

# ORGANIC FARMS AS REFUGES FOR SMALL MAMMAL BIODIVERSITY

Thomas Secher Jensen, Tine Sussi Hansen & Kent Olsen  
Natural History Museum, DK-8000 Aarhus, Denmark



## Introduction

Habitat fragmentation, the process by which relatively continuous habitats is broken into smaller pieces, occurs in natural systems but is to a high degree also human-induced through landscape use. Fragmentation of the landscape produces a series of habitat patches surrounded by a matrix of different habitats and/or land use regimes. The major landscape consequences of fragmentation are loss of habitat, reduction in habitat patch size, and increasing isolation of habitat patches. In general, population performance declines in response to habitat loss but size of remaining area and isolation effects is known also to influence the population trend. Small mammals are well suited for examination of population responses to habitat frag-

mentation as they have modest spatial requirements and short generation times.

In theory, organic farms could play an important role in the agricultural landscape as refuges for some small mammal species, as the lack of pesticide and fertiliser treatment, less weed control, more diversified crop structure and a general environmental-friendly attitude, form a basis for habitats that provide cover and food for small mammals, and thus for larger predators of these species. Furthermore, density and area of small biotopes could be expected to be higher in the organic farms, thus leading to a decreased distance between optimal habitats.

## Aims and methods

This study compares species diversity and abundance of small mammals in conventional farms and intensively and extensively grown organic farms.

In a wide range of different fields in conventional and organic farms, the diversity and density of small mammals were investigated by live-trapping sessions, comprising trap lines with 15 meters between each trap.

We studied the responses of populations (belonging to 13 species of small mammals) to habitat patches of different size and different surrounding management strategies (ecological and conventional farming).

## Results

▼ Fig 1. Number of small mammal individuals (all species) per habitat patch in relation to patch size (m<sup>2</sup>) during autumn and spring. Population levels decrease from autumn to spring as a result of mortality during the non-reproductive winter period.

Fig 2. Autumn number of individuals (all species) in relation to small biotope patch size within conventional and organic farms. Generally, small biotopes within organic farms tend to have higher densities of small mammals.

Fig 3. Spring number of individuals (all species) in relation to small biotope patch size within conventional and organic farms. Generally, small biotopes within organic farms tend to have higher densities of small mammals, however not statistically significant.

Fig 4. The number of small mammal species in small biotopes within organic and conventional farms in relation to habitat patch size. A saturation point of 5-6 species for both farming systems is reached already at patch levels around 1000 square meters.

▲ Fig 5. The number of individuals of various small mammal species in hedge rows within conventional (n=194) and organic farms (n=277). Bank voles *Myodes glareolus* and Harvest mice *Micromys minutus* are dominant and found in highest numbers within organic farms.

Fig 6. The number of individuals of various small mammal species in grassland within conventional and organic farms. Field voles *Microtus agrestis*, Harvest mice *Micromys minutus* and Common shrews *Sorex araneus* and Pygmy shrews *Sorex minutus* are dominant and found in highest numbers within organic farms.

Legend: As: *Apodemus sylvaticus*; Af: *A. flavicollis*; Mg: *Myodes glareolus*; Mag: *Microtus agrestis*; Marv: *M. arvalis*; Mm: *Micromys minutus*; Sa: *Sorex araneus*; Sm: *S. minutus*; Nf: *Neomys fodiens*; Rn: *Rattus norvegicus*; Mmm: *Mus musculus musculus*; Mn: *Mustela nivalis*; Me: *M. erminea*.

## Conclusions

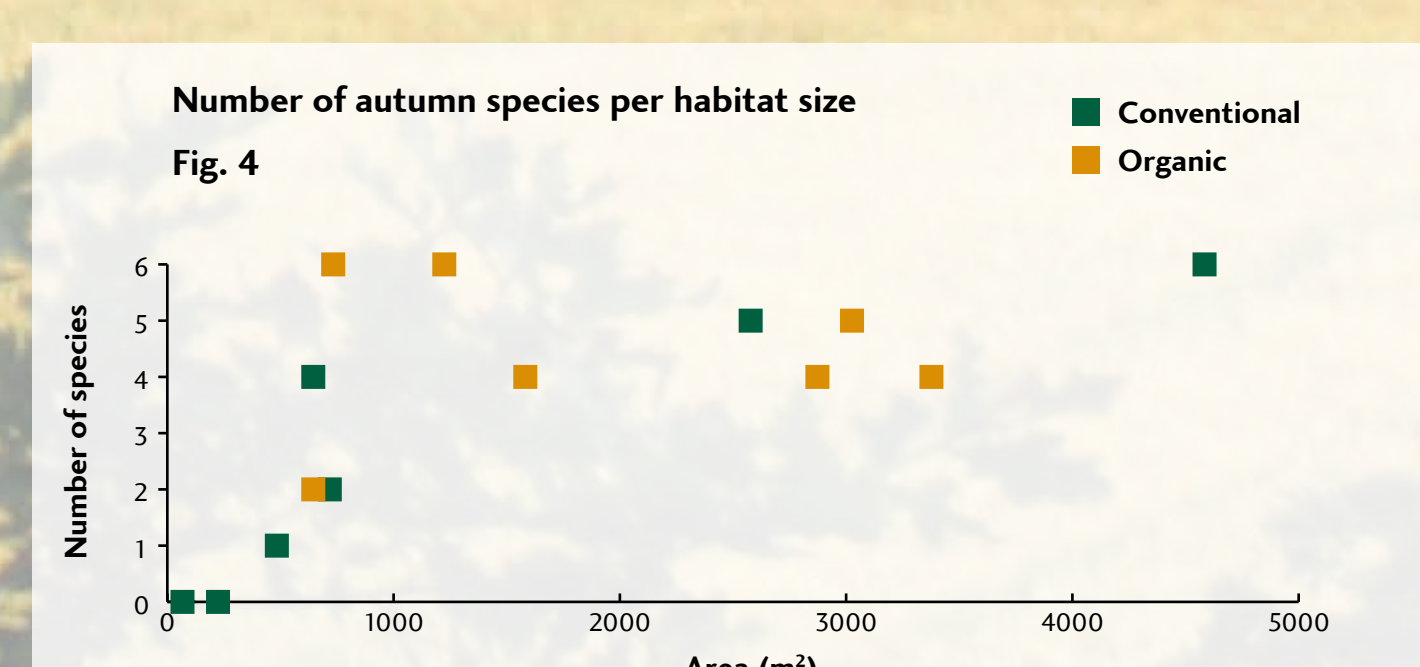
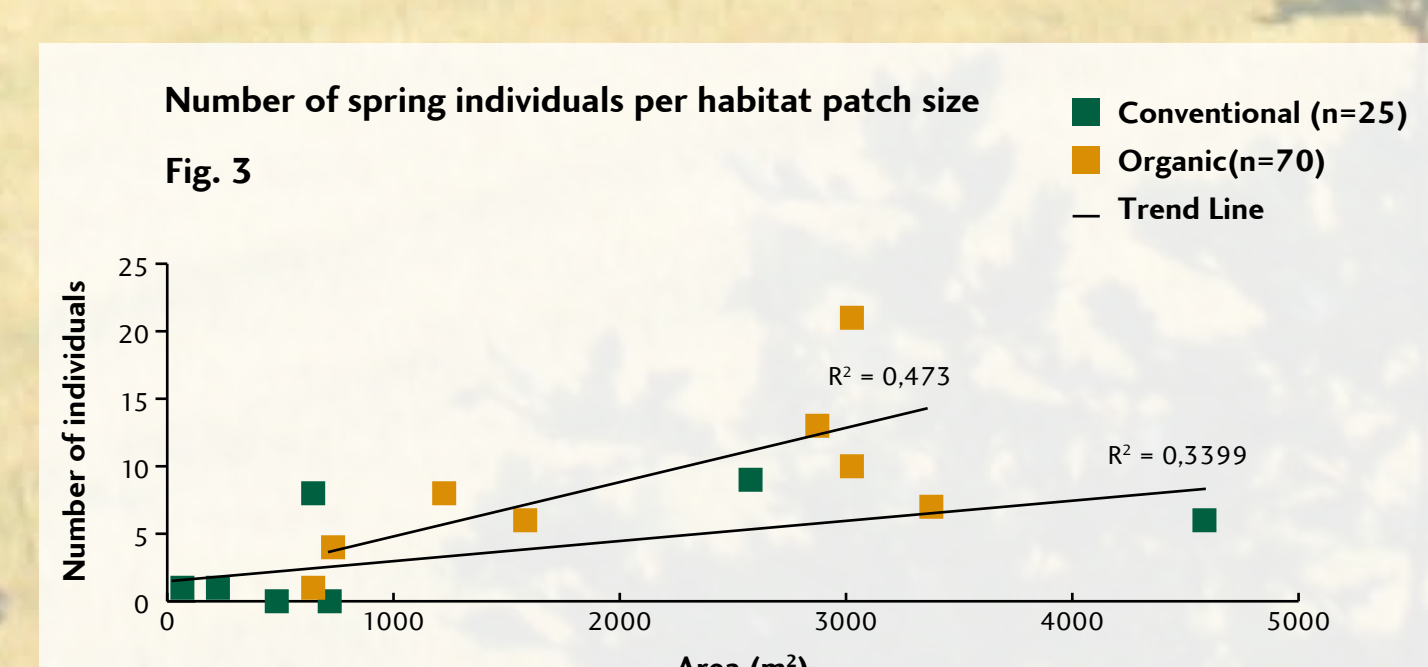
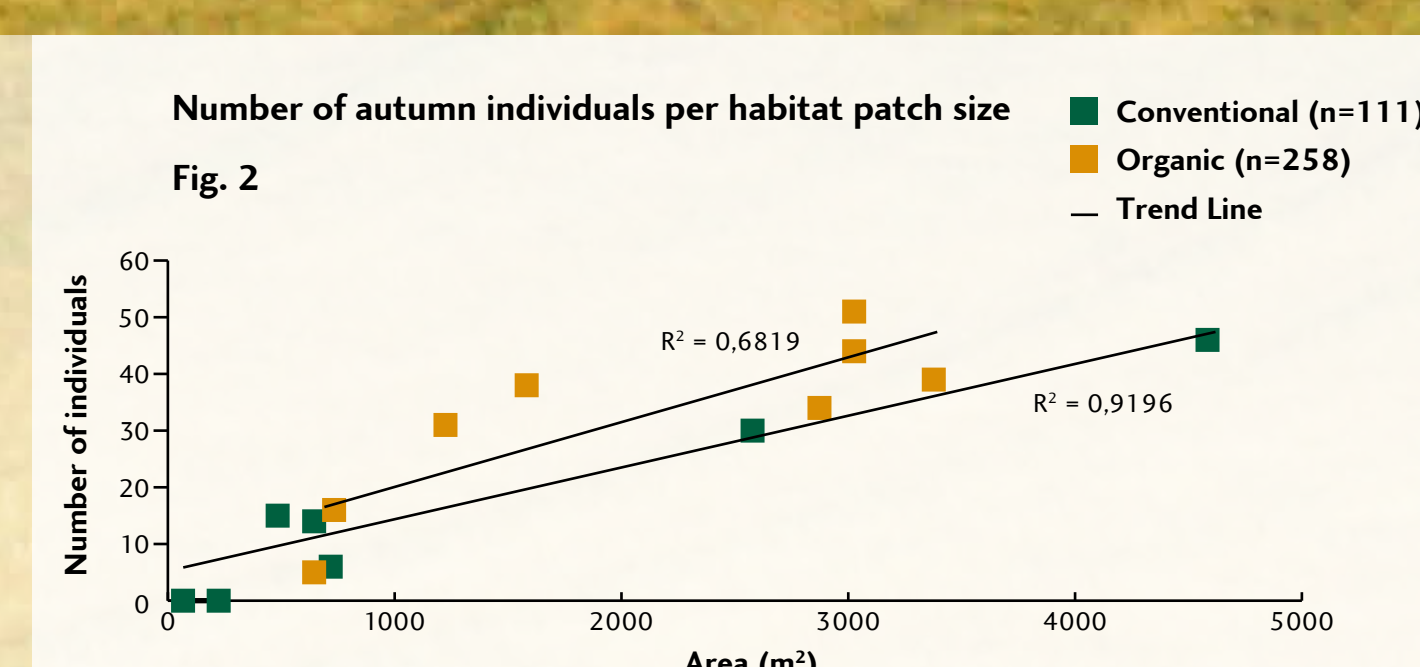
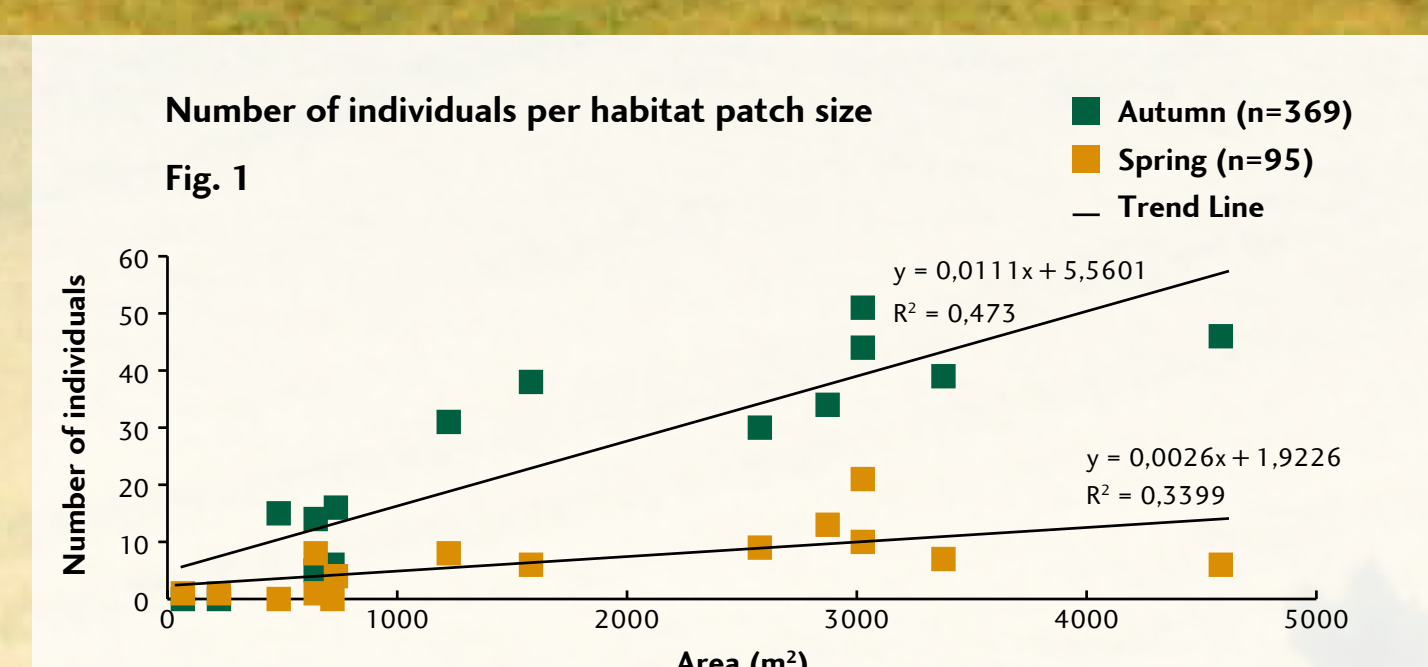
- There is a general correlation between the number of small mammal individuals and small biotope size.

- This correlation applies in autumn as well as in spring.

- There is a only a weak tendency for more small mammals in small biotopes within organic farms compared within conventional farms

- The number of small mammal species stabilises at small biotope sizes around 1000 sqm.

- The value of organic farms in respect to small mammal biodiversity depends mainly upon the number and area of small biotopes, and only to a minor degree upon the treatments of the fields.



Corresponding author: T. S. Jensen  
Natural History Museum, Wilhelm Meyers Allé 10,  
DK-8000 Aarhus C, Denmark.  
tsj@nathist.dk · www.nathist.dk