

Sustainable management of common voles (*Microtus arvalis*)

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The common vole (*Microtus arvalis*) is the most abundant mammal in European agrarian landscapes. Its population dynamics can vary spatially and seasonally. Every two to five years outbreaks can occur and population densities can reach 1000 individuals per hectare. Especially during these outbreaks, common voles migrate to farmland and damage crops like grain cereals or rape-seed with monetary damage amounting to several million Euros. Farmers often use rodenticides as management method of choice. Its efficacy can decrease if voles emigrate from their primary grassland habitats or if a better food source is available. Furthermore, there may be risks for non-target species and chemical rodenticides are no option for organic farmers. An ecologically based management including expert knowledge of the target species and combining different methods could help organic farmers to protect their crops.

In our BMEL funded project we pursue the idea of inhibiting migration of common voles to farmland by a barrier system. A furrow at the field margin is combined with repelling odorous substances or traps emptied by predators. If a vole wants to reach secondary farmland habitat, it comes across a furrow designed to lead the vole towards a trap.

Avian and terrestrial predators learn to patrol these traps and to remove voles. We observed with camera traps if a vole was removed within 12 hours and which predators visited the traps. We could also confirm that rodents of the family *Muridae* were able to jump out of the trap avoiding non-target captures. But because of its opening the trap is quite light and voles often prefer darker surroundings. Increasing trappability can be accomplished by an attractive bait. In the laboratory, we screened natural substances, selected a suitable grain base and created three new bait types. Under semi-natural conditions we tested trappability in four populations with these new baits.

The second approach follows the idea of repellent natural substances placed in the furrow. In T-maze trials we screened different odors. Three essential oils significantly reduced residence time in the treated box of a T-maze. These oils were tested further in enclosures with eight vole populations. One combination of oils significantly reduced oat consumption and may have potential as common vole repellent.

We present our results of three years research in sustainable common vole management.