

# Fungicide Resistance Action Group-UK

**FRAG - UK**



**FRAG-UK 48<sup>th</sup> Meeting**  
**9:00, Thursday 25<sup>th</sup> March 2021**  
**Conducted over TEAMS**

## Minutes

<b>Present</b>	
<b>Chair</b>	Prof F Burnett (SRUC)
<b>Secretary</b>	Position open. Minutes taken by NP on rotation.
<b>Members</b>	Dr N Paveley (ADAS) Mr S Jackson (Corteva) Dr K Maguire (Bayer CropScience) Mr P Kowalski (BASF) Mr B Clark (NIAB-TAG) Dr L Cooke (Specialist/QUB) C. Lambourne (AHDB) Mr M Thompson (AICC) Mr R Dyason (Nu Farm) Dr D Ellerton (AIC) Dr J Tatnell (Syngenta) Dr S Kildea (Teagasc) Mr A Bailey (Adama) Dr J O'Leary Quinn (HSE) Dr T Fleming (AFBI)
<b>Guests</b>	None
<b>Apologies</b>	Dr Judith Turner Dr Greg Kemmit Dr Bart Fraaije Dr J Clarkson (Warwick Crop Centre) Mr A Sisson (Belchim)

A copy of the current anti-trust guidelines was available during the meeting.

### 1. APOLOGIES FOR ABSENCE

As listed above.

## 2. INTRODUCTION OF NEW MEMBERS/VISITORS

Not required.

## 3. NOTICE OF ANY OTHER BUSINESS

None.

## 4. CONFIRMATION OF PREVIOUS MINUTES

Accepted as a true record.

Lise Jorgensen's name to be corrected.

## 5. ACTIONS FROM PREVIOUS MEETINGS

Updating of the FRAG constitution. CL provided a link to the constitution document on the AHDB website. WSC noted that the members list is out of date.

**ACTION:** Someone to update.

The meaning of MEC<sub>50</sub> had been queried previously and was confirmed as 'mean EC<sub>50</sub>', which is normally referred to as EC<sub>50</sub>.

## 6. UPDATE FROM FRAC

No update from FRAC. KM noted that the FRAC meetings were recent.

## 7. FRAG-UK GUIDELINES/ADVICE

### 7.1 FRAG Guidelines – updates to documents

LC summarised the current status of guidelines.

Soft fruit: CL agreed to take ownership of updating soft fruit guidance.

Potato late blight: will need revising for 2022. A sub-group has been agreed to do this (see previous minutes).

Oilseed rape: Last updated in 2017. FR will make minor amendments and circulate.

Apples and pears: CL to take ownership of amendments.

Cereal guidelines – Has been updated. WSC to revise perhaps end of 2021 for the 2022 season.

Some guides are not on the website:

Potato tuber guidelines were last updated in 2010, not an urgent task.

Turf grass guidelines last updated 2012. FB to check who did it before and see if they will take on an update, otherwise not a high priority.

There are no FRAG guidelines on sugar beet. FB to contact Mark Stevens to see if there is value in working with BBRO on a FRAG guidance document.

FB to contact Becky Howard at PGRO to discuss if there is a case for pulse guidelines.

## 7.2 Update on EPPO Resistant Pathogens List (and addressing of questions from FRAG 47<sup>th</sup> meeting)

JOQ The EPPO resistance data base contains a list of resistant pathogens in each different countries and the UK has made input into this with the support of FRAG. When work is complete validated cases will be publicly available, other non-validated information will be available to members of the group only. There was recent discussion about whether cases which didn't impact field performance should be entered and currently these have been entered. However, this was considered relevant to all the resistance databases and not just fungicides and will be discussed in detail at the November meeting. FRAC are involved in the EPPO resistance data base and Jean-Luc Genet from Corteva is on the panel. So FRAC are directly involved in this work.

**ACTION:** KM agreed to take lead on checking if revisions are needed to the FRAG resistance list and circulate to wider group. JOQ will feed in from EPPO to KM. LC has the various updated versions of the list as a start point. It was agreed, at the suggestion of the Chair, not to return to debating the definitions that are included in the list.

Post meeting note: JOQ has managed to locate the 2012 version of the UK resistance list and will circulate this to the group (thanks to all those who helped in the hunt for this!)

## 7.3 Strategic messages for 2021

JOQ raised loss of mancozeb for potatoes. The extension to use will cover the 2021 season, so the need to revise strategic messages will be for 2022.

SJ noted that Corteva are hopeful for approval of Inatreq in time for T2 but depends on regulators. SJ will prepare some information about Qii stewardship. A three pronged approach is being adopted: One application only. Statement on label that it should be mixed. Dose adjusted according to variety and disease pressure.

**ACTION: FB** to work with **SJ** on statements for a blog.

## 8. UPDATE ON CURRENT RESEARCH

### 8.1 Blight update

NP summarised findings from the second year of a three year industry/levy funded project led by Faye Ritchie with SRUC and JHI. Field trials are using 37\_A2 selection by fluazinam as an experimental system to test resistance management strategies in multi-spray programmes. Summary to date:

- The experimental system works.
- Repeated application of fungicides with the same mode of action selects strongly for fungicide resistance.
- Mixture and alternation strategies were effective, whether based on multi-site or single-site acting MoA.

- Variation in rank order of strategies between sites and seasons may be due to epidemic progress relative to treatment applications and low 37\_A2 sample numbers.
- Third year of data and ongoing analysis required to see if strategies differ significantly in their effectiveness.

## 8.2 Update from researchers

Sugar beet.

NP summarised results from limited sampling of the major sugar beet foliar pathogens from autumn 2019, funded by BBRO. *In vitro* and *in planta* sensitivity phenotyping and genotyping conducted by ADAS. In summary:

*Cercospora beticola*

- Isolates collected from one location all carried the QoI insensitive mutation G143A.
- *In vitro* bioassay (colony growth of 7 isolates) confirmed high level of insensitivity to QoI.
- Azole EC<sub>50</sub> values varied around 1ppm, which is typically used as a discriminatory dose.

*Erysiphe betae*

- Isolates collected from one location did not carry the fungicide insensitive mutation at the F129L or G137R amino-acid motif, but most isolates were G143A

*Uromyces betae*

- Isolates collected across the main growing area were all wild type at amino acid locations 129, 137 and 143.

*In planta* bioassay indicated QoI sensitivity, supporting the sequencing data

JT raised the limited product availability for sugar beet and the contrast between practice in UK (one or two sprays with main focus usually on mildew and rusts) and Europe (4 or more sprays, with greater focus on cercospora). The FRAC guidance is that QoI should be limited to 50% of the spray programme. Difficult to apply this guidance given the shortage of non-QoI products. MT noted that cercospora control from two spray programme was inadequate in 2020 and raised concerns about how to obtain control and manage resistance with limited products and existing resistance problems, particularly if cercospora becomes a more consistent problem. The discussion reinforced the need for greater diversity of products and for guidance to be considered by FRAG in liaison with BBRO (covered under action point above).

## 9. RESISTANCE IN THE UK

Update on company monitoring/sensitivity testing

BCS presented their sensitivity monitoring for the 2020 season.

- *Zymoseptoria tritici* – GB few cases of high EC<sub>50</sub>s to Bixafen identified and 27% with low to moderate RF's. In IE, 38% with low to moderate RFs. These are showing a 'shifting type' phenotype. Across Europe, high RF were found in IE, DE and NL (all higher than GB). This contrasts with the

sensitivity monitoring of *Z. tritici* to Fluopyram where the RF are much lower.

- *Z. tritici* had stable sensitivity in GB and IE for prothioconazole and this was echoed across Europe.
- *Puccinia triticina* and *P. striiformis* confirmed stable sensitive population without any changes to SDHIs, prothioconazole and fluoxastrobin.
- Barley and wheat powdery mildew, were confirmed fully sensitive to prothioconazole.
- *Pyrenophora teres* showed full sensitive to trifloxystrobin. Sensitivity to prothioconazole, remained stable except for one isolate (one site) in BE which has a much higher EC50 than other locations.
- Strawberries - Fluopyram sensitivity in *Botrytis cinerea* has decreased over the past year. Large proportion from GB carry the G143A mutation. This is similar to previous years.
- *Venturia inaequalis* was fully sensitivity to fluopyram in GB and Europe in 2019, samples were not taken from GB in 2020 but samples from Europe suggest there are no changes to sensitivity. Monitoring of fluopicolide performance of *Phytophthora infestans* in detached leaf assays showed full sensitivity in both 2019 and 2020.

#### PK, BASF presentation

- *Zymoseptoria tritici*
  - SDHI random monitoring (Epilagic)
- Majority of European isolates were wild type in 2016, however virtually no wild type detected already in 2019. Increasingly high frequency of less sensitive isolates in UK & IE but still mainly “moderate” mutations with few cases of H152R (4%).
  - DMI random monitoring (Epilagic)
- BASF DMI monitoring for sensitivity to Epoxiconazole was carried out from 2001 to 2019 but stopped from 2020 after the withdraw of EPX from the European market. Sensitivity monitoring to metconazole is still ongoing having started in 2004. Further shift in sensitivity (metconazole) in 2020 in UK.
- Sensitivity monitoring to mefentrifluconazole (Revysol) started in 2014 and is on-going. No shift in sensitivity since the start of monitoring
- *Blumeria graminis* f.sp. *tritici*
  - Metrafenone and SDHI monitoring (Epilagic)
- *In vivo* test with discriminatory dose, at which reference isolates are completely inhibited. No resistant isolates in 2020 season detected
  
- *Pyrenophora teres*
  - SDHI and F129L monitoring (BASF)
- Monitoring confirms that the majority of the UK net blotch population now has a high level of SDHI resistance. F129L Qol mutation dominates in Europe (G137R very rare and only found in IE). Levels of F129L very variable in UK may be influenced by small sample size and use of Qols
- *Ramularia collo-cygni*
  - SDHI and DMI random monitoring

- 14 mutations with effect on SDHIs were detected in field isolates, SDHI resistance in Ireland and UK with relatively lower frequency of adapted isolates in the samples than in 2019, but sample number of both years are limited. Field efficacy of DMIs variable depending on levels of sensitivity shift – Revysol performing well

AB, Adama, presentation

- Update on monitoring data from 2020 season (isopyrazam)
- *Zymoseptoria tritici*
  - Increase in mean EC50 for isopyrazam in UK and Netherlands (resistance factors of 8.8 and 11 respectively exhibiting slight to moderate adaption) compared to rest of countries (no samples from Ireland) which were sensitive (resistance factors < 3)
- *Pyrenophora teres*
  - Increase of resistant isolates in UK, Belgium, Poland and Czech compared to 2019
  - Stable situation in other countries compared to 2019 (Ireland not included in 2019)
  - UK, Ireland, Belgium and Czech => 100% isolates resistant in 2020
  - Resistance factors for isolates in UK & Ireland circa 180, relating to an advanced level of adaption

In terms of any further commentary around the net blotch data (recall Mike Thompson asked if this level of resistance would lead to field performance issues) then it's difficult to add anything. I asked my colleague in Europe who manages this data generation and the comment was that insensitivity to SDHIs continues to develop further with net blotch populations but one cannot draw conclusions on field performance from these data. So much as expected.

WSC showed some data from BF monitoring of SDHI *Z. tritici* and images from Sutton Scotney FP site flagging up the loss of SDHI eradicator action.

## 10. UPDATE FROM COMPANIES

Update on Inatreq given by Corteva in previous item.  
KM noted a new potato product.

**ACTION: KM** to provide information to future meeting.

## 11. FRAG-UK WEBSITE UPDATE

CL noted that Jason Pole is the contact point for implementing comms at AHDB.

## 12. LIASION WITH OTHER GROUPS

**ACTION: FB** to send FRAG Minutes to Anne-Sophie Walker (France) and Lise Jorgensen (NorBaRAG).

JOQ has been contacted by someone in the Netherlands interested to re-vitalising FRAG in the Netherlands.

**ACTION: JOQ** to forward contact to FB if this is OK with the contact.

Comment received from WRAG on the difficulty of getting EMUs through CRD.

AHDB and NFU plan to set up meeting to discuss with CRD

JOQ noted that CRD are very aware of situation and noted the complexity of the assessments required.

### 13. Future events and publicity

FB will include a piece on resistance stewardship in the Arable Scotland (virtual event) in 2021.

CL will update on Cereals 2021 event when plans are known.

### 14. AOB

LC concerned to see that growers had voted down the AHDB potato levy and the implications for fungicide resistance work.

WSC noted that hard copies of FRAG guides can be requested from AHDB.

JT noted that WRAG are developing common resistance management guidelines by MoA and class of target across crops and asked if FRAG might adopt a similar approach. This is a logical approach for weeds, which are rotational across crops, but not for most pathogens. FRAG will not be adopting that approach.

### 15. Date and Venue of next meeting

**ACTION: FB** to circulate a Doodle for dates in November. Decision on virtual or in-person meeting TBC closer to the date.