Bird community monitoring in chlorpyrifos-treated citrus. Results of years 1 & 2 of 3 year program in Valencia region

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INTRODUCTION & OBJECTIVES

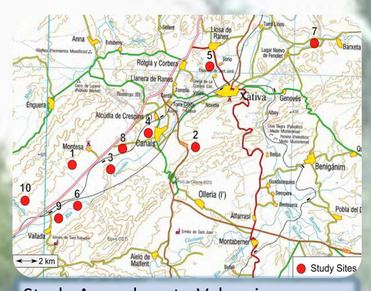
This study is used for a refined risk evaluation focusing on the long-term time scale; monitoring bird communities in chlorpyrifos-treated citrus orchards. The aims are to provide information on the status of bird communities (diversity and abundance), to evaluate reproductive performance of bird populations and to evaluate the factors (both natural and anthropogenic) which may influence reproductive performance and community of birds present at each study site.

RISK ASSESSMENT CONTEXT of CHLORPYRIFOS

In standard laboratory acute studies with gavage dosing, chlorpyrifos shows a high toxicity to birds. Likewise, effects are observed in standard laboratory bird reproduction studies resulting from acute toxicity (driven by inhibition of acetyl cholinesterase). EU 'worst case' standardised 'Tier 1' exposure estimates for insectivorous and omnivorous birds, together with laboratory toxicity endpoints, result in Toxicity Exposure Ratios (TER) which are very much lower than Annex VI (Directive 91/414 EEC) triggers of 10 (acute) and 5 (reproduction). As such, Tier 1 clearly indicates a potential high risk, triggering the need for more-realistic risk assessment. No bird poisoning incidents have been reported in actual use. Data on generic ecology of bird species (affinity for specific crop habitats), together measured peak residues of chlorpyrifos (and residue decline) on arthropods, provide 'Tier 2' assessments indicating low risk for low-application-rate uses. However, this is insufficient to demonstrate low risk for applications at 500 g chlorpyrifos/ha and above, which is the major usage in EU. Hence, over the past 5 years a major program of field studies in a range of treated crops has been conducted by the expert field teams of Rifcon GmbH and tier3 solutions GmbH (sponsored by Dow AgroSciences, Makhteshim Agan, and Cheminova). Chlorpyrifos is the key active ingredient for control of the 'red scale' insect-pest in citrus. In Spain, the great majority of the citrus area is sprayed with chlorpyrifos every year in May. Application to citrus is the highest registered application rate in EU (2.4 kg a.i./ha). To assess whether or not bird communities in treated citrus are affected by chlorpyrifos, over the long-term, an intensive 3-year field project is being conducted by tier3 solutions GmbH (2010 – 2012).

MATERIAL & METHODS

- Long term study started in ten citrus orchards as study sites in 2010 and is still ongoing (2012 is final year).
- Standardised bird trapping with mist-nets was performed regularly during and after the breeding season.
- Systematic nest search was conducted in all study sites. Active nests were monitored to detect their fate. Nest cameras were used to identify predators.
- Bird surveys were carried out to obtain information on bird behaviour inside and outside study sites.
- Radio tracking to determine the location and to assess potential activity of birds trapped inside study orchards.
- Presence and absence of predators and vegetation status are recorded during every bird ringing session.
- All sites treated every year with chlorpyrifos in May/June.



Study Area close to Valencia

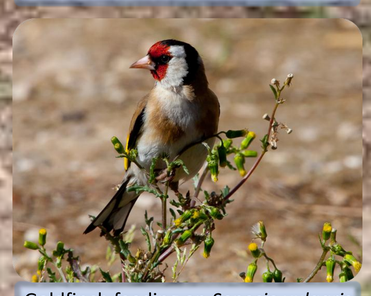

Mist nets for bird trapping


Bird ringing


Trapped Serin


Trapped Golden Oriol

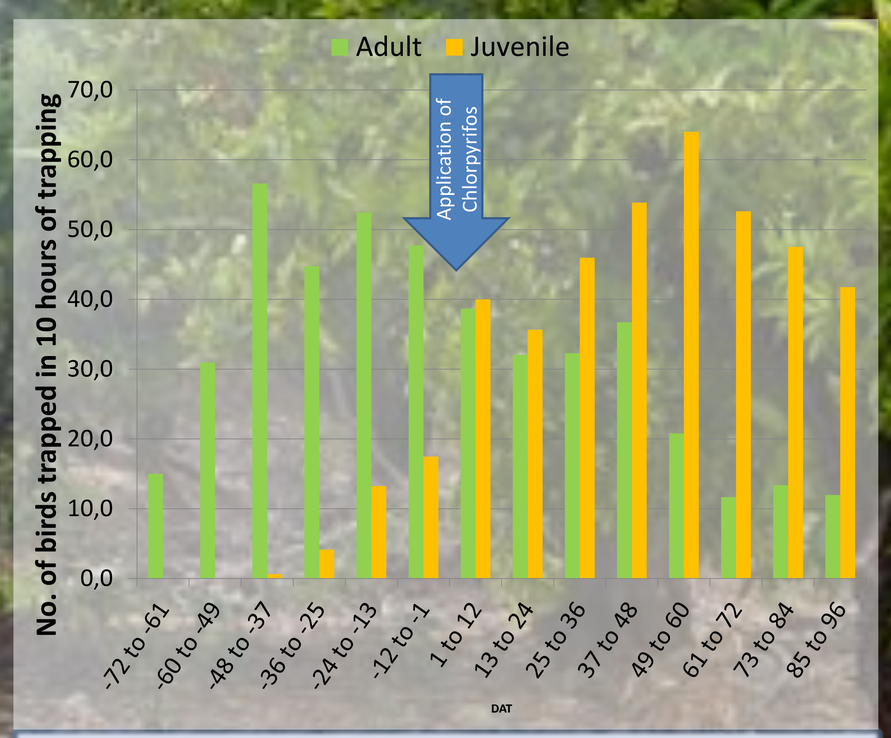

Blackbird with a radio-transmitter


Goldfinch feeding on *Senecio vulgaris*

RESULTS & DISCUSSION

- Chlorpyrifos-treated citrus orchards show a high diversity on bird species trapped (73 species in 2011) including migrants, wintering and breeding birds.
- Number of birds trapped varies greatly between the 10 study orchards (259 to 1176 in 2011).
- Orchards are used for feeding, roosting and nesting.
- Nest predation rate (around 60%) was high mainly due to garden dormouse, magpies and lizards.
- In 2011, 102 nests fledged and 120 were predated.
- A significant share of nests are completed before application period starts in mid-May (study is ongoing)

Individual birds retrapped between seasons and the number of birds captured before and after the application indicates a continuous use of the study orchards by breeding species demonstrating a high viability of the bird community.



2011: Combined trapping results for common breeding birds in relation to application of Chlorpyrifos (Species: Serin, Sardinian warbler, Blackbird, Greenfinch, Goldfinch and Great tit). Start of monitoring in April. Application of chlorpyrifos in May/June. Monitoring completed in August.

Study Period	No. of trapped Birds [ad./juv.]	No. of Species trapped	No. of birds retrapped	No. of Nests found
July/Aug. 2010	1329/1955	52	-	329
Apr./Aug. 2011	2578/3853	73	318	314
Mar./Apr. 2012	1168/0	42	226	219

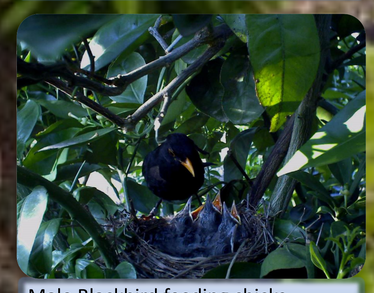

Systematic nest search


Nest observation by camera


Radio tracking


Great tit nest with 8 eggs


Serin nest with chicks


Male Blackbird feeding chicks


Nest predated by garden dormouse

CONCLUSIONS

Citrus orchards treated with chlorpyrifos during breeding season are used continuously by a diverse and abundant bird community, including successful breeding activity:

2011: 73 species trapped, 1379 adults, 1955 juveniles. **In total, since the study-start in 2010**: 10883 birds trapped up to May 2012

Breeding activity & number of birds encountered appears to depend on various factors: nest predators > human activity (e.g. pruning) > surrounding habitats & food sources

When appropriate, it is important to go in to the field as a 'reality check' and not to rely only on theoretical risk assessment calculations.

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