

## Insecticide Resistance Action Group

**Minutes of the 35<sup>th</sup> meeting held at Throws Farm, Dunmow  
Wednesday, 21 October 2015  
Hosted by Chris Wallwork**

Buss, David (EMR)  
Collier, Rosemary (Warwick Crop Centre)  
Denholm, Ian (University of Hertfordshire)  
Fenton, Brian (SRUC)  
Foster, Steve (Rothamsted Research: *Chair*)  
Harris, Dilwyn (Dow AgroSciences)  
Horgan, Alan (Certis)  
Mattock, Sue (CRD) (via teleconference)  
Morris, Reuben (Frontier)  
Phillips, Richard (Bayer CropScience)  
Pope, Tom (HAUC)  
Slater, Russell (Syngenta) (via teleconference)  
Sparrow, Gemma (Adama)  
Wallwork, Chris (Agrii)  
White, Sacha (ADAS: *Secretary*)

### 1. Welcome

IRAG welcomes Brian Fenton from Scotland's Rural College (SRUC), Reuben Morris attending in place of Stuart Hill (Frontier), Gemma Sparrow joining us as Adama's representative, replacing Paul Fogg, who has moved to Frontier, and Richard Phillips attending in place of Nigel Adam (Bayer CropScience).

### 2. Apologies for absence

Adam, Nigel (Bayer CropScience)  
Bean, Chris (Zantra Ltd)  
Collins, Larissa (Fera)  
Cowgill, Sue (AHDB Potatoes)  
Hill, Stuart (Frontier Agriculture Ltd)  
Matthews, Lynne (BASF)  
Nicholls, Caroline (AHDB Cereals and Oilseeds)  
Parker, Bill (HDC)  
Pickup, Jon (SASA)  
Saunders, Pete (Syngenta)  
Sisson, Adrian (DuPont)  
Stevens, Mark (BBRO)

### 3. Minutes of last meeting

All actions except production of a draft template (indicating pest/crop combinations of concern for the development of resistance) arising from the last meeting have been carried out.

RS says that a database/matrix identifying pest/crop combinations of concern for the development of resistance would be a very useful tool but would involve significant work to develop and maintain. For it to remain valuable it would need updating at least twice a year. RC suggested that AHDB should be involved. SM mentions that this would be an extension of IRAG's Mode of Action classification table and Resistance Matrix. CW, SF, ID and RC expressed an interest in the development of the matrix.

*Action: CW to contact BP, SF, ID and RC to progress MOA resistance matrix.*

SW contacted VP regarding continued involvement in the group but had not received a response.

*Action: SW to ask Vivian Powell if she would like to continue involvement in the group and to receive minutes, etc.*

### 4. Feedback from IRAC

RS joined the meeting by speaker phone and updated the group on developments.

- Cereal aphid (*Sitobion avenae*): Resistance monitoring is ongoing. IRAC have developed EU-wide IRM recommendations, which are currently being circulated within the IRAC Sucking Pests team for review and will be available to IRAG shortly.
- Cabbage stem flea beetle (*Psylliodes chrysocephala*): A resistance monitoring programme is ongoing and a molecular technique has been developed to detect the *kdr* mutation. Both will be reported by IRAC and will be covered in a journal publication.
- *Tuta absoluta*: Has been detected in the UK. AH mentioned that the miner is regularly found in UK glasshouses and is effectively dealt with by growers. IRM guidelines are available. Resistance to diamides has been detected in Italy. It is unknown whether the resistance came from South America or developed in Italy where this group of insecticides have been used intensively for 2-3 years. Resistance to pyrethroids (*kdr*) is already widespread, originating from South America.
- *Aphis gossypii*: Neonicotinoid resistance has been detected in China, Japan and South Korea. Resistance is based on same target-site mutation as found in *Myzus persicae* in Europe. Resistance conferred through heterozygotes carrying the resistance gene.

- MOA group update: Evidence available to justify separating pymetrozine and flonicamid into separate groups (currently in 9B and 9C respectively). No indication of cross-resistance between these insecticides. Flonicamid will move to a new group, 29.
- IRAC, FRAC and HRAC are working with ECPA & Croplife to determine the best approach to opening a dialogue with the food chain (supermarkets) with regards to the indirect effects of providing restrictions on the total number of pesticide residues allowable in crops. Restricting the maximum number of detectable residues inadvertently promotes the use of the same pesticides rather than promoting mode of action rotation and therefore in some cases increases resistance risk.
- IRM recommendations are being prepared for seed treatments and soil-applied insecticides.
- A leaflet is being developed in collaboration with CropLife International to communicate to growers the importance of implementing resistance management programmes. It will be available to pick up at seed distributors and on the IRAC website.

## 5. Regulatory Issues

SM provided the following update via speaker phone:

- Emergency 120 day Authorisations (EAs) for Cruiser (1949 of 2015) and Modesto (1950 of 2015) neonicotinoid seed treatments were issued on 24 July 2015. The conditions for this were subject to a risk assessment by an agronomist and a stewardship plan. BF asked whether, in hindsight, the Emergency Authorisations would still be made. SM said that there had been some criticism that generally seed treatments are prophylactic, the decision for their use is made ahead of the knowledge of pest pressures. But the consideration of these Emergency authorisations was based on assessment of the evidence of the problem, with a recommendation from the ECP. SF says that he is uncomfortable with the use of the term “prophylactic” in relation to seed treatments as it suggests that they are unnecessary whereas the damage seen in 2014 illustrates their importance.
- Teppeki (Flonicamid) given an EA (2447 of 2015) for control of *Myzus persicae* in OSR. InSyst (acetamiprid) given an EA (1968 of 2015) for control of cabbage stem flea beetle in OSR.

- Biscaya (thiacloprid) given an EA for control of mangold fly (*Pegomya hyoscyami*) in sugar beet.
- There are increasing numbers of EAMUs and EAs being issued to compensate for the limited range of tools available.
- UK guidance on comparative assessments published (<http://www.pesticides.gov.uk/Resources/CRD/Migrated-Resources/Documents/U/UK-Comp-Assess-Guidancev2.pdf>). The assessment stops if there is not a minimum of four alternative MOAs. This derives from the EPPO standard developed to assess the agronomic impacts of the comparative assessments (EPPO standard 1/271 'Comparable assessment' and is freely available from <http://pp1.eppo.int/list.php>).
- RS asks about the influence supermarket marketing decisions have on insecticide use. SM replied that this can create the impression of a two-tier regulatory system. CRD does occasionally liaise with supermarkets regarding insecticide use and IPM. CW notes that pressures from supermarkets to suppliers regarding insecticide use have declined in the last three years. Cost is a higher priority. Discussion regarding the involvement of supermarkets in IRAG. Supermarkets have been repeatedly invited to meetings but never attend. Issues relate to who/which supermarkets to invite (they do not represent each other but inviting all would create a large meeting) and whether they ought to be invited on a permanent or temporary basis. The Fresh Produce Consortium (FPC) is the UK's trade association for the fresh produce and cut flower industry. However, supermarket representatives rarely attend this. Suggested that IRAG could produce guidance for dissemination to supermarkets or to the FPC.
- Changes have been made to the RAG sites to standardise the format across the different groups and make them more user-friendly. Please contact SM with any feedback. HSE will move to a new site and the RAGs will go with it. This change will make it easier to upload documents although there will be a period during the migration (likely to be in the New Year) when the site will be unavailable.

## 6. Update on research

### Work at Rothamsted Research

SF provided an update on the three-year project PS2720 – 'Combating Resistance to Aphicides in UK Aphid Pests', which has been extended until 2017.

- Myzus persicae*: 2015 had average spring conditions and the first aphid flight was in line with this. There was a slight decrease in the proportion of MACE/super kdr forms and an increase in susceptible and kdr forms in 2015. 85% of field populations were therefore probably P and O types but this needs to be confirmed by microsat analysis. This continued majority is despite a cold winter in 2013 and late spring in 2014, indicating that they are well adapted. No indication that neonicotinoid resistant forms (Nic-R+ or Nic-R++) are in the UK nor that they have moved from southern Europe. RS points out that these forms are now widespread in Italy and are now found in southern Spain. They are still primarily found on stone fruits with very limited movement to adjacent vegetable crops (despite laboratory studies demonstrating that they can reproduce on other crops). Altitude does not appear to be affecting movement. It is not known whether these forms are holocyclic. RS mentions that pymetrozine and flonicamid are being used on crops where Nic-R+/++ forms are found. An EAMU for spirotetramat is also in place.
- Sitobion avenae*: The proportion of kdr heterozygotes (SR) levelled out in 2015 although in some places they remained common. No kdr homozygotes have been found. Recommendation is to use pyrethroids at full rates. Kdr SR confers approx. 40x resistance meaning pyrethroids should still be effective at full field rate. Lambda-cyhalothrin was used for bioassays but kdr should affect all pyrethroids equally. RS seconds this, a range of commercially available pyrethroids were tested with comparable results. Recommendation is to use the most effective pyrethroid. Studies are underway using field simulators at Rothamsted to establish whether kdr SR forms are repelled by lambda-cyhalothrin in the same way as SS forms. Also planning to investigate whether SR forms are non-sexual by stressing them.
- Cabbage stem flea beetle: kdr resistance is present in the UK and there are indications that another resistance mechanism is present. Addition of PBO reduces survival suggesting involvement of a metabolic resistance mechanism. In 2015 pyrethroid resistant populations increased in the west, north and east of England. LC50 highest in Suffolk (RR = 3.4) > Cambridgeshire > Hertfordshire > Essex > Yorkshire > Norfolk. RS added that their surveys found a resistance hot-spot around Cambridgeshire in 2014. In 2015 that hot-spots could be found along an eastern corridor of kdr mutations. Resistance was found outside this area but at lower frequencies. Very few populations were found without the kdr mutation.
- Pea and bean weevil: Pyrethroid resistance has been detected in 2015 in the east and centre of England, and Lincolnshire. RS added that their laboratory bioassays found reduced susceptibility to pyrethroids in some populations but that this was not correlated with field performance. Recommends judicious use of pyrethroids at full label rate.

- Pollen beetle: No sites had samples without resistant individuals in 2015. Most sites had 0-50% of individuals resistant. Mechanism is likely to be P450-based metabolic resistance.
- Bruchid beetle, grain weevil, saw-toothed weevil, seed weevil and striped flea beetle represent potential future resistance problems.

### Work at Warwick Crop Centre

RC updated the group on research underway at the Warwick Crop Centre.

- SCEPTRE (Sustainable Crop & Environment Protection – Targeted Research for Edibles): Project recently finished. Identified potential new products for almost every crop/pest combination.
- AHDB Horticulture project investigating new control options for the virus-transmitting willow carrot aphid. Preliminary data showed that some treatments were able to reduce virus load.
- Carrot fly: AHDB Horticulture project looking at novel actives and effect of different treatment timings. Currently no evidence of resistance to pyrethroids in this pest.
- Cabbage root fly project: AHDB Horticulture project investigating crop covers, the relative efficacy of Tracer and Dursban drenches, particularly when planting is delayed, development of the 3<sup>rd</sup> generation of the pest and pest control using post-planting drenches.
- Cabbage whitefly: AHDB PhD project (Spencer Collins) developing an understanding of pest development within the crop, dispersal and colonisation patterns. A separate AHDB Horticulture project is focused on control with insecticides and biocontrol with parasitoids.
- AHDB Horticulture project on migrant Lepidoptera (Silver Y moth and diamond-back moth) investigating novel controls, remote monitoring methods and pheromone trapping.
- AHDB Horticulture project on *Orthops campestris*: investigating control of a pest that has recently increased as a problem, especially on organic celery.

*Action: SW to circulate presentations by RS and SF.*

## 7. IRAG outputs

None since the last meeting.

## 9. AOB

- Issue of decision process for new applicants discussed. Concerns expressed that the group will become unwieldy if too large. There are currently no rules for deciding on new applicants. Agreed that new applicants should submit a justification for their membership for consideration by the group.

*Action: SW to circulate link to the IRAG constitution.*

- MEP Anthea McIntyre approached RC and others to attend a meeting on 20<sup>th</sup> November to comment on the EP Agriculture Committee's Initiative (INI) report on "**Technological Solutions for Sustainable Agriculture in the EU**" for which she is rapporteur.

*Action: RC will represent IRAG at the meeting and feedback information.*

- BF updated the group on the situation in Scotland. *Myzus persicae* numbers spiked in June. Big diversity of genotypes. No neonicotinoid resistance detected.
- BF questioned the conclusions of several recent papers detailing impacts of neonicotinoids on non-target organisms:
  - Genetics, Synergists, and Age Affect Insecticide Sensitivity of the Honey Bee, *Apis mellifera*. Rinkevich et al. PLOS Published: October 2, 2015. The paper starts by considering the reduction in honey bee colonies since the 1940s. It claims the reasons for the reduction are complex. However, the authors completely ignore the most obvious and least complex, that the number of people prepared to keep bees has fallen by 90% in that time period. They seemed to forget that bee colony numbers are almost entirely driven by the numbers of bee keepers, and how good they are.
  - Evidence for pollinator cost and farming benefits of neonicotinoid seed coatings on oilseed rape by G. E. Budge, D. Garthwaite, A. Crowe, N. D. Boatman, K. S. Delaplane, M. A. Brown, H. H. Thygesen & S. Pietravalle. The underlying statistics and conclusions of this paper have been criticised in the updated review published in the Royal Society Proceedings (B). However, at IRAG before the Royal Society review was published BF criticised the authors' inability to take into account losses due to *Varroa* mites. The losses would have happened in two waves. The first associated with colonisation of *Varroa* in the UK and the second (and third) due to

the spread of pyrethroid resistance and then accumulation into RR forms.

- Seed coating with a neonicotinoid insecticide negatively affects wild bees. Rundlöf et al Nature 521, 77–80, May 2015. BF made two observations on this paper. The first was that they found no evidence that in a paired experiment honey bee colonies were negatively influenced by neonicotinoid seed treatments. They did claim that two wild bee species were negatively affected. One of these was the red mason bee, *Osmia bicornis*. BF showed data taken from the UK NBN (National Biodiversity Network Data Base) which plotted an increase in the numbers of this bee during the time of neonicotinoid use – i.e. a reverse correlation. There was no evidence from observations that supported this species being in decline in the UK because of neonicotinoids. This is also true for the bumble bee species they used. An analogy would be an aphid like *M. persicae*. Every year farmers kill vast quantities, yet every year its numbers are robust and sometimes even increase. This paper and the whole new environmentalist philosophy makes no allowance for resilience in the natural ecosystem.
  - Finally, BF showed evidence that in some sectors approximately 20% of researchers were now being asked to produce specific outcomes suited to their customers' needs – which suggests obfuscation is going on and this is malpractice. BF suggested that with so much at stake in so many areas of modern science there was a need for a professional body to make sure that science was being conducted with integrity. Given the tight and independent regulation of the pesticide industry it seems only fair that those scientists seeking to produce politically motivated science should also be subject to independent regulation.
- Group agrees to SW's request for a research update slot at the next meeting to provide an update on the work in the 'Combating insecticide resistance in major UK pests' project being carried out by ADAS/Rothamsted.

#### Post meeting note

- SM brought attention to the judgement in a legal case brought by Friends of the Earth (FOE) against DEFRA challenging the decision to issue the Emergency Authorisations. FOE lost on all three grounds, full details of the decision can be found at <https://www.judiciary.gov.uk/judgments/friends-of-the-earth-limited-v-secretary-of-state-for-the-environment-food-and-rural-affairs/>.



## 10. Date and venue of next meeting

The 36<sup>th</sup> meeting of IRAG-UK will be hosted by RC at the Warwick Crop Centre in April (date tbc).