

'Golden Rice': Unexpected genomic effects

Rice plants show reduced growth and irregular gene expression

15 February 2017 / A new publication has reported unintended effects in genetically engineered rice producing precursors of vitamin A, so-called carotenoids. Crossing the manipulated rice with the Indian variety Swarna led to a nasty surprise: The resulting plants showed extensive disturbance in their growth. The researchers identified several reasons for this: The new gene constructs interfere with the plant's own gene for producing growth hormones, and the additional gene constructs were not, as intended, active solely in the kernels, but also in the leaves. This led to a substantial reduction in the content of chlorophyll that is essential for vital functions in the plants.

These unintended effects were not detected in previous investigations, and it was assumed that the genetically engineered plants used in these trials would show genetic stability. In fact, these detrimental genomic effects remained undetected until the transgenic plants were crossed with the variety called Swarna, which is grown widely in India.

The observed effects are highly relevant for the risk assessment of the plants. Once released, the transgenic plants could spread their gene constructs into populations of weedy rice as well as other cultivated varieties. In addition, genomic effects not found in the original plants can occur in plant offspring. At the stage when the hazards are identified, it can be impossible to remove the transgenes from the environment.

"Instead of helping people to combat malnutrition, these plants, if grown on the fields, might endanger their whole rice harvest," Christoph Then says for Testbiotech. "It is worrying that effects that can arise from crossing genetically manipulated plants with other varieties are, as yet, not included in risk assessment."

It is not the first time that such problems have been reported: Some other 'Golden Rice' lines are already known to show irregular patterns of inheritance. Furthermore, there are uncertainties regarding the biological quality and safety of the plants. For example, additional changes in the metabolism of the rice kernels were described in 2016.

So far, there are no varieties available for commercial cultivation. According to the International Rice Research Institute IRRI, the safety and usefulness of the plants for nutrition needs further investigation.

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

Further information: [The new study on unexpected genomic effects](#) [2]
[Publication on changes of metabolism in 'Golden Rice' plants](#) [3]
[Testbiotech report on 'Golden Rice'](#) [4]
[More information by Testbiotech on "Golden Rice"](#) [5]

Source URL: <https://www.testbiotech.org/en/news/golden-rice-unexpected-genomic-effects-0>

Links

- [1] <mailto:info@testbiotech.org>
- [2] <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169600>
- [3] <http://journal.frontiersin.org/article/10.3389/fpls.2016.01622/full>
- [4] <http://www.testbiotech.org/node/1004>
- [5] http://www.testbiotech.org/en/limits-to-biotech/rice/basic_paper

