

New scientific publication on novel risks and applications of gene scissors

Need for a case-specific risk assessment of plants obtained from new genetic engineering

26 October 2021 / A new study published in the scientific journal, Plants, presents the specific risks of new genetic engineering techniques and gives an overview of possible gene scissor applications. Inducing supposedly small alterations in the genome of crop plants can nevertheless generate complex changes. The results of the study highlight the need for plants developed using New Genetic Engineering techniques to undergo case-specific risk assessment, taking both the properties of the end product and risks posed by the applied procedures into account.

The study was published in a special issue "Potential Unintended Effects of Genetic Technologies in Plants" of the scientific journal, Plants. The study focuses on so-called SDN-1 gene scissor applications, such as CRISPR/Cas, which can be used to induce small changes in the genome of target organisms. These small changes can be applied multiple times and in combination, and thus lead to significant changes in the metabolism and ingredients of plants.

The study concludes that in slightly more than half of the examined studies on crop plants, individual genes are knocked out by small changes. Among them is the 'CRISPR tomato' which has already been approved in Japan and has an increased content of an antihypertensive ingredient (i.e. GABA). This case highlights the fact that conventional breeding was not able to change the relevant genes in the way that was possible using gene scissors.

SDN-1 applications are also used to simultaneously modify several genes (i.e. multiplexing) or several gene variants at the same time. In camelina, for example, 18 gene copies of the target genes were knocked out simultaneously in order to produce plants with a higher oleic acid content. Such interventions would have been practically impossible to achieve with conventional methods. They can, however, lead to new biological properties in the respective plants.

In addition to the intended genetic changes that SDN-1 applications can achieve, the publication also presents specific and partly novel risks associated with gene scissors and caused by unintended effects. On the one hand, these so-called off-target effects can result from the fact that the gene scissors cut at unintended regions of the genome, and thus induce changes at these sites. On the other hand, the gene scissors can also cause unintended changes at the target sequence (also called on-target effects). Many of these unintended effects are triggered by the multi-step procedures used during the application of New Genetic Engineering techniques. Therefore, risk assessment must examine in detail the unintended changes both in the genome and in the metabolism of the respective plants.

The publication is of particular relevance in the context of current discussion on the future regulation of new genetic engineering methods. At the end of September, the EU Commission presented a document proposing far-reaching deregulation of, amongst other things, SDN-1 applications in plants if they can also be produced conventionally. In doing so, however, it is largely disregarding current scientific findings on the risks of the new methods.

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Further information: [The new publication](#) [2]

[Background information on the risks of CRISPR/Cas applications by the „Project Genetic Engineering and the Environment“](#) [3]

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