

## **Genetic polymorphism, distribution and adaptive capacity of Ukrainian honey bee breeds**

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In recent years, the problem of the global loss of western honey bees (*Apis mellifera* L.), which threatens catastrophic consequences not only for the ecosystems of the planet, but also for food security and the world economy, is causing more and more concern. One of the reasons for the mass death of bees and the decrease in their productivity, in particular in Ukraine, could be the loss of indigenous breeds of *A. mellifera* that are well adapted to local environment, as a consequence of the introduction of bees of other geographical origin, which is widely practiced by amateur breeders.

In the project, by means of morphometric analysis and molecular barcoding using mitochondrial (*CoxI-CoxII*) and nuclear (5S rDNA) molecular markers, monitoring was carried out and the current distribution of subspecies/breeds of honey bee in regions of Ukraine was clarified. It has been found that more than 90% of bees in Ukraine are hybrid forms that arose as a result of uncontrolled hybridization between the Carpathian, Ukrainian steppe and Gray Caucasian breeds. Genetic material of the Dark European breed and Western European lines of *A. m. carnica* is almost absent in Ukraine. In all regions of Ukraine, there is a significant violation of honeybee zoning, which creates conditions for uncontrolled hybridization and results in disappearance of indigenous breeds.

By means of a large-scale survey of beekeepers, a comparative analysis of the health of bees in regions of Ukraine was conducted and potentially threatening environmental factors that cause the death of bee colonies during wintering were identified. Annually, the national level of total losses does not exceed the average compared to other European countries. At the same time, the relative risk in some administrative regions may significantly exceed the average value.

Physiological changes in the body of worker bees during preparation for wintering and under the influence of low temperatures were experimentally evaluated and the influence of different diets on biomarkers of stress and bee survival was studied. It has been demonstrated that the consumption of feed containing pollen or beebread has a positive effect on the lifespan of worker bees.