FARMING PRACTICE
ORGANIC FARMING SYSTEMS

IMPACT: BIODIVERSITY

Reference 17

Montañez, MN; Amarillo-Suárez, A. 2014 Impact of organic crops on the diversity of insects: a review of recent research. Revista Colombiana de Entomología 40: 131 - 142. www.scielo.org.co/scielo.php?pid=S0120-04882014000200001&script=sci_abstract

Background and objective

This review analyses experimental studies published as journal articles between 2001 and 2013 that compare organic and conventional crops to determine whether organic practices effectively improve the conservation of insects compared to conventional practices. Differences in the patterns of abundance and taxonomic diversity of insects on organic vs. conventional crops were analyzed. A comparison of functional diversity is also provided.

Search strategy and selection criteria

Data were compiled from studies published as journal articles that compare the taxonomic, trophic and functional diversity of insects between organic and conventional agriculture. A literature search was performed using ISI Web of Science with the key words "organic farming", "conventional farming", "multitrophic interactions", "insects", "insect biodiversity", "organic agriculture" and "pest and natural enemies". In addition, the references of the papers found in this search were also reviewed. Only papers between 2001 and 2013 were included. The criteria for including a study in this review were as follows: (1) published journal article, (2) compares at least one conventional to one organic crop, (3) explicitly presents data on the diversity (richness and abundance) of the insects in these two agrosystems and (4) compares trophic guilds between the two agrosystems.

Data and analysis

The studies were organized in a matrix of data that contained, for each study, the following information: geographic location, climatic category according to the Köppen climate classification, size of the crop system, and sampling area and method (fields, plots, collecting traps, transects, etc.). A matrix containing the average value, standard deviation (SD) and sampling size (N) for each treatment was developed for each paper. Effect sizes were estimated for comparisons made at three landscape scales: (1) plot; (2) farm; and (3) the landscape matrix. A mixed model of meta-analysis was used.

Number of papers	Population	Intervention	Comparator	Outcome	Quality score
35	Studies assessing the performance of organic systems in comparison to conventional systems.	Organic systems	Conventional systems	Metric: Species richness was used as the measure of diversity. Abundance was considered as the total number of individuals for the study as well as the totals per trophic guild and per sampling unit.; Effect size: Hedge g (standardized difference) comparing the considered metrics between intervention and control	75

Results

- The global data on accumulated effect size revealed a significant increase in species richness associated with the organic agrosystem. In addition, the effect size calculated as the log ratio indicates that organic crops are 39% richer in insect species than conventional crops
- The global data on cumulative effect size were significant, indicating that organic crops have a positive effect on abundance. The cumulative effect size estimated as log ratio shows that insect abundance was 34% higher in organic agrosystems.
- Compared to conventional crops, organic crops supported a higher richness in all trophic guilds. The highest proportion of species is grouped within predators (58%), followed by pollinators (20.3%), herbivores (16.5%), coprophages (3.6%) and parasitoids (1.6%).
- NULL

Factors influencing effect sizes

- Experiment scale : There was a larger effect size at the plot level, followed by the farm scale, and last the landscape matrix. This could be caused by the fact that in small plots, the positive effects are more conspicuous due to the individual behavior of insects such as preferences for some host plants or food resources.

Conclusion

Organic crops certainly increase the taxonomic richness and abundance of insects as well as the richness of insects within trophic guilds (herbivores, predators, pollinators and parasitoids). Thus, the belief that organic agriculture contributes to the conservation of biodiversity is supported by the analyses performed here for the case of insects. An additional and important result that emerged from this study is that both the agrosystem and the surrounding landscape are relevant to the conservation of biodiversity.