

Disturbance in interactions between GE cotton and the environment

Research shows risk of invasive spread in centre of biodiversity

11 February 2021/ It is known that genetically engineered (GE) cotton is spreading within populations of wild cotton species in Mexico. Resulting offspring are often transgenic and, consequently, produce insecticides or are resistant to the herbicide, glyphosate. A recently published paper has now shown that there are disturbances in the interactions between the transgenic offspring and their environment. This finding has serious implications for the protection of wild cotton species because Mexico is one of the centres of origin for cotton.

Cotton plants naturally produce a kind of nectar on their surface. If plants are attacked by pest insects, they produce more nectar. This attracts predatory ants which help to reduce the pest insects. The new study shows that the amount of nectar is significantly changed in the hybrid transgenic offspring.

Both types of transgenic offspring were examined: those that produce insecticides (Bt toxins) and those that are resistant to glyphosate. There were significant differences in comparison to the wild cotton plants: in the wild species, the amount of nectar and the composition of the ant populations was changed after infestation with pest insects. However, these reactive changes were absent in the transgenic plants: instead, the amount of nectar was permanently reduced in the herbicide-resistant cotton and in the Bt plants it was permanently enhanced.

Consequently, there were also changes in the ant populations: in general, there were more ants in wild cotton plants. There were also differences in the types of ant species: there was a reduction in ant species that are especially useful in combating pest insects in cotton with herbicide resistance, whereas it was higher in the Bt plants.

Ants are important as a defence against pest insects and in the distribution of wild cotton seeds; therefore, the disturbance in the interactions between the cotton plants and their environment can have significant long-term impacts. The higher nectar production may enable the Bt cotton plants to become invasive. It could mean that wild cotton species may be replaced by transgenic plants, which would be a disaster for the centre of biodiversity of cotton species.

On the other hand, the herbicide-resistant cotton seems to show reduced fitness: in these plants, there was an increase of pest insect damage. However, findings from other researchers indicate that additional EPSPS enzymes produced in the transgenic plants to make them resistant to glyphosate, also enhance plant growth and number of seeds unintentionally. Consequently, the herbicide-resistant GE plants could acquire the characteristics of invasive plants. The researchers emphasise that the transgenes are currently spreading rapidly in natural populations and some offspring even inherit combinations of several transgenes. Against this backdrop, urgently recommended measures must be taken to protect the centres of biodiversity much more efficiently.

Contact:

Christoph Then, info@testbiotech.org [1], Tel + 49 (0) 151 54638040

Further information: [Current publication from Mexico \(2021\)](#) [2]

[Initial publication on the spread of genetically engineered cotton in Mexico \(2011\)](#) [3]

[Publication on higher fitness of glyphosate resistant GE plants](#) [4]

[Testbiotech publication on the risks of uncontrolled spread of genetically engineered plants \(2020\)](#) [5]

Source

URL: <https://www.testbiotech.org/en/news/disturbance-interactions-between-ge-cotton-and-environment>

Links

[1] <mailto:info@testbiotech.org> [2] <https://www.nature.com/articles/s41598-021-81567-z> [3] <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-294X.2011.05258.x> [4] <https://www.nature.com/articles/s41598-017-07089-9> [5] <https://enveurope.springeropen.com/articles/10.1186/s12302-020-00301-0>