2015 FRAC Update

EPPO Resistance Panel

Rothamsted, 16-17 September 2015

Role and Purpose of FRAC

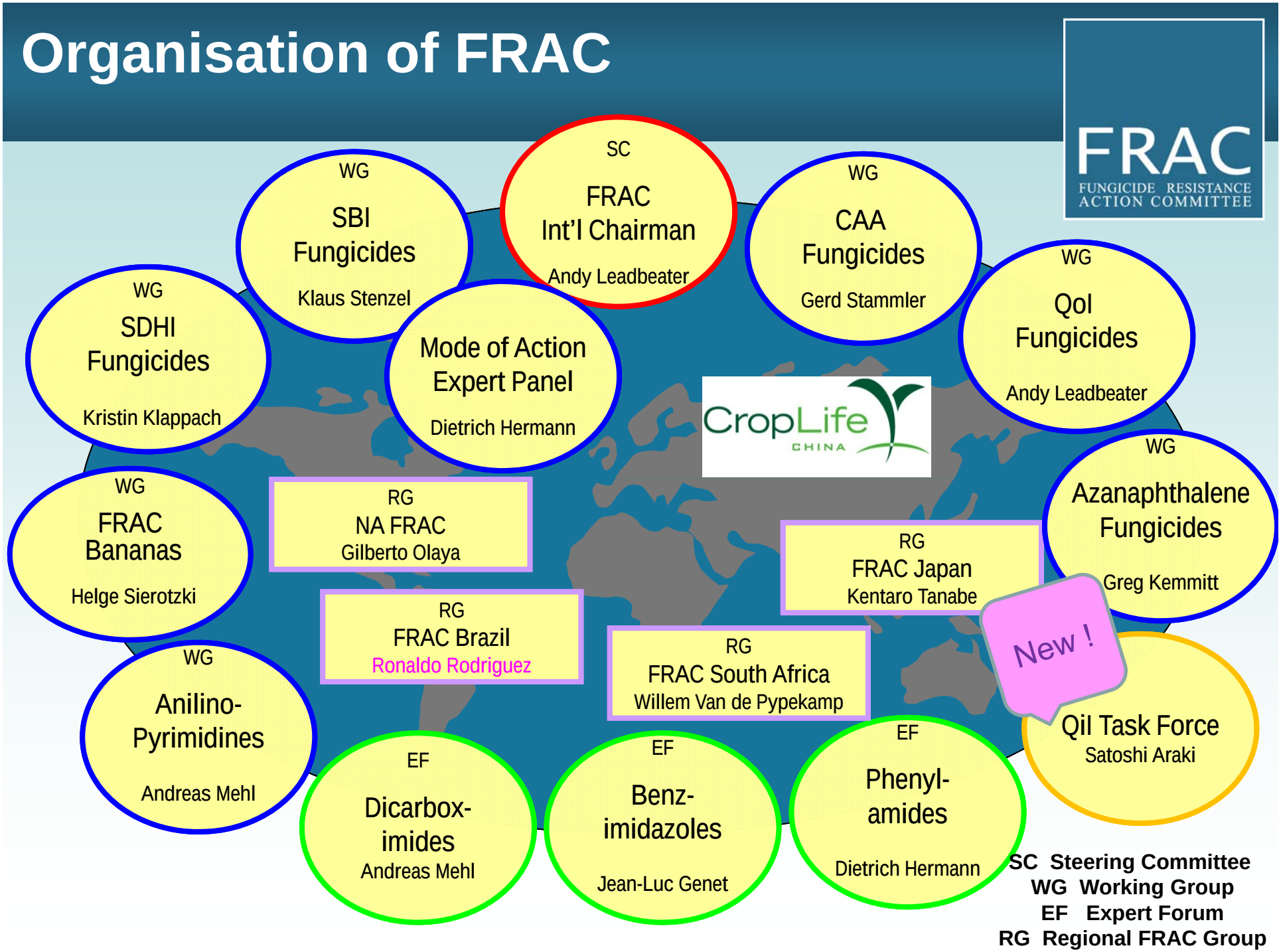
- The main goal of **FRAC** is to provide resistance management advice and guidelines and thereby sustain the effectiveness of “at risk” fungicides
- **FRAC** represents a centre of knowledge and expertise, and seeks via effective networking with independent bodies to actively promote effective resistance management.
- **FRAC** offers a wide range of services (publications, FRAC code lists, methods, training) to assist researchers, advisors and growers.
- Key route for communication is the FRAC website: www.frac.info

List of FRAC International member companies

- Adama
- BASF
- Bayer Crop Science
- Dow
- DuPont
- FMC/Cheminova
- Isagro
- Syngenta

Not all CLI companies participate to FRAC (e.g. Monsanto)
Several other companies are represented in regional groups

Organisation of FRAC

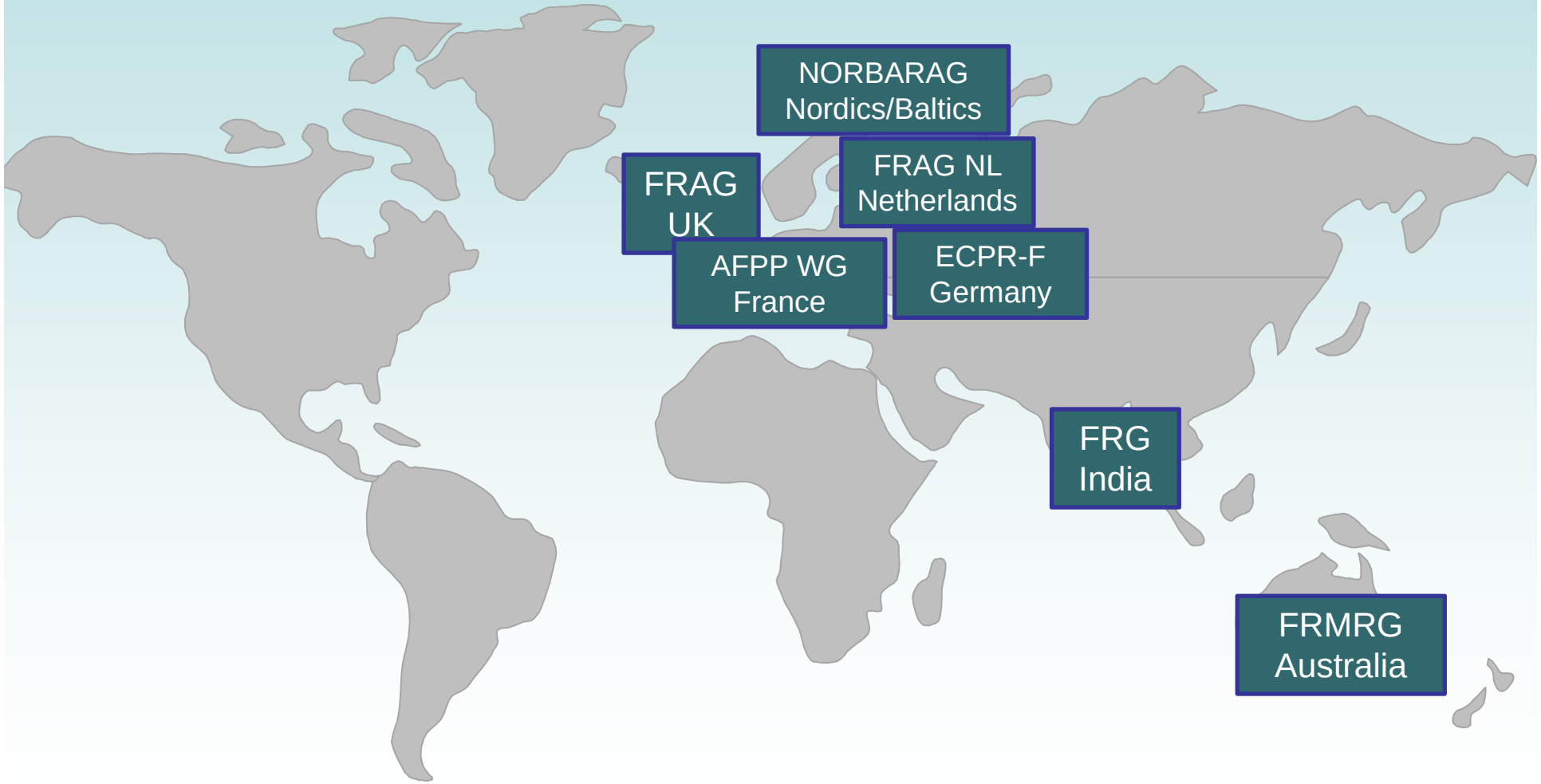


QiI Task Force

- Cyazofamid (ISK) and amisulbrom (Nissan)
- Draft guidelines established for Europe
- Sensitivity monitoring carried out on grape downy mildew and potato late blight
- First draft recommendations for these crops to be available soon on the FRAC web page
- Likely to soon become a formal Working Group

Outreach to other national groups

FRAC
FUNGICIDE RESISTANCE ACTION COMMITTEE



FRAC Steering Committee 2015

Mr. A. Leadbeater	Syngenta Crop Protection	Chairman FRAC, Chairman QoI Fungicides WG
Dr. K. Stenzel	Bayer CropScience	Vice Chairman, Chairman SBI Fungicides WG
Dr. D. McKenzie		Scientific Support Officer
Dr. L. Hoffmann	DuPont	Communication and Website Officer
Dr. G. Kemmitt	Dow Agrosciences	Chairman Azanaphthalene WG
Dr. A Mehl	Bayer CropScience	Chairman Anilinopyrimidines WG, Dicarboximide expert forum
Dr. G. Stammler	BASF	Chairman CAA Fungicides WG
Dr. K. Klappach	BASF	Chairwoman SDHI Fungicides WG
Dr. H Sierotzki	Syngenta Crop Protection	Chairman Banana WG
Mr. J.L. Genet	DuPont	Chairman Benzimidazoles Expert Forum
Dr. D. Hermann .	Syngenta Crop Protection	Chairman Mode of Action Expert Group, Phenylamides Expert Forum
Dr. K. Tanabe	Nippon Soda, Japan	Representative Japan, Chairman QiI Task Force
Dr. G. Olaya	Syngenta, USA	Representative North America
Dr. R. Rodriguez	BASF Brazil	Representative Brazil

FRAC Organisation Changes

- Duncan McKenzie elected as FRAC SC Scientific Support Officer
- Sumitomo was invited to join the QoI WG (mandestrobin)
- FMC and Isagro have joined the SDHI WG (IR9792, proposed common name = fluindapyr)
- ISK considering to join NAFRAC SDHI group (isofetamid)

FRAC
FUNGICIDE RESISTANCE ACTION COMMITTEE

Update from Working Groups 2015

SBI Working Group

- In general stable situation.
- In *Septoria* populations with highest EC50 values observed in areas of high disease pressure and pronounced use of azoles.
- The following changes were made to the recommendation for *use in cereals:*

  - When used in mixture recommended effective rates of the SBI **must** be maintained.

  - To ensure good performance in situations of high disease pressure it is **essential** to adhere to dosages and spray timings as recommended by manufacturers

  - Mixing with a non-cross resistant fungicide at effective dose rates may contribute to a **more effective disease control and resistance management**
- The situation in Phakopsora continues to be stable until 2010/11, but a variability in performance of DMI-mixtures has been observed .

QoI Working Group

- In general stable situation
- Asian Soybean Rust *(P. pachyrhizi):*

  - Isolates containing the F129L mutation were found for the first time in a number of samples. However sensitivity monitoring bioassays show that sensitivity has remained in the range of previous years.

  - Use recommendations strengthened.
- Sugarbeet Cercospora:

  - High levels of QoI resistance found in parts of Europe.

  - Recommendations adjusted.
- No other changes to use recommendations
- New case of QoI resistance reported in Japan: Elsinoe

CAA working Group

Grape downy mildew

Overall, no significant change in resistance situation; field performance of registered products was good. No change in recommendations.

Potato late blight

Fully sensitive. Recommendations unchanged.

Cucurbit downy mildew

CAA resistance was detected in US in 2013 and a first case of CAA resistance was observed in 2014 in Murcia (Spain). No changes to use recommendations

Anilinopyrimidines (AP) Working Group

Grapes *Botrytis*: Frequencies of resistant strains vary from low to moderate with high regional variability, particularly in France.

Strawberry *Botrytis*: Compared to 2013, the frequency of resistant isolates in the monitored populations remained stable.

***Botrytis* of vegetables:** Overall, data show a low frequency of resistant isolates in all studied crops with the exception of tomato.

Apple scab:Frequency of moderately adapted populations have increased gradually during the past years. However, these populations are controlled by recommended label rates

No change in use recommendations

SDHI Working Group

- **Septoria** – stable situation, no increase, new mutations (N86S, SDH subunit B: N225T)
- **Barley net blotch** – clear increase, group is concerned but no field efficacy impacts reported and no clear pattern of development, thus no change in guideline, low in UK, moderate in F, DE, BE; 5 mutations added
- **White mold, OSR** – single resistant isolates in FR, no resistant mutations detected in DE, PL, UK, CZ
- **Grey mold** – further increase of resistance reported in grapes in DE (FR stable)
- **Grey mold**, other crops – single cases of resistanct mutations reported
- **Apple scab** - no resistance found, single isolates from trial site in BG found with reduced sensitivity. No product performance affected
- **Cucurbit powder mildew** – resistance reports from ES, IT and China (FR, GR, DE, CH – no resistant mutations), monitoring ongoing
- **Alternaria solani** – Isolates with reduced sensitivity were detected in Europe in Netherlands and Belgium. Fully sensitive elsewhere.
- **Soybean rust** – monitoring data showed full sensitivity

SDHI Resistance Monitoring

sensitive
resistance detected
monitoring ongoing
no monitoring done

Crop	Crop group	Common name	Pathogen	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Asparagus	SPC		STEMBO												
Banana	SPC	Black sigatoka	MYCOFI												
Carrots	SPC	Carrot leaf spot	ALTEDA												
Cereals, wheat	Cereals	Eye spot	eye spot												
Cereals, barley	Cereals	Barley rust	PUCCHD												
Cereals, wheat	Cereals	Brown rust	PUCCRT												
Cereals, barley	Cereals	Net blotch	PYRNTE												
Cereals, barley	Cereals	Ramularia	RAMUCC												
Cereals, barley	Cereals	Scald	RHYNSE												
Cereals, wheat	Cereals	Septoria	SEPTTR												
Cereals, wheat	Cereals	Powdery mildew	ERYSGT												
Cereals, wheat	Cereals	Snow mold	MONGNI												
Cucurbits	SPC	Corynespora leaf blotch	CORYCA												
Cucurbits	SPC	Gummy stem blight	DIDYBR												
Cucurbits	SPC	Powdery mildew	P.xanthii, SPHRFU												
Grapes	Grapes	Grey mold	BOTRCI												
Grapes	Grapes	Powdery mildew	UNCINE												
OSR	OSR	Phoma	LEPTBI (B-type)												
OSR	OSR	Phoma	LEPTMA (A-type)												
OSR	OSR	White mold	SCLESC												
Ornamentals	SPC	Grey mold	BOTREL												
Pomefruit	Fruit	Powdery mildew	PODOLE												
Stonefruit	Fruit	Brown rot	MONISP												
Pomefruit	Fruit	Scab	VENTIN												
Potato	SPC	Early blight	ALTESP												
Potato, tomato	SPC	Brown leaf spot	ALTEAL												
Potato, tomato	SPC	Early blight	ALTESO												
Strawberry	SPC	Grey mold	BOTRCI												
Vegetables	SPC	Alternaria leaf spot	ALTESP												
Vegetables	SPC	Grey mold	BOTRCI												
Soybean	Soybean	Soybean rust	PHAKPA												

SDHI Guideline - Soybeans

- Apply SDHI fungicides **always in mixtures**
- The mixture partner:
  - should provide satisfactory disease control when used alone on the target disease
  - must have a different mode of action
- Apply a **maximum of 2 SDHI fungicide containing sprays** per soybean crop.
- Apply the SDHI fungicide preventively or as early as possible in the disease cycle. Do not rely only on the curative potential of SDHI fungicides. Strongly reduced rate programs including multiple applications must not be used. Refer to manufacturers' recommendations for rates.
- Good agricultural practices must be considered to reduce disease pressure and resistance risk, e.g. avoiding **multiple cropping**.

AZN Working Group

- Wheat powdery mildew
  - No major change in sensitivity recorded. Highest level of resistance in north Germany and parts of the UK.
  - Field performance remains good
  - No changes to current resistance risk management recommendations

- Grape powdery mildew
  - No significant change of overall EU wide sensitivity of *E. necator* populations Resistant isolates continue to be reported in several countries
  - Performance remains good when used in rotational spray programs
  - No changes to current resistance risk management recommendations

- Cucurbit powdery mildew
  - No monitoring was conducted in 2014.
  - Field performance remains as expected when the product is used according to label recommendations

QiI Draft Recommendations

FRAC
FUNGICIDE RESISTANCE ACTION COMMITTEE

Plasmopara viticola – Grape downy mildew

- Apply QiI fungicides preferably in a preventive manner
- Apply a maximum of 50 % of the total number of intended applications for disease control not exceeding a total of 4 QiI fungicides sprays during one crop cycle
- Apply QiI fungicide based products according to manufacturers' instructions

Phytophthora infestans – Late blight of potatoes

- Apply QiI fungicides preferably in a preventive manner
- Apply a maximum of 50 % of the total number of intended applications for late blight control
- Alternation with fungicides having other modes of action is recommended in spray programs
- Apply QiI fungicide based products according to manufacturers' instructions

New Groups

- DuPont and Syngenta are working on resistance management recommendations for **oxathiapiprolin** which are expected to be ready in December 2015.

FRAC Classification Update

- Inclusion of Tolprocarb (melanine biosynthesis, I3, code 16.3),
- Inclusion of Dimethachlone (signal transduction, E3, code 2)
- Inclusion of Picarbutrazox (unknown MoA, U17)
- Validamycin re-classification in discussion (currently H3: trehalase and inositol-biosynthesis)
- Phenamacryl (JS399-14, Iangsu, China), Pyraziflumid (NF 0721, Nihon Nohyaku) are being discussed among MoA experts

Aspergillus Resistance to DMIs

- Rothamsted Research Programme
  - –Title: “Understanding the sources and spread of azole resistance in environmental Aspergillus fumigatus populations”
  - – Principal Investigator: Bart Fraaije;
  - – 4 years = Dec 01, 2014 - Nov 31, 2018
  - – Scientific Advisory Board (SAB) to manage the project. Head: Prof. John Lucas
- Objectives
  - – Identify high risk areas for azole resistance development in the environment
  - – Define risk factors and build a basis for developing precautionary measures
- Linkage to Dutch project sponsored by Dutch government