

CRISPR mustard greens for the US

Pairwise to sell mustard greens as salad leaves

25 May 2023 / The biotech company, Pairwise, has announced that it will soon bring mustard greens produced using new genetic engineering (New GE) techniques to the US market. The plants are genetically engineered with the aim of making the leaves less pungent, and the company has also applied for a patent (WO2021030738). According to a 2022 publication, New GE was used to alter 17 genes in the plant genome in parallel.

Brown mustard (*Brassica juncea*) is grown worldwide for use in oil and mustard production. This plant species is able to spread in the environment and can be hybridized with related species; it is pollinated by insects. The plants naturally produce substances known as glucosinolates, which act as a defense against pests and are also known to be associated with health benefits.

Pairwise used CRISPR/Cas to intervene in the metabolism of the glucosinolates and knock out specific gene functions of an enzyme. As a result, the leaves are less pungent. However, this intervention is associated with a reduction in those compounds which are especially relevant for positive health effects and necessary for the plants' defense mechanisms.

According to the 2022 publication, the process of genetic engineering resulted in unexpected genetic changes such as rearrangements and recombination of gene sequences. In addition, transgenic gene segments were unintentionally inserted into the plant genome. Unintended genetic changes may still be present in the plants when they are brought to market.

The U.S. Department of Agriculture (USDA) deregulated the plants without carrying out a detailed risk assessment – they neither investigated possible health effects nor environmental risks in any detail. Specific impacts on the cultivation of the plants were also not considered, e. g. such as a greater need for pesticides due to weakened defense mechanisms.

Testbiotech doubts that there are any significant benefits associated with the cultivation and consumption of these plants. Similar to two other New GE crops that have already been brought to the market, i.e. tomatoes with alleged blood pressure lowering effects and soybeans with altered oil content, no real progress seems to be associated with their introduction. As with previously introduced transgenic plants, it appears that the biotech companies are bringing everything technically feasible and potentially profitable to market.

In addition, according to Testbiotech, there remain questions about whether the plants are safe for human consumption and the environment. The depth of the genetic intervention means it could disturb plant interactions with their environment, e.g. with insects and soil organisms. It is also possible that the composition of the plants is altered in a way that their consumption has negative effects on health, or that any natural positive health effects are lost. Therefore, more detailed risk assessment would have been necessary.

Pairwise is cooperating with Monsanto (Bayer) and specializes in applications of new genetic engineering in plants. It has already filed nearly 200 patent applications and announced the introduction of New GE plants several times.

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Further information: [Pairwise publication \(Karlson et al., 2022\)](#) [2]

[The patent \(WO2021030738\)](#) [3]

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