



# The Impact of Human Habitat Modification on the Functional Diversity of Insects

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## DESCRIPTION

When people grow crops, pests kill their crops, and insects are the main competitors in the struggle for survival. The insect-plant relationship is a very important biological interaction, and about 50% of insect species are herbivores, and most herbivores feed on plants of a related plant family. Pests destroy 18% of the world's agricultural production, and much of this is controlled by chemical methods. Despite these diseases, less than 0.5% of all known insect species are considered pests. Despite anthropocentric beliefs and social prejudices, insects are not pests in an ecological or evolutionary context. Insects are essential to human life, as reproduction would not be possible without the ecosystem services provided by insects. About 72% of the world's crops depend on insects for pollination. It improves or stabilizes the yields of three-quarters of the world's crops—one-third of the world's crops by volume. Different insect species are associated with increased seed set. There are many species of bees, bumblebees, wasps, flies and insects on many crops, and wild bees are more important pollinators than the honey bee, *Apis mellifera*. Global insect pollination services are estimated to contribute 9.5% to crop yields. Eradication of pests in agriculture is inevitable. Insect predators contribute to important ecosystem functions by controlling insect pests in crops. In 75% of the field studies, generalists were found to significantly reduce pest populations on farmland, with ground beetles being the main predators of food and reducing the population size of economically important agricultural pests such as aphids, slugs, root-feeding flies and herbivorous flies insects are also important for improving agricultural soil. Through their action on the soil, they can add more nitrogen, phosphorus, potassium, calcium and magnesium, or total protein, making wheat plants more productive than artificial fertilizers. Ecosystems are complex systems with many interactions.

In agriculture, ecosystems are increasingly becoming managed ecosystems, resulting in increased resource use, including increased use of agrochemicals and increased input and output. These systems are open systems that lose energy, so external inputs must be paid for. This is in contrast to ecosystems, which

are closed systems, where energy is recycled within the system, eliminating the need for external inputs. In agricultural ecosystems the important ecosystem functions, mostly provided by insects, are systematically removed. Insect pests are created through the manipulation of habitats by humans, where crops are selected for larger size, higher yields, nutritious value, and are cultivated in monocultures for maximum production. Monocultures essentially create “biological deserts” where only a limited number of species can survive. In addition, monocultures provide a highly favourable environment for the population increase of certain herbivorous insects. These herbivorous insects are also capable of evolving to biotypes that can adapt to new situations, for example, overcome the effect of toxic materials, such as pesticides, or bypass natural or artificial plant resistance. When pesticides are used, natural predators are killed in the process, leaving no control for the growth of plant insect populations.

The functioning of the ecosystem is damaged by chemical fertilizers. Excessive use of nitrogen fertilizers will cause fewer plant species to grow, but most insect-resistant plant species will disappear from the system. The heavy use of agricultural production systems and heavy chemicals on agricultural land is the main reason for the rapid decline of biodiversity. The loss of this biodiversity in agriculture has economic and social consequences with long-term impacts on agricultural productivity and food security. Maintaining sustainable land use in unpredictable and changing environments is only possible by maintaining high biodiversity. The shift to sustainable agriculture requires changes in production methods that increase the diversity of agricultural systems. Future research on sustainable agriculture should focus on the role of insects in the ecosystem. By understanding the important role of insects in the ecosystem, people understand their value in agricultural systems. By understanding the ecosystem services that insects provide, we can integrate these insects into agricultural systems by changing management practices to increase the diversity of activities in the system.

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