

GMOs vs. mutagenesis vs. conventional breeding: Which wins?

When countries reject or ban genetically modified crops over safety concerns, agricultural companies often turn to developing new strains using mutagenesis—wherein plants are subjected to radiation treatments or doused in toxic chemicals that randomly scrambles genes to produce new traits.

Despite the fact that this process is much less precise than genetic modification—in which scientists take a gene that gives rise to a desired trait, such as pesticide resistance, and insert it into the target plant—mutagenesis is unregulated and widely used.

One example of this is the [Rio Red grapefruit](#), which was created in a laboratory after years of experimentation. Because mutagenesis, like genetic modification, is a process, mutagenetically created Rio Reds can even be sold as organic.

Is mutagenesis really safer than genetic modification? The [pseudonymous](#) “BioChica,” a scientist with a PhD in molecular genetics who writes the [FrankenFoodFacts blog](#), addresses the safety differences of GMOs, mutagenesis and conventional breeding by looking at peer-reviewed academic papers and other publications.

BioChica focuses on the potential of unintended changes in gene expression that may result from the different methods of breeding. A [paper](#) from the Proceedings of the National Academy of Sciences, which compared GM rice to ‘mutant’ rice, concluded that, although there are unintended genetic changes in the GM rice, there were far fewer than in rice bred through mutagenesis, although the potential for harm in both cases is trivial.

She also dissects a 2010 [paper](#) that concluded that year-to-year climate variation and geographic location accounts for more changes in gene expression in crops than the process used to develop them. The environment in which a plant is grown has more impact on the plant’s genome than whether it was genetically modified or conventionally bred.

Both papers recommend that food safety assessments be carried out on a case-by-case basis, rather than “just lumping all genetically modified foods into one category.”

“I fail to see how mutagenic technologies are any safer than [genetic modification],” BioChica writes. “Substantial equivalence” is the starting point for food safety assessments, and hundreds of studies [indicate](#) that genetically modified crops are substantially equivalent to their non-GM counterparts. Food safety should be regulated, but the regulations should be on the food product itself, not on the method used to grow a particular crop.

The National Academy of Sciences [agrees](#), saying that “regulating genetically modified crops while giving a pass to products of mutation breeding isn’t scientifically justified.”

Read the full, original story here: [Death Match: Transgenesis vs Traditional Breeding](#)

Additional Resources:

- [Anti-GMO activism forces countries to use unregulated chemical and radiation techniques to breed new varieties](#), Bloomberg News
- [Popular sweet grapefruit 'Rio Red' a product of unregulated, process of mutagenesis](#), Science Based Cuisine
- [FAO publication: Induced Plant Mutations in the Genomics Era](#), Food and Agriculture Organization of the United Nations