

A response (by Dick Atlee, 03/25/14) to

The Evidence on GMO Safety

Posted on April 28, 2013 by Ramez Naam

<http://rameznaam.com/2013/04/28/the-evidence-on-gmo-safety/>

Mr. Naam's initial disclaimer:

First, a statement on my interests: I have no relationship whatsoever with Monsanto or any other ag or biotech company. I hold no Monsanto stock. I get no money from them. Nothing of the sort. My only interest is in advancing public knowledge of a technology that's widely misunderstood and which, when well-managed, can benefit both humanity and the planet. All the research I presented was research I did when writing my book on innovating to save the planet, *The Infinite Resource: The Power of Ideas on a Finite Planet* (<http://www.amazon.com/dp/161168255X>).

...I want to link to statements from the world's most respected scientific bodies and journals on the topic of GMO safety. Here's what they say. (Update: Below that I will answer some other common questions on GMOs which I receive.)

Dick Atlee: *Before I begin, it should be pointed out that "premier," "prestigious," "respected," "learned," etc. applied to scientific or professional societies is an invocation of authority, not of science. The question has to be, "What does the SCIENCE show, and is that science well-done and clear of conflict of interest?" Societies are subject to the many non-scientific pressures that professions as a whole are subject to, perhaps in an even more concentrated way.*

Beyond the points in this article, the issue of the driving out of seeds adapted over millennia of breeding to a wide variety of environmental situations is not addressed. The loss of gene pool biodiversity will inevitably become dangerous as the climate begins to be less predictable and the need for material for hybridization becomes ever more important.

My responses to Mr. Naam's points are presented in italics.

The US National Academy of Sciences

This is the premier scientific body in the United States. They have repeatedly found genetically modified food safe, noting that after billions of meals served, "no adverse health effects attributed to genetic engineering have been documented in the human population."

- 1. Because there is no labeling, there is no way to document health impacts of GMOs.*
- 2. Optional (not required) animal feeding studies are 90 days in length, the human-life equivalent of 8-9 years. The Seralini study demonstrated that toxic effects only began to develop after this, and really became pronounced only in the second year -- last half of life. The human experiment has only been going on for less than 20 years. There hasn't been sufficient time to make a "no adverse health effects" claim.*
- 3. The outbreak of soy allergies in the U.K. after the introduction of GM soy is well documented.*

4. *The deadly 1980's L-tryptophan epidemic involved ONLY those who took the GM version of the supplement. The attempt to blame this on poor filtration is ridiculous -- if there had not been a GM-related issue, filtration would have been irrelevant. The main point of the affair was that if the diseases hadn't been acute, fast-acting, unique, and associated with a particular food, it never would have been spotted.*
5. *The radical rise in food-related illnesses has tracked the rise in GMOs. While this is a correlation rather than a proof of cause, it is important to look at the effects of Roundup on certain metabolic pathways and liver enzyme systems, systems which are vital in preventing a large number of diseases (see especially Dr. Stephanie Seneff's work -- "Seeds of Truth" on YouTube).*

They've also found that genetically engineered crops are kinder to the environment than non-genetically engineered crops. The National Academy of Science's 2010 report, *Impact of Genetically Engineered Crops on Farm Sustainability in the United States*, found that GM crops planted to date had reduced insecticide use, reduced use of the most dangerous herbicides, increased the frequency of conservation tillage and no-till farming, reduced carbon emissions, reduced soil runoffs, and improved soil quality. The report said that, "Generally, GE (GMO) crops have had fewer adverse effects on the environment than non-GE crops produced conventionally."

1. *"Reducing the use of the most dangerous herbicides" is a phony argument, a refusal to look at consequences and future inevitability. It has vastly increased the use of Roundup, speeding up the resistance development, making the use of those "most dangerous" herbicides inevitable. Dow and Monsanto are already promoting seeds resistant to 2,4-D (Agent Orange) and dicamba (a dangerously volatile herbicide that could kill neighboring non-GM fields), which will then follow the pattern of vast increase until they fail and even more is needed. This is the epitome of non-sustainability.*
2. *Glyphosate (Roundup main ingredient) kills plants, including bacteria. It kills soil bacteria, which results in soil compaction, inability to absorb water and inability to fix nitrogen, resulting in greater fertilizer requirement and flooding and run-off (to claim reduced run-off is patently ridiculous). In the Iowa floods several years ago, one could pick out the GM fields because they were the ones underwater.*
3. *Bt corn is now falling prey to insects resistant to Bt because of the intense monoculture of GM corn. This not only injures organic agriculture, which depends on Bt, but means we will now have to turn to more dangerous insecticides.*

The American Association for the Advancement of Science

This is the largest organization made up of professional scientists in the United States, and also publisher of *Science* magazine, one of the two most respected scientific journals in the world. The AAAS says "The science is quite clear: crop improvement by the modern molecular techniques of biotechnology is safe."

As an example of the non-scientific approach of *Science* magazine on this issue, their September 2013 endorsement of beta-carotene fortified Golden Rice as the solution to vitamin-A deficiency in the Third World ignored a number of important points:

1. *After years of work, a GM version of the indica variety used in the areas of Southeast Asia*

where vitamin-A deficiency is endemic is still not available.

- 2. No work has been published on whether the beta-carotene in the rice will survive the real-world handling methods in its target areas*
- 3. Additional nutrients needed for intra-body conversion of beta-carotene to Vitamin A are not always available in the target areas.*
- 4. Vitamin-A deficiency in the Philippines (poster child for the problem) has been reduced to below serious levels by inexpensive supplemental methods.*

The magazine's ignoring of these serious issues raises questions about its position on the issue of GMOs, quite apart from whether its "respectedness" may or may not be warranted on others.

The American Medical Association

The premier body of physicians in the United States. They have consistently found genetically modified foods as safe to eat as any other food, stating "there is no scientific justification for special labeling of genetically modified foods".

- 1. The question always is, what does "they have found" mean? What research have they evaluated in coming to that conclusion? The fact that the AMA long asserted that water-supply fluoridation was not a problem, even while former presidents of the organization acknowledged that this was not the case, should give us pause about their conclusions on scientific issues without further understanding how they reach those conclusions.*
- 2. Although anecdotal, it is not scientific to disregard the experience of doctors dealing with large numbers of patients who have seen reduction or elimination of symptoms -- often in surprisingly short timeframes -- in a wide range of disorders and diseases through the elimination of dietary GMOs.*

The European Commission

Europe is extremely anti-GMO. But even there, the scientific community is clear that genetically modified foods are safe. The scientific advisor to the European Commission has said "there is no more risk in eating GMO food than eating conventionally farmed food".

The European Commission's 2010 report on genetically engineered food (based on independent research not funded by any biotech company) said: "The main conclusion to be drawn from the efforts of more than 130 research projects, covering a period of more than 25 years of research, and involving more than 500 independent research groups, is that biotechnology, and in particular GMOs, are not per se more risky than e.g. conventional plant breeding technologies."

- 1. Europe is extremely anti-GMO precisely because the press there has covered the issue fairly (i.e., not under direct influence or threats from the biotech industry), and labeling is required.*
- 2. The Commission is not a scientific research entity. It is a political body heavily influenced by EuropaBio (The European Association for Bioindustries). As a result, any evaluation it does on how "independent" any give study is can't be taken simply at face value. An example of industry infiltration of agencies (in this case the World Health Organization and the European Food Safety Agency) can be found at <http://www.theparliament.com/latest-news/article/newsarticle/food-industry-accused-of-massive-infiltration-of-efsa-pesticides->*

panel.

3. *Anne Glover, science advisor to the president of the EC, simply makes blanket statements about "hundreds of studies" without referencing which of them found what, and what the quality of the study and its findings were. Again, this is not "science."*
4. *It's interesting that the EC at first belittled the Seralini long-term feeding study as poorly conceived, and then turned around and implicitly endorsed it with an offer of a grant to develop procedures for long-term testing that matched his.*
5. *As an example of how the EC works, the vote on Dow/DuPont GM corn was:
 Against (19): France, Italy, Hungary, Greece, Romania, Poland, the Netherlands, Austria, Bulgaria, Croatia, Cyprus, Denmark, Ireland, Latvia, Lithuania, Luxembourg, Malta, Slovakia, Slovenia.
 For (5): Spain, the UK, Finland, Estonia and Sweden.
 Abstained (4): Germany, Portugal, Czech Republic and Belgium.
 *Abstentions count as "for," so the vote, instead of 19-5-4, becomes 19-9. An overwhelming majority. And yet because of the way votes are counted, the GM corn won. So when you see EC decisions, keep this in mind.**

Royal Society of Medicine

England's top medical society, the British equivalent of the American Medical Association, published a review of all the information about genetically modified foods that concluded, "Foods derived from GM crops have been consumed by hundreds of millions of people across the world for more than 15 years, with no reported ill effects (or legal cases related to human health), despite many of the consumers coming from that most litigious of countries, the USA."

1. *Again, the utter non-scientific nature of this claim lies in the fact that (a) there has been no labeling with which to connect cause and effect, and (b) the potential diseases -- with the exception of allergies -- tend to be chronic and slow-to-develop, so that it is impossible to scientifically claim that "no reported ill effects" proves safety.*
2. *In any case, that the "no reported ill effects" claim is patently false is shown, for instance, in the epidemiological evidence in cases where it has been possible to connect the GM entity with non-chronic fast appearing symptoms -- the 1980's L-tryptophan epidemic, and the huge rise in soy allergies after GM-soy introduction in the UK (remarkable that the Royal Society can turn a blind eye to their own back yard).*

The Largest Ever Review of Studies on GMOs

In 2013, a group of Italian scientists (from a country where no GMOs are grown) conducted the largest-ever survey of scientific information on genetically modified foods. They looked at 1,783 published research papers, reviews, and reports on GMOs. What they found was no evidence of harm.

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

Who were these Italian scientists? What does "significant" mean? What does "directly connected" mean. Once you start injecting scope-limiting adjectives, you have to look at the raw data -- to what extent was the research good -- and once you also include reviews and reports, to

what extent are these "double" counting the research.

The French Supreme Court

The French Supreme Court isn't a scientific body, but I mention them here because their recent decision was so remarkable. France is a very anti-GMO country. Yet the French Supreme Court struck down France's GMO ban, ruling that the government had shown no credible evidence of any harm to humans or the environment. You can read about that here.

- 1. Yes, you said it -- "the French Supreme Court isn't a scientific body." Once you add the "but," you've taken it away from the scientific realm. A court decision depends on the skill of the combatants, the evidence presented, and the (non-scientific) capabilities and potential conflicts of interest of the judges or jurors.*
- 2. France feels the case is so strong against GMOs that is intent on reinstating that ban:
<http://www.farming.co.uk/news/article/9554>*

Don't GMOs Cause Cancer in Rats? Or Infertility?

Thus far there have been several hundred studies on the safety of genetically engineered food. All but a handful have found them completely safe. The only studies that have found that genetically modified foods harm animals (the ones quoted as saying that they cause cancer and infertility) all come from one laboratory, that of Gilles-Éric Séralini in France.

*Keep in mind that Séralini was the first person to extend the "typical" but seldom-done 90-day rat feeding studies (8-9 year human equivalent) to 2 years (lifetime equivalent). **It is important to understand** that he followed to the letter Monsanto's own 90-day study (harm evidence from which was suppressed until the raw data was forced into the open by legal action) in terms of design and number and strain of rats. He simply **extended** the time and increased the variety of feeding groups and parameters measured. The Monsanto study was designed as a **toxicity** study, and so was Séralini's -- NOT as a carcinogenicity study. He did not expect to find tumors.*

Yet Séralini's studies have been widely debunked. The study linking GMOs to cancer was forcibly retracted by the journal that published it (something very rare in science).

It should be mentioned what "forcibly" actually means. In fact, the industry put huge pressure on the editor of the journal, who violated all the principles of scientific publication and his own publication's guidelines by removing the article. His only comment was that the results were "not conclusive," which would, of course, eliminate almost every article ever published in a scientific journal. The point of publishing research is to stimulate others to try to replicate it to confirm or reject it.

In a previous example of this, Arpad Pusztai's 1996 research, the editors of the journal in which it was published resisted massive industry and government pressure to rescind his paper.

In fact, the study, was clearly flawed from the beginning. It was immediately criticized by the six major French scientific academies and by neutral scientists and science journalists not affiliated with biotech companies.

Unmentioned are the large groups of scientists who came out in support of Séralini's study, criticizing the removal of his journal article.

The primary basis of the criticism was that it was improperly designed. The explicit or implicit assumption underlying this is that there were not enough rats for a carcinogenicity study, and the rats were of a strain susceptible to tumors. The fact that the study was identical to Monsanto's in these respects -- i.e., designed for toxicity testing, not carcinogenicity -- was ignored or deliberately suppressed by these attacks.

Perhaps most damning is the way in which Séralini manipulated the press. He refused to allow science journalists to see the actual paper before publication day, preventing those journalists from going through their normal process of calling scientists to get opinions about the results before writing up their news stories. As award-winning science journalist Carl Zimmer (also not affiliated with any biotech firm) wrote, science journalists were played.

Given what happened to Arpad Pusztai back in 1996, when he was fired from his 35-year position as one of the foremost investigators in the world after he found organ degeneration and tumors, and he and his research team was gagged with threat of a lawsuit from Monsanto, it is no surprise that Séralini would be concerned about a response. His concern was born out by the commencement within a couple of hours of a world-wide attack on him, before anyone could have adequately evaluated his work. It was just one indication of the pressure that would have been exerted to prevent publication.

Even GMO opponents found the rat-cancer link hard to believe. My fellow guest on MSNBC, food policy advocate (and GMO opponent) Marion Nestle, herself said that she found the Séralini study linking GMOs to cancer hard to believe. Marion Nestle writes:

These results are so graphically shocking (see the paper's photographs), and so discrepant from previous studies (see recent review in the same journal), that they bring out my skeptical tendencies. (Note: Although Séralini is apparently a well known opponent of GMOs, his study—and that of the review—were funded by government or other independent agencies.) ... the study is weirdly complicated.

<http://www.foodpolitics.com/2012/09/what-to-make-of-the-scary-gmo-study/>

Again, these comments deliberately ignore or avoid the fact that Séralini and his colleagues were caught completely off guard by the appearance of tumors, the first of which appeared a month after the 90-days that the Monsanto study ran. No previous study of this sort had been done, so the fact that the results departed from previous studies is completely unsurprising. The investigators have openly stated that their study was not designed to establish carcinogenicity. The appropriate scientific response to this situation is exactly what Séralini's group called for -- further study to find out what's actually going on here. His opponents are doing exactly the opposite.

Long Term Safety Studies

A common myth is that there are no long-term safety studies of GMOs. There have, in fact, been dozens of long-term studies of feeding GMOs to animals for their entire lives, sometimes for as

many as ten generations in a row, with no ill effects discovered whatsoever. Here's a good survey of long-term and multi-generation GMO safety studies.

Some of these studies relate to salmon and quail, with which I'm not familiar. Rats are considered the basis for possible human-related issues. Some of these studies just looked at macro issues, such as blood composition and weight of body and organs. Some found parameters "within a normal range," when this often masks the inclusion of all kinds of strains of rats, instead of just the rats under study (I'm not asserting this was the case in this study). Some of them seemed to get at the more fundamental issues, so it would be interesting to get the anti-GM analysis of these.

The report on dairy cattle showing no effects, however, really makes me wonder about such studies. This flies in the face of the experience of hundreds of farmers, including many in a carefully designed peer-reviewed study. Cattle refuse to eat GMO corn if given the option, and if they have no choice, they develop a variety of serious, life-threatening conditions that clear up quickly after GMO feed is replaced with normal corn. The same is true of pigs.

Independently Funded Studies

Another common myth is that Monsanto or other biotech companies control all biotech research, preventing independent research from happening. This is not the case. Two sets of independent studies:

- The European Commission Report I mention above includes 130 independent studies, paid for by the EU, conducted by more than 500 teams.

- BioFortified maintains a (largely distinct) list of more than 120 independently funded studies which were conducted outside the biotech industry and without biotech dollars.

1. *Who defines "independent" in these cases? A detailed evaluation of "safe" vs "maybe not safe" study results found that "safe" correlated not so much with "industry funding" alone, as with "industry funding" and "molecular biologist." A molecular biologist is subject to career pressures and funding availability, whether a given study involves direct funding or not.*
2. *A numeric accounting of studies does not in any way reflect the quality of the research.*

A Scientific Consensus

All together, the scientific consensus around the safety of genetically modified foods is as strong as the scientific consensus around climate change. These foods have been studied more than any other, and everything tells us that they're safe.

1. *A claim of "scientific consensus" in a controversial field is always suspect, because such fields -- and GMOs are no exception -- tend to be controversial because of industry pressure, involving funding of research, threats against publication of contrary findings, and potential career sidelining. The past is littered with examples -- tobacco, water fluoridation, radio-frequency radiation physiology, trans-fats, and many others.*
2. *Given this, saying one "scientific consensus" is as strong as another is not scientific. It's like saying "There once was a princess who was as beautiful as she was good." Which says...?*

3. *A peer-reviewed study of GMO studies found that of the roughly half that were independent, 100% found cause for concerns, while most of the half that were industry related found safety. This is not a case for consensus.*

Update: Other Common Concerns on GMOs

I receive a few other frequent questions on GMOs that don't relate to safety, so answering three of the most frequent here:

What About Superweeds?

Pesticide resistance is a real thing. It's also an old thing. The first notion that it exists dates back to 1914, when A.L. Melander published a paper asking "Can insects become resistant to sprays?" Realistically, resistance has been evolving for the 4,000 or so years that humans have been using pesticides.

It would be interesting to know what the nature of "pesticides" are that humans have been using for 4000 years. Natural plant based pesticides evolve to control pests, the pests eventually develop resistance, and the plant then adapts further, in a long, gradual process. The concentrated use of chemical pesticides is a phenomenon of the last century or less. Bacteria-based Bt insecticide has been around forever, but the corn root worm had no resistance to it until the advent of Bt-producing GMOs. Farmers were told to reserve 20% of their field for non-GMO, so that there would be a supply of non-adapted insects to compete in mating with any that developed resistance. Scientists predicted that anything less than 50% would result in rapid resistance development. Farmers in large part ignored the advice, and now will have to turn to far more dangerous insecticides.

It's clear today that weeds are becoming resistant to glyphosate (Roundup) and that this is threatening the use of roundup. It's not at all clear that this has anything to do with GMOs, however. The rate of the evolution of new pesticide resistant weeds appears to be the same for GMO vs. non-GMO crops. That doesn't make the problem any less important. But it suggests that pointing the finger at GMOs is missing the point.

The unfortunate fact for this argument is that RoundUp has been around for a long time, but the superweeds only developed after GMOs caused a massive increase in the use of RoundUp. The claim that they existed before GMOs (except as some rarity) is absurd -- Monsanto couldn't have sold GMOs on such a large scale if RoundUp had been seen to be failing against weeds.

Trying to claim that "superweeds will develop anyway," regardless of GMOs, is particularly dangerous, because the obvious take-away from that argument is that we just have to engineer a resistance to a different herbicide, and on and on into more dangerous and damaging materials. This does not lead to sustainability by any stretch of the imagination.

What About Farmer Suicides in India?

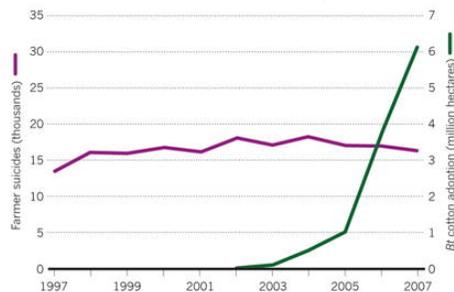
The allegation has been made that GMOs have been driving farmers in India to commit suicide. Farmers in India do commit suicide, and every one of those is a tragedy.

However, the farmer suicides started long before GMOs were introduced to that country, and the suicide rate has held steady or slightly dropped since GMOs were introduced.

Every suicide is a tragedy, but linking them to GMOs is false.

A STEADY RATE OF TRAGEDY

Contrary to popular myth, the introduction in 2002 of genetically modified Bt cotton is not associated with a rise in suicide rates among Indian farmers.



1. *It's interesting that the graph goes only to 2007, leaving off the recent period, in which Bt cotton crop failures and increasing costs for seeds and chemicals put increasing pressure on farmers.*
2. *It also doesn't show pre-1997, and the fact that suicides began to be significant after the introduction of companies with seed monopolies into India in 1995*
3. *The chart doesn't indicate what the universe of "farmers" is. It is non-scientific to include farmers who are not growing cotton.*
4. *More perspective can be obtained from Vandana Shiva, who I'm sure would be labeled as highly biased by Mr. Naam*

<http://www.gmwatch.org/index.php/news/archive/2013/15165-vandana-shiva-on-seed-monopolies-gmos-and-farmer-suicides-in-india>

What About Corporate Control of Food?

Patents end. Monsanto's patent on Roundup Ready I Soy expires in late 2014. Last I checked, that was the single most planted GMO in the United States. After that patent expires (and unlike copyrights, patents do actually expire) the seed and trait will be in the public domain, with farmers able to replant, seed growers able to cross-breed the strain, and academics and other companies able to tinker with the gene, without owing Monsanto anything.

The majority of GMOs planted in the US and the world today will see their patents expire in the next decade.

The main problem with this is that new patents on variations are coming out all the time, and Monsanto fully intends to unleash its Terminator technology (seeds are sterile) and the associated technology that requires the company's chemicals to permit germination. You can't plant sterile seeds or seeds that won't germinate, no matter how public domain they are.