

FEATURED IRAC MEMBER:

Domingos Pedroni (Syngenta) was voted as the new Chair of IRAC International. Domingos is a former member of IRAC Brazil and has taken up a new position with Syngenta in Switzerland.



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NEW MOA PHONE APP

Download the new MoA phone app for your iPhone, iPad or Android phone.

IRAC INTERNATIONAL MEETING

Report from the 48th IRAC Meeting held at Jealott's Hill, UK.

SPOTLIGHT ARTICLE

Research articles that have recently featured in the journals.

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NEWS SNIPPETS & CONFERENCES

Ongoing IRAC activities, conferences and symposia.

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About This Issue

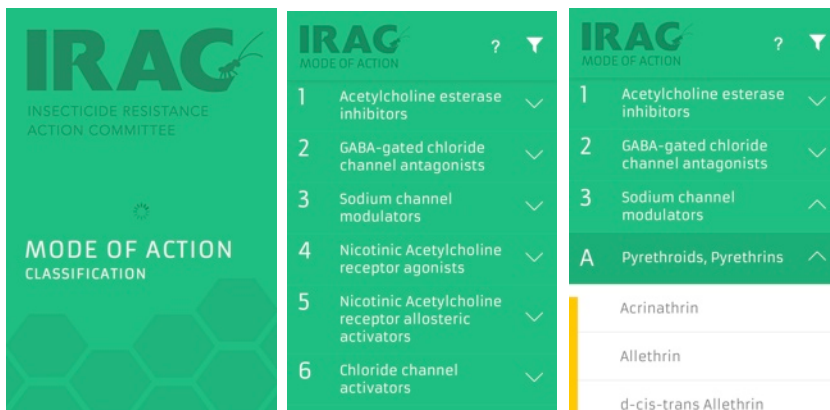
Welcome to another IRAC eConnection newsletter. As always we try to bring you interesting and informative articles about the work of IRAC and keep you updated on developing insecticide resistance problems around the world.

This is the first eConnection since the 2013 IRAC International Spring Meeting so in this issue we provide a brief summary of the meeting with a list of the guest speaker presentations. We report on a new IRAC MoA phone app including links to download the app for both Apple and Android devices. We also have news and some screenshots of the recently developed IRAC website Pest Pages which are proving to be very popular. We have our normal Spotlight Report on new insecticide resistance papers appearing in the literature and an article summarizing the findings from the 2012 European pollen beetle monitoring work. As always we finish off with some IRAC News Snippets and details of upcoming conferences.

Remember, if you have any news or resistance topics of interest, please let us know so that we can inform others in the IRAC Network. We hope you enjoy the issue.

New Mode of Action Phone App

IRAC has developed a Mode of Action Classification App. for mobile devices. It is an easy to use searchable database which allows the user to identify insecticide active ingredients and their respective MoA groups without the need for a data connection once the app has been downloaded. The user can either scroll through and open up each of the groups and classes to see the active ingredients listed or use the filter function to select a particular group, class or active to find out where they fit within the classification.



The IRAC MoA App is free to download from the [iTunes Apple Store for the iPhone or iPad version](#) or from the [Google Play Store for Android phones](#). A version for tablets using the android system will follow shortly.

IRAC International Spring Meeting, 2013

IRAC held their 48th International Spring Meeting at Syngenta’s Research Centre in the UK on 18-22 March 2013. There were 12 sessions held over the 5 days including various working group planning meetings, a meeting of the IRAC Executive, and an ‘International Day’ with guest speakers giving talks as listed below:

- Resistance behaving badly (I. Denholm & S. Foster, Rothamsted Research)
- *Myzus persicae* resistance mechanisms (S. Foster, Rothamsted Research)
- Mechanisms of insecticide resistance: Historical and more recent developments in target site resistance to insecticides (M. Williamson & C. Bass, Rothamsted Research)
- Metabolic Resistance Mechanisms of Man and Mosquito (M. Paine, Liverpool School of Tropical Medicine)
- Insecticide resistance in *M. domestica* and status of the housefly genome project (M. Kristensen, Aarhus University)
- Plant Biotechnology IRM (T. Dennehy, Bayer CropScience)

Presentations from the ‘International Day’ can be found on the IRAC website [Resources Page](#)



IRAC International Spring Meeting, 2013

New Pest Profiles on the IRAC website

For those of you who have visited the IRAC website recently you will notice that we now have a collection of pest profiles as a new feature on the site. Access is via the [Pest Index Page](#) and there are links to this on both the navigation bar and on the IRAC home page. Currently we have 21 profiles with information including background biology, pest distribution and life cycle details, known resistance & mechanisms, IRAC Test



Methods when available and links to relevant documents on the IRAC website and on other sites. The plan will be to continue adding further pests focusing particularly on those where there are significant resistance issues.

Spotlight on recent Insecticide Resistance Articles in Publications

“The path of least resistance is the path of the loser” - H. G. Wells, Author

“I’m drawn to the path of least resistance” - Jeff Bridges, Actor

What these quotes imply about Jeff Bridges can be left to your own interpretation; however the scientific research community continues to avoid the ‘path of least resistance’ by conducting and reporting new developments and understandings in insecticide resistance science. The following section provides a brief overview of some of the key studies reported between Q4-2012 and Q2-2013.

The discovery that the R81T point mutation, which had previously been associated with neonicotinoid resistance in the green peach aphid (*Myzus persicae*), could also be expressed in the cotton aphid (*Aphis gossypii*) was first reported in late 2012¹. Although the mutation occurred in a ‘laboratory-selected’ population, the paper demonstrates the potential for this form of neonicotinoid resistance to be found in other insect species. At around the same time, field-resistant populations of neonicotinoid resistant *Aphis gossypii* were being reported in the Xinjiang region of China². Whilst this resistance was not identified with any particular mechanism of resistance, it adds to the recent reports of the neonicotinoid resistant cotton aphids in Australia and historical reports of similar resistance cases in the USA and Portugal. Resistance to neonicotinoids was also documented for the first time in the cotton leafhopper (*Amrasca bigutulla*)³. Although the differences in observed neonicotinoid susceptibility between populations are not large, the reduced performance of neonicotinoid foliar sprays has been long reported in the cotton growing regions of India. This is not the first case of neonicotinoid resistance to leafhoppers, with cases of resistance being reported with *Empoasca vitis* several years ago.

There have been great advancements in the technologies and techniques used to identify mechanisms of resistance and this is demonstrated with the publication of several papers identifying key polymorphisms or gene up regulations which are implicated in insecticide resistance, including a point mutation (G275E) associated with spinosad resistance in the western flower thrip (*Frankliniella occidentalis*)⁴; the confirmation that a *kdr* (L1014F) point mutation in some pyrethroid resistant populations of the pollen beetle (*Meligethes aeneus*)⁵ and the over-expression of a P450 monooxygenase (*Cyp6cm1*) can not only confer cross-resistance amongst some neonicotinoids, but also insecticides with unrelated modes of action, such as pymetrozine⁶.

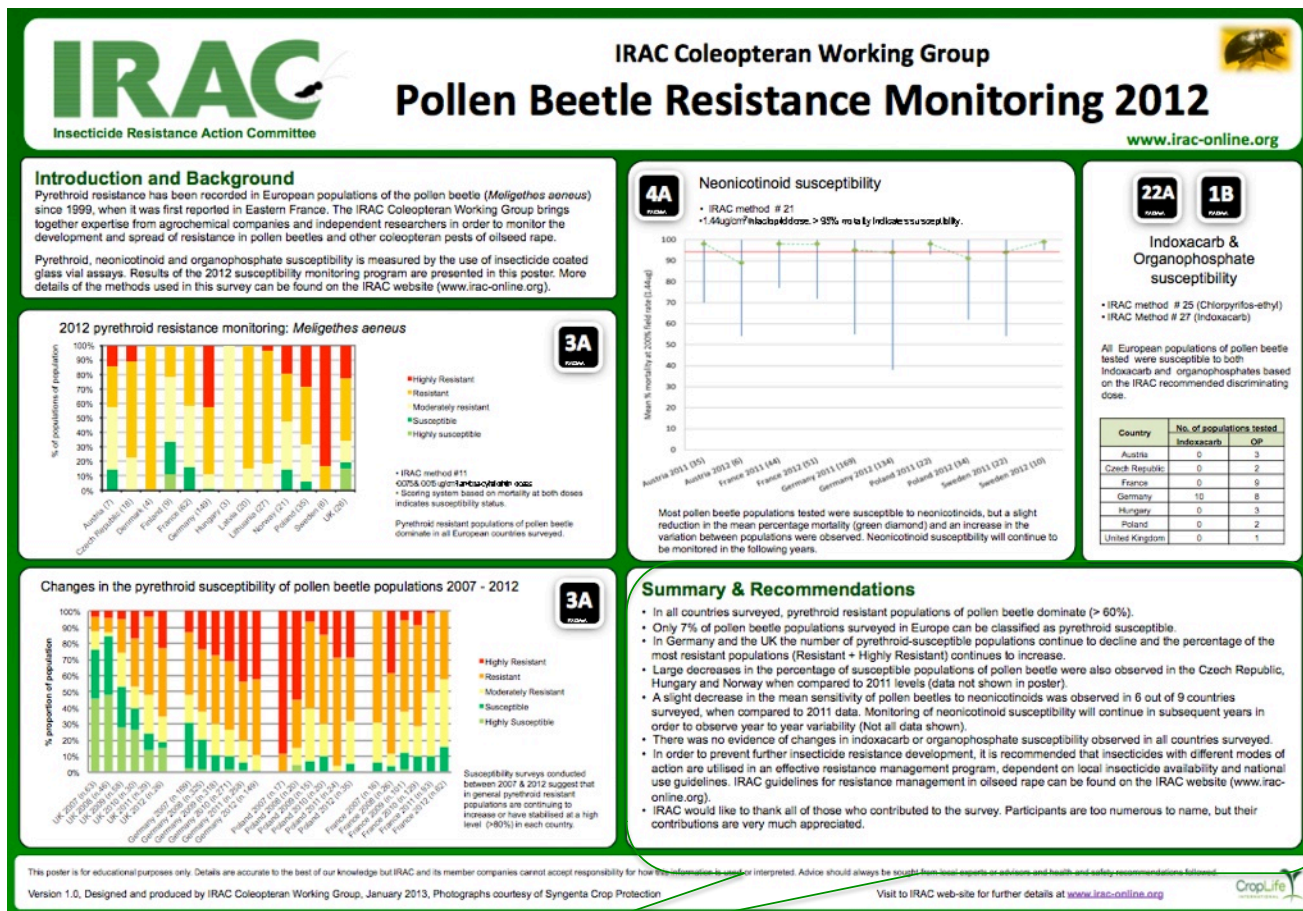
Whilst insecticide resistance research continues to deliver new insights, we are reminded that the insects are usually several steps ahead and this is demonstrated clearly by the remarkable ability of the diamondback moth (*Plutella xylostella*) to develop resistance to many of the insecticides that are developed for its control. Resistance to the relatively newly introduced diamide insecticides is reported in China^{7,8} as well as the Philippines and Thailand⁹. Although the contribution of other mechanisms of resistance has not been ruled out, resistance appears to be associated with an amino acid substitution (G4946E) within the ryanodine receptor protein⁹.

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Results from the 2012 Pollen Beetle Resistance Monitoring in Europe

The IRAC Coleoptera Working Group (previously the Pollen beetle WG) has been monitoring the development and spread of resistance in European populations of pollen beetles (*Meligethes aeneus*) over the last 6 years. Pyrethroid, neonicotinoid and organophosphate susceptibility is measured by the use of insecticide coated glass vial assays. Results of the 2012 susceptibility monitoring program and the changes in pyrethroid susceptibility of pollen beetles populations during 2007-2012 are presented in a new poster as shown below.



Summary & Recommendations

- In all countries surveyed, pyrethroid resistant populations of pollen beetle dominate (> 60%).
- Only 7% of pollen beetle populations surveyed in Europe can be classified as pyrethroid susceptible.
- In Germany and the UK the number of pyrethroid-susceptible populations continue to decline and the percentage of the most resistant populations (Resistant + Highly Resistant) continues to increase.
- Large decreases in the percentage of susceptible populations of pollen beetle were also observed in the Czech Republic, Hungary and Norway when compared to 2011 levels (data not shown in poster).
- A slight decrease in the mean sensitivity of pollen beetles to neonicotinoids was observed in 6 out of 9 countries surveyed, when compared to 2011 data. Monitoring of neonicotinoid susceptibility will continue in subsequent years in order to observe year to year variability (Not all data shown).
- There was no evidence of changes in indoxacarb or organophosphate susceptibility observed in all countries surveyed.
- In order to prevent further insecticide resistance development, it is recommended that insecticides with different modes of action are utilised in an effective resistance management program, dependent on local insecticide availability and national use guidelines. IRAC guidelines for resistance management in oilseed rape can be found on the IRAC website (www.irc-online.org).
- IRAC would like to thank all of those who contributed to the survey. Participants are too numerous to name, but their contributions are very much appreciated.



IRAC News Snippets

- ★ A new IRAC Steering Team has been formed comprising of the IRAC Chair (Domingos Pedroni), the 3 Vice-Chairs (Ralf Nauen, Russell Slater and Tatjana Sikuljac), the IRAC Treasurer (Lixin Mao) and the Coordinator (Alan Porter). The role of the Steering Team is to work with the Executive Committee to ensure that the IRAC structure, constitution, organization and finances serves the needs of IRAC and to propose to the Executive new strategic initiatives to promote global insecticide resistance management.
- ★ IRAC have developed two new test methods for adult Stink Bugs, *Euschistus heros*, validated for use with pyrethroids (MoA Group 3A) and neonicotinoids (MoA Group 4A). [Method No 028 is a bean dip assay](#) and [Method No 029 is a topical assay](#).
- ★ IRAC US is organizing another symposium in their highly successful series during the week of the ESA meeting in Austin, Texas, November 2013. The title of this year's symposium is: "Mechanisms of Resistance: From Mechanism to Management".

Conferences & Symposia

- ★ International Symposium on Entomology, Orlando, US, Sept. 4-6th, 2013
- ★ 246th Meeting American Chemical Society, Indianapolis, Sept. 8-12, 2013
- ★ MIM Pan African Malaria, Durban, S. Africa, Oct 2013
- ★ NPMA PestWorld, Phoenix, Arizona, Oct. 2013
- ★ Entomological Society of America meeting, Austin, TX, Nov. 10-13, 2013
- ★ ASTMH Annual Meeting, Washington, DC, Nov. 2013

Feedback

The eConnection is prepared by the IRAC International Communication & Education Working Group and supported by the 15 member companies of the IRAC Executive. If you have information for inclusion in the next issue of eConnection or feedback on this issue please email aporter@intraspin.com

Disclaimer

The Insecticide Resistance Action Committee (IRAC) is a specialist technical group of CropLife. Information presented in this newsletter is accurate to the best of our knowledge but IRAC and its member companies cannot accept responsibility for how this information is used or interpreted. Advice should always be sought from local experts or advisors and health and safety recommendations followed.

FURTHER INFORMATION

SOURCE:

The eConnection is the newsletter of IRAC International

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