Mode of Action: Labelling

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MoA Labelling Initiative

Resistance is a critical focus for the industry

- Resistance is more likely to occur after regular use of same Mode of Action (MoA)
- The more farmers use a pesticide with the same MoA the more likely that pests will develop resistance.
- Resistance develops through selection of “R” individuals by using the same MoA continuously
- Sequential applications or applying mixtures of products with different effective MoA are the key strategies to delay onset of resistance

Rationale: Frequency of genes for resistance to an insecticide will decline during application of alternative insecticide with different MoA increasing product longevity!!

How Insecticides work

- Insecticides work by **affecting an essential activity** in the pest .
  - Respiration
  - Nerve and muscle function
  - Growth & development
  - Midgut processes

e.g. Organophosphates- **Affects nerves** by inhibiting acetylcholinesterase (**target site**) resulting to paralysis

Synthetic pyrethroids – **Affects nerves** by modulating the sodium channels (**target site**) which results to paralysis

Target site and mode of action

- The **target site** is the specific biochemical process affected by the insecticide

- Active ingredients which affects the same target site have the same **mode-of-action (MoA)**

e.g. **Organophosphates-** Acetylcholinesterase inhibitors (MoA 1A)

Active Ingredients : Chlorpyrifos, Malathion, Phenthoate, Profenophos

Pyrethroids- Sodium channel modulators (MoA 3)

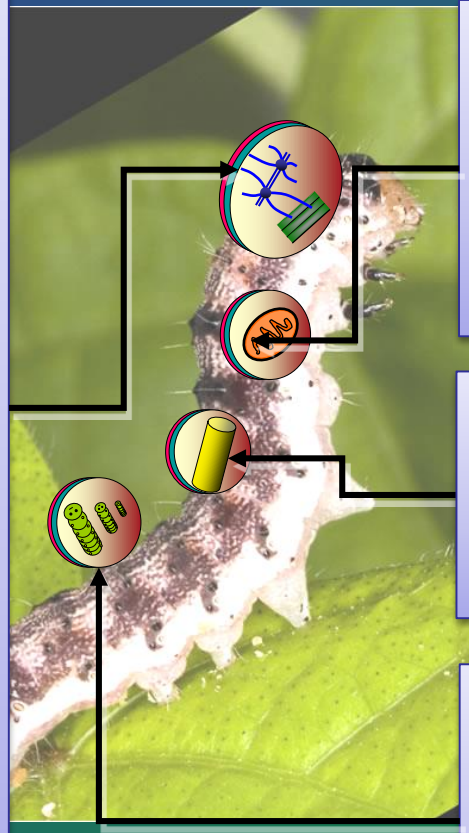
Active ingredients- Deltamethrin, Cyfluthrin, Lambdacyhalothrin, Permethrin, Cypermethrin

Insecticide Resistance Action Committee

IRAC Publication
Lepidoptera MoA Poster

Nerve & Muscle Targets

1. Acetylcholinesterase inhibitors
2. GABA-gated chloride channel blockers
3. Sodium channel modulators
4. Nicotinic acetylcholine receptor competitive modulators
5. Nicotinic acetylcholine receptor allosteric modulators
6. Glutamate Gated Chloride channel allosteric modulators
14. Nicotinic acetylcholine receptor blockers
22. Voltage dependent sodium channel blockers
28. Ryanodine receptor modulators
30. Gaba gated CL channel allosteric modulators
32 Nicotinic acetyl choline receptor allosteric modulators



Respiration Targets

13. Uncouplers of oxidative phosphorylation via disruption of the proton gradient
21. Mitochondrial complex I electron transport inhibitors

Midgut Targets

11. Microbial disruptors of insect midgut membranes
31. Baculoviruses

Growth/Development Targets

7. Juvenile hormone mimics
15. Inhibitors of chitin biosynthesis, Type 0
18. Ecdysone receptor agonists

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Resistance Management

- CropLife and its resistance action committees (RACs) address this by advancing understanding of MoA

- RACs provide communication resources on MoA.

- Inclusion of MoA information on the product labels supported by training and other resources is critical to ensure that growers have the information they need to follow resistance management guidelines.

  - E.g. online, training modules, posters, brochures etc.

MoA Labelling Initiative

Industry Commitment

- Including MoA information on product labels is critical for growers to manage resistance

- MoA labelling is required by authorities as mandatory in some countries in APAC including the Philippines 

- CropLife encourages **all** pesticide manufacturers worldwide to include MoA information on their labels

MoA Labelling Initiative

Industry Commitment

CropLife members have made a voluntary commitment to include MoA information on all product labels by 2023

MoA Labelling Initiative

The MoA Guidance Document

- CropLife has developed a ‘guidance document’ to support this initiative

- **“Icons “**are used to provide a clear and simple method to help users determine:
  - ✓ The type of pesticide and its MoA group (products with the same MoA are grouped)

  - ✓ The guidance also supports the implementation of effective resistance management strategies

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The MoA Guidance Document

- Growers and extension workers need to recognize and understand which products they can rotate.
- Companies should provide technical brochure identifying MoA
- RM statement should also be stated on the label.

Example of a single product with one active ingredient

GROUP	28	Insecticide

Example of a premix product with two active ingredients

Group	3	Insecticide
Group	4	Insecticide

MoA Labelling Initiative- PH
Current Situation

- Rotation of pesticides belonging to different mode of action is not generally practiced by farmers due to lack of or poor understanding of MoA classification.
- Farmers are more inclined to use pesticides according to brands
- One active ingredient has more than 100 brands
- Many active ingredients can belong to only one MoA Classification
- Since 2012, CLP members have been training famers on resistance management. However due to lack of MoA icons on the label, farmers find it difficult to practice rotation
- CLP submitted to FPA a proposal to include MoA on the labels and was approved by FPA as a mandatory requirement

MoA Labelling - PH

1. Print MoA classification on the front panel of the label (based on the new FPA guidelines)

(Name of Active Ingredient)	*(Group)*	*(Mode of Action)*	*(Type of Pesticide)*
CYPERMETHRIN	**GROUP**	**3A**	**INSECTICIDE**
DIMETHOMORP + MANCOZEB	**GROUP**	**40 + M 03**	**FUNGICIDE**

2. Add resistance management statement which includes specific resistance management strategies for a product

MoA Labelling Initiative- PH

- Resistance develops through selection of “R” individuals by using the same MoA continuously
- Frequency of genes for resistance to an insecticide will decline during application of alternative insecticide with different MoA increasing product longevity
- Growers and extension workers and other stakeholders need to recognize and understand which products they can rotate through **MoA labelling**
- **MoA labelling is a critical component to educate the farmers in managing resistance**

2020 PH RAC COMMITTEE
Chairman: Florinda B. Vasquez

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CropLife PHILIPPINES

Vision

To be the most responsible and progressive association of the plant science industry contributing significantly to a sustainable and globally competitive Philippine Agriculture.

MISSION

To provide collective leadership in the plant science industry through the advocacy of clear-cut policies and effective programs that contribute to a sustainable and globally competitive Philippine agriculture. We pursue this in active partnership with government and alliance with other stakeholders.

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Status of Mode-of-Action Labelling for CP Products in APAC countries

Country	Can MoA icon be included in label?	Voluntary or Mandatory?
Australia	Yes	Mandatory
Bangladesh	Yes	Voluntary (but no precedent)
Cambodia	Yes	Voluntary (mandatory proposed)
China	Yes	Voluntary
India	Yes	Voluntary
Indonesia	Yes	Voluntary
Japan	Yes	Voluntary
Korea	Yes	Mandatory (if code is available)
Malaysia	Yes	Mandatory (from January, 2018)
Myanmar	Yes	Voluntary
New Zealand	Yes	Voluntary
Pakistan	Yes	Voluntary (but no precedent)
Philippines	Yes	Mandatory by 2020
Taiwan	Yes	Voluntary; mandatory from 2019
Thailand	Yes	Mandatory
Vietnam	Yes	Voluntary