Sucking Pest WG

Imre Mezei & Colleagues,
51st IRAC International Meeting,
Philadelphia March 28-31, 2017
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• **All IRAC meetings are held under anti-trust rules** and regulations.
• Regulations are developed under **guidance from CropLife International**
• All discussions should be **technical discussions and NOT commercial**.
• **Do not talk about individual products**, but active ingredient or mode of action only
• **Do not talk about prices**, marketing strategies, etc.
• **If you have any concerns – please stop the conversation** and consult with IRAC colleagues or CropLife International.
• A **copy of the anti-trust guidelines** is typically provided before each meeting/conference call.
Objective of the meeting

51st IRAC International Meeting, Philadelphia March 28-31, 2017

This was to make sure that IRAC members were aware of the past years activities early in the meeting and then be inspired to propose new impactful activities and projects for the coming year. The same format was followed in 2016, but we have attempted to shorten the time reflecting on past activities and focus on planning for the year ahead.

What do we would like to achieve as members of IRAC. What activities do we feel would be a benefit for the company and for global pest management.

1. **The development and communication of practical IRM guidelines.** We have made great progress in this area over the last few years and I understand that IRAC’s efforts to provide practical advice have been appreciated by many who have in the past challenged IRAC’s effectiveness. However, there are many agricultural, horticultural and urban environments which are challenged by insecticide resistance issues and many where our guidance would be valuable.

2. **Effective promotion of insecticide resistance management to growers and advisors.** Much of the criticism of IRAC in the past has been that its outputs have been technical in nature and focused away from growers/pesticide applicators. We have made significant efforts to provide more grower centric materials and we need to continue in this trend.
## SP WG Activities: 2014 – 2016

<table>
<thead>
<tr>
<th>Date</th>
<th>No. of participants</th>
<th>Meeting structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.-20.03.2014</td>
<td>10</td>
<td>F2F in RTP, USA</td>
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<tr>
<td>22.07.2014</td>
<td>8</td>
<td>Conference call</td>
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<tr>
<td>09.09.2014</td>
<td>9</td>
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<tr>
<td>27.10.2014</td>
<td>10</td>
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<tr>
<td>17.12.2014</td>
<td>7</td>
<td>Conference call</td>
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<tr>
<td>19.02.2015</td>
<td>10</td>
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<tr>
<td>14.04.2015</td>
<td>9</td>
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</tr>
<tr>
<td>09.07.2015</td>
<td>10</td>
<td>Conference call</td>
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<tr>
<td>14.-17.09.2015</td>
<td>8 + 2</td>
<td>F2F Rothamsted, UK</td>
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<tr>
<td>25.11.2015</td>
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<tr>
<td>23.03.2016</td>
<td>8</td>
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<tr>
<td>07.04.2016</td>
<td>8 + 4</td>
<td>F2F Dublin, IRL</td>
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<td>04.08.2016</td>
<td>6</td>
<td>Conference call</td>
</tr>
<tr>
<td>27.10.2016</td>
<td>7</td>
<td>Conference call</td>
</tr>
</tbody>
</table>

Participation had been constant for the past years, with active contribution from eight companies:
- ADAMA, BASF, Bayer, Cheminova, Dow, DuPont, Nufarm, Syngenta.
## IRAC-Sucking Pest WG Team structure – 2016/2017

<table>
<thead>
<tr>
<th>Names</th>
<th>Email Address</th>
<th>Company</th>
<th>Sucking Pests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alan Porter</td>
<td><a href="mailto:aporter.apa@gmail.com">aporter.apa@gmail.com</a></td>
<td>IRAC</td>
<td>✓</td>
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<td>Anil Menon</td>
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<td>BASF</td>
<td>✓</td>
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<tr>
<td><strong>Brian Duggan</strong></td>
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<td>Nufarm</td>
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<tr>
<td>Diane Silcox Reynolds</td>
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<td>ADAMA</td>
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<tr>
<td>Eric Andersen</td>
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<td>FMC</td>
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<td>Imre Mezei</td>
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<td>Dow</td>
<td>1</td>
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<tr>
<td>Juan M Alvarez</td>
<td><a href="mailto:Juan.M.Alvarez@dupont.com">Juan.M.Alvarez@dupont.com</a></td>
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<td>✓</td>
</tr>
<tr>
<td>Luis Gomez</td>
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<td>Dow</td>
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<td>Luis Pavan</td>
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<tr>
<td>Ralf Nauen</td>
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<tr>
<td>Russell Slater</td>
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## IRAC Sucking Pest WG Objectives 2016-17

**Updated 7th March 2017**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Objectives</th>
<th>Timeline</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short term (&quot;alert&quot;) actions to minimise spread of resistant pests</strong></td>
<td>• <em>Myzus persicae</em> Follow-up with “implementation” of IRM Guidelines in Southern EU&lt;br&gt; • <em>Bemisia tabaci</em> monitoring program (PROMIP/IRAC-BRA): how to design IRM strategies?&lt;br&gt;  • update IRAC method #015&lt;br&gt; • <em>Sitobium avenae</em> review last year’s alert for Mainland EU for PYR-resistance (in view of few MOAs)&lt;br&gt; • <em>Aphis gossypii</em> (neonicotinoid target site resistance)&lt;br&gt;  • Develop IRM recommendations for Korea as template for future use&lt;br&gt;  • Finalize / review poster: globally &amp; local Korean language version</td>
<td>2016&lt;br&gt;Q2 2016&lt;br&gt;Q2 2016&lt;br&gt;2016</td>
<td>Ongoing&lt;br&gt;Ongoing&lt;br&gt;Done&lt;br&gt;Ongoing</td>
</tr>
<tr>
<td><strong>Prepare IRM guidelines for pests with, or at risk of developing resistance in the mid term</strong></td>
<td>• <em>Euschistus heros</em>, check on MOA IRAC 01, 03, 04, with PROMIP/IRAC-BRA&lt;br&gt;  • Follow up with monitoring efforts: how to design IRM strategies?&lt;br&gt;  • Method validation and implementation (review vial test to IRAC approved methods)&lt;br&gt; • <em>Bathycoelia distincta</em> Support research efforts in RSA (suspected PYR-resistance)&lt;br&gt; • <em>Diaphorina citri</em>&lt;br&gt;  • poster update with IRM recommendation&lt;br&gt;  • Validate &amp; publish a Flush tube systemic test for IRAC Groups 23&amp;28&lt;br&gt; • <em>Bactericera cockerelli</em> Activate monitoring, validate and publish a method, notably for IRAC 04&lt;br&gt; • <em>Myzus persicae</em>&lt;br&gt;  • updated IRM Guidelines for new cases (Andalusia, ESP)&lt;br&gt;  • the poster, incl. new MOA with IRAC ESP&lt;br&gt; • <em>Bemisia tabaci</em> (<em>T. vaporariorum</em>) updated poster version, incl. new MOA&lt;br&gt; • Fruit fly species (pyrethroids-resistant olive fly suspected, Greece): 1. Summarize current resistance situations, 2. Exchange about methodology and 3. Pro-actively release recommendations (highlight value of current options / prevent use restrictions)</td>
<td>Q2 2016&lt;br&gt;Q3 2016&lt;br&gt;2016&lt;br&gt;2016&lt;br&gt;Q2 2016&lt;br&gt;Q3 2016</td>
<td>Ongoing&lt;br&gt;Postponed&lt;br&gt;Done&lt;br&gt;Done&lt;br&gt;Ongoing&lt;br&gt;Done</td>
</tr>
<tr>
<td><strong>Prepare for future Sucking Pest problems long term (avoidance)</strong></td>
<td>• <em>Tetranychus sp.</em> (mites), <em>Nilapavarta lugens</em>, bugs/stinkbugs (<em>Dichelops melacanthus</em>)&lt;br&gt;  • Collect reports on monitoring studies and publications, follow up field failures&lt;br&gt; • <em>Aphis gossypii</em>, <em>Myzus persicae</em>, <em>M. nicotianae</em> (neonicotinoid target site resistance)&lt;br&gt;  • Monitor complaints globally and report liaise with researchers</td>
<td>2016&lt;br&gt;2016</td>
<td>Ongoing&lt;br&gt;Ongoing</td>
</tr>
</tbody>
</table>
**Myzus persicae**: Neonicotinoid resistance management guidelines


This is an update of the resistance alert and management recommendations issued in January 2013 by the IRAC Sucking Pest Working Group. The resistance is based on a target-site mutation which strongly affects neonicotinoid efficacy1,2. The results of surveys from 2010 to 2016 confirmed the spread and presence of neonicotinoid-resistant aphids in many of the stone fruit orchards of Southern France, Spain and Italy1,3. Recent findings proved the resistance also in Andalusia, Spain where the R81T mutation was found also in several vegetable crops.

Map of the region showing areas where target site resistance to neonicotinoids was detected in *Myzus persicae* collected from stone fruit orchards from 2010 to 2016.

- High interest and activity
- Guidelines are well perceived
- Spain issued their own alert and poster on MYZUPE resistance approved by IRAC SP WG and also an educational presentation

IRAC resistance management recommendations for the control of *Myzus persicae*:

**Example 2016: Peaches and Nectarines in Southern Europe**

- Where no loss of performance to neonicotinoids has been experienced, it is recommended to use a maximum of one neonicotinoid application per crop cycle to minimise the further spread and intensification of the resistance and maintain effectiveness of the neonicotinoids. Depending on crop and local guidelines, this single spray can be applied pre- or post-flowering, to fit with local IPM recommendations. (Note: Following restrictions to the neonicotinoids imidacloprid, thiamethoxam and clothianidin announced in 2013 by the European Commission, the recommended rotation programme has been modified accordingly to comply with these restrictions. See attached rotation scheme.)
- If a decline in neonicotinoid efficacy was observed during the previous seasons, it is recommended not to use this group of insecticides to prevent escalation or development of resistance. It is recommended to use insecticides with other modes of action, according to local registrations, such as products from groups 1A, 3A, 9, 23 and 29 as well as mineral oil to control *Myzus persicae*. IRAC supports the use of any other IPM measures locally recommended, and may assist with the characterisation of resistance mechanisms in local *Myzus* populations.

Acknowledgements: Many thanks to representatives of Rothamsted Research International, *Università Cattolica del Sacro Cuore* - Piacenza campus, University of Cartagena, Spain, Chamber of Agriculture in Catalunya and Aragon in Spain and the IRAC Spain Sucking Pest Working Group for inputs into the IRAC recommendations.

04/04/17
Sitobion avenae: IRM recommendation is available in 4 languages in EU

- Re-evaluate the importance of the resistance in practical plant protection...
- Renewal and release of further warnings for Mainland EU seem appropriate:

Local farmer paper articles are promoted on the issue highlighting the IRAC recommended management practices...

Recomendaciones para Manejo de resistencias a insecticidas en plagas de cereales en Europa

Ejemplos de estrategias de aplicación que cumplen con las recomendaciones de manejo de resistencias de plagas

FENÊTRE 1: Automne-Hiver
- Si un pyrithrinide a été utilisé durant l'été précédent pour lutter contre les pucerons, il faut s'assurer que le traitement est nécessaire, ne pas utiliser le même mode d'action de façon consécutive.
- Si des coléoptères sont couramment présents dans votre région, il est recommandé de réserver la folioine aux pyrithrinides contre ces ravageurs et d'utiliser des produits moins toxiques et moins acides pour lutter contre les pucerons.

FENÊTRE 2: Printemps-Été
- Si plus d'un traitement insecticide est nécessaire, ne pas utiliser le même mode d'action.
- Si des phytophages sont couramment présents dans votre région, il est recommandé d'utiliser des pyrithrinides contre ces ravageurs et d'utiliser des produits moins toxiques et moins acides pour lutter contre les pucerons.

Recomendación de gestión de la resistencia de los insectos dañadores de cereales en Europa

Ejemplos de estrategias de aplicación que cumplen con las recomendaciones de manejo de resistencias de plagas

FENÉTRE 1: Automne-Hiver
- Si se ha utilizado un producto anti pulgón durante el verano anterior para luchar contra los pulgones, es necesario asegurarse de que el tratamiento es necesario, no utilizar el mismo modo de acción de manera consecutiva.
- Si hay coléopteres presentes comúnmente en su región, se recomienda reservar la folioine para los pyrithrinides contra estos insectos dañadores y utilizar productos menos tóxicos y menos ácidos para luchar contra los pulgones.

FENÉTRE 2: Printemps-Été
- Si es necesario más de un tratamiento insecticida, no utilizar el mismo modo de acción.
- Si los insectos de plantas son comúnmente presentes en su región, se recomienda reservar la folioine para los pyrithrinides contra estos insectos dañadores y utilizar productos menos tóxicos y menos ácidos para luchar contra los pulgones.
**Aphis gossypii in Asia:** action: extending the local IRM-activities

It is really difficult to get a clear insights how resistance is handled locally as no formal IRAC country teams are available...

**Step-wise approach:**

1. **Intensify** local Lepidopteran/Diamide team and **extent** to other companies

2. Focus on a most critical crops to develop IRM recommendations  
   - 2 crop programs were developed but should be updated with local annual cropping and pest cycles and available pest control options.

3. **Further monitoring** of NNI resistance across South-East Asia is **suggested**...  
   - **Develop a comprehensive IRAC resistance management** recommendation and validate with local experts then issue in local language...

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04/04/17
**Bemisia tabaci:** monitor susceptibility and design IRM strategies

**Monitoring in 2016 in Brasil:**
- Field monitoring in 2016 continued on adults and nymphs on 6 soyabean and 5 tomato populations. Buprofezin, pyriproxyfen, imidaclorpid, spiromesifen, ciantraniliprole and thiametoxam were tested and some adult tests showed clear efficacy decrease for NNIs.

**Method comparison and outputs:**
- IRAC accepted the PROMIB best practice and adjusted IRAC method #015 => using 25 °C temperature and 72 h for Group 4, and 120 h for Group 9 and 29 products incubation time.

**2017 Plan:**
- Keep monitoring
- Design a comprehensive IRM recommendation
- Establish a communication program
- Field trial program

04/04/17
Introduction and background

Whiteflies (Homoptera: Aleyrodidae) globally comprises approx. 1500 species, but only a few of them are known and described as serious sucking pests in numerous agricultural and horticultural settings. Among them the cotton whitefly, Bemisia tabaci is by far the most important one, followed by the greenhouse whitefly, Trialeurodes vaporariorum. B. tabaci is known for its genetic diversity resulting in morphologically indistinguishable species rather than biotypes. The two most important phylogenetic groups of B. tabaci from an agricultural perspective are MEAM1 (Middle East-Asia Minor 1; also commonly known as biotype B) and MED (Mediterranean; including the commonly known biotype Q among others). B. tabaci causes damage to a diverse range of host plants by symblastic feeding, transmission of numerous plant viruses and indirectly by the excretion of honeydew as a substrate for sooty mold.

In order to keep crop infestations by B. tabaci under economic damage thresholds insecticide treatments are quite common, so that insecticide resistance developed against many chemical classes of insecticides. However there are also a number of biological control methods available these days which are preferably successful under greenhouse conditions rather than open field situations.

Resistance mechanisms

Target-site resistance

Reduced or even no binding of the insecticide to its target-site due to mutations evolved by continuous selection, e.g.
- Knock-down resistance (kdr) → Pyrethroids
- Modified acetylcholinesterase → OP’s, carbamates

Metabolic resistance

Detoxification (degradation) of insecticides due to the over-expression of metabolic enzymes, e.g.
- Cytochrome P450 CYP6CM1 → Neonicotinoids, & pymetrozine

Rapid discrimination of biotypes B (MEAM-1) and Q (MED) by mtCOI PCR using primers specific for the B and Q biotypes of B. tabaci.

Strain BRA1: Brazilian B-type
  - PCR product only with primers specific for B type mtCOI (lane 2)

Strain ESP7: Spanish Q type
  - PCR product only with primers specific for Q type mtCOI (lane 3)
**Euschistus heros:** Monitoring in 2016

**Stink Bugs Work Group Brazil:**
- It was decided to run just vial tests in 2016 season
- 12 populations were collected and tests realized
- Imidacloprid, acephate, beta-cyfluthrin, lambda-cyhalothrin and thiametoxam were tested.
- A slight shift in sensitivity for piretroids, OPs and NNIs in some populations were observed.

**2017 Plan:**
- Keep monitoring
- Design a comprehensive IRM recommendation
- Establish a communication program
- Plan to run field trials in the area/site where vial tests are conduct?
**Diaphorina citri** Asian Citrus Psyllid – Methodology and IRM recommendation

**Flush tube systemic method was updated and a consent to field validation to Brasil**

**Introduction and Biology**

The Asian citrus psyllid, *Diaphorina citri*, is an invasive vector associated with the bacteria *Candidatus Liberibacter asiaticus* and *C. auricula*. These bacteria are suspected to be the causal agents of Huanglongbing (HLB) in Asia and America. There is evidence that the psyllid also carries disease symptoms in both adults and nymphs collected in the field. ACP carrying HLB is more sensitive to insecticides than non-infected psyllids. ACP nymphs, much less agile than adults, can be retrieved from inside the cage. Handling ACP nymphs does not require a handling cage (nymphs are anesthetized in Eppendorf tube around the petiole with Parafilm and coolers for insect collection, or in a cage using a sharp razor blade or scalpel, Parafilm membrane, small forceps, camel hair brushes, brushes or glass are ca. 100 ml capacity for test liquids, pipette for liquid or weighing balance for solid products; maximum/minimum thermometers; ice-tray (flame dried) Pantera pipette; handling cage (e.g. Fig. 1)).

**Excised leaf method** (Ammer et al. 2013a, 2013b, 2015):

(a)Collect Asian citrus psyllid (ACP) adults by using a sweep net or a stem-tap along the rows of the grove selected for sampling. Use the insect collected and assume it is not required for further sampling. The insects collected can be anesthetized in a water bath and then dipped in an excised leaf. ACP nymphs can be collected by cutting off an entire leaf, then dipping it in an excised leaf and collecting the ACP nymphs using fine camel hair brush or an aspirator. ACP nymphs can be transported in an insect collection cage. Each leaf fragment with ACP nymphs should be placed in a cage and then put into the Petri dish, leaving a small hole for air exchange, and then place the Petri dish vertically above the Petri dishes. It is recommended that a set of 3 replicates (30-50 adults) is put in a cage, and the Petri dish is used to maintain the insects for 4-6 days.

(b) Place 10-20 ACP nymphs in a Petri dish, and cover with a Parafilm membrane. Add a cotton ball to facilitate the transfer of adults onto the treated leaves. Label each Petri dish with the bottom half of the Petri dish, so that the nymphs can be transported in a Petri dish with the bottom half of the Petri dish. 

(c) After each dish is 20-25 adults or nymphs (in the mix of the two) using a camel hair brush or an aspirator, and then seal the Petri dish with Parafilm. To facilitate the transfer of adults onto the treated leaves in Petri dishes, refrigerate the adults or briefly anesthetize them with carbon dioxide. The Petri dish with treatment, replicates number, etc. is available.

Use a handling cage (as in Fig. 1) or another design) when adding ACP adults to the Petri dishes or when counting adults daily, so that any adult that escapes can be retrieved from inside the cage. Handling ACP nymphs does not require a handling cage (nymphs are much less agile than adults).

After the insects settle to start feeding on the leaf, place the Petri dishes vertically in racks to allow insect access to either side of the leaf (Fig. 2). Adults during feeding assume a typical posture with head towards the leaf and use the antennae to feel the leaf surface. ACP adults attach to the leaf by their head using their 3rd instar nymphs.

**Integrated ACP Management Guidelines**

This paper is for educational purposes only. Farmers are advised to the best of our knowledge at this time and another manufacturer cannot accept responsibility. The International and/or registered. ACHG should always consult their local expert on action and health and veterinary recommendations.

**Insecticide Plan Example, US-related**

**Relevant Literature**

**Material**

- Asian citrus psyllid, ACP nymphs, adults, and oviposition for insect collection; Petri dishes (9 cm- and 14 cm-diameter), Tap sampling tray,

**Description**

- D. G. Hall

**Method**

- No xxx

**Status**

- Draft

**Species**

- Diaphorina citri

**Species Stage**

- Adults/3rd instar nymphs

**Product Class**

- Dinitrofluro and Tetronic and Tetronic acid derivatives
Research efforts for two-spotted stinkbug *Bathycoelia distincta* in macadamia (suspected PYR-resistance) are funded by IRAC for 1st year: 2015. The contract has been finalized and signed, incl. remarks made by the SP-team.

- The sucking pest team as well as IRAC South Africa keeps an eye on the progress of the project aiming at developing IRM recommendations together with the UFS based on available information.

- In 2016 no significant progress was achieved due to drought and logistic problems.

- The contract was prolonged to 2017 with no additional budget.

- The research will be led by Devilliers Fourie, in Bloemfontein, window persons for IRAC are:
  - Tanya Zais & Andrew Bennett (both IRAC-RSA),
  - Jan van Vuuren (established local contacts),
  - Russell Slater/Imre Mezei (IRAC /SP WG).
Information collection on olive fruit fly (*Dacus oleae*) piretroid resistance was targeted in 2016 and a survey was done in major olive producing countries...

It is considered an issue only in Greece so far in Europe or even in the Globe and in the other countries there are no reports of resistance in *Dacus oleae* towards pyrethroids.

A paper will be published soon on this topic by Roditakis *et al*.

Next steps ????
Other topics

Potato psyllid (*Bactericera cockerelli*) methods were created (one for systemic compounds one for non-systemic compounds ) and sent for validation

Establish cooperation between SP WG and IRAC India and IRAC Korea.

Update our pest resistance priority list...
# Key resistance risks/issues affecting sap feeding pests across the Globe

<table>
<thead>
<tr>
<th>Pest Species (group)</th>
<th>Major Crop</th>
<th>Major resistance issues to focus</th>
<th>Region/Country to focus</th>
<th>Global Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myzus persicae</td>
<td>stones (veggies)</td>
<td>NNI's (piretroids, OPs, carbamates)</td>
<td>South Europe, Australia</td>
<td>1</td>
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<tr>
<td>Bemisia tabaci</td>
<td>Cotton, veggies, soybean</td>
<td>NNI's (piretroids, OPs, etc.)</td>
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<tr>
<td>Frankliniella occidentalis</td>
<td>Veggies, ornamentals, fruits</td>
<td>Piretroids, OPs, spinosyns, etc</td>
<td>US, Brazil, S. Cone, China</td>
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<td>Rice</td>
<td>NNI's (pyretroids, OPs); buprofezin, pymetrozine, fiproles</td>
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<td>Aphis gossypii</td>
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<tr>
<td>Mahanarva fimbriolata</td>
<td>Sugar Cane</td>
<td>NNI's (piretroids, OPs, etc.)</td>
<td>Brazil, S. Cone</td>
<td>3</td>
</tr>
<tr>
<td>Sitobion avenae</td>
<td>cereals</td>
<td>piretroids</td>
<td>North Europe</td>
<td>4</td>
</tr>
<tr>
<td>Stinkbugs (various spp</td>
<td>Macadamia</td>
<td>pyrethroids</td>
<td>Southern Africa</td>
<td>4</td>
</tr>
<tr>
<td>including Nezaria)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amrasca biguttula biguttula</td>
<td>Cotton</td>
<td>NNI's</td>
<td>India</td>
<td>4</td>
</tr>
<tr>
<td>Frankliniella fusca</td>
<td>Vegetables</td>
<td>NNI's</td>
<td>Southern US</td>
<td>4</td>
</tr>
</tbody>
</table>
## IRAC Sucking Pest WG Objectives 2017-18

**Updated 7th March 2017**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Objectives</th>
<th>Timeline</th>
</tr>
</thead>
</table>
| **Hot issues management**<br>Actions to minimise spread of resistant pests, monitoring resistance issues | • *Myzus persicae* Follow-up with “implementation” of IRM Guidelines across Europe  
  - Monitor vegetable crops and new areas in Europe  
  - Monitor complaints globally and report liaise with researchers  
• *Bemisia tabaci* monitoring program (PROMIP/IRAC-BRA): Design IRM strategy in Brasil.  
• *Bemisia tabaci* (*T. vaporariorum*) updated poster version, incl. new MOAs  
• *Sitobium avenae* Follow-up with “implementation” of IRM Guidelines across Europe  
  - Write local warnings in farmer papers  
• *Aphis gossypii* (neonicotinoid target site resistance)  
  ▪ Monitor complaints globally and report liaise with researchers  
  ▪ Develop IRM recommendations for Korea as template for future use  
| **Mid term issue management**<br>Prepare IRM guidelines and test methods for pests with, or at risk of developing resistance | • *Euschistus heros*, check on MOA IRAC 01, 03, 04, with PROMIP/IRAC-BRA  
  ▪ Follow up with monitoring efforts; Design IRM strategy  
  ▪ Method validation and implementation (review vial test to IRAC approved methods)  
• *Bathycoelia distincta* Support research efforts in RSA (suspected PYR-resistance)  
• *Diaphorina citri* Validate & publish a Flush tube systemic test for IRAC Groups 23&28  
• *Bactericera cockerelli* Activate monitoring, validate and publish a method, notably for IRAC 04  
• Fruit fly species (pyrethroids-resistant olive fly suspected, Greece): Exchange about methodology and Pro-actively release recommendations (highlight value of current options / prevent use restrictions)  
  ▪ Decide on future poster needs (Liriomyza)  
• *Euschistus heros*, check on MOA IRAC 01, 03, 04, with PROMIP/IRAC-BRA  
  ▪ Follow up with monitoring efforts; Design IRM strategy  
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• Fruit fly species (pyrethroids-resistant olive fly suspected, Greece): Exchange about methodology and Pro-actively release recommendations (highlight value of current options / prevent use restrictions)  
  ▪ Decide on future poster needs (Liriomyza) | 2017 | Q3 2017 | 2017 | 2017 | Observer ? |
| **Prepare for future Sucking Pest problems long term (avoidance)**<br>Edit list of future problematic sucking pests, identify new targets for IRAC SP WG work | • Establish a list of future problematic sucking pests, identify new targets for IRAC SP WG work  
  ▪ Collect reports on monitoring studies and publications, follow up field failures  
  ▪ Create educational materials, test methods, IRM recommendations if needed  
• Follow the monitoring of high risk species such as Frankliniella occidentalis (thrips), Tetranychus sp. (mites), Nilapavarta lugens (stinkbugs)  
  ▪ Collect reports on monitoring studies and publications, follow up field failures | Q2 2017 | Ongoing | Ongoing | Ongoing |
Sucking Pest WG Session program (Conf. call available) in “Adams”, Thursday, 30th March 2017

11:00-12:00:
- Welcome, introduction, reminder of antitrust guidelines
- Team structure 2017, scheduling tel cons in 2017
- *Myzus persicae* – New results across Europe (Ralf)
- *Aphis gossypii* - IRM recommendation (Russel)
- *Bemisia tabaci* – Update and new poster (Ralf)
- *Bemisia tabaci* and *Euschistus heros* IRM findings and recommendations in Brazil (Pavan)

12:00-12:30:
- Review of new problematic pests and identify available and missing IRAC materials useful being in IRAC-web pages. List and prioritize the key resistance risks/issues and then identify if IRAC actions.
- Finalize SP WG SMART Objectives 2017

13:30-15:00: Further discussion topics (if needed, otherwise members join to other WG sessions)
-- *Sitobion avenae* – Pyrethroid resistance in EU
-- Olive fruit fly resistance to pyrethroids actions, further fruit fly species
-- RSA – Stinkbugs – PYR resistance
-- *Diaphorina citri*, Asian Citrus Psyllid – method validation news
-- *Bactericera cockerelli* – monitoring, methodology
-- Other pest issues/any other business; spider mites?, Lygus?, rice plant hoppers? (These themes will be discussed in later webex meetings if insufficient time here)
Many Thanks for Sucking Pest WG Members and Supporters
Questions or Comments?