

The Expected Impact of Global Warming and Climate Change on Insect Biodiversity

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Aim of the Study: Global warming and climate change are one of the biggest international problems. It is considered to affect all living things either positively or negatively. As the insects are poikilotherms, it is biologically reasonable to expect that climate warming will have strong effects on insect biodiversity either directly or indirectly. Growth and development of insects are influenced by changes in the ambient temperature. Therefore, in this study, we intended to review the effect of global warming and climate change on insect biodiversity. For this purpose, we wanted to attract people's attention to understand how the problem is big and devise appropriate measures to mitigate the effects of change in climate on insect biodiversity avoiding being a factor that causes global warming.

Material and Methods: Insects represent almost half of the biodiversity based on so far described numbers of species and are important on ecosystem structure and function. Global warming and changes in climate may influence insects alike all the living things. Of course, this will also have some consequences on the environment. In this study, it was aimed to reveal the effect of global warming and climate change on insect biodiversity. In this context, some behaviour and biological characters of insects such as population dynamics, geogophysical distribution, migration, overwintering, development, longevity, fecundity, voltinism, herbivory, pest outbreaks, pest invasion, parasitism, predatory and synchrony between plants and insect pollinators are discussed with available knowledges and literature.

Results: Insects are important individuals in ecosystem, behaving as herbivores, pollinators, predators and parasitoids and are poikilotherms. Thus insect's body temperature is variable and depends on ambient temperature. And therefore climate change can impact insects at different levels. In general increased temperature affects the pest population dynamics, development, reproduction, diapause, voltinism, winter mortality, survival rate, growth rate, migration and movement of insects. Studies have shown that increased temperature tends to have positive effects on insects. These positive effects can be expected as extension of geographical distribution, increasing of overwintering, rapid population development, increasing voltinism and fecundity, increased risk of pest's invasion by migration. Many insect species, for example, are predicted to expand their geographical range to higher latitudes and altitudes as a result of global warming. Positive physiological responses to increased temperatures will allow for rapid insect growth and movement. Additionally, mild winters would allow reduce insect growth time and reduction in overwintering deaths. In addition to these positive impacts, global warming and climate change may affect insects negatively such as changing insect-host plant interactions, affecting the synchrony between insect pests and their predatory and parasitoids, insect biodiversity and extinction of some species and reducing effectiveness of plant protection managements. It maybe expected that changes in climate will result in causing both temporal and spatial mismatches between plants and herbivores, plants and pollinators, and hosts and parasitoids. As a result, forecasting of changes in geographical distribution and population dynamics of insect pests will be useful to adapt the pest management strategies to mitigate the damage of climate change on crop production and biodiversity.

Keywords: global warming, insect biodiversity, population dynamics, temperature.