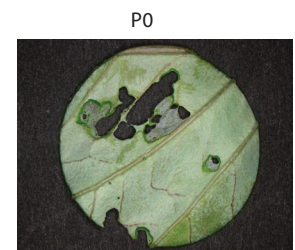
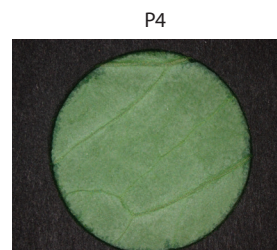


### Exirel® insect control powered by Cyazapyr® active Translaminar Activity on Diamondback Moth in Cabbage

Treatment <sup>1</sup>	Active (ppm)	% trans (P2-4)	0	1	2	3	4	% mortality (P0-1)	% mortality (P2-4)
Exirel insect control	50	94	0	1	8	9	0	100	100
Coragen® insect control	50	94		1	5	11	1	100	100
Avaunt® 30 WG insecticide	333	0	17	1				100	—
Lannate® 2.4 LV insecticide	3,364	41	7	3	5	2		82	100
Intrepid® 2F insecticide	467	0	18					96	—
Proclaim® 5G insecticide	40	0	16	2				100	—
SpinTor® 2 SC insecticide	333	39		11	7			100	100
Warrior® 1 EC insecticide	77	28	5	8	4	1		100	100
UTC	—	0	18					1	—
MSO only		0	17					1	—

<sup>1</sup>All treatments (except UTC) contained methylated seed oil (MSO) at 5,000 ppm.

0 = Perforated  
1 = Window paned  
2 = Mesophyll punctured  
3 = Lower epidermis punctured  
4 = No visible damage

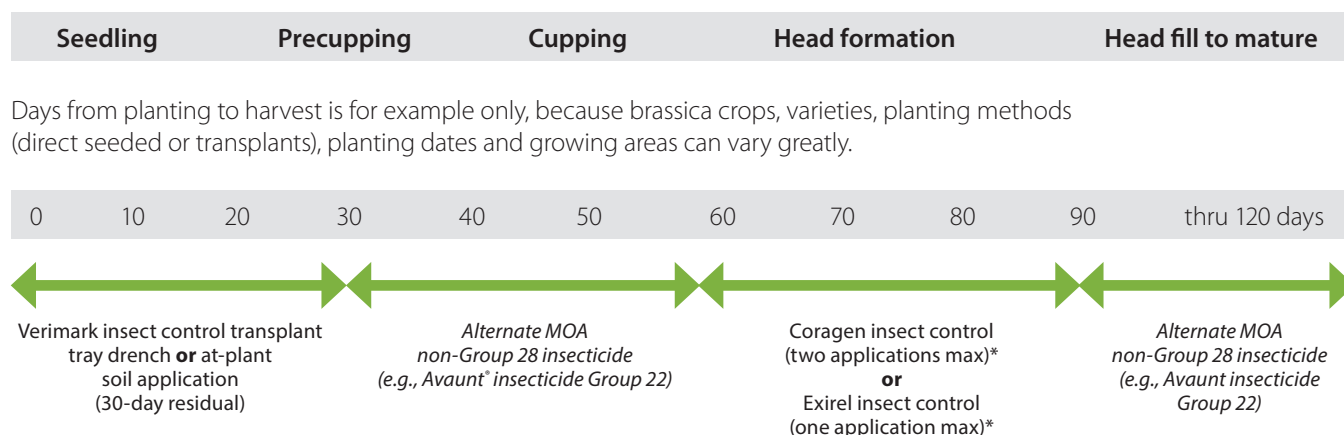


Source: DuPont Stine Haskell Research Center, 2006.

## Preferred technical position and IRM guidance for Cyazypyr® and Rynaxypyr® active in brassica vegetables when Verimark® insect control is used as a transplant tray drench or at-plant soil application

Verimark® insect control and Exirel® insect control are powered by Cyazypyr® active.

Coragen® insect control is powered by Rynaxypyr® active.



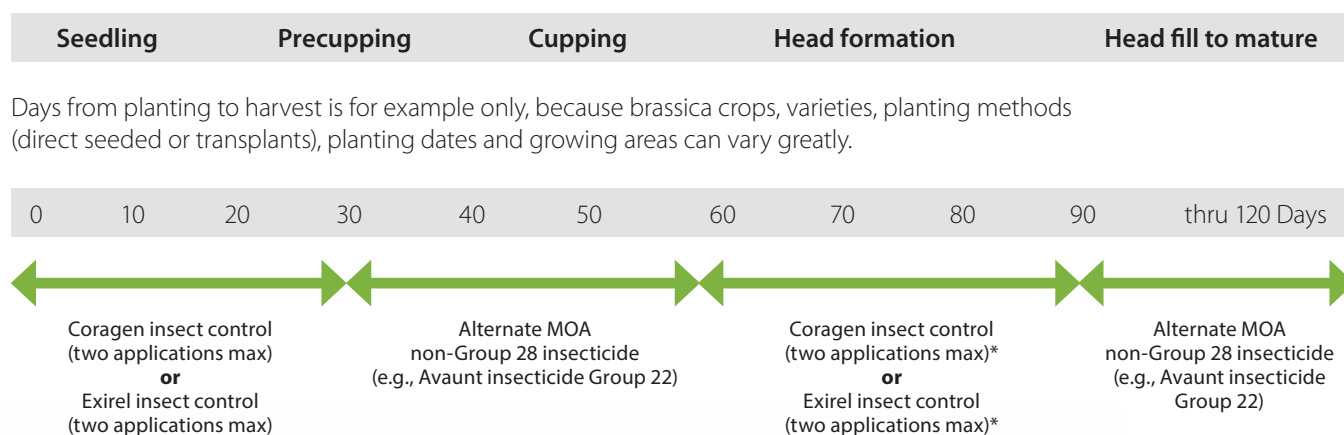
Consult the Verimark, Exirel and Coragen insect control labels for additional resistance-management guidance.

\* If the crop cycle is 90 days or shorter, do not use a Group 28 insecticide in this application window.

## Preferred technical position and IRM guidance for Coragen insect control and Exirel insect control in brassica vegetables when used as a foliar application

Coragen insect control is powered by Rynaxypyr active.

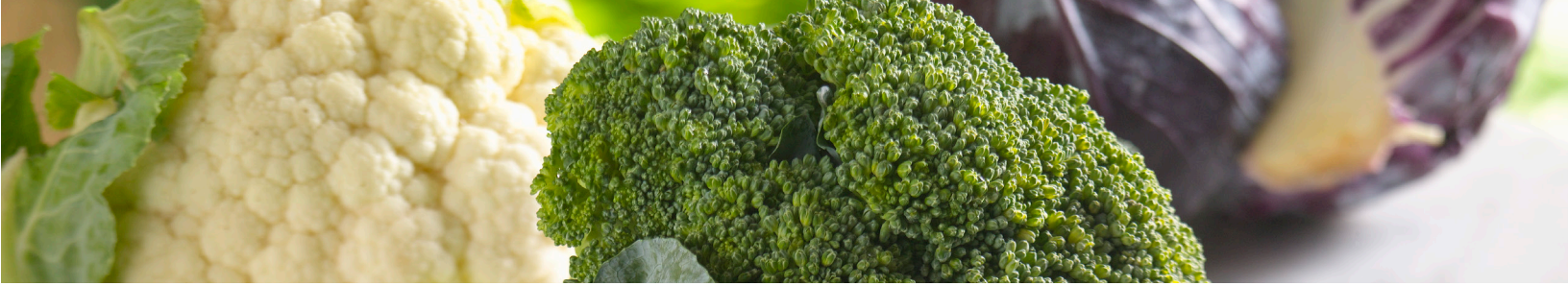
Exirel insect control is powered by Cyazypyr active.



Consult the Coragen and Exirel insect control labels for additional resistance-management guidance.

\* If the crop cycle is 90 days or shorter, do not use a Group 28 insecticide in this application window.





## For best results on DBM

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- Understand the source of your transplants, any issues with DBM contamination and their susceptibility to insecticides you plan to use in the field.
  - Create a plan for control and consult your local university, extension expert or an industry representative to understand product efficacy.
  - Start control early: Once DBM is established, it's hard to keep up.
  - Rotate insecticides with different modes of action using a "window" approach to reduce exposure of the same mode of action to consecutive DBM generations.
- When using Verimark® insect control powered by Cyazypyr® active, monitor closely when its residual control starts to break (indicated by larvae able to feed and cause damage). If feeding is observed, start foliar sprays immediately using non-Group 28 insecticides.
  - Use adulticides, preferably sprayed at night, to reduce adult populations.
  - Make sure you maximize spray coverage.
  - Don't use overhead irrigation within one to two days after an insecticide spray.

**For more information, contact your local FMC retailer or representative to learn more about Verimark and Exirel insect control from FMC and visit us at [FMCCrop.com](http://FMCCrop.com).**

**Karate, Dibrom, Warrior and DuPont™ Lannate LV insecticides are Restricted Use Pesticides.** The EPA registered labels for Avaunt® insecticide and Exirel® insecticide contain the following statements: "These products are highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply these products or allow them to drift to blooming crops or weeds if bees are foraging (actively visiting) the treatment area." Always read and follow label directions. FMC, Verimark, Coragen, Avaunt, Cyazypyr and Rynaxypyr are trademarks of FMC Corporation or an affiliate. Karate, Proclaim, Warrior and Durivo are trademarks of a Syngenta Group Company. Radiant, Intrepid and Spintor are trademarks of Dow AgroSciences, LLC. Rimon is a trademark of Arysta LifeScience North America, Xentari and Venom are trademarks of Valent. Dibrom is a trademark of AMVAC. Admire Pro is a trademark of Bayer CropScience. Lannate is a trademark of DuPont. As of November 1, 2017, the U.S. EPA registration for DuPont™ Exirel insect control has been sold to FMC by DuPont. ©2018 FMC Corporation. All rights reserved. 17-FMC-0975 05/18

