



Our views on *Insect Decline*

Background

In recent years, various scientific studies from different parts of the world have been recording declines of abundance, biodiversity, or biomass of insects. Published data on this topic are diverse in geographic and taxonomic focus, methodology, time period covered, and quality, and not all studies are reporting declining tendencies. Nevertheless, available evidence suggests that there has in fact been a decline of insects; the extent of decline however is controversial and variable between different insect groups and different regions. The reasons behind the declines are not yet fully understood; a multifactorial origin is very likely. A variety of potential causative factors has been suggested, but none of them has so far been confirmed as a main driver by strong scientific evidence.

Our View

Considering all available information, it is very likely that the main drivers of insect decline are factors acting at landscape level, which are related to structural transformations of landscapes, habitat loss, and changes in landscape management, including forestry, agriculture, and other aspects related to human activity, like urban development, atmospheric nitrogen input, or light pollution. Likewise, changes in climate can influence the development of insect populations and the distribution ranges of insect species.

Agriculture certainly contributes to the decline of insects, for instance by changes in the structures of agricultural landscapes, modifications of cropping practices, nitrogen input, large-scale monocultures, reduced pasture grazing of livestock, intensive grassland management, and to some degree also crop protection.

On the other hand, agriculture is not likely to be the unique factor, as the recorded declines are not specifically seen in agricultural landscapes, but also in conservation areas. Pesticides may play a certain role, however there is no strong evidence pointing at them as a key driver. Although insecticides

At a Glance

- // The decline of insects, which is currently being observed by scientists, is causing concern to many people. There are signs of declining abundance and diversity of insects in various parts of the world, yet the extent of the decline is controversial and varies from one insect group to another and from region to region.
- // It is very likely that the **main drivers are factors acting at landscape level**, which are related to **structural transformations of landscapes, habitat loss, and changes in landscape management**, including forestry, agriculture, and other aspects related to human activity, like urban development or atmospheric nitrogen input.
- // We are convinced that halting and reversing the decline of insects is a shared responsibility of our society, which only can be tackled effectively by collaboration between all involved stakeholder groups.
- // Being aware of the importance of insect diversity for global ecosystems and for agriculture, Bayer is dedicated to developing and implementing measures to halt and revert insect decline:
 - // Products are only approved for the market if it can be shown that they **do not affect non-target arthropod populations out of the treated areas**.
 - // **New testing methods and risk assessment approaches** for the safety of crop protection products are **continuously developed and improved**.
 - // **Innovative approaches in application technology** can help to ensure as little exposure of non-target insects to pesticides as possible.
 - // Across all continents, Bayer is engaged in **over 30 international collaboration projects with leading scientists and conservation institutes on cutting-edge research to protect pollinators and other insects**.





are used to control insect pests in the treated crops, there are efficient measures in place to avoid adverse effects to insect populations out of the treatment areas. Moreover, no systematic decline of insect pests has been observed, which would have to be assumed if crop protection with insecticides was a significant causative factor.

Bayer is dedicated to make a contribution to closing the knowledge gaps regarding the causes of insect decline. Conducting further research to elucidate causes and taking action to counter insect decline do not exclude each other, and we know enough to act in insect protection.

Our Contributions

Bayer takes the decline of insects very seriously. Being well aware of the importance of insect diversity for global ecosystems and for agriculture, we are dedicated to developing and implementing measures to halt and revert insect decline. We constantly take substantial efforts to minimize the impact of agriculture in general and of our products in particular, to non-target insects, e.g. by the following approaches and measures:

- // Bayer has committed to reduce the environmental impact of crop protection by 30 percent by 2030, helping farmers apply more sustainable practices. This will help reducing the exposure of non-target organisms to crop protection products.
- // In our research and development activities, we strictly follow strategic approaches for the safety of our products, and environmental compatibility is one of the criteria driving our business decisions. As a standard procedure, we comply with rigid testing and risk assessment requirements to assure the safety of our products to non-target insects. Where possible, we proactively even go beyond legal requirements for product safety. Environmental friendliness is an important criterion for us in the decision about product development from early development phases onwards. Products are only approved for the market if they can be shown not to affect non-target arthropod biodiversity out of the treated areas, and that they do not cause adverse effects to the relevant function of the arthropod community even within the treated area. Regarding the environmental friendliness of our products, we are constantly learning and strive for a continuous further improvement of their safety.
- // Bayer is actively involved in the continuous adaptation of new testing methods and the development of new risk assessment approaches for the safety of crop protection products and traits to non-target insects, which reflect the latest state of science.
- // In the area of application technology, Bayer is strongly involved in the development of innovative approaches to minimize the exposure of non-target insects to pesticides – e.g. optimized planting machineries and improved seed coating for seed-applied products, or the Dropleg technology for foliar applied products. Where existing technical standards turned out not to be robust enough to ensure full protectiveness even under worst-case conditions, we proactively go for raising the standards with innovative technological and stewardship approaches (e.g. after an accident with bee intoxications caused by a seed treatment product in Germany 2008).
- // Bt crops are another effective approach to minimize the exposure of non-target insects to insecticides and to reduce the use of insecticides. With their selective mode of action, they are harmless to insects other than the target pests.
- // Since 2010, Bayer jointly with conservation institutes is engaged in research to develop optimized ecological enhancement measures to foster the biodiversity of insects in the agricultural landscape, e.g. in the Upper Rhine Valley in Southern Germany. In other programmes with independent research organizations, we are investigating how insect biodiversity can increase the yield in selected crops and can be protected as a part of agricultural production systems (e.g. in apple orchards in Germany and in avocado plantations in Chile).
- // In currently more than 30 international research collaboration projects with leading scientists on all continents, we are advancing cutting-edge research to protect pollinators and other insects.
- // To address the decline of the monarch butterfly in the US, The Climate Corporation developed the [HabiTally](#) app which is housed by Iowa State University. This app enables farmers and citizens to record their monarch habitat creation, generates data for the United States Fish and Wildlife Service and supports conservation efforts as monarch butterfly habitat can also support many other insect, bird, and mammal species.
- // In 2017, we established a cross-functional Bayer Working Group on Insect Decline, which is bringing together our expertise in disciplines related to the topic. Bayer experts from various disciplines are actively doing research into approaches for in-depth analysis of causative factors behind the decline. In research collaborations with independent scientists, we evaluate data on potential factors behind insect decline and participate in the analysis of long-term monitoring data. In addition, we support independent research on insect decline and are engaged in the dialogue with multiple stakeholders involved in the topic.

Beyond these approaches, Bayer has developed an action plan comprising further activities, which can help protecting, and restoring insect biodiversity in the context of sustainable agriculture:

- // More targeted and specific pesticide application and thereby further reduced exposure of non-target organisms by means of digital application technologies – including drone application.
- // Toxicogenomic approaches to support a more targeted development of environmentally friendly and selective crop protection products as they can reveal at an early stage of development which mode of action may affect which taxonomic groups.
- // Application of digital methods of yield potential mapping to optimize the positioning of landscape measures fostering insect biodiversity in agriculture, thus optimizing balance between insect protection and agricultural productivity.
- // With our Biodiversity Strategy, which is focusing on biodiversity-enabling cropping systems, sustainable vegetation management, and capacity building, we strive to conserve and restore biodiversity within and beyond cropping systems.

With these approaches, Bayer actively contributes to the protection of insect diversity in agriculture, and to halting insect decline. Moreover, we collaborate on the topic with scientific stakeholders like universities and entomology associations. We are convinced that halting and reversing the decline of insects is a shared responsibility of our society, which only can be tackled, effectively by collaboration between all involved stakeholder groups.

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