

Insecticide Resistance Action Group

Minutes of the 39th meeting held at SRUC Edinburgh Campus, King's Buildings,
Edinburgh

Wednesday, 15 November 2017

Hosted by Brian Fenton



Bailey, Andrew (Adama)
Collier, Rosemary (Warwick Crop Centre)
Collins, Larissa (Fera)
Cowgill, Sue (AHDB)
Fenton, Brian (SRUC)
Foster, Steve (Rothamsted Research: *Chair*)
Harris Dilwyn (Dow AgroSciences)
Mattock, Sue (CRD)
Mortlock, Philip (BASF)
Newbert, Max (Syngenta)
Pickup, Jon (SASA)
Pope, Tom (HAUC)
Shaw, Bethan (EMR)
Stevens, Mark (BBRO)
Wallwork, Chris (Agrii)
White, Sacha (ADAS: *Secretary*)

1. Welcome

IRAG welcomes the following new members; Andrew Flind and Andrew Bailey who are joining in place of Dorin Pop and William Nicholls respectively. Also joining for the meeting are Fiona Burnett (Fiona.Burnett@sruc.ac.uk), Head of Crop and Soil Systems at SRUC and chair of FRAG-UK, Andy Evans (andy.evans@sruc.ac.uk), Team Leader - Applied Practice Team, Crop and Soil Systems, SRUC and Beth Moore, PhD student of Jon Pickup at Aberdeen University.

2. Apologies for absence

Denholm, Ian (University of Hertfordshire)
Flind, Andrew (Bayer CropScience)
Horgan, Alan (Certis)
Morris, Reuben (Frontier)
Slater, Russell (Syngenta and IRAC representative)

3. Minutes of last meeting

Action: SF to send a list of farming press in which he's contributed to RS.

- Done.

Action: IRAG recommend that inclusion of MoA information on product labels be compulsory.

- Done.

Action: SF to contact RAGs regarding issuing a joint statement.

- Delayed until today's discussion.

Action: RC to contact the All-Party Parliamentary Group on Agriculture to enquire about their holding a session on resistance issues.

- Daniel Pearsall, co-ordinator of Group, is content to put the issue forward but has asked for the reasons to be set out. Presents an opportunity to raise profile of issue and highlight need for management options to use in improved IPM programmes.
- *Action: IRAG to prepare proposal. RC to send information to group.*

4. Feedback from IRAC

No update from IRAC.

Action: Secretary to contact Russell Slater prior to meetings for update when RS not able to attend.

5. Regulatory Issues

SM gave the following update:

A. New proposal to extend neonicotinoid restrictions:

- Sue provided an update based on the latest deliberations from the ECP in light of new evidence provided, and the response from Michael Gove. (Links given post-meeting:

<https://www.gov.uk/government/news/environment-secretary-backs-further-restrictions-on-neonicotinoid-pesticides> and

The ECP advice: <https://www.gov.uk/government/groups/expert-committee-on-pesticides#advice-to-ministers>).

- The conclusion of the ECP deliberations were that: New studies (e.g. Woodcock et al., 2017) have improved understanding of impacts of neonicotinoid seed treatments (NSTs). Exposure to neonicotinoids (NNIs) can have unacceptable effects. These effects are not always clear. Risk assessments are not currently able to take account of these effects. So far these impacts have only considered Hymenoptera. Other pollinators have not yet been considered.
- Further the ECP explained that use of NSTs in non-flowering crops still risks exposure to pollinators as NNIs have been found in non-crop vegetation and

- persistence of compounds for uptake in following crops is also an issue. MN noted that imidacloprid is the only documented NNI to be found in non-crop vegetation but this insecticide is no longer used.
- Applying for an emergency authorisations is still an option should further restrictions be adopted. However, these are only for use where it can be proven there is no other means of control, and must be limited and controlled in extreme circumstances. Post-meeting SM provided links to the ECP advice, studies and Gove's Guardian article in an email.
 - BF asked after environmental half-life data provided by companies. SM replied that this is a matter of a persistent landscape effect of accumulation of NNIs and what this means in terms of residues in non-crop vegetation. Ian Boyd, Chief Scientific Adviser at Defra, has spoken of the concept of the cumulative effect of pesticide use at the landscape level.
 - DH asks if there is a possibility of introducing alternative restrictions, e.g. use of the active one in three years. SM responded that theoretically this could be possible, and has been done during the renewal process for other active substances (as). SM added that under EU regulation EC 1107/2009 there is no scope for an argument for retaining an active on the basis that banning it will result in the increased use of another, also damaging substance. Also there is no consideration of balancing risk with benefit. This regulation is being reviewed so this could change.
 - BF asks if there are accumulation studies to indicate whether actives are bioaccumulating. SM replied that there are, but they don't look at wider effects of groups of substances, the evaluation considers only an individual as/product. Current modelling looks at specific actives in soil. CW adds that traces of DDE (a breakdown product of DDT, which was last used prior to 1978) are still found in produce and added that there is an issue of carryover of herbicides from cereals into following crops. SM added that bioaccumulation is a hazard criteria under the current system but that this a step beyond with new issues such as flowering weeds taking up residues. BF asks about the ability of insects to metabolise these substances and SF says that different species will be able to metabolise insecticides differently.
 - MS asks whether anything is known about the position of other member states. SM replies that as far as she is aware no one's position has changed. MS asks whether any extension to the restrictions will come in straight away. SM says she cannot say although a delayed introduction is more likely. There is always the opportunity to apply for emergency authorisations. MS responds that seed treatments need to be applied now ahead of the new sugar beet season. SM responds that this could be taken into account. Broader arguments are now being considered so doesn't preclude such an application.
 - BF asks whether the situation will change post-Brexit. SM explains that ECP passes advice on emergency authorisations to the minister making the decision.

The minister is not bound by the advice given. The EU is informed on decisions to grant an Article 53 authorisation currently.

B. Future sustainable use of pyrethroids

- The aim of the restrictions would be to encourage sustainable use. Potential approaches to determining the maximum permitted number of sprays are:
 - i. Using the current maximum use for any one product, e.g. five applications in OSR.
 - ii. Taking a more tailored approach, e.g. the average number of applications on a crop by crop basis or determine what is deemed to be the maximum number of necessary sprays.
- CW feels that the first approach is simplest. Concern for latter approach is where situations arise in which repeated insecticide applications are needed over a matter of weeks, e.g. when serious silver y moth infestations occur in lettuce. Also notes that if NSTs go then resistance selection pressure will shift to spirotetramat as this is the only active able to control *Nasonovia ribisnigri* and root aphid in lettuce. SM stresses that it isn't intended to introduce something that prejudices growers. A collaborative approach will be used. Still the issue remains that there are situations where pyrethroid use is excessive.

C. Extension of non-target arthropod protection buffers to 10 m (from 5 m)

- There is an ongoing general review of buffer zones in terms of simplifying the scheme, and other risk mitigation measures such as low drift nozzles and identifying the risks being mitigated for. Draft proposals will be submitted before the end of the year and these will then go for review and consultation. It is hoped the buffer zone for NTA proposals will be completed ahead of next season.

6. Links to other RAGS

Fiona Burnett (FB), visiting from FRAG, says that the Groups share many similar issues, for example regulatory scrutiny of particular groups of actives such e.g. azoles and multi-site fungicides. It is also helpful to avoid overcomplicating messages to wider society. For this reason the RAGs ought to work together more closely. FRAG supports the provision of MoA information on product labels. This issue illustrates a common effort between the RAGs.

SM adds that the benefits of providing MoA information on labels is clear but noted there had been some concern that this may cause confusion with fungicide and herbicides, where mixtures are commonplace. FB responded that the mood of FRAG remained positive. SM suggested that implementation of the change may be better following consultation with Crop Protection Association (CPA) followed by a gradual transition of the changes. Text should be standardised and follow the IRAC example. DH added that there is strong willingness within the industry to improve communications of resistance and MoAs.

Action: Joint RAG statement to be drafted regarding MoA labelling and be sent to SM. SF to lead for IRAG.

7. Update on research

Work at Rothamsted Research

SF provided an update on PS2720 project – ‘Monitoring and managing insecticide resistance in UK Pests’.

Myzus persicae (peach-potato aphid):

- Received a better range of samples from across the UK in 2017.
- Nic-R remains at low levels (<10%). Individuals with this resistance are capable of walking but cannot reproduce. The R8IT clone (Nic-R⁺⁺) clone has been found in Greece and N. Africa on secondary hosts. No evidence of northern spread. If NNI resistant clone arrives and is suited to the conditions it could become fixed in the UK. Key is to keep monitoring. Aphid found on lettuce imported from Spain. Only a photo provided so unable to identify with confidence but could be *M. persicae*. JP adds that new aphid species have been found coming on blueberries, however they are not resistant to flonicamid, pymetrozine or spirotetramat.
- MACE resistance present in approx. 70% of the population.
- Super-kdr resistance present in approx. 70% of the population.
- Kdr resistance is increasing (approx. 30% of population).
- No esterase resistance has been found in field or protected populations since 2014.
- 88% of genotypes are MACE/Super-kdr. Made up of P and O types. These have not been affected by cold or wet winters so well adapted. Males have been found so may not be producing females.
- In Scotland approx. 50% have been found carrying virus. No obvious association with particular clones. P-type predominating, O-type on the wane. Unclear why, could be chance or other differences, e.g. vulnerability to pathogens.

Macrosiphum euphorbiae and *Nasonovia ribisnigri*:

- Susceptible baselines created in anticipation of future resistance problems. Allows rapid detection of resistance.

Sitobion avenae:

- Kdr resistance present in 2017 but only in heterozygote form. No evidence to suggest tau-fluvalinate is more effective than other pyrethroids. Sav3 is the UK ‘super-clone’. A PhD student that SF is co-supervising has found eggs in short-day length, low temperature controlled environment experiments with Sav3. This suggests it can sexually reproduce but no homozygote kdr resistant forms have been found in the UK. Possible that there is a fitness costs associated with it. In Scotland approx. 30% of clones are Sav3.

Rhopalosiphum padi:

- Slight shift toward pyrethroid insensitivity but nothing to be concerned about at the moment. Needs continued monitoring.

Metopolophium dirhodum:

- No pyrethroid resistance detected.

Cabbage stem flea beetle:

- No samples found without pyrethroid resistance in 2017. Several growers have lost crops. Resistance ratios are increasing; >100 in Cambridgeshire and >350 in Suffolk. Over expression of P450s is likely responsible as addition of PBO causes mortality in bioassays.

Pollen beetle and pea & bean weevil:

- Few samples received but metabolic resistance to pyrethroids detected in the majority of samples. CW asks whether PBO is an option for the control of pests with metabolic resistance. SM asks whether doing so would select for target-site resistance. SF says it would if target-site resistance is present in the population.

Diamond back moth (DBM)

- Resistance to pyrethroids was detected in samples tested from the 2016 influx. RC adds that DBM populations may be able to overwinter in the UK but the main risk remains populations immigrating from the continent. The 2016 influx was not resistance to cyantraniliprole and spinosad.
- Also one sample of striped flea beetle (*Phyllotreta striolata*) and bruchid beetle (*Bruchus rufimanus*) were found with pyrethroid resistance. This is the first time resistance has been found in these species. Treatment with PBO made bruchid beetle susceptible so this could be metabolic resistance.
- Reports of greenhouse whitefly (*Trialeurodes vaporariorum*) control problems with acetamiprid have been reported. Also of onion thrips (*Thrips tabaci*) control problems with spinosad. Resistance is yet to be verified.
- LC mentions that pyrethroid resistance in saw-tooth grain weevil (*Oryzaephilus surinamensis*) and grain weevil (*Sitophilus granarius*) has already been described in the UK.

Action: LC to email details of saw-tooth grain weevil and grain weevil resistance to SF.

Work at Warwick Crop Centre

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

Brassica moths:

- Website that collates migrant moth monitoring on mainland Europe now up and running. 2017 has seen low DBM pressures across Europe.

SceptrePlus:

- Ed Moorhouse is Chair of the project. A range of key target pests of horticultural crops have been identified, including aphids, western flower thrips, spotted wing

Drosophila and asparagus beetle. Work investigates new insecticides and bioinsecticides. All have been offered by companies so are relatively close to market. Some trials in the project may be subcontracted out.

- For asparagus beetle a range of products have been tested against the adults at oviposition on spears and larvae. Cypermethrin is effective against larvae but not adults. Some other promising products too.
- Work on *Thrips tabaci* in leek has shown two coded products to produce significant reductions in damage, albeit with low damage in the UTC.
- Also updating pest factsheets. These are taking more of a whole crop approach. Can suggest to AHDB to include MoA group information in future versions.
- Sue noted CRD have offered to provide a contact for the project (as with the original Sceptre) to assist in advice on regulatory issues for potential candidates.

Work at SRUC

BF updated the group on research at SRUC:

- Pyrethroids are used extensively to control PVY transmission by aphids in the potato crop. Monitoring is carried out in potato fields using yellow water traps. The frequency of individual vector species is linked to a multiplication factor based on their relative efficiency factor to give a traffic light system for spray applications. Historically, the relative efficiency factor (REF) of *S. avenae* was considered to be relatively low (0.01). Reassessment of REF lifted this to 0.6 which increased the influence of this species in spray decisions. Project started at SRUC to investigate the REF of the *Sitobion avenae* SA3 pyrethroid resistant clone discovered a few years ago in the UK. This was conducted by a Czech final year PhD student, Kateřina Jégrová (Brno Mendel Agricultural University). This clone is now present throughout the UK at levels of around 30%. The transmission system is a standardised system used by other virologists including studies at Fera (UK) and Holland. *Physalis floridana* is used as a host plant for the virus to be acquired from infected potato because it is a standard indicator plant for viruses. *S. avenae* was not found to transmit PVY and agrees with the Dutch study by Verbeek et al (2009). Therefore this suggests the REF = 0.6 is incorrect and may be resulting in over spraying. LC notes that a study using Electro Penetration Graph (EPG) where aphids are tethered and have no choice, found PVY acquisition in *S. avenae* (Boquel *et al* 2011). [The same study found no transmission of *R. padi* and *A. fabae*, which score as 0.4 and 0.1 in the current REF table]. BF and LC agreed there could be differences between clones of *S. avenae*. When the REF study was conducted at Fera the *S. avenae* genotyping was not being carried out, so the clones used were not characterised. JP added that field observations looking at correlations between virus levels in the total potato crop on a yearly basis are correlated with *S. avenae* and *M. dirhodum* numbers. BF questioned whether the correlation could distinguish between different cereal aphids and the Dutch study that found no transmission of *S.*

avenae did find transmission by *M. dirhodum*. JP commented that he preferred epidemiological correlations from the field to practical lab work. BF pointed out that the seminal work by Harrington et al at Rothamsted Research in the 1980s had used field experiments to score *S. avenae* at the original 0.01 REF.

New PhD studentship:

- JP introduces Beth Moore, who recently started a PhD titled “The role of sex, climate change, and land use on the spread of aphid pesticide-resistance in the UK: a PhD project using transcriptomic and GIS-based approaches” at Aberdeen University. JP is co-supervising the studentship with Dr Lesley. Beth is studying the evolutionary and ecological factors that regulate the development of resistance in *S. avenae*, for instance the variation in life cycle between England and Scotland. Beth makes a request for *S. avenae* for the work. BF suggests she asks Dr Gaynor Malloch (JHI).

7. IRAG outputs

Updating IRAG Resistance Management Guidelines:

- SW offers to update old versions. RC offers to update the brassica pest guidelines.

Action: SW and RC to update guidelines.

Annual newsletter and NFU proposal for a joint statement on resistance issues:

- FB says that joint messages between AHDB and FRAG have helped.

Action: SF to contact RAGs regarding issuing a joint statement.

Action: SW to circulate link to the final report in the “Combating insecticide resistance in major UK pests” project.

Action: SF/SW to draft an insecticide resistance guidance fact sheet.

9. AOB

IRAG membership policy:

- FRAG have a résumé process for assessing new applicants to the group.
- Members could be categorised as relevant stakeholders, specialist members or invited attendees.

Action: SW to request FRAG policy wording from FB.

Action: Group to update membership policy.

Action: Group accepts membership request of Caroline Nicholls as representative of AICC.

10. Date and venue of next meeting

Possibly Agrii’s Throws Farm. Otherwise EMR is possible. Possible dates are 24-26 April 2018.