



Grassland fields as surrogate crop for field effect studies on the common vole



INTRODUCTION

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Field effect studies to investigate potential effects of a PPP on small mammals in arable crops like cereals are difficult to conduct. A major challenge represents the low and fluctuating population density of the small herbivorous mammals (mainly the common vole *Microtus arvalis*) because cropped fields such as grain cereals and oilseed rape constitute secondary habitats, which cannot maintain common vole populations sustainably for long periods owing to seasonal farming activities, where populations are regularly disrupted by harvest and ploughing [1].

Habitat preferences of the common vole

Primary habitats of the common vole are steppe habitats or human-made surrogates, such as meadows, set-aside land, flower strips, grassy field verges, and alfalfa and clover fields [2, 3]. In contrast to the secondary habitats, primary habitats offer more refuges, thus, year-round populations are established and can reach high densities [3].



Common vole in arable fields

- found in many crops
- pests during population outbreaks
- no permanent populations due to farming practices like ploughing, harrowing or harvest
- depend solely on immigration from refuge habitats after local extinction with recolonization starting approximately in June [4]



Common vole in grassland fields

- e.g. permanent grassland fields used for hay production
- more stable habitat
- sustains vole populations for a long time
- not treated with PPPs
- high population densities of common voles
- small home ranges due to abundant food availability



Grassland as surrogate

- structural similarity between cereal crops and grassfields
- no reduction in the exposure of voles in grasslands compared to cereal crops if vegetation height kept below 20 cm
- PPPs applied directly onto the (short) grass layer by a boom sprayer ensure a high and even exposure via food items, leaving little or no alternative food sources to the 'contaminated' grass layer in the grassfields, assuring a realistic worst-case exposure scenario
- small home ranges and high population densities increase probability to capture and recapture marked individuals providing histories of individual measurements prior, during, and after (multiple) applications of plant protection products
- single grassfields with abundant food can host entire populations within treated areas, providing large data sets and statistically more robust results
- year-round established populations, no recolonization after local extinction necessary
- 'Clean' control fields without any agricultural chemicals applied can be assured. With many high-valued crops in particular, it may be impossible to find suitable control fields without pesticide use.
- Treatment fields only treated with test item

CONCLUSIONS & OUTLOOK

Field effect studies on common voles in grasslands as a surrogate crop represent a good alternative and allow to investigate a realistic worst-case scenario. When accepted as a valid study design, other surrogate habitats might be found for species other than the common vole. Harvest mice (*Micromys minutus*), for example, are potential focal species but are difficult to detect by ground-trap monitoring (Flowerdew et al. 2004) due to their above-ground nests and movements in the canopy of grasses and forbs (Bence et al. 2003). This species might be studied on fallow land with tall grasses.



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