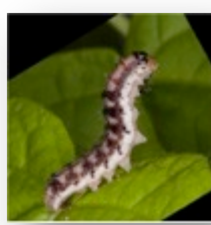
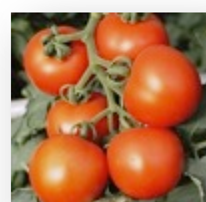
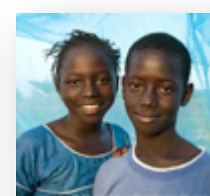
Insecticide Resistance Action Committee

MoA WG 2016/2017

51st IRAC International Meeting, Philadelphia

March 28th, 2017



MoA WG Team Members: 2016-2017

Team increased by 4 members

- ADAMA Danny Karmon
- AgBiTech Holly Popham*
- BASF Vince Salgado & Barbara Wedel*
- Bayer Ralf Nauen & Ulli Ebbinghaus-Kintscher
- DuPont **Dan Cordova** (Team Leader)
- Dow Tom Sparks & Jerry Watson
- Mitsui Toshifumi Nakao* & Shinchi Banba* (guest members)
- NNI Shinsuki Fujioka* & Kazuyuki Sakata (outgoing)
- Sumitomo Shigeru Satio
- Syngenta **Andrew Crossthwaite** (Deputy Team Leader) & Ferus Earley

- Excellent support from Alan Porter

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MoA WG Activities

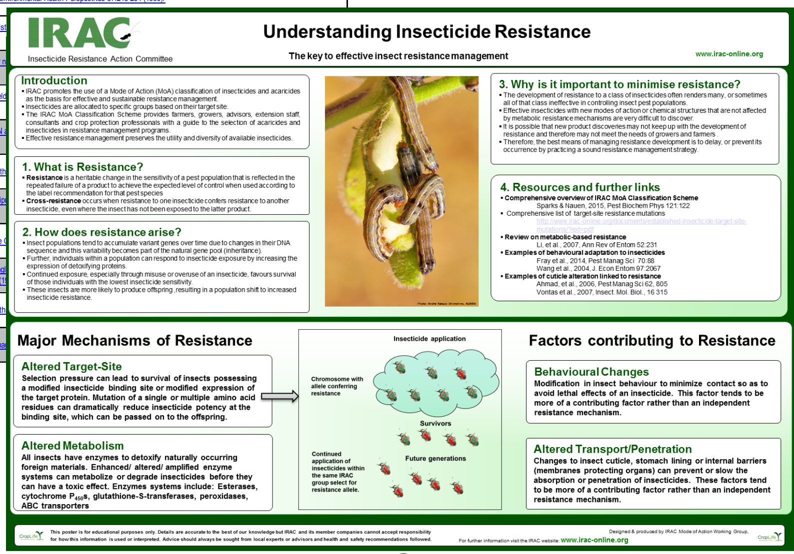
Four conference calls (# of participants)

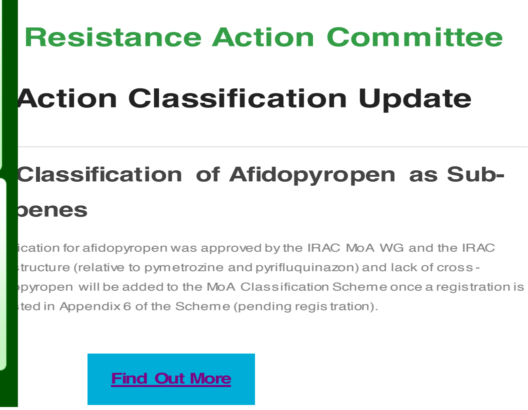
January 2016 (8)
November 2016 (12)
August 2016 (7)
January 2017 (11)

Focus

Enhancing external awareness of MoA Classification and changes

Group	Mode of Action	Hyperlinked References
1	Acetylcholinesterase (AChE) inhibitors	Fukuto TR Mechanism of action of organophosphorus and carbamate insecticides. Environmental Health Perspectives 87:245-254 (1990).
2	GABA-gated chloride channel antagonists	Salgado VL, Schnatteter S and Holmes KA, Ligand-gated chloride channel antagonist… Witschel M, Wiley-VCH Verlag, Weinheim, pp. 1283-1305 (2012).
		Chen L, Durkin KA and Casida JE, Structural model for -aminobutyric acid receptor n… 5190 (2006).
		Zhao X, Salgado VL, Yeh JZ and Narahashi T, Differential Actions of Fipronil and Dield… (2003).
		Grolleau F and Sattelle, DB, Single channel analysis of the blocking actions of BIDN a… Pharm 130:1833-1842 (2000).
		Hainzl D and Casida JE, Fipronil insecticide: Novel photochemical desulfinylation with…
		Hosie AM, Baylis HA, Buckingham SD and Sattelle DB, Actions of the insecticide fipr… 912 (1995).
		Cole LM, Nicholson RA and Casida JE, Action of Phenylpyrazole Insecticides at the G…
		ffrench-Constant RH, Steichen JC, Rocheleau TA, Aronstein K and Roush RT, A singl… insecticide resistance in Drosophila populations. Proc Natl Acad Sci 90:1957-1961 (1…
3	Sodium channel modulators	Davies TGE, Field LM, Usherwood PNR and Williamson MS, DDT, Pyrethrins, Pyreth…
		Soderlund DM, Pyrethroids, knockdown resistance and sodium channels, Pest Manag…





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MoA Classification Updates

GS-omega/kappa-Hxtx-Hv1a

Vestaron requested dual MoA(K_{Ca} & Ca_v channel blockers)

Classified in UN due to insufficient data supporting dual MoA

Azadirachtin

Reclassification request reviewed; maintained in UN as current evidence supports multiple actions without indication of target protein.

Etoxazole

Evidence supporting chitin synthase MoA is strong.

Concern for move to Group 15 given mite cross-resistance between certain 10A miticides. To be revisited

Nucleopolyhydrosis viruses

AgBitech request for new Group 30 (NPVs). Implications of including "non-traditional" insecticides (i.e. biopesticides, dsRNA, biologicals) raised concern with several members. Agreed to delay classification decision.

Afidopyropen

BASF request for Group 9D (Chordotonal organ – TRPV modulators) reviewed and approved

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MoA Poster & Website Updates

Language posters

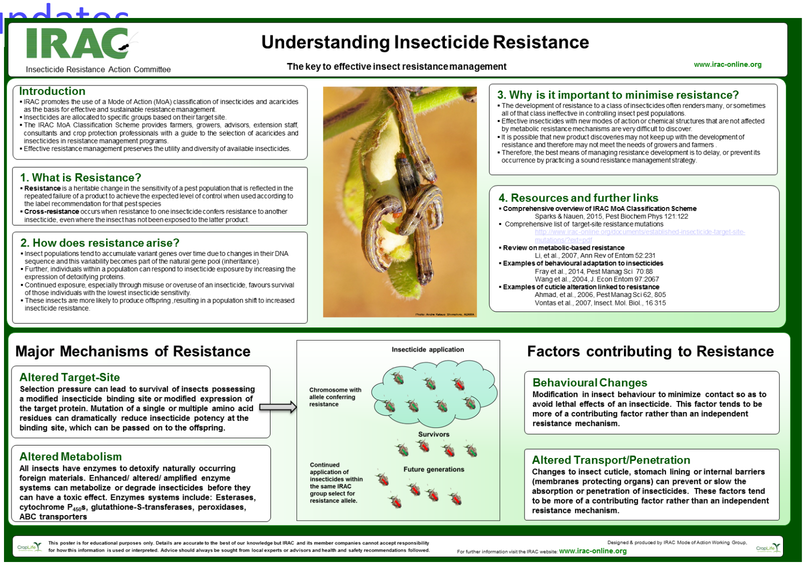
Spanish, Portuguese and Japanese posters updated; still waiting on Chinese update

Pest-Specific Posters

Mite (Ebbinghaus-Kintscher), Vector Control (Saito), Lep (Sparks), Sucking Pest (Nauen)

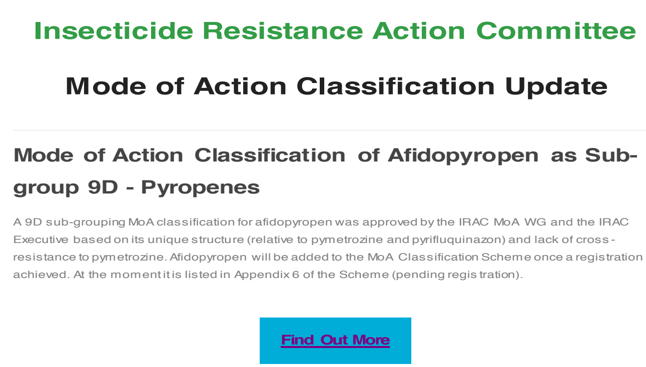
Resistance Mechanism Poster

Completed (Crossthwaite)



Website Upgrade

Subscription for classification updates



New Additions to Website

MoA reference document

Initiated by V. Salgado; prepared by WG members

Key literature reference for each MoA group with embedded hyperlinks

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1	Acetylcholinesterase (AChE) inhibitors	Fukuto TR Mechanism of action of organophosphorus and carbamate insecticides. Environmental Health Perspectives 87:245-254 (1990).
2	GABA-gated chloride channel antagonists	Salgado VL, Schnatteter S and Holmes KA, Ligand-gated chloride channel antagonists (fiproles), in Modern Crop Protection Compounds 2nd edition, ed. by Kramer W, Schirmer U, Jeschke P and Witschel M, Wiley-VCH Verlag, Weinheim, pp. 1283-1305 (2012).
		Chen L, Durkin KA and Casida JE, Structural model for -aminobutyric acid receptor noncompetitive antagonist binding: Widely diverse structures fit the same site. Proc Natl Acad Sci 103:5185-5190 (2006).
		Zhao X, Salgado VL, Yeh JZ and Narahashi T, Differential Actions of Fipronil and Dieldrin Insecticides on GABA-Gated Chloride Channels in Cockroach Neurons. J Pharm Exp Ther 306:914-924 (2003).
		Grolleau F and Sattelle, DB, Single channel analysis of the blocking actions of BIDN and fipronil on a Drosophila melanogaster GABA receptor (RDL) stably expressed in a Drosophila cell line. Br J Pharm 130:1833-1842 (2000).
		Hainzl D and Casida JE, Fipronil insecticide: Novel photochemical desulfinylation with retention of neurotoxicity. Proc Natl Acad Sci 93:12764-12767 (1996).
		Hosie AM, Baylis HA, Buckingham SD and Sattelle DB, Actions of the insecticide fipronil, on dieldrin-sensitive and - resistant GABA receptors of Drosophila melanogaster. Br J Pharm 115:909-912 (1995).
		Cole LM, Nicholson RA and Casida JE, Action of Phenylpyrazole Insecticides at the GABA-Gated Chloride Channel. Pest Biochem Physiol 46:47-54 (1993).
		ffrench-Constant RH, Steichen JC, Rocheleau TA, Aronstein K and Roush RT, A single-amino acid substitution in a y-aminobutyric acid subtype A receptor locus is associated with cyclodiene insecticide resistance in Drosophila populations. Proc Natl Acad Sci 90:1957-1961 (1993).
3	Sodium channel modulators	Davies TGE, Field LM, Usherwood PNR and Williamson MS, DDT, Pyrethrins, Pyrethroids and Insect Sodium Channels. IUBMB Life 59:151-162 (2007).
		Soderlund DM, Pyrethroids, knockdown resistance and sodium channels, Pest Manag Sci 64:610–616 (2008).

MoA WG Activities

Establishing “comment period” for changes to existing MoA classifications

- Include generic providers
- Obtain list of key contacts

MoA Training Module

- Ongoing objective (since 2010)
- Waiting on BASF response for use of existing training slides
- Consideration for having external party generate IRAC version

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