New findings on the evolution of plants

Research outcomes also concern the differences between New GE and conventional breeding

14 January 2022 / A new scientific publication in *Nature* shows that the occurrence of mutations in plant genomes is not purely random, and their frequencies in populations do not only depend on the mechanisms of selection. However, it is now becoming evident that there are natural mechanisms in the genome which prevent specific genomic regions from frequent mutations. The published research sheds new light on evolutionary biology and, at the same time, raises questions in regard to the consequences of genetic engineering in plants.

The results presented in the publication show that genes essential for the survival of species are more frequently repaired by natural mechanisms in the cells, compared to others. In addition, both the structure of the chromosomes and the location of the genes influence the rate of mutations. The scientists who conducted the research are interpreting these findings as evidence of evolutionary mechanisms, which were so far not known. According to the research, the existence of the described mechanisms means that selection is not the sole factor to determine which genetic variations will be dominant over the course of time.

These findings are also important for the discussion of new genetic engineering (New GE or genome editing): CRISPR/Cas can be used to alter genes that are particularly well protected by natural repair mechanisms. The genetic scissors prevent the cells from restoring the original function of the gene; they can also override other natural protection mechanisms. For example, as far as applications of genetic scissors are concerned, it hardly matters where the genes are located in the genome. In addition, CRISPR/Cas also can block the function of all the ‘backup’ copies of a target gene, of which there can be several in the genome of the plants.

Plants developed with these methods can both be profoundly changed and exhibit completely new genetic combinations, even if no additional genes are inserted. Their biological traits can be clearly different in comparison to those found in conventional breeding. Therefore, the risks associated with these plants must be thoroughly assessed.

A scientific paper published by the *‘Project Genetic Engineering and the Environment’* in 2019, highlighted the differences between conventional breeding and new genetic engineering. The findings in this earlier publication have now been backed by this latest publication on evolutionary biology.

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

Further information: The Nature publication [2]
The 'Project Genetic Engineering and the Environment' publication [3]

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