



Insecticide Resistance Action Committee

IRAC SPWG Spring Meeting summary

Tuesday 18th March
Stephen Skillman



SPWG Team membership 2013

Member	Company			
Alan Porter	IRAC			
Alejandro Arevalo	BASF			
Eric Andersen	Cheminova			
Ben Bolton	Nufarm	<i>replacing</i>	<i>Jean-Paul Genay</i>	<i>Nufarm</i>
Imre Mezei	Dow	<i>replacing</i>	<i>James Thomas</i>	<i>Dow</i>
Luis Antonio Pavan	Dow			
Juan Manuel Alvarez	DuPont	<i>replacing</i>	<i>Dan Vincent</i>	<i>DuPont</i>
Luis Gomez	Dow			
Michael Klueken**	Bayer			
Ralf Nauen	Bayer			
Russell Slater	Syngenta			
Steve Skillman*	Syngenta			
Tamar Danon	Adama			
Tatjana Sikuljak	BASF			
TOTAL	13			

* Chair

** Vice-Chair

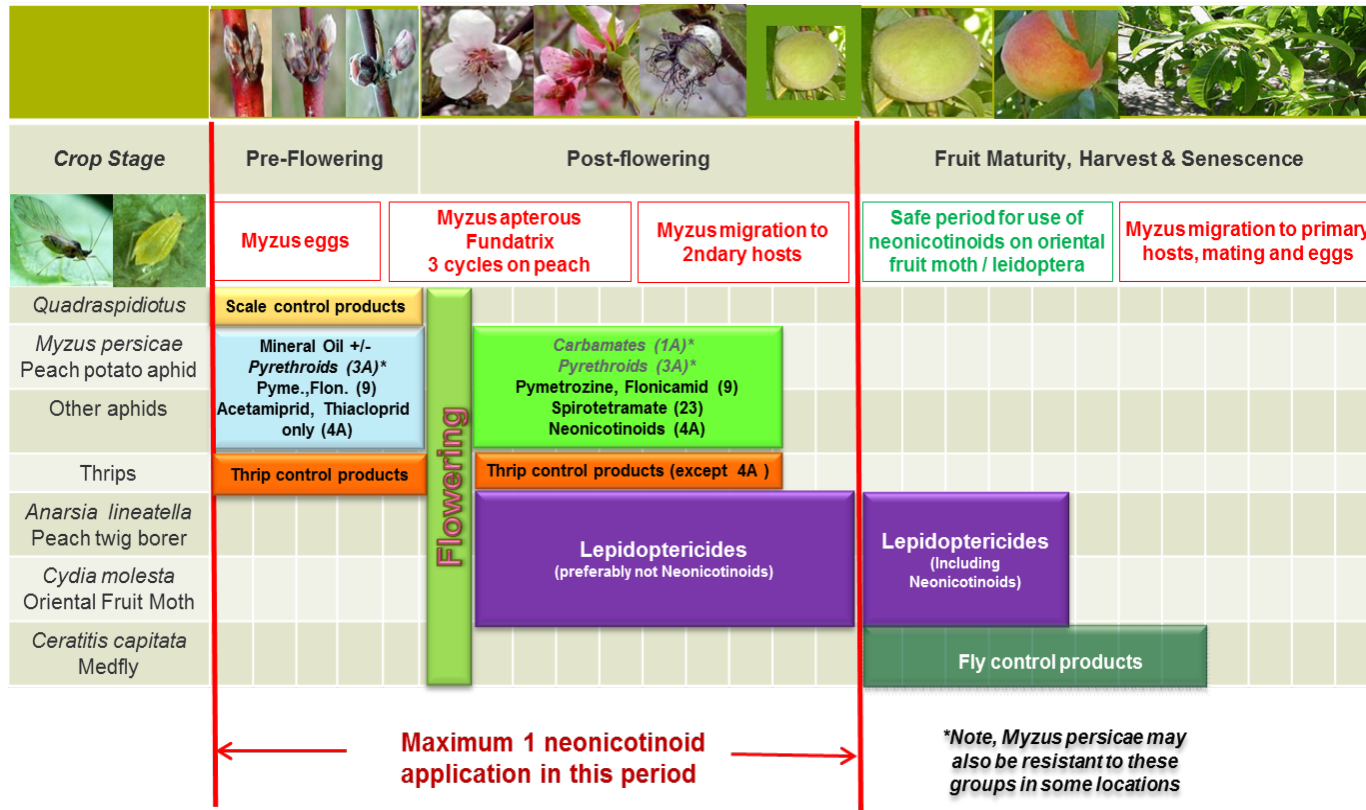
- Welcome to Ben, Imre, Luis Antonio and Juan Manuel!
- Thanks to Jean-Paul, Jamie and Dan for their contributions

SPWG Objectives 2013

Goals	Objectives	Date	Status
Short term actions to minimise spread of resistant pests	<ul style="list-style-type: none"> • <i>Myzus persicae</i> NNI resistance in Europe – follow regulatory events and new monitoring results and adapt NNI IRM recommendations according to future legislation. Re-issue new guidelines in Dec 2013 • <i>Sitobium avenae</i> PYR target site resistance in UK – Communicate guidelines of IRAG to member companies 	Dec 2013 Q1 2013	Done 2/2014
Prepare IRM guidelines for pests with, or at risk of developing resistance in the mid term	<ul style="list-style-type: none"> • <i>Myzus persicae</i> update poster to reflect new situation in 2013 • <i>Diaphorina citri</i>, Asian Citrus Psyllid – Poster IRAC Brazil • <i>Sitobium avenae</i> support IRAG UK as necessary 	Q4 2013 Q2 2013 Q3 2013	Ongoing Ongoing Done
Prepare for future Sucking Pest problems long term (avoiding resistance development)	<ul style="list-style-type: none"> • Action plans for pests that are at risk of developing resistance. <ul style="list-style-type: none"> ○ <i>Diaphorina citri</i> (ACP) (Florida/USA, Brazil) <ul style="list-style-type: none"> ▪ Elaborate methodology (MOA group) ▪ Monitoring results Florida (Univ Florida) ▪ Establish baselines (IRAC members) ○ <i>Euschistus heros</i>, Brown Stink Bug: poster and IRM guidance, baselines and monitoring methods pyrethroids, neonicotinoids and organophosphates ○ <i>Aphis gossypii</i> (neonicotinoid resistance) <ul style="list-style-type: none"> ▪ Monitor complaints globally and liaise with researchers 	Q2 2013 Q1 2013 Q4 2013 Q2 2013 Q4 2013	Done Pending Ongoing Ongoing Ongoing

2013: Myzus resistance in Peaches in S. Europe

IRAC management recommendations for neonicotinoid resistant *Myzus persicae*:
 Example 2014: **Peaches, Nectarines in Southern Europe**



- No spread of target site resistance to neonicotinoids into vegetables and field crops reported
- EU Guidelines adapted to new neonicotinoid regulatory situation, and agreed with IRAC Spain
- IRAC SPWG guideline issued eConnection 33 Feb 18 2013.
- Main recommendation for peaches unchanged

Arising sucking pest resistance problems: *Aphis gossypii*



- **Korea** – NNI failure reports that problem is spreading nationwide
- **Japan** – Miazaki, Southern Kyushu, 3 *Aphis gossypii* populations from Cucumber and Pepper with significant **loss of control** to 5 neonicotinoids but less to ACETAMIPRID and THIACLOPRID Dr Matsuura, July 2012. Mechanism of resistance not yet defined.
- **China** – R81T substitution (like in Myzus) **produced in the lab** after 60 generations exposure to IMIDACLOPRID in *Aphis gossypii*
- **Australia** - Grant Heron – *Aphis gossypii* resistance to NNIs has **not increased in 2011/2012 season**
 - **Action for 2014** – Monitor NNI performance in all countries

Asian Citrus Psyllid *Diaphorina citri*

- Needs new modes of action
- IRM adherence critical for sustainability



Integrated ACP Management Guidelines

- Protect nursery plants under netting and use only HLB free certified stock.
- Transport infected nursery stock according to government regulations.
- Protect young and non-bearing trees with soil applied systemic insecticides. In older trees, soil applied systemic insecticides may not satisfactorily work on the pest.
- Rotate soil applied insecticides with foliar sprays of other modes of action. Rotation of different modes of action is key to resistance management.
- Management of adults during dormant season is key to maintain low populations for the rest of the year.
- Use locally defined monitoring methods and intervention thresholds to make spray decisions. Notify to manufacturers any product performance failures immediately.
- Use and protection of bio-control agents is encouraged as part of the IPM programs and to reduce the risk of insecticide resistance development.

Management Plan Example

Figure 2: Management plan and opportunities for MoA rotation used for citrus psyllid based on plant phenology. The rotation uses various MoA which are registered and labeled for control of citrus psyllids. The rotations and number of MoA might vary according to the number of products registered in each country.

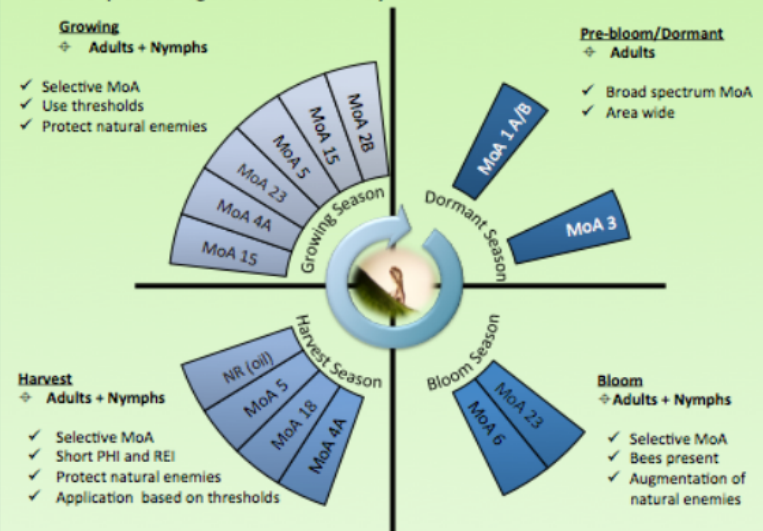


Table 2: Modes of action registered for ACP management. Pest and Resistance management should be based on an appropriate rotation of these MoA

Modes of action registered for ACP management			
1 A&B: AChE Inhibitors	4: nAChR agonist	15: Inhibitors of chitin biosynthesis type 0	NR: Horticultural oils
2B: GABA antagonists	5: nAChR allosteric activators	18: Ecdysone receptor agonist	
3: Na ⁺ Channel modulator	6: Cl ⁻ channel activator	23: Inhibitor of aCoA carboxylase	

Stink Bug: *Euschistus heros*



- **Pest increasing** with «green bridge» sequential seasons in LATAM/BR
 - Dependence on few modes of action: OP, PYR, NNI
 - Performance decline? Dense crops, spray timing, increased pressure
 - No firm evidence of resistance development yet
 - Need new modes of action, IPM, IRM programmes
- **Methodology**
 - Topical and Contact feeding methods approved. Vial test?
- **Monitoring results: Parana, 2013**
 - No resistance to PYR/NNI mixture, OP reported in Parana
 - Syngenta internal monitoring – multistate – slight shifts for pyrethroids and neonicotinoids within normal field variation
- **Key issues**
 - Resources for funding of IRAC monitoring programme via PROMIP
 - Design and implementation of IRM programmes in LATAM/Brazil

Sucking Pest Working Group – Summary 2013

Status by species

- ***Myzus persicae*** – R81T (nni) spread into vegetables and field crops not detected yet (SEU). Continue vigilance and reinforce IRM programs
- ***Sitobium avenae*** – L1014F (pyr) not spreading outside UK yet. Seems to be low risk.
- ***Aphis gossypii*** – R81T (nni) not yet detected in any wild pops, but failures increasing (Korea/ Japan). Could become a major issue
- ***Diaphorina citri*** – no field failures reported in Brazil or USA yet. Extend monitoring methodology to more modes of action. High risk pest
- ***Euschistus heros*** – no field failures reported in Brazil. Monitoring shows continued sensitivity to key MOAs 1,3,4. High risk pest with limited MOAs
- ***Bemisia tabaci*** – metabolic resistance recorded in Egypt (nni), currently widespread, adults only. No reports of resistance to Group 23
- ***Lygus sp*** – field failures (nni) reported in USA, but no firm data available to confirm
- ***Bactericera cockerelli*** – field failures and metabolic resistance reported in Mexico (several modes of action)
- ***Dichelops melacanthus*** – new potential risk pest, Brazil
- ***Frankliniella fusca*** – field failures reported (nni) but no firm data available to confirm
- ***Nilaparvata lugens*** – Resistance to group 1,2,3,4 (except 4c),16, but not yet 9.

Objectives 2014: Draft proposal 19th March

Goals	Objectives	Timeline	Comments
Short term actions to minimise spread of resistant pests	<ul style="list-style-type: none"> • <i>Myzus persicae</i> lead by IRAC Spain (NNIs), support with analyses for R81T. <ul style="list-style-type: none"> • Support Aphid initiatives in Rothamsted / IRAG. Review IRM approach • <i>Sitobion avenae</i> reactive testing of failures in NEU • <i>Bemisia tabaci</i> update resistance status for different MOAs with IRAC Brazil. <ul style="list-style-type: none"> • Elaborate IPM/IRM program with IRAC Brazil • Rice Plant Hoppers – support Crop Life/IRRI/GIZ initiative to promote Hopper IPM by reviewing proposed training material 	<p>2014 2014</p> <p>Q3 2014</p> <p>Q3 2014</p>	
Prepare IRM guidelines for pests with, or at risk of developing resistance in the mid term	<ul style="list-style-type: none"> ▪ <i>Euschistus heros</i>, (neonicotinoids, pyrethroids, Brazil) <ul style="list-style-type: none"> ▪ Collect sensitivity data in Brazil and other countries ▪ Poster with IRM guidelines in collaboration with IRAC Brazil • <i>Myzus persicae</i> update poster to reflect new MOAs • <i>Diaphorina citri</i>, Asian Citrus Psyllid – Brazil specific poster (IRAC Brazil). • <i>Bemisia tabaci</i> update poster with new MOA guidelines • <i>Lygus sp</i>, USA Cotton – ?? Tbd 	<p>Q2 2014</p> <p>Q3 2014 2014</p> <p>Q3 2014 2014</p> <p>2014</p>	
Prepare for future Sucking Pest problems long term (avoiding resistance development)	<ul style="list-style-type: none"> ▪ <i>Diaphorina citri</i> (ACP) (neonicotinoids, pyrethroids, others?) <ul style="list-style-type: none"> ▪ Monitor sensitivity in Florida and Brazil (Local initiatives) ▪ Extend methodology to other modes of action (MOA Group) ▪ Establish baselines for new chemistries using agreed method (IRAC members responsibility) ▪ <i>Aphis gossypii</i> (neonicotinoid target site resistance) <ul style="list-style-type: none"> ▪ Monitor complaints globally and report liaise with researchers ▪ <i>Dichelops melacanthus</i> (neonicotinoids, pyrethroids, OPs) <ul style="list-style-type: none"> ▪ Establish baselines using Euschistus methods ▪ <i>Frankliniella fusca</i>, Cotton, USA – follow up on reports. ▪ <i>Bactericera cockerelli</i>, Potato, Mexico follow up reports Medina Dec 2012 	<p>Q2 2013</p> <p>Q3 2013</p> <p>Q4 2014</p> <p>2014</p> <p>2014</p> <p>2014</p>	



Insecticide Resistance Action Committee

Thanks to the IRAC SPWG team and external consultants for their support to manage global Sucking Pest Resistance!

