

Reference 31

Bengtsson, J; Ahnstrom, J; Weibull, AC. 2005 The effects of organic agriculture on biodiversity and abundance: a meta-analysis. Journal of Applied Ecology 42: 261-269. 10.1111/j.1365-2664.2005.01005.x

Background and objective

Organic farming usually increases species richness, having on average 30% higher species richness than conventional farming systems. However, the results were variable among studies, and 16% of them actually showed a negative effect of organic farming on species richness. 1) Does organic farming generally increase species richness within organism groups? 2) Does organic farming generally increase the abundance of the studied organism groups? 3) Do the effects of organic farming differ between organism groups? (iv) Do the results differ depending on the spatial scale of the study (plot, field or farm)?

Search strategy and selection criteria

Literature published before December 2002 through computer searches on the databases available at the Swedish University of Agricultural Sciences (SLU, Uppsala, Sweden). We used the following key-words: biodiversity, biological diversity, conventional farming (agriculture), organic farming (agriculture). We also followed the literature in the field and searched the reference lists of relevant articles All the studies on species richness and diversity or abundance where an effect size and pooled SD could be calculated were included.

Data and analysis

All studies were classified according to the scale of the study, and whether the authors had attempted to control for differences in landscape characteristics between organic and conventional farms or fields. The effect size used was Hedges' g. Then a weighted average effect size T for a fixed effect model and the homogeneity test statistic Q were calculated. If Q was significant, effect sizes were heterogeneous and differed among the included studies. In these cases, we used a random effects model to estimate effect sizes.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
66	Studies assessing the performance of organic systems in comparison to conventional systems.	Organic systems	Conventional systems	Metric: Species richness, Species abundance; Effect size: Hedge g (standardized difference) comparing the considered metrics between intervention and control	68.75

Results

- The mean effect size measured as the log ratio was 0.29, indicating that organic farming on average increased species richness by about 30%.
- The authors found positive effects of organic farming on species richness of all organism groups except non-predatory insects and soil organisms
- Considering abundance, measured as a log ratio, mean effect size was 0.40, indicating that organisms on average were around 50% more abundant in organic farming systems.
- The effects of organic farming on abundance varied between different organism groups.
- The authors conclude that positive effects of organic farming on species richness and diversity can be expected in intensively managed agricultural landscapes, but not necessarily in small-scaled mosaic landscapes with a mixture of agricultural fields and non-cropped habitats.

Factors influencing effect sizes

- Landscape structure and heterogeneity : NA

Conclusion

On average, the increase in species richness was around 30% compared with conventional farming.