Insecticide resistance monitoring: how to maximize the benefit whilst reducing workload ?

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Does the current requirement for providing susceptibility data as part of the (re)registration dossier achieve its desired goals ?

- Baseline Susceptibility
  - Provide an initial measure of variability in sensitivity of insect populations to an insecticide active ingredient
  - Provides contributory data to evaluation of resistance risk.
  - A reference for comparison should resistance be suspected in the future.

- Resistance Monitoring.
  - To measure changing variations in insecticide susceptibility over a period of time at a single location.
  - Provide information of the distribution and frequency of resistance in different geographic regions.
  - Contributing data to modify product use patterns and therefore reducing resistance risk.

- Can achieve these objectives, but quality and quantity of data is essential.
  - Heavily reliant on a consistency in insect sampling, bioassay methodology and data interpretation.

- Significant investment is required.
- It is easy to expend significant resource but not achieve objectives.

The current system for assessing insecticide susceptibility through insecticide monitoring presents a challenge to both registrants & assessors.

Registrants

- Open interpretation of which species, number of samples and frequency of monitoring.
- Variable requirements across different zones and assessors.
- Unclear if all registrants are being asked to provide equivalent data.
- Consequences of NOT providing resistance data are unknown or inconsistent.
- Difficult to collect & rear samples for many species .
- High costs of studies.
- IRM recommendations require coordinated effort across industry, not just for single products.
- Level of data protection is unclear.

Registrants are unclear how and where to invest in monitoring when the requirements and benefits are unclear or inconsistent.

Assessor

- Variable quality and quantity of data from different registrants.
- Potentially multiple sources of data for same insecticide or mode of action, but uncoordinated.
- Use of different bioassay methods = results not comparable.
- Inconsistent assessments of resistance risk.
- Different registrant recommendations for resistance management for same insecticide or same MoA.
- No clear overview of resistance situation for individual pests.

Limiting view on actual status of resistance or resistance risk.

Insecticide Resistance Risk: Proposal

- Could monitoring requirements be reduced in breadth but increased in quality to meet objectives ?
  - Reduce costs and allow structured planning for registrants.
  - Provide clearer view on resistance risk and status of key pests for industry.

- Would focusing on those species with high resistance risks achieve the objectives of monitoring better ?

  - 1-6 key species identified per regional zone (Maritime, Mediterranean, North-East & South-East)
  - Species selected based on EPPO recommendations in PP 1/213 (4)
  - Agree on minimal number of samples per insecticide **mode of action** and the sampling countries identified (3 per zone)
  - Compulsory use of agreed methodologies for each species.
  - Each species susceptibility measured at two year intervals
    - Allows for resource spacing & does not significantly reduce impact of monitoring.
  - List of species can be reviewed at regular intervals (EPPO & IRAC ?) with species interchanged if needed.
  - Data for non-listed species may be requested by regulators but would not be compulsory as part of (re)registration.

- There must be **clearly defined consequences** for registrants who do not provide the minimal dataset.

What it could look like ?

Maritime UK, DE, FR		Mediterranean ES, FR, IT		North-East PL, LT, RU		South-East TU, UK, RO	
Year 1	Year 2	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Myzus persicae	*Lepinotarsa decemlineata*	*Aphis gossypii*	*Frankliniella occidentalis*	*Leptinotarsa decemlineata*	*Meligethes aeneus*	*Aphis gossypii*	*Bemisia tabaci*
Cydia pomonella	*Meligethes aeneus*	*Bemisia tabaci*	*Tetranychus urticae*	*Myzus persicae*	*Tetranychus urticae*	*Frankliniella occidentalis*	*Tetranychus urticae*
Panonychus ulmi	*Trialeurodes vaporariorum*	*Myzus persicae*	*Spodoptera exigua*			*Myzus persicae*	*Spodoptera exigua*

- Group 1: Pirimicarb
- Group 2: Cypermethrin
- Group 4: Imidacloprid
- Group 9: Pymetrozine
- Group 23: Spirotetramat
- Group 29: Flonicamid

II Invertebrates

Aphis gossypii (APHIGO)
Bemisia spp. (BEMISP)
Cydia pomonella (CARPPO)
Frankliniella occidentalis (FRANOC)
Leptinotarsa decemlineata (LPTNDE)
Meligethes aeneus (MELIAE)
Myzus persicae (MYZUPE)
Panonychus ulmi (METTUL)
Phorodon humuli (PHODHU)
Spodoptera exigua (LAPHEG)
Tetranychus urticae (TETRUR)
Trialeurodes vaporariorum (TRIAVA)

EPPO example list: PP 1/213 (4)

- 10 samples per country (30 samples per zone),
- Data generated for insecticide or representative AI from mode of action group.
- Using agreed methodologies approved by EPPO-IRAC
- Benefits
  - Reduces workload for companies to maximum of 12 studies per year spread over 4 zones.
  - Increases options for collaborative efforts from registrants.
  - Potential for outsourcing to 3rd party research institutes & supporting resistance research in Europe.
  - Ensures European wide monitoring of all modes of action top 11 high risk insects/countries every two years.

Conclusions

- Proposal provides clear view of the susceptibility status of the highest resistance risk species for each insecticide mode of action in all four registration zones.

- Approach would encourage cross-industry collaboration, reducing costs and reducing uncertainty. There would however still be an option for each company to generate their own data.