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# Effect of host plant species and insecticides on the evolution of genetic diversity of a crop pest

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# CONTEXT

Pesticides applications can be a strong driver of the evolution and genetic differentiation of pest populations. Pesticides use varies between crops and over time according to marketing authorization. A better understanding of the evolution and spread of pesticide resistance alleles in populations is a major challenge for pest management.

# **BIOLOGICAL MODEL**

- *Myzus persicae* (Sulzer 1776)
- Generalist (>50 crop species)
- Multi-resistant to most insecticides
- Holocyclic and anholocyclic populations
- Sexual phase on peach trees (primary host) and asexual phase on many plants (secondary hosts)



# MATERIAL AND METHODS

-Two sets of samples :

- From various host plants → identified crop species peach / oilseed rape / tobacco (+14 other)
- From aerial trap  $\rightarrow$  temporal sampling 2001-2007
- 14 microsatellite markers
- 4 target site resistance loci
- 1299 successfully genotyped individuals

## RESULTS



0 150 300 km

-four well defined neutral genetic clusters
-1 cluster associated with the primary host
-2 clusters associated with secondary hosts
-1 highly divergent cluster (likely *Myzus certus*, a closely related species)
-strong association between resistance
genotype and genetic cluster



#### **Temporal clonal dynamics**



Temporal variation of multilocus genotypes (MLG) in the aerial trap

Genetic cluster membership of MLG is indicated by the same colors as in the 4-K STRUCTURE analysis. Solid colors: repeated MLG. Shaded colors: unique MLG. MLG belonging to the resistotype RG2 (carrying both a pyrethroid and pirimicarb resistance alleles) are indicated by a red star. Vertical dashed light blue line: first record of recurrent control failures with carbamate in oilseed rape in France

## CONCLUSIONS

- genetic differentiation strongly associated with host plant/reproductive mode and resistotypes
- a small number of generalist clones carrying resistance alleles and persisting over time
- an evolutionary dynamic driven both by biological capacities and human activities
- better understanding of the evolution of

-some persistent MLG

-rapid turn-over of MLG

-higher genotypic and genic diversity in the red and blue clusters -emergence of a multi-resistant clone linked to control failure pesticide resistance in agricultural landscape necessary for a better control of pests

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