

Honey bees – nature conservation with genetic engineering?

Gene scissor CRISPR being used to produce pesticide-resistant honey bees

3 July 2019 / In February 2019, the first paper on using CRISPR technology to produce pesticide-resistant honeybees was published in South Korea. Ostensibly, this is intended to ‘protect’ the bees from insecticides. This is further not just a one-off case: more and more stakeholders are interested in promoting genetically engineered organisms to ‘protect’ endangered species. Ultimately, it means that wild populations might be replaced by genetically ‘optimised’ organisms.

One goal of the Korean research, written as an MSc thesis, was to make honey bees resistant to the insecticide spinosad. It cannot be concluded from the thesis whether this was successfully accomplished or not. Another paper published by US scientists in 2019, shows how the CRISPR/Cas nuclease can be used to investigate and manipulate the development of honey bee queens. This paper also discusses the possibilities of producing pesticide-resistant honey bee colonies.

“The problems in the conservation of species cannot be solved by replacing them with genetically engineered organisms. If we want to protect honey bees, we have to encourage the protection of wild populations and their ecosystems,” says Christoph Then for Testbiotech. “Given the complex biology of bee colonies and their manifold interactions with the environment, such interventions on the level of the genome cannot be justified. We have to set effective limits to genetic engineering applications.”

Most recently, the number of projects aiming to intervene in ecosystems via genetic engineering has increased strongly. For example, the release of chestnut trees with blight resistance is being discussed in the US. Furthermore, there are plans to manipulate insects and rodents via gene drives in a way that whole populations could become extinct. In the near future, mosquitoes could be infected with a transgenic fungus that produces an insecticidal toxin to prevent malaria. The use of insects to broadly spread genetically engineered viruses in the environment is also under discussion. Some of these applications are also discussed in a recent report of the International Union for Conservation of Nature (IUCN), also commented by Testbiotech.

There is a general problem with these applications: if genetically engineered organisms persist and propagate in the environment, the biological characteristics of their offspring can be quite different from those originally intended. In addition, their reaction to environmental impact cannot be predicted. Christoph Then adds: “In regard to the precautionary principle, it is important that releases cannot be allowed if there are no effective methods available to prevent the uncontrolled spread of the genetically engineered organisms. We have to make such standards mandatory by including them in regulation.”

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Further information:

Factsheet - genetic engineering and honey bees: www.testbiotech.org/node/2383

Testbiotech comment on the IUCN report: www.testbiotech.org/content/testbiotech-comment-iucn-report-conservation-synthetic-biology