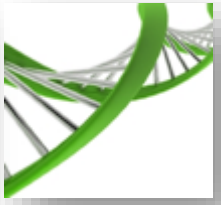
Insecticide Resistance Action Committee

# IRAC International

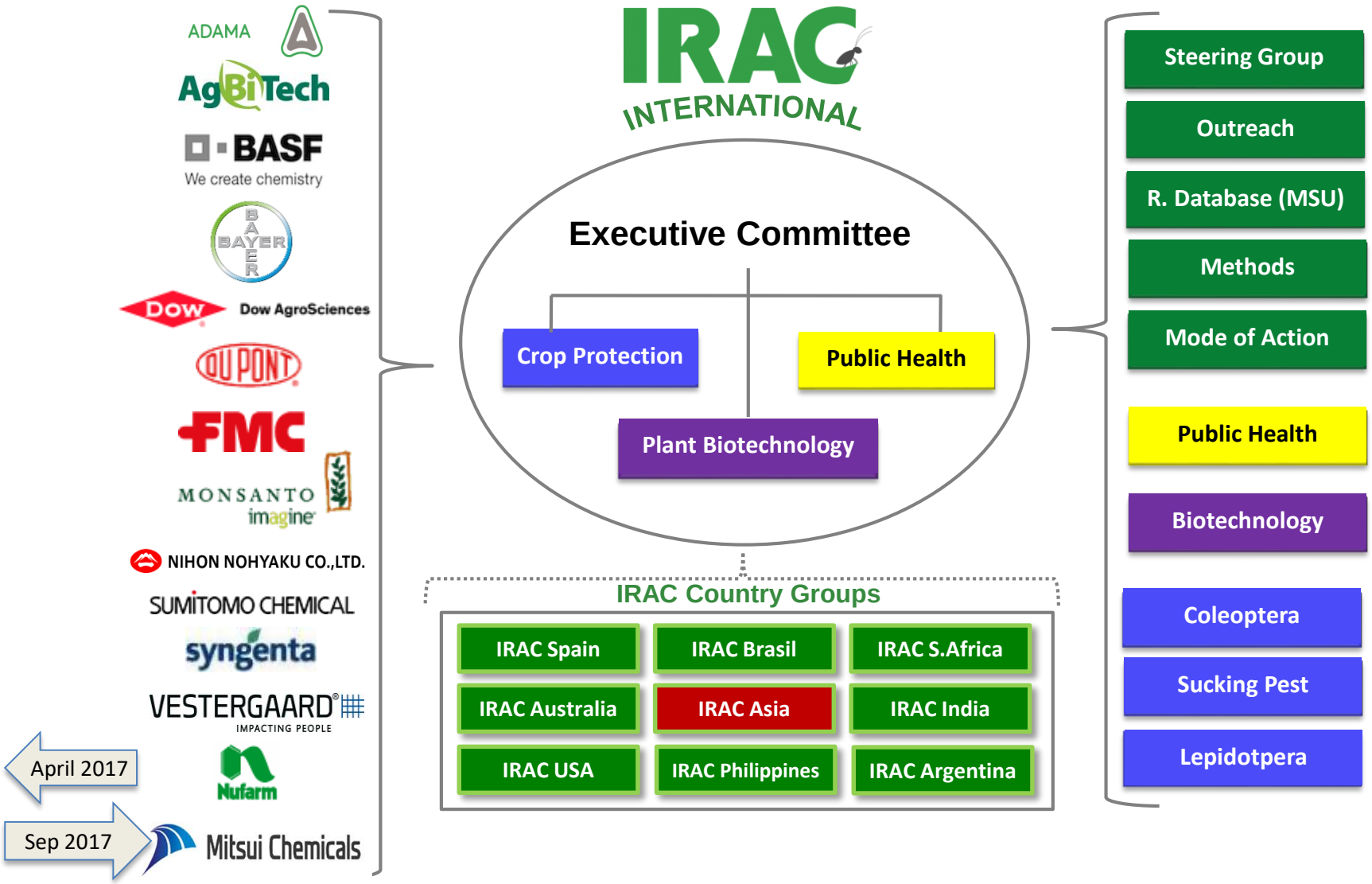


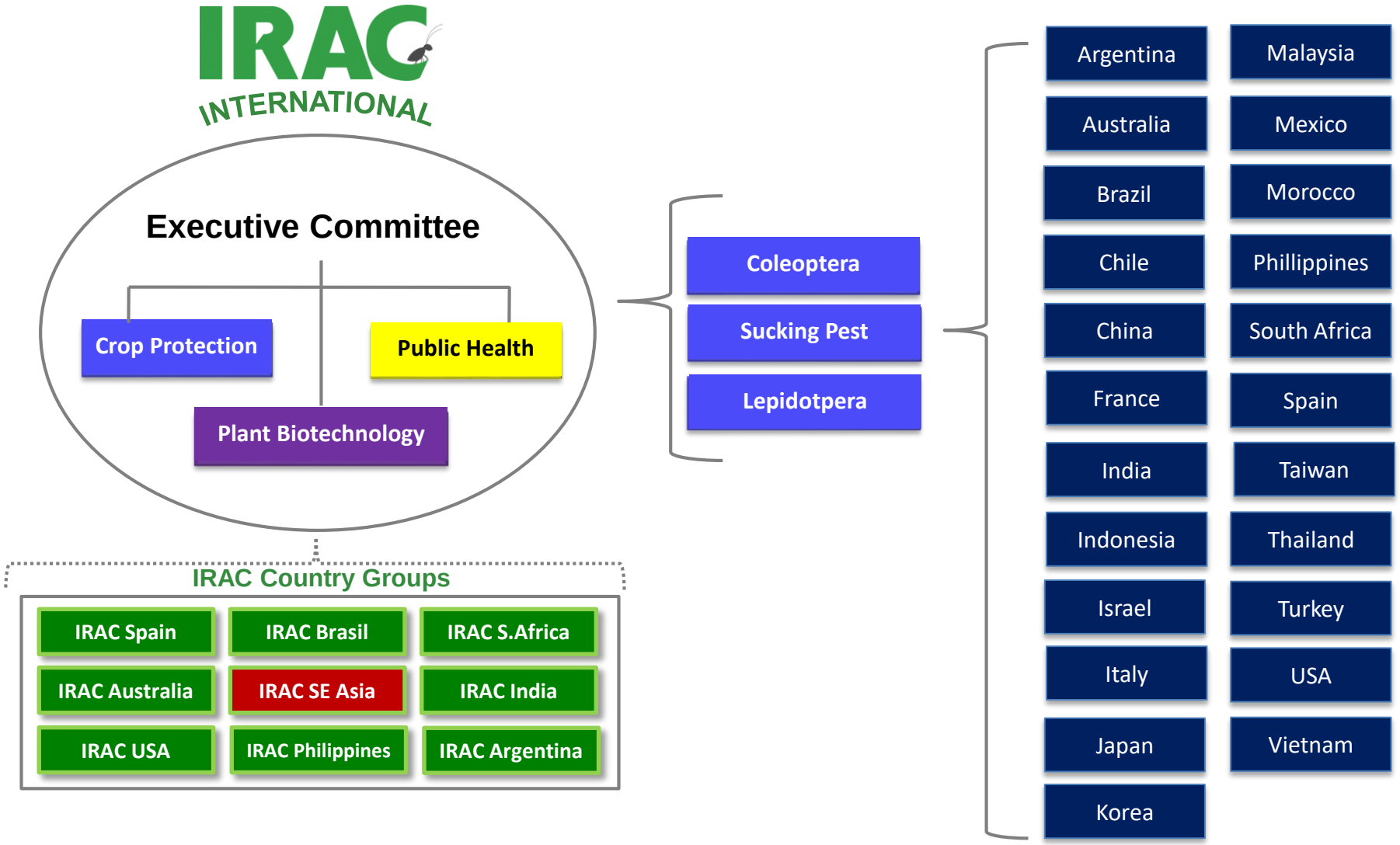

# IRAC Mission

- Facilitate communication and education on resistance to insecticides and insect-resistant traits.
- Promote and facilitate development and implementation of resistance management strategies to maintain efficacy and support sustainable agriculture and improved public health.

13 Member Companies
(8 Croplife)

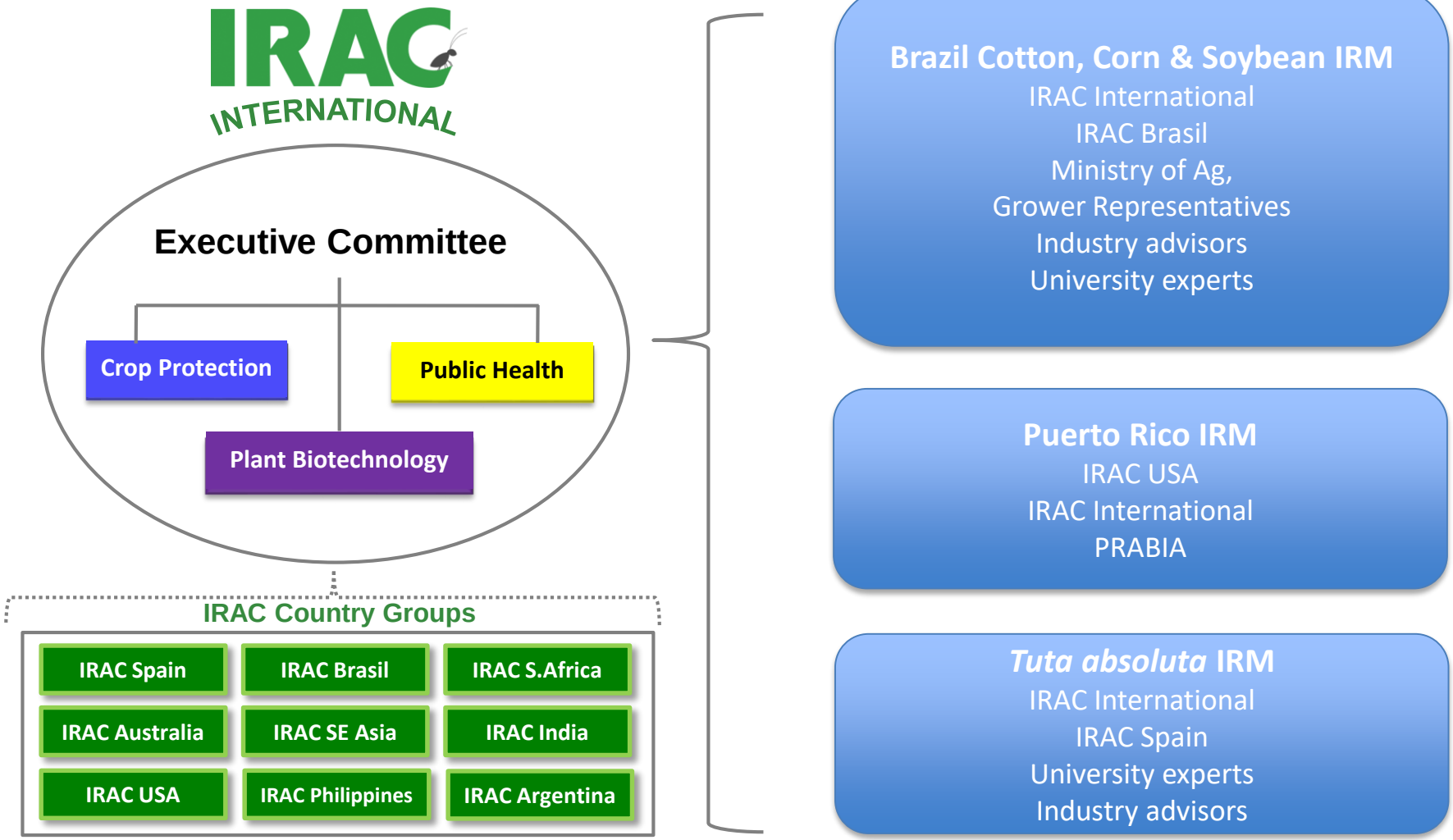


# Crop Protection Country Working Groups




Working groups established to develop IRM guidelines for diamide insecticides, then expanded to provide lepidopteran IRM. Final stage has been to expand to cover other pests and crops.

# IRAC Task Teams
## Short lived collaborative teams with specific objectives



# IRAC Executive objectives 2017-18

- Enhance available information on pest resistance on IRAC web-site.

IRAC
Insecticide Resistance Action Committee

LOGIN | Search SEARCH

Resistance Management for Sustainable Agriculture and Improved Public Health

HOME NEWS ABOUT TEAMS PESTS CROPS MODES OF ACTION TEST METHODS INDEX

FRANKLINIELLA OCCIDENTALIS: PROFILE NEWS POSTERS (2)

## Western flower thrips

*Frankliniella Occidentalis*


*Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae) originated in western North America and has since become a major pest of vegetables, fruit and ornamental crops across the US and around the world. *F. occidentalis* are small (1-2 mm long), slender, soft-bodied insects that are yellow to light brown in color; adults have distinctive fringed wings. It can develop quickly, going from egg to adult in two weeks or less at favorable temperatures. Adult females insert eggs into plant tissue under the epidermis. When mature, larvae drop to the soil to go through the prepupal and pupal stages, and finally return to the plants as adults. Larvae and adults feed on flowers, buds, terminals, leaves, and fruit.

*Frankliniella occidentalis* feed by rasping open plant cells and sucking up the cell contents. The damaged cells collapse, leaving bronzed or russeted areas on the leaves or fruits. Besides the direct plant damage this pest causes, *F. occidentalis* also transmits several species of destructive plant viruses in the genus Tospovirus (Bunyaviridae), including Tomato Spotted Wilt Virus (TSWV) and Impatiens Necrotic Spot Virus (INSV), of which it is the most important vector worldwide.

Adults can move long distances on air currents to find new food; adults and larvae can also be transported on transplants. Although there are some effective natural enemies of *F. occidentalis*, growers rely on chemical control to reduce damaging populations of this pest. Natural enemies such as predatory bugs (*Orius* spp.), lacewings (*Chrysoperla* spp.) and predatory mites (*Amblyseius* spp., *Neoseiulus* spp.) can provide significant control of *F. occidentalis* populations. The number of effective chemical compounds that control *F. occidentalis* is very limited and insecticide resistance has been reported to several major classes of insecticides.

PEST DISTRIBUTION

### Western flower thrips resistance profile

| Species | Distribution | Chemical class | Mechanisms |
|---|---|---|---|
| Frankliniella occidentalis | Europe, Africa, North America | Carbamates (1A) | Metabolic: Enhanced detoxification by monooxygenases |
| Frankliniella occidentalis | Europe, Africa, Australia, North America | Organophosphates (1B) | Metabolic: Enhanced detoxification by monooxygenases |
| Frankliniella occidentalis | Europe, Africa, USA | Cyclodiene organochlorines (2A) | Metabolic |
| Frankliniella occidentalis | Europe, Australia, USA | Pyrethroids-Pyrethrins (3A) | Metabolic: Enhanced detoxification by monooxygenases. Links to target site resistance (kdr) |
| Frankliniella occidentalis | China, Spain | Neonicotinoids (4A) | Cytochrome P450 detoxification |
| Frankliniella occidentalis | Australia, Brazil, China, Spain, USA | Spinosyns (5) | Altered target site resistance: G275E mutation in the α6 subunit of nAChR |
| Frankliniella occidentalis | China, USA | Avermectins (6) | |
| Frankliniella occidentalis | China | Pyriproxyfen (7C) | |

### Western flower thrips susceptibility test methods

014 **Larvae** *Dip*

010 **Adults** *Dip*

### Key western flower thrips resources

Frankliniella occidentalis IRM Poster
*V4.1, Sep '11*

Sucking Pests MoA Poster
*V7.0, Apr '14*

### References


Esterase isoenzymes and insecticide resistance in Frankliniella occidentalis populations from the south-east region of Spain.
*López-Soler N, Cervera A, Moores GD, Martínez-Pardo R, Garcerá MD, (2008) . Pest Management Science, Vol. 64 (12), 1258-66. doi: 10.1002/ps.1627..*

Field-evolved resistance to insecticides in the invasive western flower thrips Frankliniella occidentalis (Pergande) in China
*Wang ZH, Gong YJ, Jin GH, Li BY, Chen JC, Kang ZJ, Zhu L, Gao YL, Reitz S, Wei SJ, (2016) . Pest Management Science, Vol. 72 (7) pp.1440-1444, DOI: 10.1002/ps.4200.*


- Greater focus on providing resistance information.
- Aim to be a first destination and subsequent hub-site site for resistance knowledge.

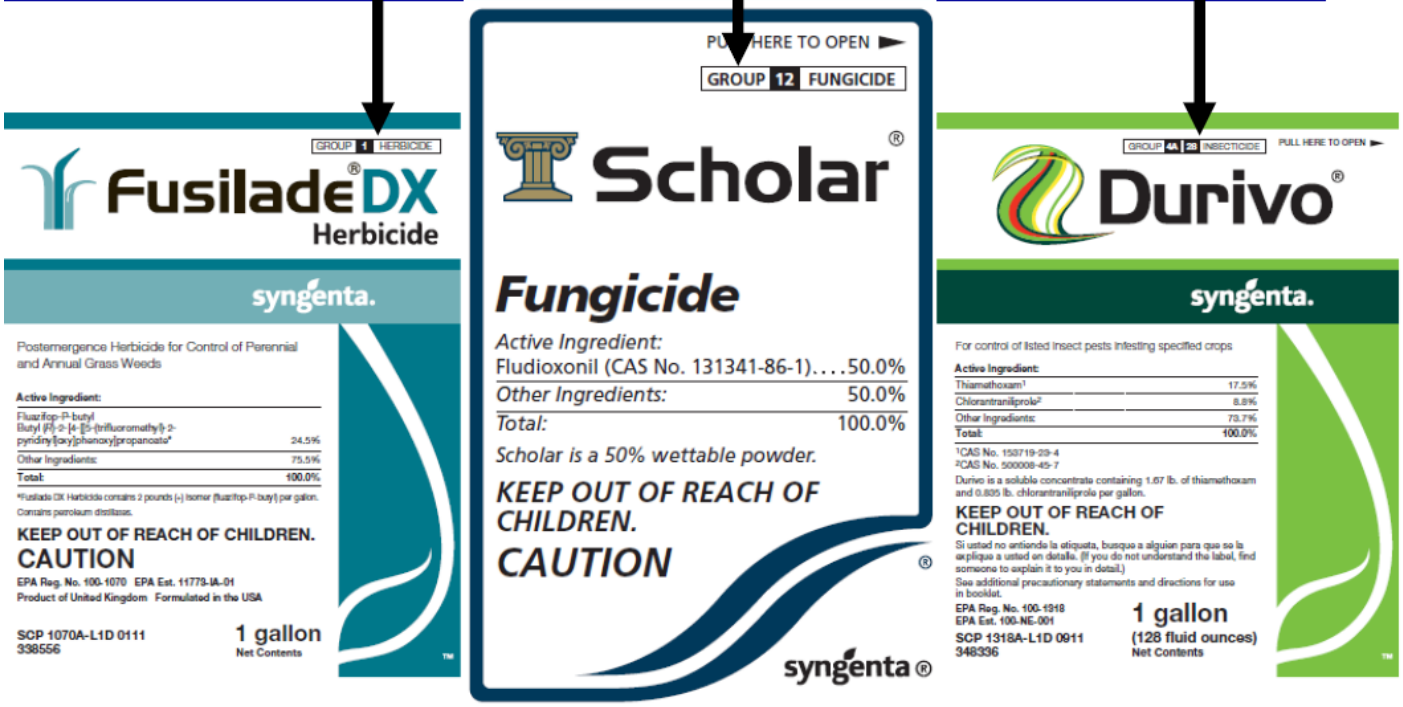
# IRAC Executive objectives 2017-18

- Enhance available information on pest resistance on IRAC web-site.
- Complete agreement with IRAC member companies on MoA icon adoption.

**Use the IRAC Mode Of Action (MoA) system to identify Insecticide, Fungicide, and Herbicide products that attack the same pest target sites and properly rotate to practice ideal IRM.**

**Examples:**

**HERBICIDE** **FUNGICIDE** **INSECTICIDE**




- Agreement on voluntary use of MoA icons within IRAC member companies.
- Awaiting ongoing Croplife Intl. discussions across insecticide, fungicide and herbicide labels before implementation.



IRAC

# IRAC Executive objectives 2017-18

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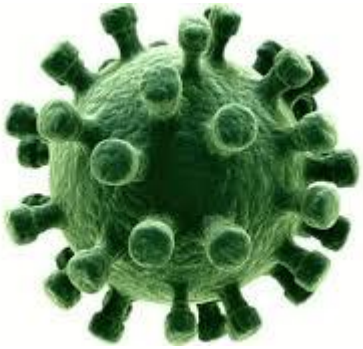
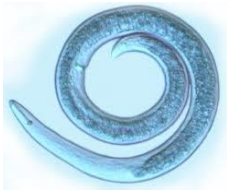
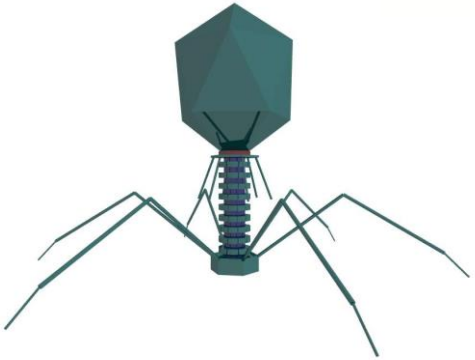
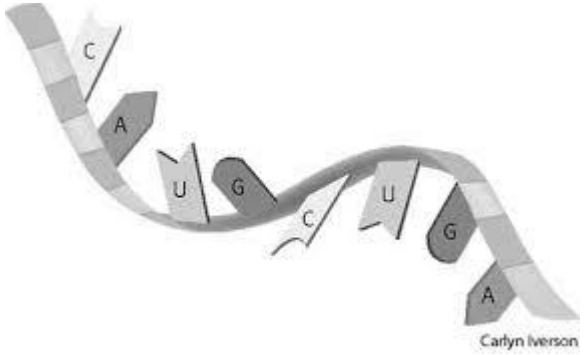
- Complete agreement with IRAC member companies on MoA icon adoption.
- Develop IRM classification scheme for biological and non-chemical insecticides.

# Classification schemes for non-synthetic chemical insecticides and alternative methods of insect control










- *Agreed that some form of classification for `Alternative` methods of control.*
- *IRAC MoA working group working on a draft proposal.*

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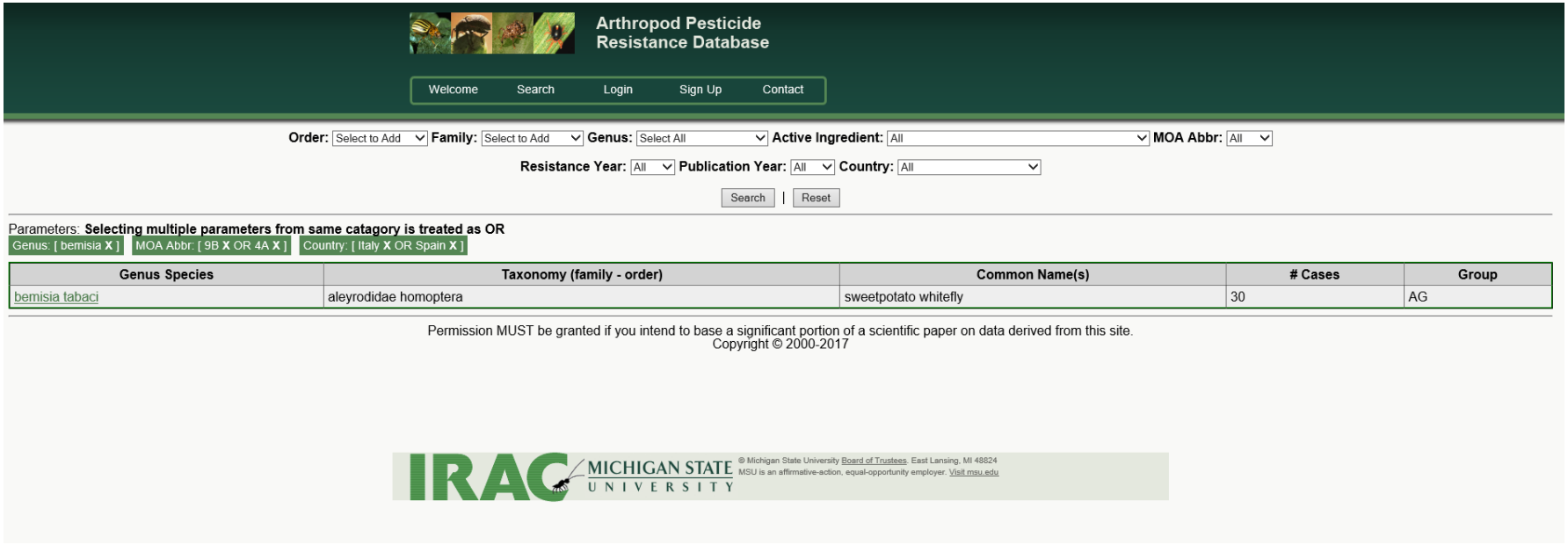
- Find long term solution for resistance record database.

# MSU APRD database

- MSU APRD database: New version.
- IRAC funded an update to the database with increased search functionality.
- Can now search for multiple parameters.
- Functionality much improved.
- Working on including a laboratory vs. field derived resistance search function.
- Working on regional descriptors (i.e. search by geographic region (Northern Europe) not just by country).




- Still a need to find a long term solution: Changes in MSU staff & need for more accurate database
- Ongoing discussions to find a long term way of recording resistance cases.

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- Provide an IRAC guidance document on IRM Modelling.

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- Working group established and first meeting in August.
- Agreed to develop two streams of information:
  - Page on IRAC web-site explaining fundamentals of insecticide resistance modelling for visitors with no background in modelling (hands on use of model, facts & figures, what you can expect, what do you need, etc.
  - IRAC position paper for those with more advanced knowledge: Different modes, parameter use, etc

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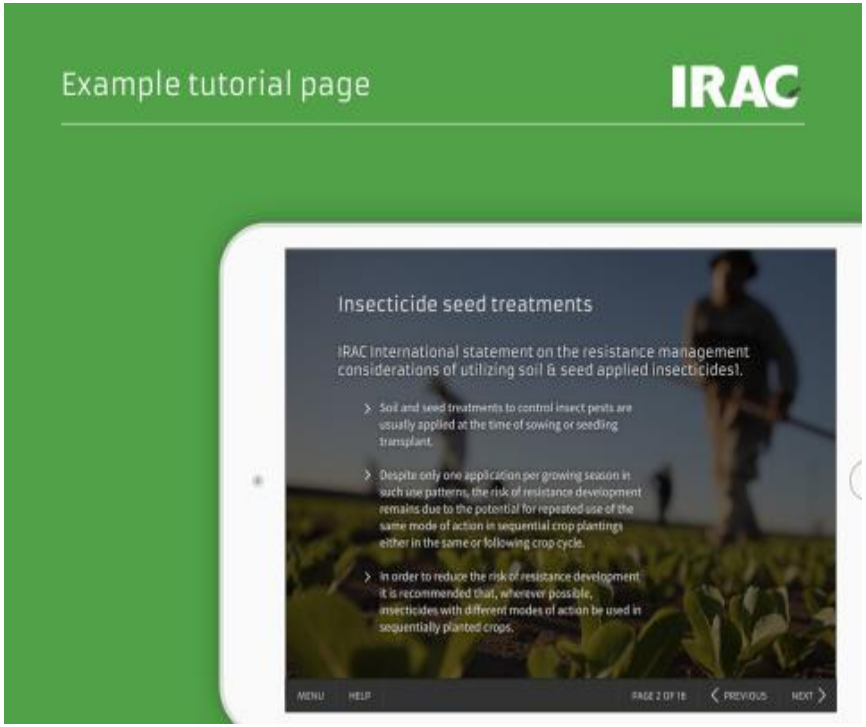
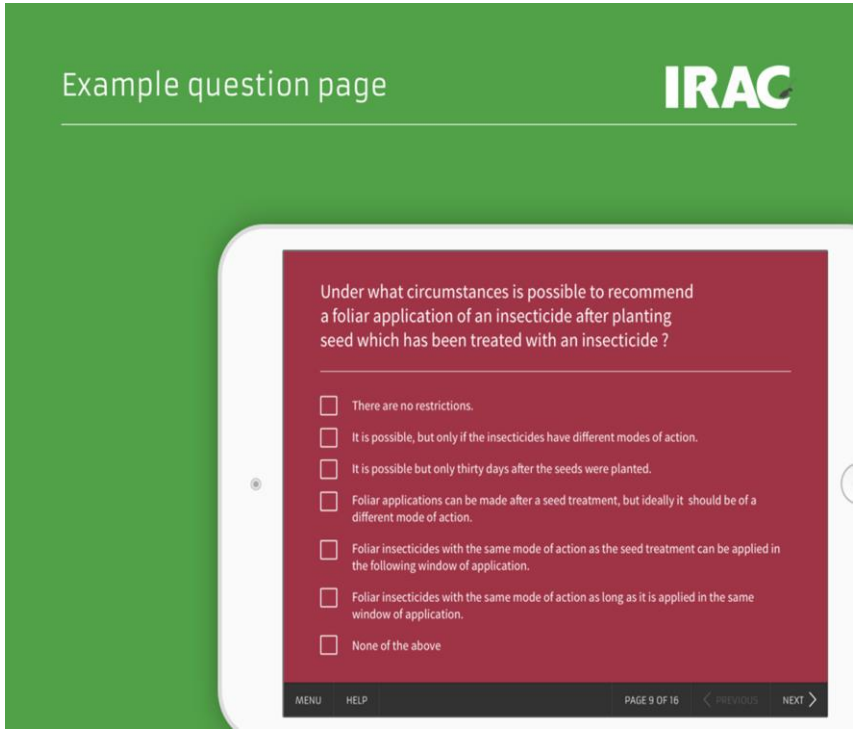
- Development of an IRM online training tool.

# Online IRM Training

- Online training in basic IRM.
- Target audience still needs to be defined:
  - Students, Farm managers, Pesticide Retailers, Company sales teams.
- Can we use existing training materials ?
- Timelines, resoruces and funding still in discussion.



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- Develop RAC proposal for the generation of EU regulatory data and engage with pesticide regulators in Europe.

A joint FRAC, HRAC and IRAC workshop was held on the 13th September in order to discuss the process of generating resistance data in support of the registration and re-registration of pesticides in Europe. The outputs of this meeting and subsequent individual discussions within the RACs will be communicated once the recommendations are fully developed.

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- Completion of Task Team activities (Puerto Rico & *Tuta absoluta*)
- Assess potential for New Task Team in Africa to address threat of invasive *Spodoptera frugiperda* ?

Currently IRM implementation and advice is being provided by IRAC South Africa. No further imput from IRAC International is currently required.

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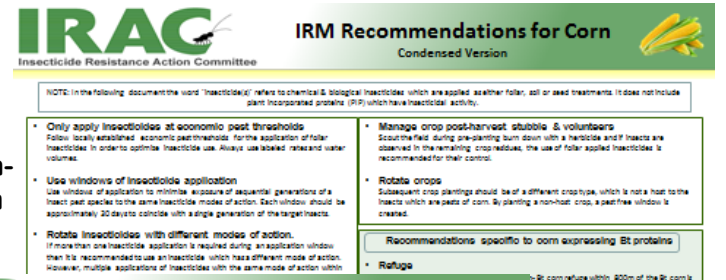
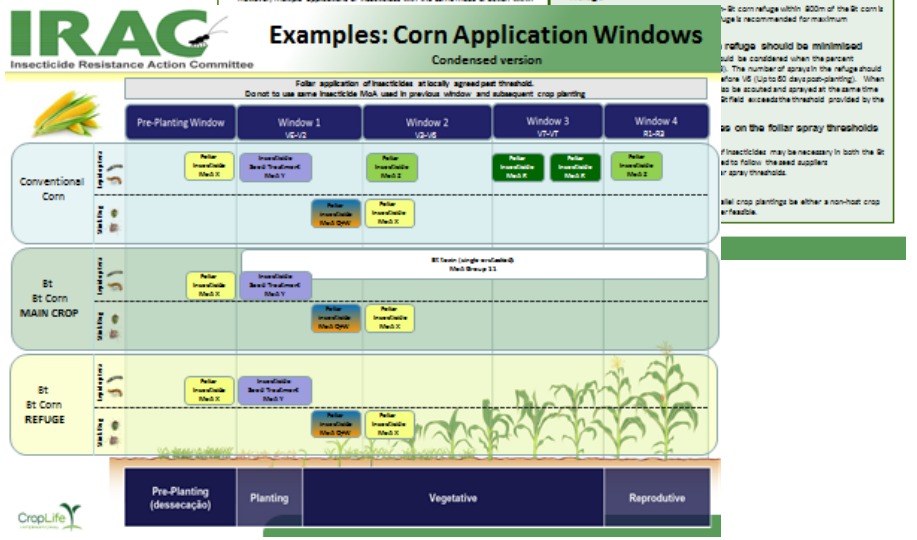
- Completion of Task Team activities (Puerto Rico & *Tuta absoluta*)
- Assess potential for New Task Team in Africa to address threat of invasive *Spodoptera frugiperda* ?
- Formation of an IRAC Nematode working group

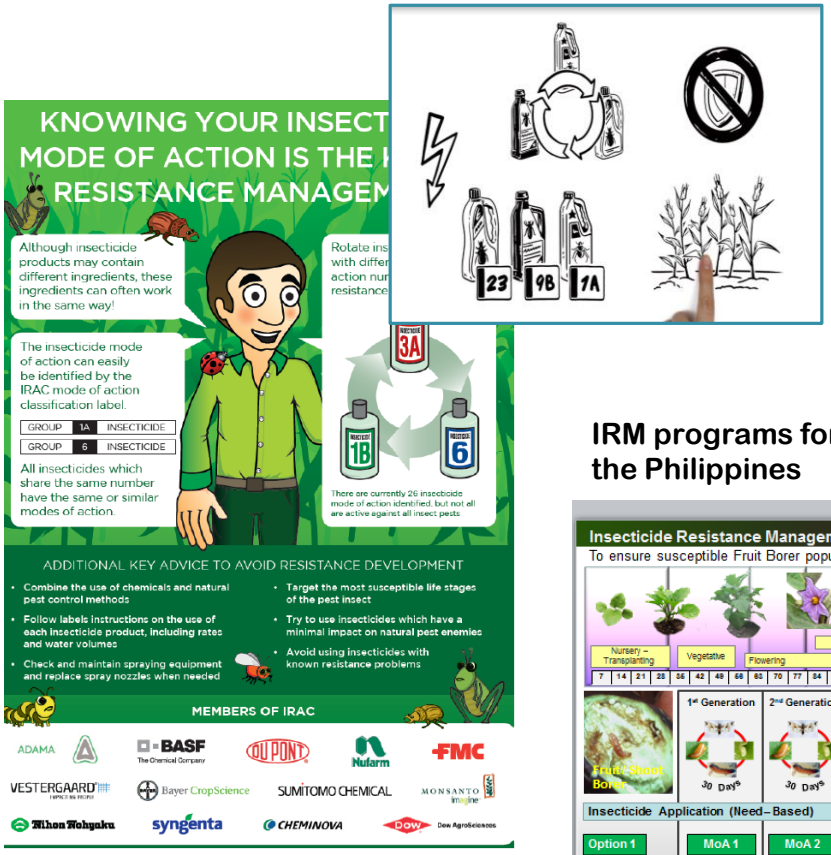
1st meeting on the 25th September

- IRAC is focused on providing practical resistance management advice to those that implement or advise on pest management.
- Growers, farm managers, independent advisors, extension services & industry representatives

**IRM guidelines for conventional and transgenic corn, developed in collaboration with non-industry experts from Brazil**




**IRM Leaflet providing Basic IRM advice for small holders.**

**IRM programs for eggplant and rice used in train the trainers programs in China & the Philippines**