Resistance to pyrethroid insecticides in Coleoptera pest populations of winter oilseed rape (WOSR), in France.

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Introduction

- Winter oilseed rape (*Brassica napus*) is visited by numerous insect pests. In France, the major pests belong to the Coleoptera family.
- For many years, resistance to pyrethroids has been monitored by Terres Inovia and its partners:
  - to evaluate the global resistance level of each species;
  - to detect the involved mechanisms.

Terres Inovia provides management advices that are adapted to the local context

Methods used in Terres Inovia Laboratory

GLOBAL LEVEL OF RESISTANCE

Bioassays with insecticide (24h exposure to λ-cyhalothrin)

- Presence of resistance
- Global level of resistance

INVOLVED MECHANISMS

Molecular analysis

- Detection of mutations conferring resistance

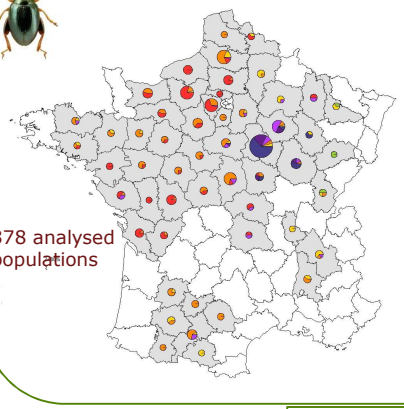
Bioassays with insecticide +/- inhibitors (PBO, DEM, DEF)

- Detection of resistance by detoxification

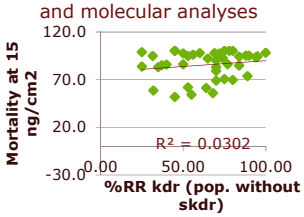
All analyses were carried out by Terres Inovia's Genetics and crop protection laboratory. For any information, contact us : laboGPC@terresinovia.fr

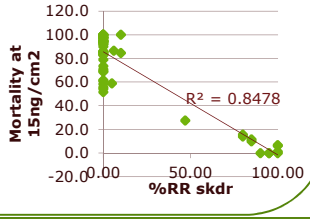
Results (2015-2019)

Psylliodes chrysocephala

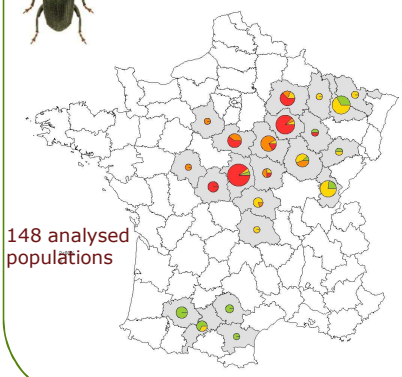


Correlations between bioassays and molecular analyses





Ceutorhynchus picitarsis



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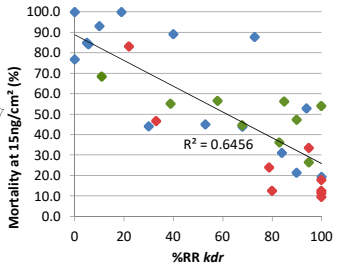

- Pop. in which mortality increase is higher than 50% when inhibitors are added
- Pop. in which mortality increase is lower than 50% when inhibitors are added
- No available information regarding detoxification

Detection of pyrethroids target gene mutations

- No KDR and no SKDR
- No SKDR and RR_KDR<30%
- No SKDR and 30%<=RR_KDR<80%
- No SKDR and 80%<=RR_KDR
- RR_SKDR<30%
- 30%<=RR_SKDR<80%
- 80%<=RR_SKDR

Ceutorhynchus napi

Ceutorhynchus pallidactylus

Ceuthorhynchus obstrictus

Main conclusions

- **Cabbage stem flea beetle :** knock down resistance (kdr) and super-knock down resistance (skdr) mutations were detected**.** There is a good correlation between mortality rate in laboratory and the proportion of individuals with skdr mutation. Our last results reveal that skdr mutation is more and more present in France, in other regions than in the historic area.
- **Rape winter stem weevil**: kdr mutation was found in some populations. There is a good correlation between mortality rate in laboratory and the proportion of individuals with kdr mutations. Resistance by detoxification is also highly suspected.
- Kdr mutations were found in some populations of **rape / cabbage stem weevil and in cabbage seed weevil** populations. Skdr was detected in one population of cabbage seed weevil populations.

Insecticides showed their limits. The only way to reduce pest harmfulness is to combine all the possible preventive measures we can find and to use chemicals as the last resort.

Acknowledgments:

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