Insecticide Resistance Action Committee

IRAC-US Update

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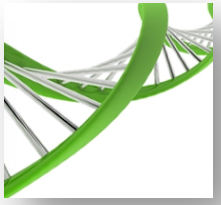
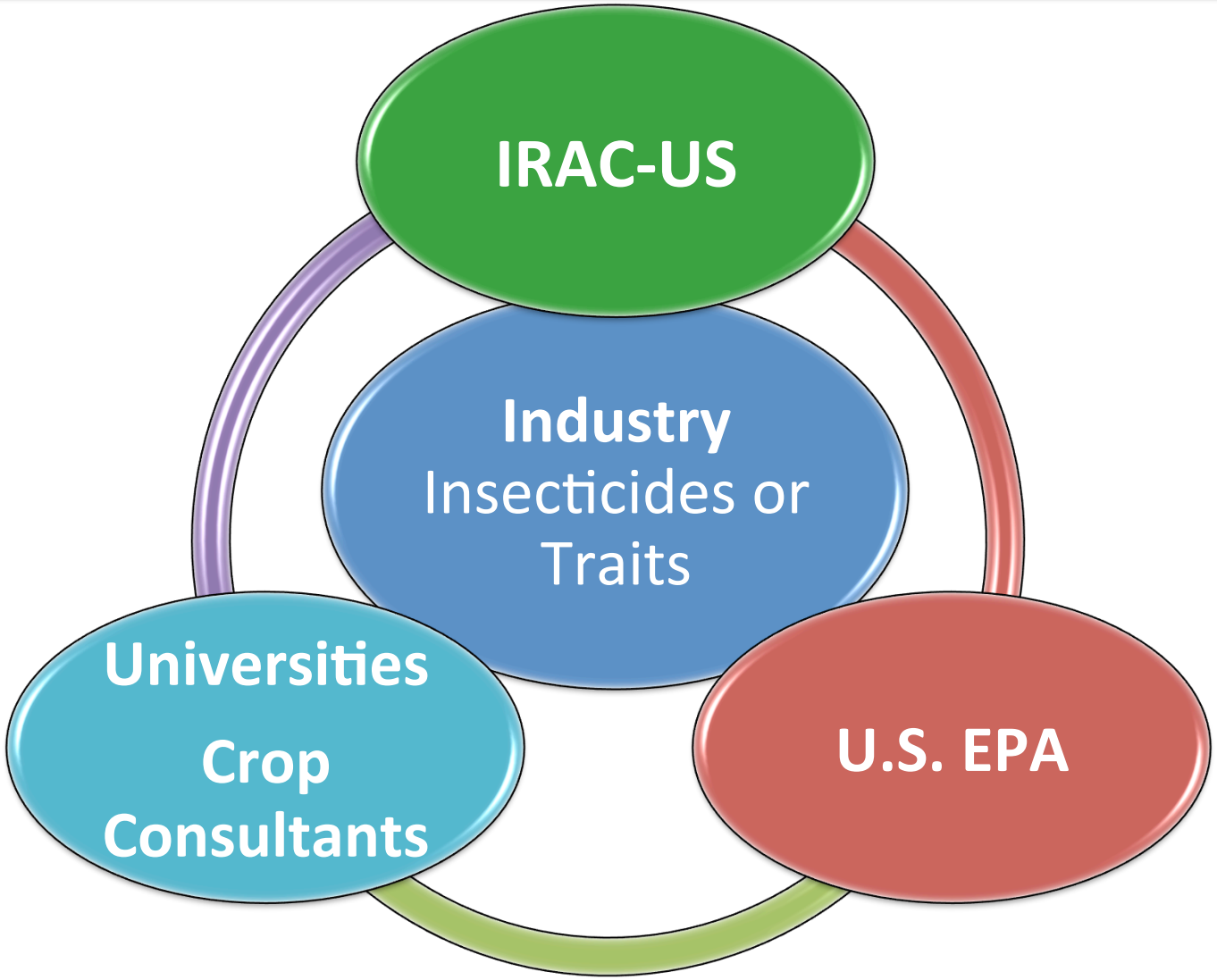



IRM Implementation / Regulation Key Groups



Insecticide Resistance Management
EPA's Role

- For conventional pesticides, EPA has historically relied on voluntary measures to encourage proactive resistance management by pesticide users.

- Agency-approved labels are an important tool, but resistance management labeling is voluntary (not mandatory for registrants).

- Bt Plant-Incorporated Protectants (PIPs) – a special case:
  - EPA places a high value on preserving the significant agricultural and environmental benefits of Bt PIPs
  - EPA requires an Insect Resistance Management (IRM) plan for each registered Bt crop.

IRAC-US
Interactions with EPA, BEAD

- Meet annually with EPA, Biological and Economic Analysis Division
  - BEAD provides pesticide use-related information and economic analyses in support of pesticide regulatory activities.
  - Increased focus on weed resistance has led to BEAD's interest in resistance management plans more generally (though purely voluntary in form at this point).
  - BEAD is involved in resistance management discussion with all of the RACs.
- IRAC-US has provided a list of key pests with high potential for resistance to EPA, BEAD
- IRAC-US has provided "Overview of an Insect Resistance Management (IRM) Plan for Plant Protection Insecticides" in 2013.
  - IRAC-US will meet in April with EPA to discuss the IRM Plan.
  - Mark Whalon, MSU is the ESA liaison to the EPA.
  - IRAC-US has regular interactions with the ESA liaison representative to facilitate our discussions with the EPA.

IRAC-US IRM Plan
Plant Protection Insecticides

- Determine insecticide mode of action.
- Establish the baseline susceptibility of key high-resistance-risk pests prior to and/or in the early years of commercialization.
- Include mode of action group on product labels.
- Provide resistance management recommendations on product labels.
- Encourage use of Integrated Pest Management (IPM) practices by growers.
- Develop educational literature for growers, researchers and extension agents to increase resistance management awareness, particularly at the grower level.
- Monitor product performance over a wide range of geographies and observe or track changes in the susceptibility of pest populations over time.

Insecticide Resistance Management Universities & Consultants Role

- Lead or participate in the development of IRM plans
- Provide education and lead implementation of IRM plans in respective geographies for the growers and crop consultants.
- Monitor susceptibility of insects of concern.
- Provide feedback to companies on successes and challenges with IRM plans.

IRAC-US
Interactions with NAICC

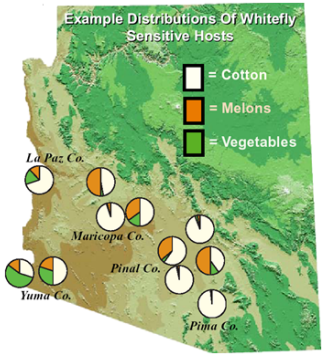
- NAICC – National Alliance of Independent Crop Consultants
  - Jim Steffel – Ad Hoc member of IRAC-US
- IRAC-US participates in NAICC annual meeting
  - Present training presentations
  - Distribute literature

Neonicotinoid IRM Plan & Implementation - *Bemisia tabaci* – Arizona/California vs. Florida

AZ / CA Recommendations

- Guidelines based on the cropping system

Cross-commodity Guidelines for Neonicotinoid Insecticides in Arizona



- ***Summary Guidelines**: Maximum number of uses per crop season for neonicotinoids in three different cropping communities.*

Community	Cotton	Melons	Vegetables
Multi-Crop	0	1*	1**
Cotton / Melon	1	1*	—
Cotton-Intensive	2	—	—

**Soil only; **Soil or Foliar*

FL Recommendations

- Cultural Controls
  - Crop Hygiene
  - Tomato free period
- Neonicotinoids
  - Application Method & Timing

IRAC

IRM Plan & Implementation
Diamide Insecticides – IRAC-US Diamide WG

- Labels - MoA Symbol, Resistance Management Language
- Collaborate with University Research & Extension
  - Develop best management guidelines for IRM
  - Literature pieces
  - Address emerging issues

Lepidopterous Larvae Management in Desert Produce Crops, 2013

Relative Efficacy Index For Lep Larvae in Desert

Product	IRAC[1] MOA	Beet armyworm	Cabbage looper	Corn earworm	Diamondback moth	Comments*
Lannate	1A	•••	•	•••	•	Tank mix with another product for broad spectrum Lep activity; provides thrips control; PHI: 10 d on lettuce; 7 d spinach; Use rates above 0.75 lb AI/ac
Lorsban	1B	•••	•	•••	•	Tank mix with another product for broad spectrum Lep activity; For use on cole crops, PHI: 21 d; use top of label rates if possible
Acephate	1B	•	••	••	•	Tank mix with another product for broad spectrum Lep activity; PHI: 14-21 d on head lettuce; 7 d on cauliflower ; provides thrips control; Use high labeled rates
Pyrethroids	3	•	•••	•••	•	Tank mix with another product for broad spectrum Lep activity; PHI: varies with products ; use high labeled rates
Radiant	5	•••	•••	•••	•••	Stand alone Lep, leafminer, and thrips control; PHI: 1 day on leafy veg and Brassica crop groups; Use rates at 5-7 oz depending on pest spectrum.
Proclaim	6	•••	••	•••	•••	Stand alone Lep control; use a penetrating adjuvant ; PHI: 7 day on leafy vegetable and Brassica head and stem crop groups; Use at rates above 3.6 oz
Bt (i.e. Dipel)	11B	•	••	•	•	Tank mix with another product for broad spectrum Lep activity, numerous Bt products available; PHI: 0 d -good spray coverage desirable
Intrepid	18A	•••	•••	••	••	Tank mix with another product for broad spectrum Lep activity; PHI: 1 day; good spray coverage desirable; mix with a pyrethroid for best results
Avaunt	22	•••	•••	••	••	Tank mix with another product for broad spectrum Lep activity; PHI: 1 day, good spray coverage desirable, use higher rates for best control
Belt	28	•••	•••	•••	•••	Stand alone Lep control; PHI: 1 day on leafy vegetable and Brassica leafy crop groups, Use 1.5 oz in LeafyVeg; 2.0 oz in Cole crops.
Coragen	28	•••	•••	•••	•••	Stand alone Lep and leafminer control; PHI: 1 day for Leafy Veg crop group; 3 d for Brassica leafy crop group for both soil and foliar uses - Use at or above 5 oz.
Voliam Xpress	28+3	•••	•••	•••	•••	Stand alone Lep and leafminer control; PHI: 1 day for head and leaf lettuce; 3 d for Brassica head and stem crop group. Use higher rates (8 oz or >).
Volium Flexi	28+4A	•••	•••	•••	•••	Stand alone Lep and leafminer control; PHI: 7 day forleaf veg crop grous; 3 d for Brassica head and stem crop group. Has aphid activity. Use higher rates.
Durivo	28+4A	•••	•••	•••	•••	Stand alone Lep and leafminer control; PHI: 30 day forleaf veg and Brassica crop groups; Has aphid activity. Use at 13 oz.
Vetica	28+16	•••	•••	•••	•••	Stand alone Lep control; PHI: 7 day for Leafy Veg crop group; 3 d for Brassica leafy crop group. Has whitefly activity. Use at 17 oz or >

••• Good residual control (7-14 d)
•• Marginal residual control (4-6 d)
• Poor residual control (1-3 d)

[1] IRAC Mode of Action - for more infor go to - http://www.irac-online.org/

* always consult the label before applying any of these products

J.C. Palumbo, VegIPM Update, Vol 4, No 10, Sep 2013

Group 28 (Diamide) Resistance Management

Diamondback moth in Cole Crops

Insecticide Resistance Action Committee (IRAC), a CropLife specialist technical group

In collaboration with the University of Georgia

http://www.irac-online.org/

IRAC

IRAC-US Funded Projects

- IRAC-US provides seed money for resistance management projects
  - Receive inquiries from university cooperators
  - Every couple of years we have a scoping exercise that includes key academics and this leads to broad project priorities.
  - Hosted a roundtable meeting in 2011 to solicit new projects.
- Past Funded Projects
  - Urgent Needs for Pyrethroid Resistance Management in the Bollworm, H. zea - B. Hopkins & P. Pietrantonio, Texas A&M
  - North American Zea Resistance Mapping and Management - B. Hutchison, University of Minnesota, S. Fleisher, Penn State University & G. Payne, University of West Georgia
  - Group 28 Diamide Resistance Management - Diamondback Moth in Cole Crops

Current Projects – Funded by IRAC-US

Research	Investigators	Timeline
• Management of Insecticide Resistance in Asian Citrus Psyllid (ACP) Populations	• Phil Stansly, University of Florida	• Year 2 of 3 Year Study
• Resistance risk assessment in populations of the Asian citrus psyllid (Diaphorina citri) to recommended insecticides: resistance monitoring in Texas and Florida, and establishment of the Asian Citrus Psyllid (ACP) resistance website portal.	• Patricia V. Pietrantonio & Cecilia Tamborindeguy, Texas A&M University	• Year 2 of 3 Year Study
• Assessment of Southern Chinch Bug Insecticide Resistance Prevention	• Eileen Buss, University of Florida	• Year 2 of 2 Year Study

2014 Proposed ESA Symposium
Managing resistance in a changing landscape IRAC US Symposium Series: No.10

Topics	Speakers
• Available Tools – cost & time for discovery, regulation challenges, enthusiasm & high adoption rates for new technology	• Tom Sparks, Dow
• Change in farm landscape	• Terry Hurley, University of Minnesota
• Cotton – changes in landscape and pest challenges, include seed treatments	• Angus Catchot, Mississippi State University
• Exotics – spotted winged drosophila	• Peter Scherer, University of Oregon
• Exotics – Asian citrus psyllid	• Beth Grafton Cardwell, University of California
• Exotics – Asian citrus psyllid	• Michael Rogers, University of Florida
• Seed Treatment Use	• Christian Krupke, Purdue University
• Game for Lygus control over large areas and implication for IRM	• Peter Ellsworth, University of Arizona
• Corn earworm and Pest Watch – changes in cropping landscapes	• Shelby Fleisher
• Fall armyworm in Puerto Rico	• Hector Portillo
• Changing landscape - CRW - causes of the issues and what are growers willing to accept	• Graham Head

Questions