A common issue

Wildlife risk assessment supported by population modelling: a case study on potential herbicide effects on common vole populations

Meet us at booth 25

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Introduction

Environmental risk assessments (ERA) for pesticides usually require **higher-tier data** for the **small herbivorous mammal scenario** represented by the vole. **Population modelling for a relevant vole species** is one way to provide such data. This **exemplarily case study** conveys all relevant steps conducted in a **population modelling** application for higher-tier ERA within a submission process. The model species was the common vole ***Microtus arvalis***, a representative species in Europe(1).

An example project on the implementation of population modelling in higher tier ERA

CA2866 (SL; 344 g 2,4-D/L and 120 g Dicamba/L)

- Selective herbicide applied once a year (Mar-Sep) in grassland

Small herbivorous mammal scenario(1) failed Tier-1 ERA

- Higher-tier data were required for this scenario

Vole species as representatives for the small herbivorous mammal scenario (1)

- A field effect study was conducted covering one vole reproductive cycle, as a first step.
- At a later stage, population modelling was conducted.

The common vole *M. arvalis* was the chosen species to obtain additional data

- ERA relevant species, most common vole in Europe
- Its primary habitat is the target treatment area
- Its primary food source is the vegetation to be treated
- Worst case species compared to other voles in Europe

Population modelling discussed with evaluating MS authorities

- Modelling approach, scenarios and reasoning
- Inclusion feasibility in the higher-tier data package

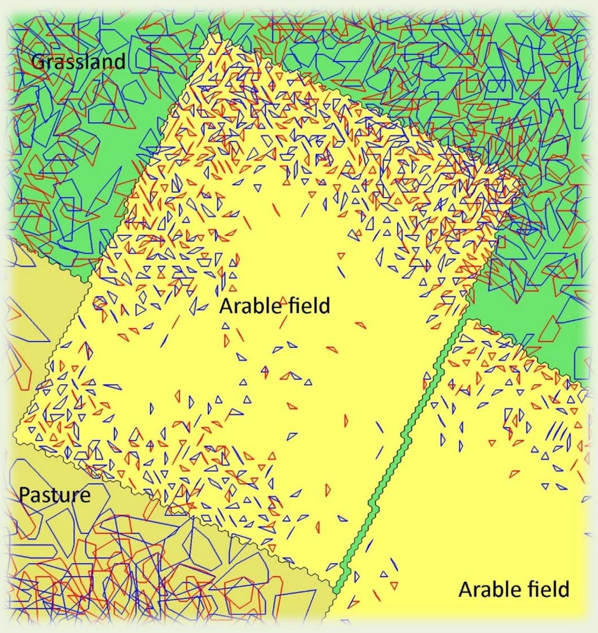
The purpose of population modelling

- Enhance the lower-tier standard assessment
- Support relevant higher-tier field effect studies on common voles in meadows
- Cover additional risk perspectives (time of application, rates, landscapes etc.)

Modelling Approach

The modelling tool, *eVole* 3.0 (©RIFCON GmbH)

- Ecological model based on literature combined with exposure & toxicological effect modules
- TRACE documentation(3)
- Spatially explicit
  - Landscape grid cells characterised by
    - Proxies for food & shelter availability
    - PPP foliar residues
- Individual-based
  - Dynamic daily home-ranges influenced by
    - Landscape characteristics
    - Interaction between individuals



Example of a heterogeneous landscape & delineations of emergent vole home-ranges on a simulation day

Daily and long-term dietary exposure

- Calculations were based on EFSA guidance(1)
- Feeding within daily home-ranges in the model

Resulting individual-level toxicological effects

- Dose-response relationships from a.s. laboratory studies
  - Response additivity for combined effects

Likelihood of long-term repercussions on population density

- Several scenarios, nominal & increased **A**pplication **R**ates
- Treatment simulations vs control (**N**ormal **O**perating **R**ange)
- An independent positive control

Example Results

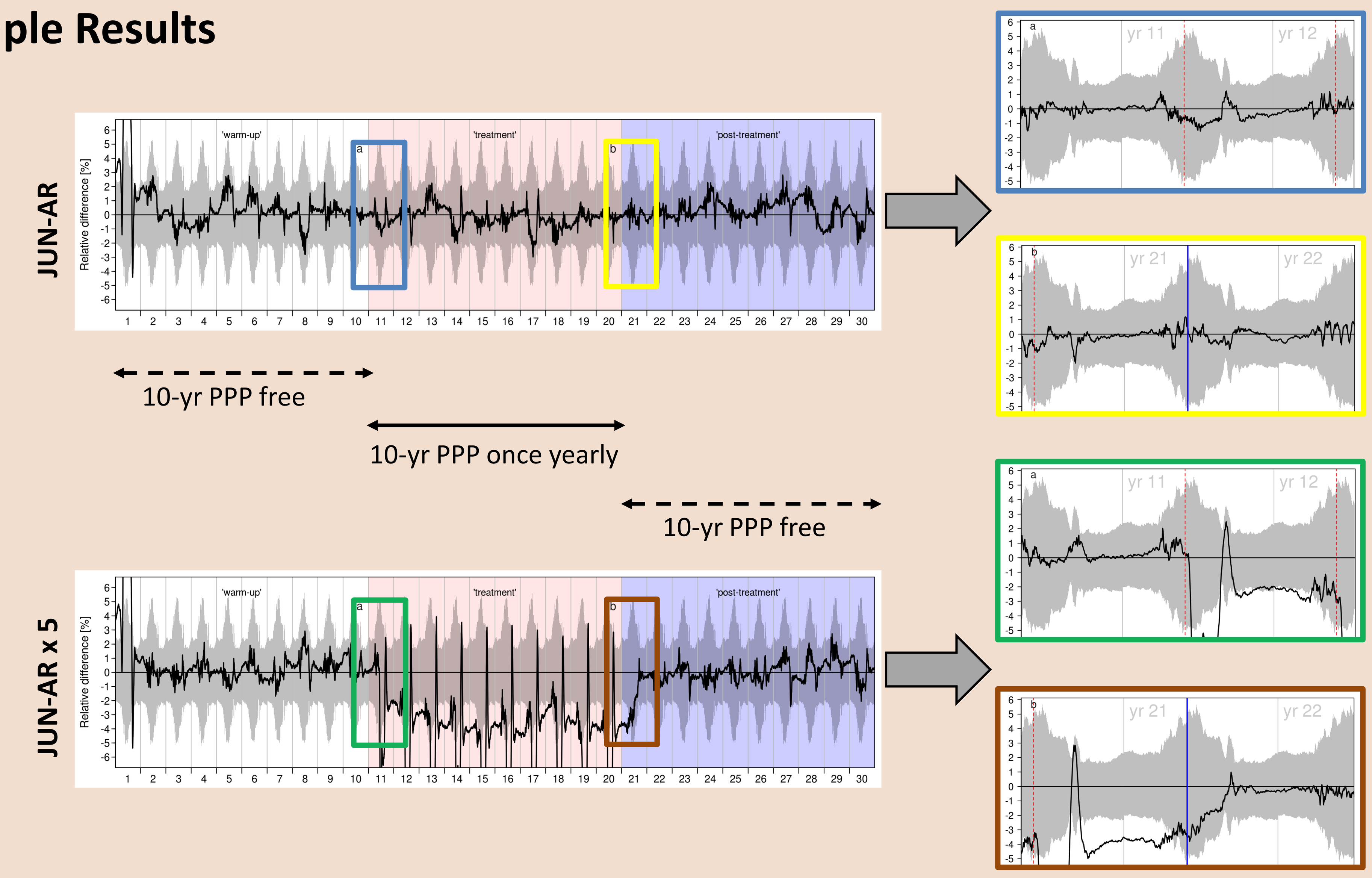
Overview of selected simulation results for CA2866 applications in grassland

Appl. date		01.03			01.04			01.05			01.06			01.07			01.08			01.09		
Phase		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Scenario		Mar			Apr			May			Jun			Jul			Aug			Sep		
Landscape 1: Rich grassland	AR	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0
	AR x 2	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0
	AR x 3	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0	-	-	0
	AR x 4	-	-	0	*	*	36	*	*	110	*	*	85	-	-	0	-	-	0	-	-	0
	AR x 5	-	-	0	*	*	296	*	*	287	*	*	328	-	*	19	-	-	0	*	-	0

Phase 1: 365 days after first application
Phase 2: 365 days after last application
Phase 3: Time (days) until full recovery

(*): Only transient effects detected
(-) : No relevant effects detected

Despite the inherently conservative simulated scenarios, it was concluded that CA2866 is unlikely to cause any unacceptable risks to common vole populations, considering nominal rates and at least 3-fold increased rates.



Take-Home Messages

- Population modelling for relevant species can provide additional information for decision making in higher-tier ERA.
- *eVole* has been developed and is being actively maintained and applied for several years now at RIFCON GmbH, for addressing effects of PPPs on common vole populations.
- The suggestions in the EFSA opinion on good modelling practice(2) are applied in projects using *eVole*.
- Transparent discussions with the evaluating member states regarding population modelling can optimize the intended approach.

Population modelling applications, using models like *eVole,* can increase the certainty of the evaluation of risks to voles.
The true risks to voles may be overestimated by the common European ERA procedure.

References: **(1)** EFSA (2009) GD on Risk Assessment for Birds & Mammals. *EFSA Journal* 7(12):1438. **(2)** EFSA PPR Panel (2014) Scientific Opinion on good modelling practice. *EFSA Journal* 12(3):3589. **(3)** Grimm et al. (2014) Towards better modelling and decision support. *Ecol. Model.* 280: 129-139.