

## Introduction



**Conservation biological control of crop pests is a promising strategy in protected horticultural cropping systems.** In Mediterranean regions, crop colonization by native predatory mirid bugs (Heteroptera, Miridae) is frequent but highly heterogeneous among production sites.

We tested whether **the variability in crop colonization levels by mirids is related to landscape heterogeneity**, and whether these effects are greater or lower than those of crop management practices.

## Study area and methods



We sampled **mirid populations (*Macrolophus* spp. and *Dicyphus* spp.)** in 34 protected tomato crops in southern France (Roussillon plain) in 2010 and 2011.

Mirid abundances were related by the mean of GLMm to :

- “ **Farming practices** (farming system, protection practices, organic or conventional standards),
- “ **Prey availability** (pest infestation levels)
- “ **Landscape composition** (percent cover) and **configuration** (connectivity) metrics (in 50, 100, 200, 300 m buffers) (Fig. 1).

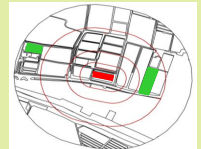


Fig. 1. Example of buffer zones created at different distances from tomato crop (in red) to calculate landscape metrics

## Results

### Comparison of bests models across scales and landscape components

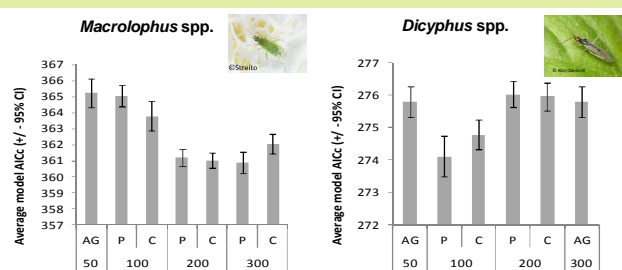


Fig. 2. Mean AICc averaged over similar best models (GLMs,  $\Delta AICc < 2$ ) in the multi-model inference process for *Macrolophus* spp. and *Dicyphus* spp. for each spatial scale (50m, 100m, 200m, 300m). AG: models integrating only local agricultural practices. P/C: models integrating both local agricultural variables and landscape (percent cover P or configuration C) metrics.

- “ Landscape composition (percent cover P) and configuration (C) have similar effects on mirid populations (Fig. 2).
- “ The two mirid groups respond to landscape heterogeneity at different spatial scales (*Macrolophus* spp.: 200-300m, *Dicyphus* spp.: 100m) (Fig. 2).

### Relative effects of agricultural practices and landscape heterogeneity on mirids

- “ Abundances of *Macrolophus* mirids in crops are increased in landscapes with fallow (source effect) but reduced by the presence of orchard (sink or dilution effects) (Fig. 3).
- “ Effects of landscape heterogeneity on mirids are lower than those of crop management practices.

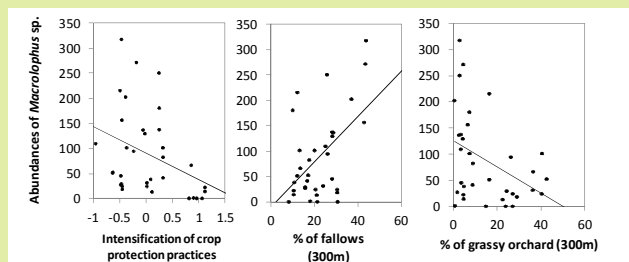


Fig. 3. Abundances of *Macrolophus* spp. according to intensification gradient of local agricultural practices, and to percent cover of fallow and grassy orchards in crop landscape context (in 300m buffers).

## Conclusion

- “ Maintaining large areas of semi-natural habitats (fallow) seems to be important to ensure crop colonization by mirids.
- “ Converting farms from conventional to organic production systems and adopting integrated plant management practices remain the most promising strategies to enhance populations of mirids in protected horticultural crops in Mediterranean regions.