Cambridge Environmental Assessments

NTA Recovery

CRD project PS2355 update

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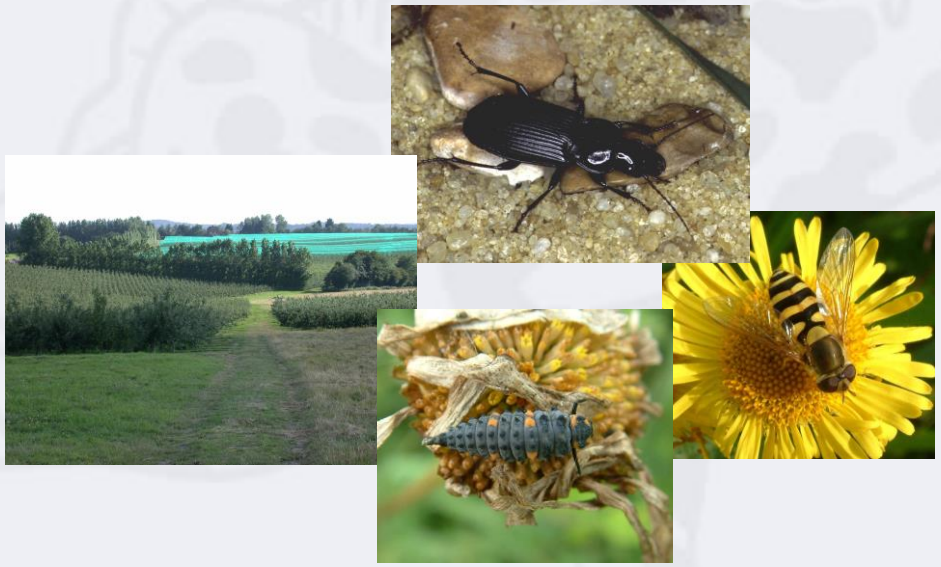
Outline

- **Background to recovery, project objectives**
- **Uncertainties – aged residue & field data**
- **Recommendations**



Introduction

"***If higher tier testing*** *demonstrates effect values below a set threshold value or* ***indicates an acceptable potential for re-colonisation/recovery,*** *no additional testing is required and* ***low risk to the habitat of concern can be concluded*****".**

ESCORT 2

Key words *acceptable* – what is acceptable?

potential – or actual?

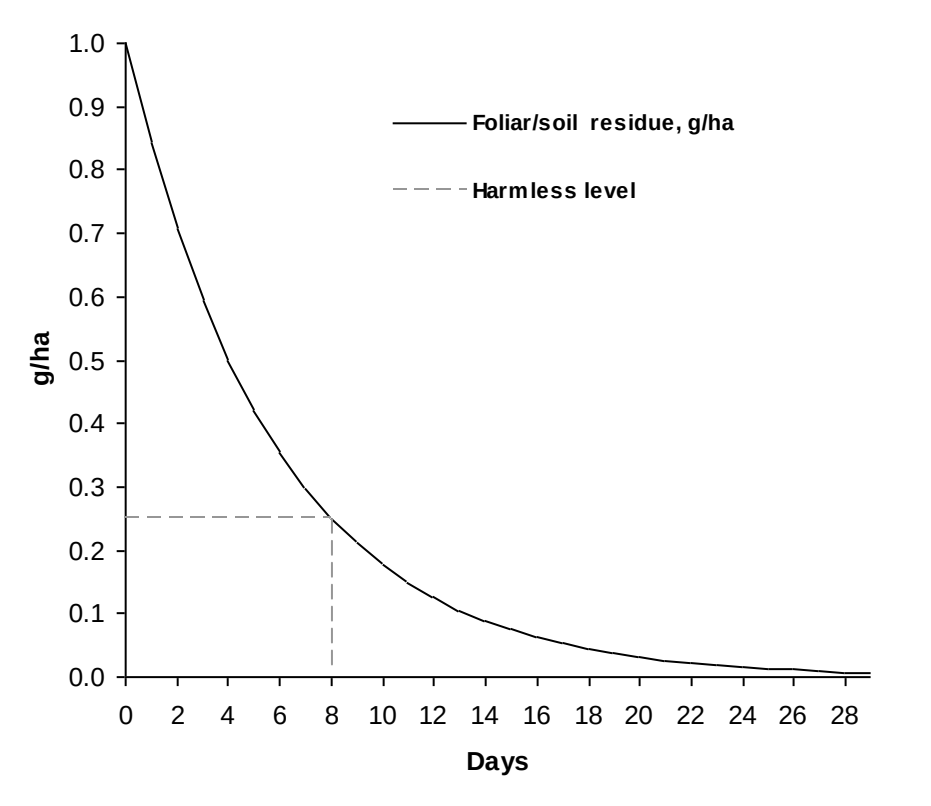
Project objective

To resolve, as far as possible, **the uncertainty surrounding the demonstration and interpretation of recovery** of non-target arthropod populations in risk assessments under EC Directive 91/414. Specifically:

a. **To conduct a critical review of recovery processes and signs** such that guidance on interpretation may be provided.

..What may affect demonstration and interpretation of recovery, how does it happen and what does it look like?
NOT *– "What is acceptable?"*

Recovery



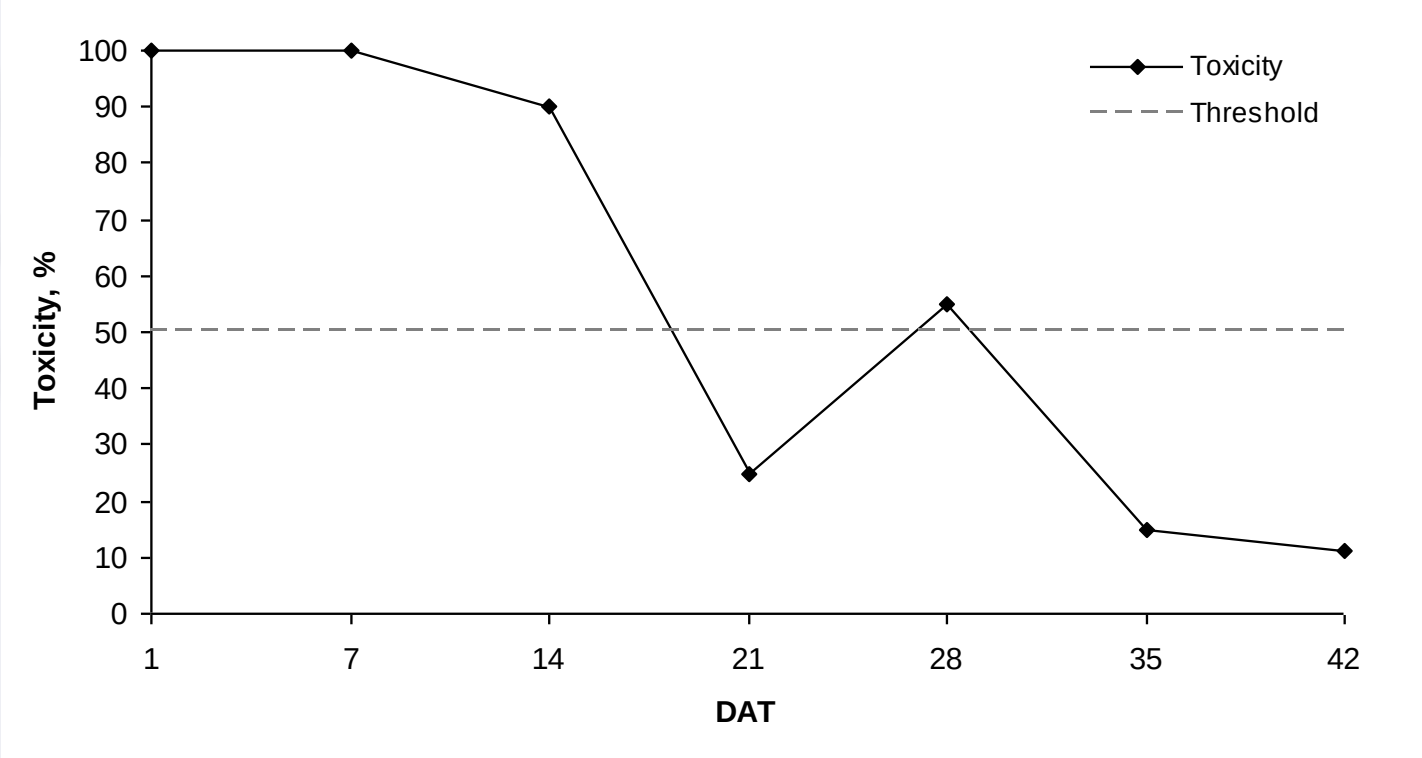
Two elements:

1. Decline of harmfulness
2. Presence of recolonising individuals

Aged residue studies

- **Demonstrate *potential* for recovery**
  - Arthropods exposed to weathered residues
  - Characterises decline of harmfulness..
  - Could be replaced by LR_{50} and DT_{50} data
- **Relevance to field?**
  - Do not provide information on recolonisers
- **Uncertainties related to exposure**
  - Contact exposure only: in field, all routes relevant
  - Rate of degradation: may vary with climate
  - Deposition: variable between leaves

Variability in leaf residue

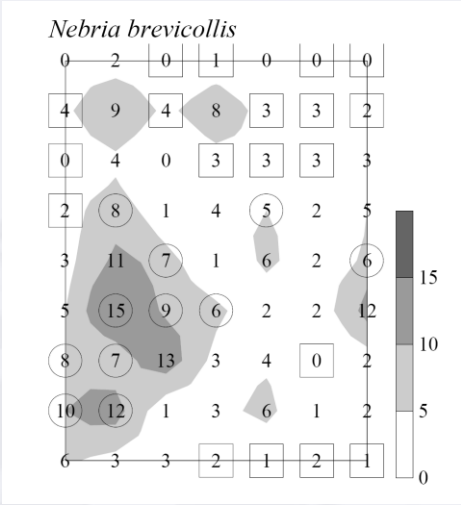


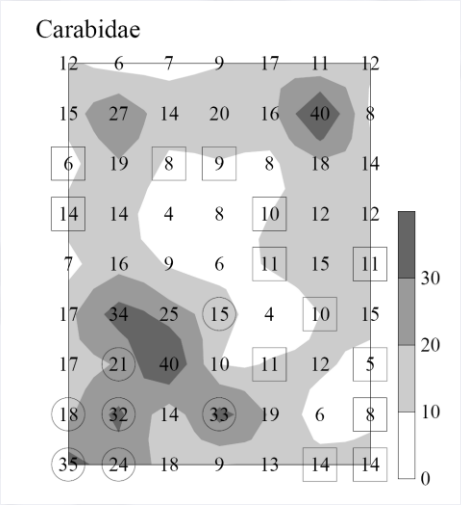
Recommendation:

Additional assessment period to capture heterogeneity in residue

Field data
Background heterogeneity

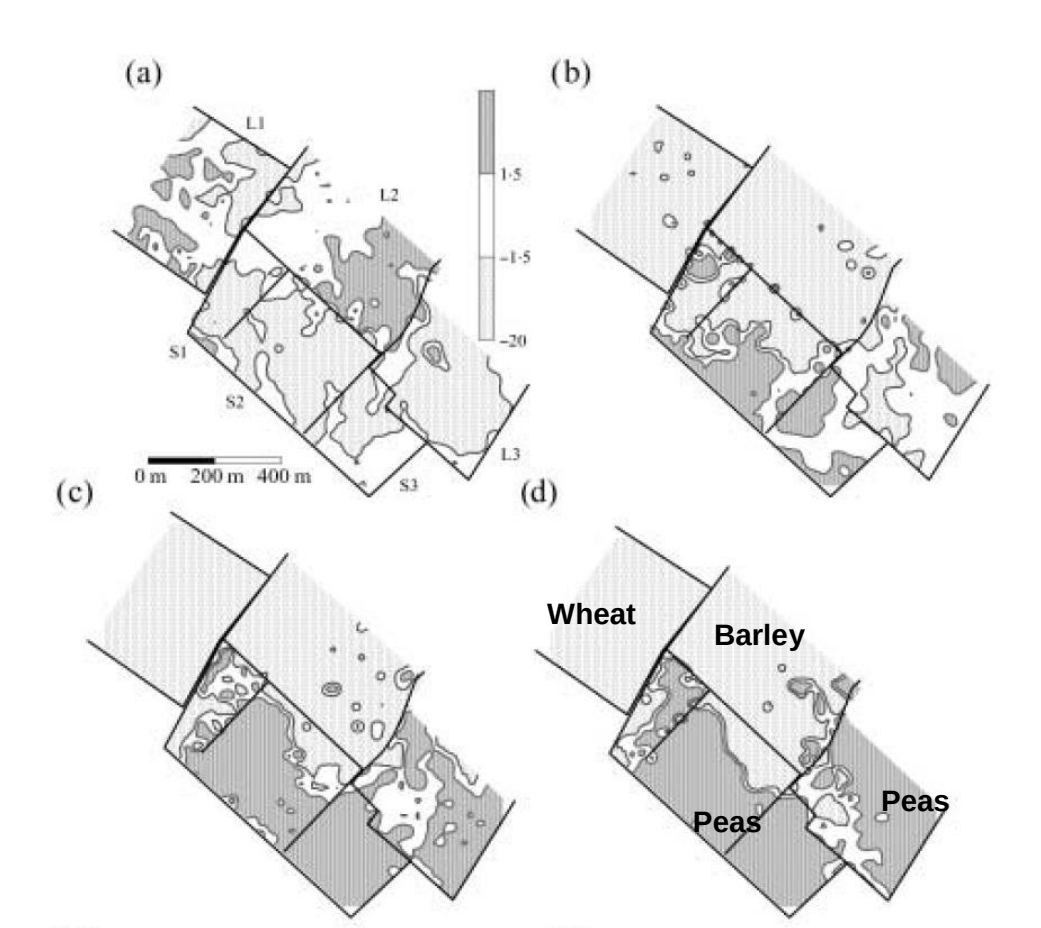
- **Arthropods highly dynamic**
  - At landscape, farm and field scales
  - Scale depends upon species' mobility
- **Drivers of distribution**
  - Landscape features, microclimate, survival cues
- **Highly variable counts may affect power of studies**
  - Understanding may reduce uncertainty





After Holland *et al*., (1999)

Farm scale



UK data, after Holland *et al*., (2005)

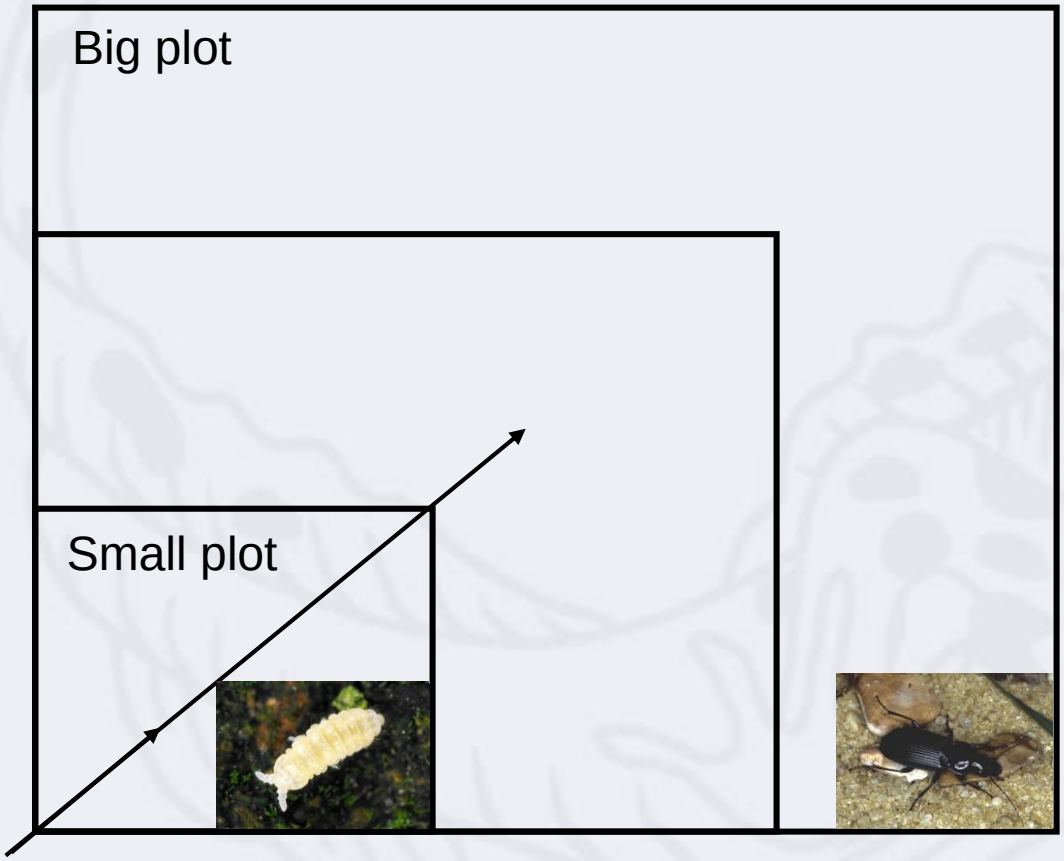
Pterostichus madidus
Highly mobile ground beetle. Over-winter as larvae in field

(a) 2-9 May 2000
(b) 6-13 June 2000
(c) 28 June – 5 July 2000
(d) 12-19 July, 2000

If field study plots in L2 – able to detect recovery?

Relevance of 1 ha plot for mobile species?
If these animals numerically dominant, may drive community response

Plot scale vs. mobility vs. study duration



For walking arthropods, time to recovery related to plot size

Some less affected by scale..

Taxonomic resolution

Family	Insecticide 1 Drift rate	Insecticide 1 Field rate	Insecticide 2 Field rate
Carabidae Coleoptera	Reduction 3% Recovery 1 week	Reduction 20% Recovery 8 weeks	Reduction 33% Recovery 8 weeks
Staphylinidae Coleoptera	Reduction 1% Recovery 1 week	Reduction 77% Recovery 8 weeks	Reduction 82% Recovery 8 weeks
Linyphiidae Araneae	Reduction 18% Recovery 6 weeks	Reduction 90% Recovery 1 year	Reduction 90% Recovery 1 year

Family level ground beetle data, UK cereal study

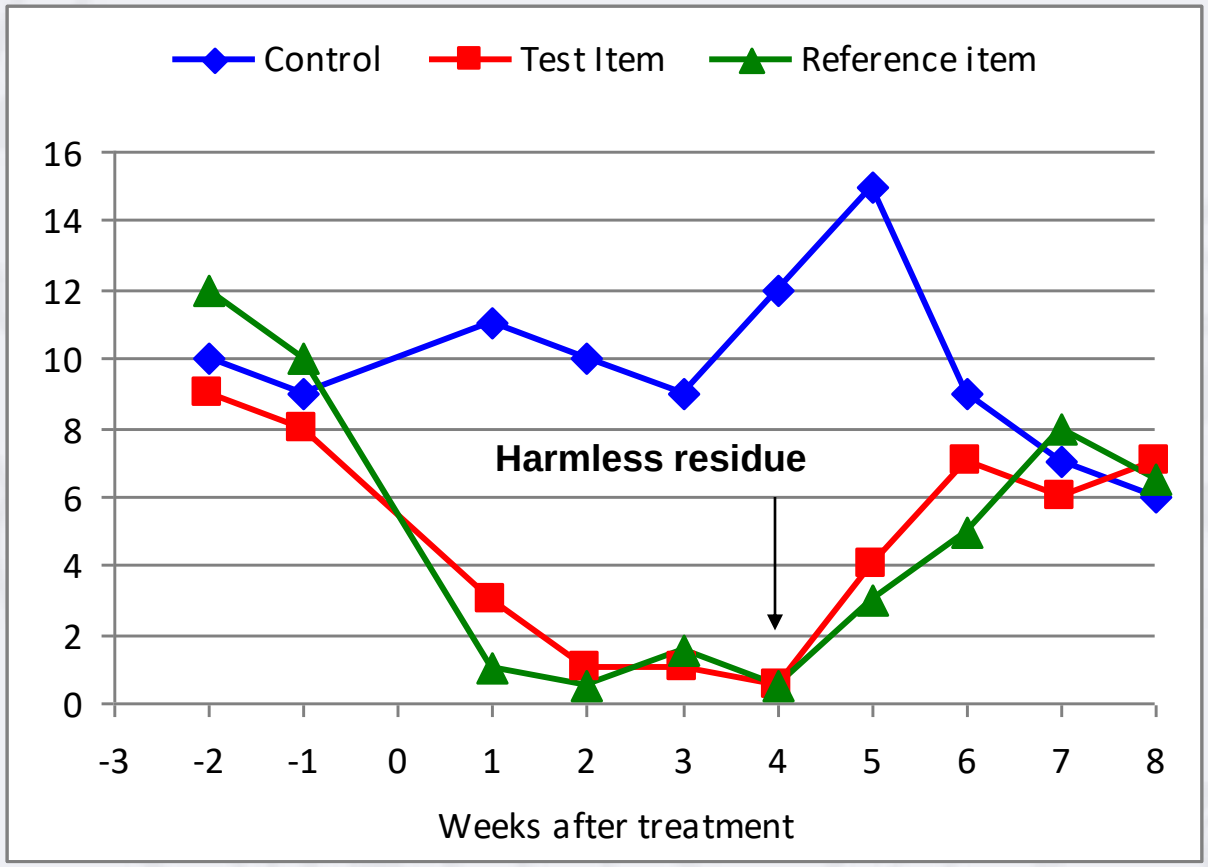
Taxonomic resolution

Example species	Insecticide 1 Drift rate	Insecticide 1 Field rate	Insecticide 2 Field rate
Asaphidion curtum Col; Carabidae	No reduction	No reduction	Reduction 90% Recovery not seen
Bembidion lampros Col: Carabidae	No reduction	Reduction 96% Recovery 6 weeks	Reduction 99% Recovery 6 weeks
Nebria brevicollis Col: Carabidae	No reduction	No reduction	No reduction
Stenus clavicornis Col: Staphylinidae	No reduction	Reduction 100% Recovery 8 weeks	Reduction 100% Recovery 8 weeks
Erigone dentipalpis. Male Araneae: Linyphiidae	No reduction	Reduction 100% Recovery 1 year	Reduction 100% Recovery 1 year

Species level data

Taxonomy ≠ ecology – effects may vary within Family

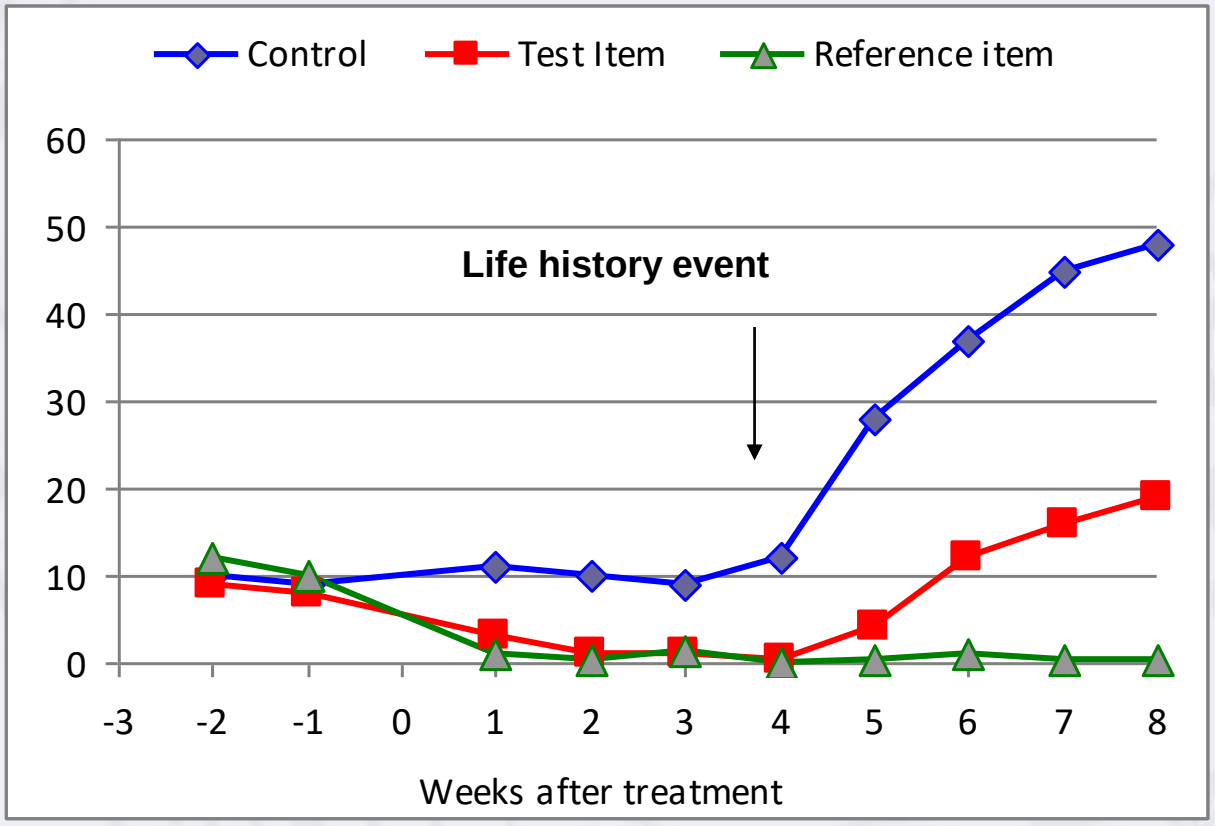
Redistribution

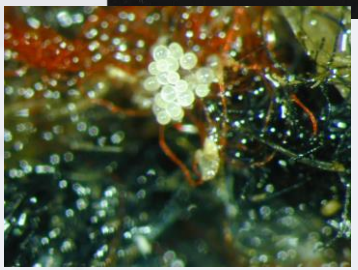


Plot scale & mobility dependent

“Statistical recovery” Harmonisation of control & treatment plots

Life history





Decline of harmfulness; potential for recovery.
May occur through emergence or reproduction of survivors

Uncertainties, further suggestions

- **How to deal with difficult species?**
  - Large, scarce, mobile
  - May be biochemically sensitive, or *K* strategist
  - Infrequent breeders, low fecundity. Pre-selected?

- **Interpret PRC in combination with abundance data**
- **Indirect effects**
- **Different chemistry, different response**
  - E.g. pyrethroids vs. Collembola
  - Predictive power from current chemistry to new chemistry?

Summary

- **Lab and field (plot) data only offer an approximation of processes which may occur at the whole field scale**
  - Even whole field scale may be too small for some taxa
  - *Actual* (vs. potential) recovery can only be measured at the appropriate scale for that taxon. Does it matter?
- **All factors relevant to off-field. Also:**
  - Landscape connectivity? Linear features vs. plots?
  - Exposure – overspray vs. drift?
- **Trade off – practicalities vs. precision**

Conclusion

- **Recovery is valid in risk assessments**
- **Can be meaningful**
- **Interpretation depends upon understanding mechanisms**
- **Relevance depends upon scale**

Thanks for your attention