



Unintended Effects of Genetic Manipulation

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High Rate of Unintended Mutations in *Arabidopsis* Plants Genetically Engineered with CRISPR/Cas9 Method

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An experiment using the popular new genetic-engineering method called CRISPR/Cas9 to manipulate *Arabidopsis* plants generated an unexpectedly high rate of off-target mutations, the researchers involved have reported. Moreover, the evidence of off-target mutations was higher in the second generation of plants grown from genetically engineered seeds than it was in the first generation.

The study, which was published in March 2018 in the peer-reviewed journal *Plant Molecular Biology*, was conducted by a team at the China Agricultural University in Beijing, China. *Arabidopsis*, a weedy plant in the mustard family, is often used as a model organism in GMO plant research. The researchers also tested and worked to refine different strategies to reduce the off-target effects. They report that by doing so they were able to significantly improve the accuracy of the genetic manipulations they were attempting. They advise other researchers, depending on their specific circumstances, to use some combination of six specific techniques to try to avoid off-target effects when using CRISPR/Cas9 in plants.

"Altogether, our results suggest that in plants, continuous attention should be paid to off-target effects induced by CRISPR/Cas9 in current and subsequent generations," the authors conclude. They add that the particular strategies they refined in the study to try to limit unintended mutations "will be useful in improving" the capacity of genome-engineering efforts involving plants and other organisms to succeed in making intended genetic changes while avoiding unintended changes.

Sources

Zhang, Q., H.L. Xing, Z.P. Wang, et al. (2018). "Potential High-Frequency Off-Target Mutagenesis Induced by CRISPR/Cas9 in *Arabidopsis* and Its Prevention," *Plant Molecular Biology* vol. 96, nos. 4-5, pp. 445-456. <https://doi.org/10.1007/s11103-018-0709-x>