Insecticide Resistance Action Committee

IRAC-US Update

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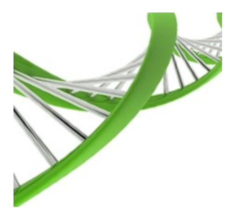


IRAC-US Interactions with EPA (BEAD)

- IRAC meets annually with EPA (Biological and Economic Analysis Division), as well as with the ESA liaison to EPA
  - BEAD provides economic analyses in support of pesticide regulation
  - Increased focus on weed resistance led to BEAD's interest in resistance management plans generally (though purely voluntary at this point)
  - BEAD is involved in discussion with all of the RACs and BPPD
- IRAC-US has provided a list of pests with high resistance potential and "Overview of an Insect Resistance Management (IRM) Plan for Plant Protection Insecticides" to BEAD
- IRAC and Biotech companies engaged with BPPD and BEAD when language limiting SAI use in combination with corn rootworm traits was proposed by EPA

ESA Position (Policy?) Statement

Constraints to effective IRM and recommendations for improvement

- **<u>Limited availability of insecticide MoAs</u>:** A limited number of new insecticides forces pest management practitioners to rely on continual application of the same insecticide. This process can rapidly select for insecticide resistance in agricultural and urban environments. Greater diversity of MoAs is needed to meet emerging resistance issues; however, new products may not be profitable enough to discover, develop and register under the current regulatory framework.
- *Identify and minimize regulatory bottlenecks* – A streamlined regulatory process, that includes reasonable and predictable regulatory requirements and review timelines, will promote the timely development of economical, reduced-risk, pest specific insecticides with novel MoAs for all uses, especially for specialty crop, livestock and public health. A comprehensive reevaluation of the current pesticide regulatory process will improve registration efficiency and minimize the evaluation timeline for new insecticides.
- *Strengthen alternative registration processes* – The IR-4 Project is an essential federal program that generates pesticide residue data to support new minor use registrations for specialty crop production, livestock and human health.[7] These registrations increase the diversity of reduced-risk pesticides available for IRM. In addition to expanding the registrations of new pesticides, IR-4 also generates basic information about pesticide residues and tolerances (Maximum Residue Limits, MRLs), a process that sets pesticide use limits on specialty crop commodities. Using these MRL standards, specialty crop growers can ensure their products meet residue standards for domestic and global markets. Improved funding support for IR-4 will be important to close existing budget shortfalls, and to advance pesticide residue research to effectively address the requirements of changing domestic and international regulatory environments.
- **<u>Early detection of insecticide resistance is a challenge</u>:** Detecting insecticide resistance is important to implement proactive IRM. Effective resistance detection methods rely on an understanding of the underlying mechanism of resistance and these studies can require many years to accomplish. To date, support of basic and applied projects to document, deploy and minimize resistance development have been limited, and these projects are often implemented through public-private partnerships long after resistance to an insecticide has developed.
- *Improve methods to detect insecticide resistance* – Development of rapid diagnostic tools to detect resistance and improve decision making by pesticide users will reduce widespread resistance development in pests. Expansion of IRM funding sources within existing federal programs (e.g., USDA NIFA, NIH NIAID) will be important to develop and deploy effective diagnostic tools for emerging insect resistance issues.
- *Increase support for resistance detection infrastructure* – Coordination between public institutions, private companies, and regulators will enable early detection of resistance in key pests of crops, livestock, and humans. Coupled with effective diagnostic tools, support for resistance detection between public and private entities will improve the stewardship of insecticides in the future.
- **<u>Lack of understanding or adoption of IRM</u>:** Education remains one major limitation to the adoption and implementation of IRM strategies. Future IRM recommendations will need to combine resistance detection, pest-specific insecticide evaluation, and MoA rotations to maximize product longevity and minimize resistance development.
- *Support IRM education* – Effective management of insecticide resistance depends on both basic and applied research to develop best management practices and inform IRM recommendations. Grower incentives and education about the basic principles of integrated pest management (IPM) and IRM are essential to optimize pest management, including best use of insecticides, pest monitoring, treatment thresholds, natural enemies, pheromones, and selectivity of insecticides. Continued support of Cooperative Extension and resistance-related Extension research projects through the Farm Bill will be crucial to improvement of IRM education, outreach and adoption.

Broader Educational Initiatives

- Annual symposium at the ESA meeting – this year at ESA/ICE in Orlando: “Globally Important Pests and Globally Important Control Tools: Comparing and Contrasting IRM Successes and Challenges”
- Participation in a working group developing resistance management programs for Iowa, along with academics and a range of other stakeholders
- Engagement with University of Nebraska, Lincoln around a proposal for a resistance management center of excellence (CEEMPR)
- Regular IRM-related presentations and workshops at the annual NAICC meeting (facilitated by representation from NAICC on IRAC)

IRAC-US Funded Projects

- IRAC-US provides “seed money” for resistance management projects to public sector researchers
  - Based on scoping exercises, solicited proposals and unsolicited requests
- Current Projects
  - Maintenance of insect resistance database - Michigan State University, in conjunction with IRAC-International
  - Maintenance of resistant insect strains – Jeff Scott, Cornell University
  - Assessment of resistance status and origin of US soybean looper populations – Jeff Davis, Louisiana State University, and Rod Nagoshi, USDA-ARS

Caterpillar Abundance in Soybeans

6 locations across Louisiana sampled weekly from V2 to R8
From 2009 to 2014

Soybean pest	% of total species
Soybean looper	50.0
Velvetbean caterpillar	25.8
Green cloverworm	12.5
Yellowstriped armyworm	7.2
Fall armyworm	2.5
Corn earworm	1.1
Saltmarsh caterpillar	0.7
Beet armyworm	0.2

Monitoring with Soybean Looper (3X LC_{95})

Intrepid 2F	% mortality	
Location	2013	2014
Alabama	—	35
Arkansas	61	—
Georgia	57	55
Louisiana-AL	—	62
Louisiana-BH	69	—
Louisiana-NI	99	—
Louisiana-SJ	72	—
Louisiana-US	86	—
Mississippi	—	80
North Carolina	68	—
Puerto Rico	0	—
Tennessee	69	—

Belt SC	% mortality	
Location	2013	2014
Alabama	—	49
Arkansas	80	—
Georgia	70	74
Louisiana-AL	—	83
Louisiana-BH	87	—
Louisiana-NI	97	—
Louisiana-SJ	81	—
Louisiana-US	88	—
Mississippi	—	82
North Carolina	28	—
Puerto Rico	3	—
Tennessee	93	—