# Genome-edited plants: negative effects on ecosystems are possible

New scientific publication shows the need for detailed investigation of ecological risks

30 March 2021 / A new scientific publication in the *Environmental Sciences Europe* journal provides an overview of the unwanted effects the release of genome-edited plants can have on ecosystems. These result from the intended properties induced by genome editing and can contribute to various metabolic processes. The publication is based on *Project Genetic Engineering and the Environment (FGU)* findings, and is one of the first worldwide to focus on ecological risks associated with specific CRISPR/Cas plant applications.

Genome editing applications predominantly using CRISPR/Cas gene scissors can increase the possibilities and speed with which the genome of plants can be changed. It does not matter whether additional genes are integrated into the genome. Even small genetic changes induced several times and in combination to generate novel properties, can significantly change metabolic pathways and ingredients. Consequently, plants with new properties must undergo risk assessment even if no additional genes are inserted.

The study uses camelina (*Camelina sativa*) to explain possible unintended effects that the release of a genome-edited crop can have on ecosystems. Camelina is rich in polyunsaturated fatty acids. The CRISPR/Cas application aimed to increase the amount of oleic acid in the camelina seeds and to reduce the amount of easily oxidizable fatty acids. This was intended to extend the shelf life of the oil extracted from camelina.

Camelina has a six-fold set of chromosomes and is, therefore, a good example to demonstrate that even small changes in the genome created with CRISPR/Cas can have a huge effect: gene scissors were used to simultaneously knock out 18 gene copies in the genome of the camelina and thus generate plants with a higher oleic acid content. Such interventions have until now hardly, or not at all, been possible with conventional breeding methods and can give rise to completely new biological properties. In the USA, these plants have already been deregulated without undergoing thorough risk assessment.

Diverse properties can be changed with CRISPR/Cas applications. In the case of camelina, gene scissors have often been used to change the composition of the fatty acids. However, besides the desired properties, unintentional effects on various processes can also occur, e.g. effects on the formation of certain messenger substances with which plants communicate and with which they, for example, ‘warn’ of a pest infestation. A change in the composition of fatty acids can affect and influence existing food webs. Apart from this, there is also the possibility that genome-edited plants will hybridise with wild species leading to unintended effects in subsequent generations. At the same time, the genome-edited camelina has the potential to persist in the environment and spread uncontrollably.

A recent EFSA opinion also comes to the conclusion that plants with complex genetic changes need to undergo risk assessment, even in cases where no additional genes are inserted.

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**Further information:** The new publication [2]
The Project Genetic engineering and the Environment (FGU) website [3]
Testbiotech news about a recent EFSA opinion [4]

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