

**Ad hoc EPPO Workshop on insecticide resistance of
Meligethes spp. (pollen beetle) on oilseed rape
BBA, Berlin-Dahlem, 2007-09-03/05**

CONCLUSIONS and RECOMMENDATIONS

Extent and seriousness of the problem

- Delegates considered pollen beetle to be a serious European problem
- Major impacts on yield: e.g. $\frac{2}{3}$ of the oilseed rape area Europe is affected. In Germany 200 000 ha were damaged or partly damaged in 2006; 30 000 ha, with an estimated value of 22-25 million EUR, were destroyed
- This is alarming for the future: the problem will increase as the area of oilseed rape increases and also if the number of spray solutions decreases
- Pollen beetle resistance is a reality, and will affect future oilseed rape production
- Resistance is resulting in increasing pesticide usage
- Potential impacts of pollen beetle on other crops have been noted.

Causes

- There has been extensive and almost exclusive use of pyrethroids for more than 20 years
- Resistance to pyrethroids is caused by long-term selective pressure by (often prophylactic) high frequency, low priced pyrethroid applications
- Overlapping exposure periods for different pest insects in oil seed rape can result often in several selections for resistance per year
- There is currently a lack of active substances with a different modes of action and/or knowledge about suitable alternative control measures
- The loss of organophosphates is a key contributing factor to current pollen beetle resistance problem
- Presently, there is no long-term, European, reasonable, multifaceted pollen beetle resistance management strategy
- There is little public information about the problem and best options for its management
- Failure to learn from previous, similar problems in managing high resistance risk targets.

Biology, monitoring and treatment thresholds

In order to address the issues described above, it was agreed that further information and actions are required in the following areas:

Biology

- More detailed studies on pollen beetle biology and behaviour
- Information on over-wintering mortality
- Characterization of the most important mortality factors and most susceptible life stages
- Characterization of the fitness costs associated with pyrethroid resistance.

Thresholds

- Clear and scientifically robust methods of monitoring populations are needed
- A review of existing pollen beetle thresholds and research to establish economic thresholds which will be of practical value
- The influence of soil, variety, BBCH growth stage and climatic conditions (e.g. soil water, temperature) on the compensatory ability of the crop needs to be established
- Farmers and advisers require training in the use and application of thresholds (pictures, numbers, data collection, timing etc.) with respect to the application of control methods.

Resistance Monitoring

- More monitoring, harmonization and cooperation between countries is required
- Other oilseed rape pests should be included in resistance monitoring projects
- Harmonized methods for resistance monitoring should be employed (e.g. IRAC methods) to ensure results can be compared between surveys.

Control options against pollen beetle

Chemical control

- Use should only occur in response to validated thresholds
- All available insecticide modes of action should be employed as part of rotation and IPM strategies
- Rotation of insecticide modes of action is essential
- Absolute minimum of two modes of action to which pollen beetle is not resistant should be made available to growers
- Chemical control strategies need to be applied that address a full range of key pests
- The use of insecticides against each target pest should be optimized
- The most efficacious products for each individual pest should be utilized according to local advice
- Appropriate, justified doses should be recommended on labels (and applied) for each active substance
- Insecticides should be used at recommended label rates; doses should not be reduced
- Insecticide applications should aim to have minimal impact on beneficial organisms
- Products with low bee toxicity should be employed
- New active substances with new modes of action are needed urgently.

Non-chemical control measures

- Cultural and biological control methods should be utilized alongside insecticides in IPM
- The potential of trap crops and biological control needs to be more fully explored and exploited
- New suitable cultivars need to be sought for trap cropping
- Long-term planning/research is required into the suitability of non-chemical measures and their integration into control strategies for pollen beetle.

Managing resistance

The following recommendations were made with respect to resistance management:

Insecticide use

- Use population assessment thresholds where appropriate
- Employ resistance monitoring
- Use products with the highest efficacy within a mode of action class
- Rotate active substances with different modes of action
 - Rotate the modes of action and not the chemistry
 - Use 3 - 4 modes of action
 - Consider making modes of action rotation mandatory
 - Evaluate spatial rotation of cropping
- Reduce number of applications (do not employ prophylactic sprays)

Pyrethroids

- Reduce the use of pyrethroids against pollen beetle when possible
- Do not create sub-classes of pyrethroids.

Organophosphates and neonicotinoids

- These compounds play a very important role in management strategies.

Insecticide Resistance Management (IRM) recommendations

- Clear, simple, coherent, proactive IRM strategies should be given to growers
- Ensure the modes of action is clearly stated on the label.

Alternatives to insecticides

- Promote the use of biological control
- Use agronomic (e.g. cultural) control.

Research requirements

- IPM: the effects of agricultural practice and beneficials, trap crops, side effects of plant protection products and biological control methods
- Basic biology (spp. determination, life tables of relevant spp., winter mortality)
- Resistance research (biological mechanisms, knock-down resistance (*kdr*) monitoring, laboratory bioassays and laboratory–field validation, effects of strategies on resistance development in the field)
- Practical thresholds (taking account of e.g. BBCH growth stage, varieties, compensatory ability, economic effects) including practical population assessment methods. Consider modelling to deliver a usable scheme
- New insecticides are needed (selective action, no cross-resistance)
- Effective communication of resistance strategies to growers.

Key take-home messages/actions:

To companies and IRAC (Insecticide Resistance Action Committee):

- Develop new modes of action to facilitate alternation possibilities
- Do not consider a good active substance to be the only solution; use it alongside others
- Encourage open dialogue on resistance issues.

To regulators:

- Speed up the regulation of new actives
- Consider mode of action labelling
- Discuss and consider mandatory resistance management (see EPPO Standard PP 1/213).

To IRAGs (Insecticide Resistance Action Groups) and IRAC:

- The mode of action of all pyrethroids is the same
- Use rotations comprising alternative modes of action
- Develop effective resistance management strategies
- Educate distributors about effective resistance management strategies
- Convince advisors to implement strategies country-wide.

To rape growers, advisors and distributors:

- Resistance is a problem that can be managed by using alternatives
- Apply good strategies before resistance is observed
- Implement and follow the strategies provided
- Alternate between modes of action
- Apply plant protection products only where needed and use treatment thresholds (do not compromise bee safety)
- Resistance will become more severe if a more rational approach is not adopted.
Act immediately.

To researchers:

- Investigate the ecology of beetle with an aim of reducing reliance on chemicals
- There is a strong requirement for standardization of bioassays to analyse the response of pollen beetle
- A common approach to research on the open issues is needed
- Explore nature of pyrethroid resistance
- Explore alternative control strategies.

To the European Commission and national politicians:

- We must maintain a diversity of modes of action. The German 2006 pollen beetle problem is a warning shot resulting from the loss of, and reliance on, too few active substances
- Practical IPM is still disappointingly not a commercial reality
- More research on IPM strategies is required
- EU FP7 should allocate funding for a call that features pollen beetle research and insecticide issues
- Develop and harmonize an appropriate regulatory approach for biological control agents.

To non-specified and EPPO:

- Sustainable insecticide use is needed
- Inform all interested parties of appropriate information from workshop
- Consider a follow-up of this workshop.