

## Impacts of Climate Change on Honey Bees

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Impacts of Climate Change on Honey Bees Changes in global climate are likely to affect the behavior and lifestyle of many animals, including insects. For insects, an increase in temperature and humidity means an increase in growth rate, displacement rate and reproductive capacity, and these changes can also affect ecological processes taking place in nature. Changes in the climate will also change the character of the environment in which living things live, and these changes will indirectly affect the behavior of insect societies living in that ecological environment. It is thought that climate changes will cause some important differences in the physiology and geographical distribution limits of insects. In particular, changes in temperature and humidity affect the function of insect metabolism, reproductive capacity, feeding habits and, accordingly, its distribution.

Biodiversity provides insurance against adversities and changes in environmental conditions. Climate change may cause living species living in a region to leave the area they live in, as well as the establishment of new invasive species that are not native to the region and the extinction of some species from the world.



Swarming of honey bees



Absconding of honey bees

## Impacts of Climate Change

The historical process of the bee, it is seen that it has genetics that can adapt to new environmental conditions such as temperature. Climate change may have a direct impact on honeybee behavior and physiology. Decreasing flower quality in the environment may reduce colony development and therefore productivity. Honey bees may have to search for new food

sources as a result of new competitive relationships between species and races. It should not be forgotten that in these new environments, indigenous genetic resources will come to the force. Although differences are expected in phenological responses to climate change among species, these responses occur at the same rate between plants and their pollinators. Since wild bees also take part in pollination, their adaptation to climate changes becomes important. It has been stated that plant flowering and pollination activity time is strongly affected by temperature. If climate change affects pollinator-dependent crop production, it will have significant implications for global food security. This is because insect pollination contributes to the production of 75% of leading global food crops. The global warming of between 2.4 °C and 6.4 °C by 2099 on watermelon pollination would result in a 14.5% decrease in pollination managed by honeybees and an increase in pollination provided by native wild species. The biodiversity should be preserved to minimize the effects of climate change, because plant pollination would decline faster without native pollinators. Honeybees are the most economically important pollinators of agricultural products. Honey bees are creatures with high adaptability to temperature changes in their environment. While climate change causes a decrease in the quality of flower pollen and nectar in the current ecology, it may have a direct impact on bee behavior and physiology and the quantity and quality of bee products. Honey bees may have to search for new food sources as a result of competitive relationships between species and races and native genetic races may be more advantageous in this competition. Changes in the global climate will likely affect the behavior and lifestyles of many animals, including insects. Increase in temperature and humidity for insects, It means increasing the development rate, displacement speed and reproductive capacity. It has been determined that genotype and environment significantly affect colony development, and are especially important in terms of adult bee population and wintering ability. The importance of biodiversity has been increasing in recent years. Honey bees are creatures with high adaptability. In this context, the future of native bees of the region is endangered by bringing breeds that are thought to be productive to the region due to reasons arising from development policies in developing countries and other countries. For this, local genetic resources must be kept under control with appropriate genetic models and breeding strategies. It has been stated that if the effects of climate change continue in the region, it will become impossible to grow the Caucasian genotype in the region. Climate change reduces survival, reproduction and habitat. For this reason, ecologists work to manage biodiversity in sustainable agricultural lands and reduce the effects of climate changes. The beekeepers complained that nectar and pollen resources that bees can use to raise offspring are scarce, especially in the early spring months, and that in recent years, as an effect of global warming, the flowering and nectar secretion periods have changed and honey yield has decreased. In this respect, it has been stated that it has become a necessity for bee colonies to be fed with additional feeds with appropriate formulations in March and April in order to produce more offspring and enter the nectar flow more strongly. Lack of sufficient nectar in the nectar source visited by honey bees is an important stress factor. In this case, it seems that cooperation between forager bees is aimed to reduce competition. In case of insufficient nectar and pollen sources, honey bees even self-destruct by sticking their heads into the honeycomb cells in order to preserve the limited food available for the next generation. For the planning of food resources of bumblebees, 4 types of pollen and nectar mixtures and 6 types of wildflower mixtures were collected. Solutions against the current global warming have been investigated on the beginning and end of flowering, planning of new blooms and their breeding. The effects of climate change on honeybee populations depend on specific life cycle characteristics and physiological adaptations. Early winter application to the bee, which needs a certain period of cold to complete the dormancy period, disrupted the development of the dormancy period, but did not have a negative effect on physical development. Therefore, in the global warming scenario, it has been stated that phenotypes with a long summer pause period, which effectively maintains the short pre-winter period despite the delayed arrival of winter, can replace the phenotypes with a short summer pause period.

## Conclusion

It is a fact that our country will be more affected by climate change due to intensive agricultural activities. Many fruit species currently grown are exposed to sudden heat and cold, and farmers suffer financial losses. Precautions against climate change should be taken and the varieties to be grown should be well determined. For a mistake made in fruit growing, the effects of this mistake are paid for many years. In addition, since climate is one of the stress factors that directly affects the food resources needed by honeybees, intensive migratory beekeeping is used to get maximum efficiency from the flora. Sudden climate changes, if no precautions are taken, can lead to a decrease in resistance in weak colonies, an increase in disease and pest activity, and eventually the extinction of the colony. A good beekeeper must follow meteorological data and flora and take precautions. Farmers have to take some economical technical and cultural measures, considering meteorological events. For this reason, data on climate parameters is always needed in fruit growing and beekeeping and they are affected by climate change. Now agricultural production it has become an activity carried out by fighting against the climate.

## References

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