



Insecticide Resistance Action Committee

The IRAC International Diamide Working Group

Stewardship of the Ryanodine Receptor Modulators

Diamide insecticides are IRAC mode of action Group 28 ryanodine receptor modulators, currently including products containing chlorantraniliprole, cyantraniliprole, and flubendiamide.

www.irc-online.org

The IRAC International Diamide Working Group

WHO ARE WE?

The IRAC International Diamide Working Group was created in 2007 to prevent or delay the development of insect resistance to the diamides, a new mode of action chemical class, by founding member companies Nihon Nohyaku/Nichino, DuPont Crop Protection, Bayer Crop Science, and Syngenta and supported by IRAC International and Crop Life membership companies.

WHAT WE DO AND WHY?

The IRAC Diamide Working Group promotes sustainable use of all insecticides through industry education and implementation of IRM disciplines and strategies. The main objective of the Diamide team is to maintain the longevity of all crop protection products available to growers by preventing or delaying the development of resistance to insect pests.

Activities of the IRAC Diamide Working Group

✓ Identify and prioritize high resistance risk and cropping systems.



Tuta absoluta *Plutella xylostella* *Spodoptera exigua*

✓ Educate the industry through grower, company, professional, and trade meetings



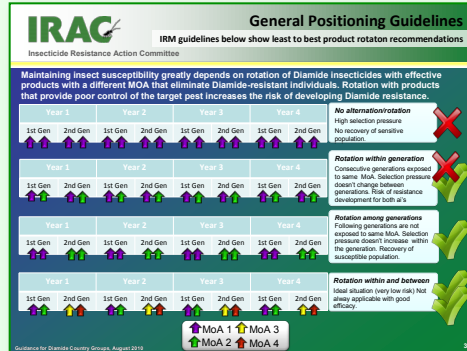
8 "Train-the-Trainers" sessions, Philippines *Plutella xylostella* workshop Thailand Philippines Veg Grower Meeting

✓ Create country Diamide IRM WGs & provide guidance & tools to effectively implement local IRM programs.

Australia	Argentina	Brazil	China	India	Indonesia	Italy
Israel	Japan	Korea	Malaysia	Mexico	Morocco	Philippines
Spain	Thailand	Turkey	USA	Vietnam	Taiwan	S. Africa

✓ Develop global IRM guidelines for adaptation & implementation in local country markets.

General IRM MoA Rotation Recommendation



Status of *Plutella xylostella* resistance to Diamides



P.xylostella resistance to diamide products occurred within 18 months after launch of flubendiamide in BangBuaThong, Thailand in 2009. The following year, DBM resistance to all diamides in crucifer production was observed in Cebu, Philippines and in 2011 it was reported in Yin Lin and Chang Hwa, Taiwan, and in the Guangzhou area of Southeast China. Tolerant populations are localized within countries while susceptible populations still remain. The mechanism of resistance is believed to be metabolic and to-date has been cross-resistant to all diamide products.

✓ Develop testing assays, create baseline susceptibility data, assess field tolerant populations, and help coordinate response plan to resistance.

Resistant Management Guidelines

- 1) Incorporate IPM practices into insect control program.
- 2) Follow the label. Do not reduce rates. Follow recommended timing of applications and spray volume.
- 3) Know the MoA of insecticides for rotation programs
- 4) Rotate insecticide MoA groups

GROUP 28 INSECTICIDE

- Avoid exclusive use of Group 28 insecticides throughout a crop cycle for a pest species with more than one generation.
- Apply insecticides using a "window" approach to avoid exposure of consecutive insect pest generations to the same mode of action.
- A "Treatment Window" is defined as the period of residual activity provided by a single or sequence of product applications with the same mode of action within an approximate 30 day period (15 - 45 days depending on local generation time from egg to adult). Generally, this "Window" should approximate the length of a generation of the target pest.
- Following a "Treatment Window", rotate to a "window" of applications of effective insecticides with a different mode of action.
- For short cycle crops (< 50 days), consider the duration of the crop cycle as a "Group 28 insecticide treatment window", thus alternate to different modes of action during subsequent plantings at the same farm location.
- The total exposure period of all "Group 28-active windows" applied throughout the crop cycle (from seedling to harvest) should not exceed approximately 50% of the crop cycle.

Example of DBM IRM Strategy - China

