

Massive Review Reveals Consensus on GMO Safety

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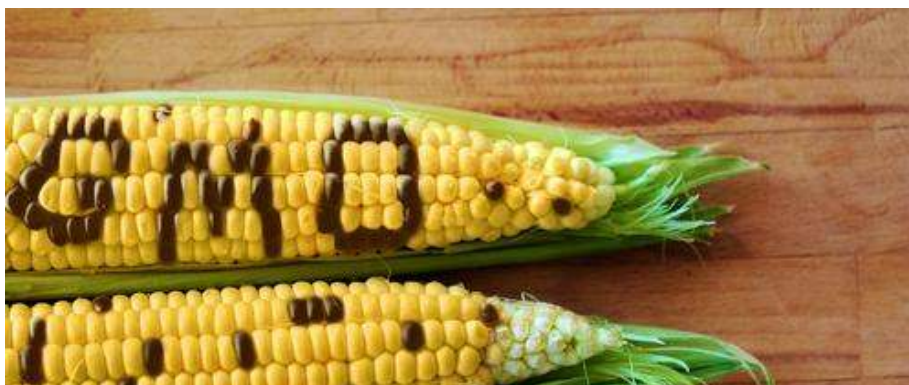
"The scientific research conducted so far has not detected any significant hazards directly connected with the use of genetically engineered crops."

That's the conclusion from a team of Italian scientists, who just completed a thorough systematic review of the scientific research conducted on genetically modified (GM) crops in the past decade. Their work is published in the journal *Critical Review of Biotechnology*.

Led by Alessandro Nicolia, an applied biologist at the University of Perugia in Italy, the team collected and evaluated 1,783 research papers, reviews, relevant opinions, and reports published between 2002 and 2012, a comprehensive process that took 12 months to complete. The records covered all aspects of GM crop safety, from how the crops interact with the environment, to how they could potentially affect the humans and animals who consume them.

"Our goal was to create a single document where interested people of all levels of expertise can get an overview on what has been done by scientists regarding GE crop safety," Nicolia told RScience. "We tried to give a balanced view informing about what has been debated, the conclusions reached so far, and emerging issues."

Overall, the scientific literature was heavily in favor of GM agriculture.





The report delved into specifics. First focusing on the effects that GM crops might have on biodiversity, the researchers found little to no evidence that GM crops harm native animal species. Furthermore, their review revealed that non-GM crops actually tend to reduce biodiversity to a higher degree.

Nicolia and his team also examined the literature for answers to a common worry: that the genes of GM crops will spread to wild plants, other crops, and even microorganisms. The review affirmed that this can indeed occur.

"The formation of hybrids between GE crops and wild relatives is possible and documented," Nicolia said.

There is a caveat, however. According to Nicolia, this sort of thing happens naturally all the time with normal crops. Local plant genotypes get replaced. Wild plant populations mutate and become resistant to herbicides. Soil bacteria can niftily uptake genes. But this isn't necessarily harmful. **It's just evolution.**

To date, there's little to no evidence that GM crops damage the environment. Similarly, they're also safe for the animals and humans who consume them. Before all GM crops are sent to market, they must first be shown to be comparable to their unaltered counterparts. For example, nutrients should be present in near identical amounts, and potentially toxic molecules should be absent. This process, known as substantial equivalence, has been very successful thus far. Nicolia's team couldn't find a single credible example demonstrating that GM foods engender detrimental effects in those that consume them.

But what about the transgenic DNA inserted into GM crops? Could that somehow muck with our precious genes? The answer, according to the review, is no. We ingest genetic information every day, between 0.1 and 1.0 gram of DNA. This doesn't affect us, however, because, according to every study ever conducted on the topic, DNA cannot be integrated into our cells, and the DNA of GM crops is not functionally different to the DNA of non-GM crops.

Another concern espoused by GM opponents is that the proteins encoded by the genes inserted into GM crops can be toxic or allergenic. Again, the reviewers found no evidence that this is the case.

Opponents of GM crops are in the news. In Washington, they're **pushing to label all GM products**. Nationwide, they're viewing *GMO OMG*, a new **documentary** damning genetic modification. On the Internet, they're cheering a just-released report announcing that **non-GMO food sales** will total \$178 billion this year, and are predicted to rise substantially by 2017.

Sadly, much of their discourse is devoid of scientific evidence, leaving a vacuum that gets filled with emotionally persuasive anecdotes, accusations of corporate corruption, and often erroneous information. It remains to be seen whether or not there will be room for the evidence contained in this exhaustive review.

Source: Alessandro Nicolia, Alberto Manzo, Fabio Veronesi, and Daniele Rosellini. An overview of the last 10 years of genetically engineered crop safety research. *Crit Rev Biotechnol*. 2013. doi:10.3109/07388551.2013.823595

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