A holistic program of intensive field monitoring for birds & mammals: Overview of 6 years of studies in EU on the insecticide chlorpyrifos

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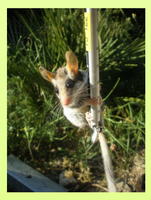
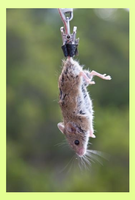
Tier 1 As a widely used organophosphate insecticide, chlorpyrifos is often the focus of regulatory attention. Chlorpyrifos has a relatively high acute toxicity to birds (quail) & mammals (rat) in standard lab studies, with acute toxicity also driving the results of long-term lab studies where treated diet is provided constantly with no alternative. When results of these lab studies have been compared with worst-case estimates of field-residues on diet & worst-case food consumption rates then high risk has been predicted.

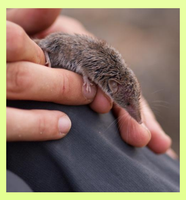
Tier 2 Tier 2 assessment analyzed residues of chlorpyrifos on field-collected samples of arthropods & vegetation. In most cases, even this Tier 2 indicates potential high risk. The paradox is that in countries which have post-registration surveillance for wildlife, the UK Wildlife Incident Investigation Scheme being the main example, no bird & mammal poisonings have ever been reported for chlorpyrifos in context of 40 years of major usage in arable, vegetable & fruit crops.

Tier 3 The rigorous demands of EU regulations require more-intensive field evidence to demonstrate safety. To provide a *strong basis for regulators to evaluate real risk to birds & mammals from chlorpyrifos, a major program of field studies (2007 – 2012)* was sponsored by the manufacturers (Dow Agrosciences, Makhteshim Agan, and Cheminova). This poster summaries the results obtained so far of this program.

Mammals






Short-term studies

Crop: **Vegetables**
Year: **2007**
Research company: **RIFCON**
Poland

Crop: **Citrus orchards**
Year: **2007**
Research company: **RIFCON**
Spain

Crop: **Pome fruit orchards**
Year: **2008**
Research company: **RIFCON**
Czech Republic

Approaches: Capture-Mark-Recapture design, Carcass search, Radio-tracking (monitoring fate)

Study	Number of species	Mammals radio-tracked	Mammals trapped
Vegetables 2007	3	6	18
Citrus orchards 2007	2	34	135
Pome fruit orchards 2008	3	36	267

Results:
- Populations of small mammals were found in each crop surveyed. No effects were observed or deaths of small mammals recorded that could be related to chlorpyrifos.

Conclusion: The results of the studies show that under field conditions no acute or short-term effects of chlorpyrifos applications on small mammal individuals and populations occurred in the surveyed crops.

Long-term studies

Crop: **Pome fruit orchards**
Year: **2008**
Research company: **RIFCON**
Czech Republic
Germany

Crop: **Citrus orchards**
Year: **2009/2011**
Research company: **RIFCON**
Spain

Approaches: Capture-Mark-Recapture design, Ecological population modelling

Study	Number of species	Mammals trapped
Pome fruit orchards 2008	5	727
Citrus orchards 2009/2011	3/6	468/1198

Results:
- The population development of small mammals was not effected by the application of chlorpyrifos in the surveyed crops.

Conclusion: The results of the studies show that under field conditions no long-term effects of chlorpyrifos applications on small mammal populations occurred in the surveyed crops.

Birds







Short-term studies

Crop: **Vegetables**
Year: **2007**
Research company: **RIFCON**
Poland

Crop: **Citrus orchards**
Year: **2007**
Research company: **RIFCon**
Spain

Crop: **Grape**
Year: **2007**
Research company: **Ecotox**
France

Crop: **Pome fruit**
Year: **2007**
Research company: **RIFCon**
France
Italy

Approaches: Capture-Mark-Recapture design, Carcass search, Radio-tracking (monitoring fate), Bird survey, Bird observation during application, Nest search and monitoring of fledging success

Study	Number of species	Birds radio-tracked	Birds trapped	Nests found and monitored
Vegetables 2007	10	73	74	10
Citrus orchard 2007	5	51	51	17
Grape 2007	14	53	88	-/-
Pome fruit 2007	6	66	66	53

Results:
- Diverse bird populations were found in each crop surveyed.
- Birds observed in treated crops showed no abnormal behaviour
- No deaths of birds recorded could be related to chlorpyrifos.
- No nesting failure could be related to chlorpyrifos.

Conclusion: This study demonstrated that no adverse impact occurred on bird survival or behaviour resulting from applications of chlorpyrifos in the surveyed crops.

Long-term studies

Crop: **Citrus orchards**
Year: **2010-2012**
Research companies
RIFCON, tier3 solutions
Spain

Crop: **Cider apple**
Year: **2012-2014**
Research company:
tier3 solutions
UK

Crop: **Cereals**
Year: **2013**
Research company:
tier3 solutions
UK

Approaches: Multi-year Capture-Mark-Recapture design, Carcass search, Radio-tracking (monitoring fate, habitat selection), Bird survey, Bird observation during application, Nest search and monitoring of fledging success, Ecological population modelling

Study	Number of species	Birds radio-tracked	Birds trapped	Nests found and monitored
Citrus orchard 2010-2012	137	48	11270	704
Cider apple 2012 -(2014)	37	ongoing	>913	>123
Cereals 2013	ongoing	ongoing	ongoing	ongoing

Results:
- Between year site fidelity of breeding birds demonstrate suitable habitat quality.
- Reproduction rate within the normal range showed conditions for viable population dynamics.

Conclusion: Population dynamics and reproduction success was not linked to the application of chlorpyrifos.

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