Role of UK-IRAG and BCPC Pests and Beneficials Working Group in Resistance Management and IPM

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Industry Resistance Action Committees (RACs)

FUNGICIDE RESISTANCE FRAC ACTION COMMITTEE

HRAC

IRAC INSECTICIDE RESISTANCE ACTION COMMITTEE

- Active/Products
- MOA Classification
- Methods
- Working Groups
- Guidance
- Education

UK Resistance Action Groups (RAGs)

1989

1995

1997

- Wider membership
- National considerations of specific targets
- Produce guidance and assist in regulation
- Establish links with other RAG's and RAC
- National RAGs formed in some other MS

UK-RAG Resistance Management Guidance

- Historical site:

http://webarchive.nationalarchives.gov.uk/20151023165207/http://www.pesticides.gov.uk/guidance/industries/pesticides/advisory-groups/Resistance-Action-Groups

- Current site:

https://cereals.ahdb.org.uk/crop-management/stewardship/resistance-action-groups.aspx

UK-IRAG MEMBERSHIP

- Agrochemical Companies
- IRAC
- Grower Commodity Boards
- Independent Research Organisations
- Agronomists/Consultants
- Regulator (CRD)

UK-IRAG AIMS

- To provide information on resistance avoidance and management strategies for use by UK farmers and growers, advisers and CRD
- Establish forum for exchange and interpretation of information on insecticide resistance
- Produce guidance and agreed media statements
- Identify knowledge gaps, research needs
- Establish links for information exchange with other MS RAG and IRAC

UK-IRAG NEWS ALERTS

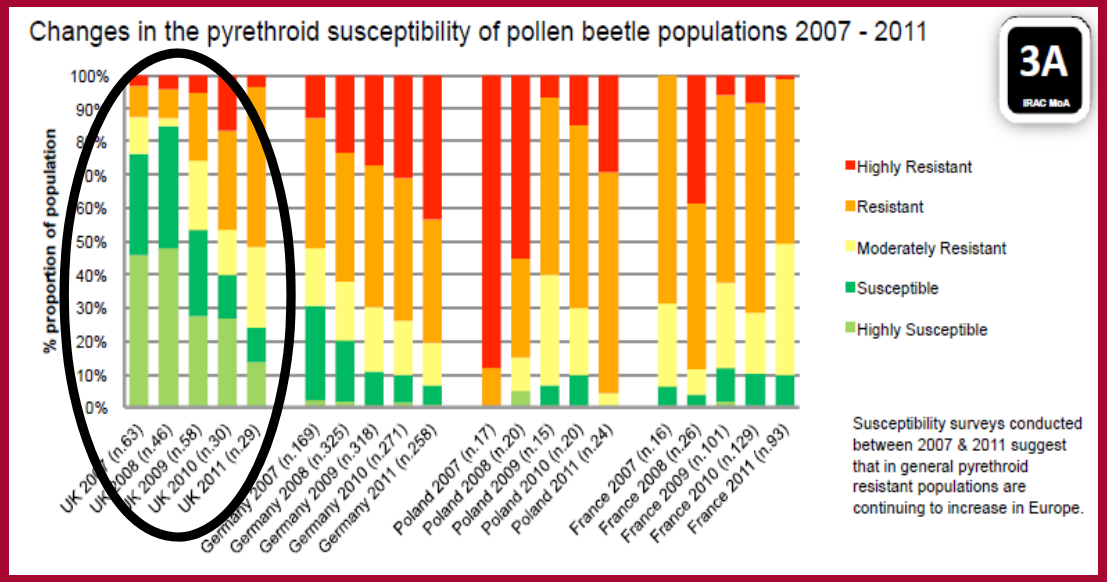
- MACE resistance to pirimicarb by peach potato aphid (*Myzus persicae*) (MYZUPE)
- Pyrethroid Resistance:
  - grain aphid (*Sitobion avenae*) (MACSAV)
  - Pea and Bean Weevil (*Sitona lineatus*) (SITNLI)
  - Onion thrips (*Thrips tabaci*) (THRITB)
- Imidacloprid in Glasshouse whitefly (*Trialeurodes vaporariorum*) (TRIAVA)
- Neonicotinoid resistance in *Myzus persicae* (Peach potato aphid) first reported in S. Europe

UK-IRAG GUIDANCE

- ‘Controlling aphids in brassica crops and managing insecticide resistance in the peach potato aphid, *Myzus persicae*’
- Guidelines for preventing and managing insecticide resistance in aphids on potatoes
- Pollen beetle pyrethroid resistance

Pollen Beetle Pyrethroid Resistance

- IRAC Monitoring



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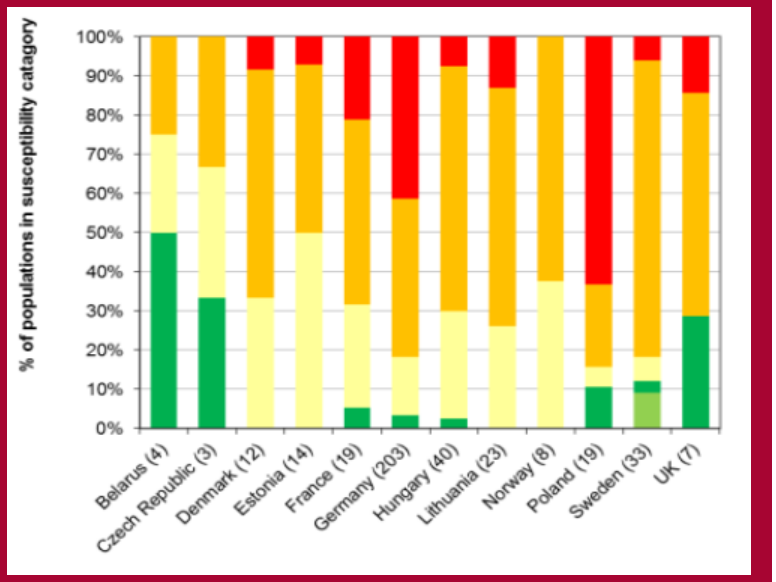

2016

- IRAG-UK: Co-ordination, communication, guidance

Monitoring and control of pollen beetle in oilseed rape

Biology

In recent years, pollen beetles have rarely been abundant enough to warrant treatment: careful monitoring can prevent unnecessary 'insurance' sprays and preserve the efficacy of pyrethroid products.

Pollen beetles migrate to winter oilseed rape crops from mid-March and throughout April. If flowers are not open, beetles bite into and kill buds. Damage to buds declines as the flowers begin to open and pollen becomes more easily obtainable.

Beetles lay their eggs in closed buds. On hatching, larvae feed within the buds and in flowers throughout May before dropping to the soil to pupate. A new generation of adults emerges in June-July and feed on pollen from a wide range of flowers, including spring oilseed rape. Adults then hibernate over winter in leaf litter, mainly in deciduous woodland.

Risk assessment

The damage-susceptible stage of the crop is green-yellow bud. Once the crop starts flowering, the beetles move to the open flowers, becoming pollinators rather than pests.

Crops are usually most at risk when the weather is dry and warm (above 15ºC). Using baited monitoring traps (Oecos), as well as online pollen beetle migration forecasts, to detect local movement can allow efforts to be focused to when and where they are most needed. A pollen beetle migration forecast based on local weather data is freely available online (**www.hgca.com/pests**). This prediction tool provides a series of three maps, informing on a local scale: (1) whether or not migration is likely to have started, (2) the risk of migration in the next three days and (3) the predicted completion of migration. Use of maps 2 and 3 in particular can help to reduce unnecessary 'insurance' sprays.

Control thresholds

The revised threshold for winter and spring oilseed rape is based on the maximum number of buds each beetle can destroy and the number of excess flowers produced by different crops. The plant population makes a large difference to the pollen beetle threshold, as plants in low plant population crops produce more branches and, therefore, more flowers.

Always consider your local conditions and consult a professional agronomist if necessary.

Revised control thresholds for winter and spring oilseed rape

If there are less than 30 plants/m²	the threshold is 25 pollen beetles per plant
If there are 30–50 plants/m²	the threshold is 18 pollen beetles per plant
If there are 50–70 plants/m²	the threshold is 11 pollen beetles per plant
If there are more than 70 plants/m²	the threshold is 7 pollen beetles per plant

Estimating plants/m²

Plants/m² can be estimated by counting the number of plants within a square foot and multiplying by 11. Ideally this should be done at several positions within a field. It is easiest to count plants at the 5 to 6 leaf stage after the risk of slugs reducing the population has passed. However, if there is winter plant kill, a spring plant count should be done at the same time as the pollen beetle assessment.

Monitoring pollen beetle numbers

Monitor the number of pollen beetles per plant periodically throughout the damage-susceptible stage of the crop (**green-yellow bud**). Sample at least ten plants along a transect of a 30m minimum from the middle of the headland towards the centre of the crop and calculate the mean number of beetles per plant, spraying only when that number exceeds the control threshold. When counting the number of beetles per plant it is important to recognise that plants in higher population crops may only have one budding shoot, whereas plants in lower population crops are likely to have branched out and produced several more.

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Insecticide resistance

Pollen beetle resistance to pyrethroid insecticides is now widespread throughout the UK. A strategy for contending with pyrethroid resistance needs to cover all spring and early summer insecticide applications, regardless of their intended target.

Agronomic advice from IRAG

The UK Insecticide Resistance Action Group (IRAG-UK) has developed advice based on reducing use of pyrethroids and on exploiting other insecticide groups, which should be used cautiously to preserve their effectiveness.

Monitor crops
- **ONLY** spray if current thresholds are reached
- **Do NOT apply insecticides purely for insurance purposes**
- **Do NOT spray after flowering starts:** the pollen beetles migrate to open flowers, away from the buds, and become pollinators rather than pests

Inspect crops
- Inspect the midfield and headland
- In recent years, pollen beetles have rarely been abundant enough to warrant treatment

If treatment is necessary
- Consider neonicotinoids, indoxacarb or pymetrozine as alternatives to pyrethroids
- **Do NOT** use more than one neonicotinoid spray
- **Do NOT** use more than one indoxacarb spray
- **Do NOT** use more than one pymetrozine spray
- Use a non-pyrethroid if above threshold numbers of beetles survive a pyrethroid treatment and there is time before flowering
- Seed weevil and summer aphids rarely need treatment
- For aphids, use a suitable aphicide (depending on the presence of other pests); consult an agronomist

Chemical group	Active substance	Example products
Pyrethroid	Alpha-cypermethrin	Alert, Contest
	Cypermethrin	Parmasect C, Sherpa 100EC, Toppel 100EC
	Deltamethrin	Decis, Delta-M 2.5EC, Ladgold Deltaland
	Lambda-cyhalothrin	Hallmark with Zeon Technology, Clayton Spark
	Tau-fluvalinate	Klartan, Mavrik
	Zeta-cypermethrin	Fury 10EW, Angri, Symphony
Indoxacarb	Indoxacarb	Rumo
Pymetrozine	Pymetrozine	Plenum
Neonicotinoid	Thiacloprid	Biscaya, Standon Zero Tolerance
	Acetamiprid	InSyst

Natural predators

Pollen beetle larvae are attacked by parasitic wasps. 25-50% of larvae are killed by these on unsprayed crops. Where insecticides are used extensively, levels of parasitism can be considerably lower.

The parasitic wasps may not be affected by insecticides applied against pollen beetle at green bud, as they arrive in crops during flowering.

Trap cropping with turnip rape can attract more parasitoids into the crop and can often reduce populations of pollen beetles to below spray threshold levels.

Further information

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IRAC website www.IRAC-online.org/teams/crop-protection/coleoptera

PR495 – Re-evaluating thresholds for pollen beetle in oilseed rape

PR504 – Development of an integrated pest management strategy for control of pollen beetles in winter oilseed rape

www.hgca.com/publications

Monitoring and control of pollen beetle in oilseed rape
Information Sheets are free to levy payers.
To join the mailing list contact subscriptions@hgca.ahdb.org.uk

UK Insecticide Resistance: Green peach potato aphid (*Myzus persicae*)

- Wide host range in arable/horticultural crops: e.g. potato, sugar beet, OSR, Brassicas

- Developed resistance to most insecticide groups with both metabolic and target site mechanisms

- Approach was via label warnings (reactive)

UK Insecticide Resistance: Green peach potato aphid (*Myzus persicae*)

- UK neonicotinoid proposed uses
  - Replacing OP and other older chemistry
  - Lack/limited alternative MOA
  - Existing resistance
- Seed treatments were approved first
- Commercial interest to expand crop range (and other pests) with foliar products
- Any developed resistance to neonicotinoids would have significant impact cross-sector

UK Neonicotinoid Statutory Restrictions on *Myzus persicae*

- PROACTIVE resistance management underpinned by research, discussed and agreed by UK-IRAG
- Limit on number of applications of any neonicotinoid containing product on a crop, accounting length of growing season and overall treatment regime

- Most crops: 2 foliar applications or 1 soil/seed treatment + 1 foliar. (Short or long season crops differ).
- Potatoes: 1 application on ware, 2 on seed potatoes
- OSR: 1 autumn application (seed or foliar) for aphid control + 1 spring application (pollen beetle)

British Crop Production Council (BCPC) Pests and Beneficials Working Group (2015)

- Forum to discuss relevant research, new legislation and impact on IPM
- Annual reviews to researchers, growers and industry
- Further details of annual reviews:

https://www.bcpc.org/expert-groups/pests-beneficials

BCPC Pests and Beneficials
Can we continue to grow oilseed rape in the UK? (I)

- OSR most important and widely grown break crop
- Area grown decreased (market prices) and in cabbage stem flea beetle high risk areas
- Oats, beans, spring cereals, linseed, peas and maize alternatives. But smaller markets and would be overwhelmed by even small OSR changes
- Knowledge gaps in natural pollinator diversity and lack of monitoring scheme/establishing baselines.
- Farmers implemented measures to promote pollinator populations

BCPC Pests and Beneficials
Can we continue to grow oilseed rape in the UK? (II)

- CSFB damage both direct losses, but patchy establishment causing weed control problems
- Early drilling to avoid adult activity (weather dependent. If before clean up of previous crop then create ‘green bridges’ for pest/disease
- No seed treatment and lack of foliar insecticide options increasing problem
- IPM solutions developing but need for further research

BCPC Pests and Beneficials Second Review- Pyrethroid use and future IPM (I)

- *Achieving sustainable pest control – learning from pyrethroid story and implications for IPM future*
- Historical use of insecticides in the UK
- Focus on pyrethroid in late 80's, usage increased substantially. Often for autumn BYDV and driven by low cost (insurance sprays)
- History of *Myzus persicae* resistance and other pest pyrethroid resistance

BCPC Pests and Beneficials Second Review- Pyrethroid use and future IPM (II)

- Monitoring - adopted but time consuming
- Thresholds - growers conservative; need updating
- IPM Challenges in horticulture
  - Demanding quality standards
  - Uniform produce requirements
  - Rotation, breeding, physical barriers
- Biopesticides
  - No residues, short re-entry, short PHI
  - Optimising effectiveness challenging

Summary

- Limited chemistry
- Increasing resistance problems
- Need to encourage wider adoption IPM
- Identify knowledge gaps
- Share experience across stakeholders
- Communication and advice to growers
- Value of National RAG - how to encourage more?