

## **Biotech Food Myths, Misconceptions and Misinformation -- A Response to False Activist Claims**

**AgBioWorld Foundation  
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**On June 15, a group of anti-biotech organic food activists calling themselves the "Independent Science Panel" issued a report called The Case for a GM-Free Sustainable World, regarding crops and foods improved using modern biotechnology techniques. That report makes a series of claims regarding bioengineered crops that is not supported by the depth and breadth of extensive scientific and economic data collected in laboratory tests, field trials and commercial cultivation over the past two decades. The following report from the AgBioWorld Foundation is a point-by-point refutation of those assertions.**

***Myth 1. Activists say: "GM crops failed to deliver promised benefits."***

**FACTS: Crops improved through biotechnology enjoy farmer satisfaction levels in the high 90% ranges, and these new varieties have penetrated the market at rates never before seen in agriculture. The reasons are very simple: Despite the desperate denials of activists, these crops deliver value to farmers, including lower overall costs and more efficient methods for controlling insect pests, weeds and diseases with reduced environmental impacts. This is why the overwhelming majority of farmers have freely chosen to plant biotech improved crops year after year once they try them.**

**As a direct result of the introduction of biotech improved crops, pesticide use has been dramatically reduced, and herbicide use has shifted from older, narrow spectrum and higher toxicity compounds to the newer generation of broader spectrum lower impact formulas (see Gianessi et al. studies at [www.ncfap.org](http://www.ncfap.org)). There have been no confirmed crop failures with biotech-improved crops. The rare, ephemeral case of alleged under-performance seems to be associated with the use of inferior starting varieties unrelated to the biotechnology-mediated improvement.**

***Myth 2. Activists say: "GM crops [are] posing escalating problems on the farm. The instability of transgenic lines has plagued the industry from the beginning, and this may be responsible for a string of major crop failures. A review in 1994 stated, "While there are some examples of plants which show stable expression of a transgene these may prove to be the exceptions to the rule. In an informal survey of over 30 companies involved in the commercialisation of transgenic crop plants...almost all of the respondents indicated that they had observed some level of transgene inactivation. Many respondents indicated that most cases of transgene inactivation never reach the literature."***

**FACTS:** Predictions of widespread problems based on this ten-year-old article have since been shown by vast experience with commercial crops to be incorrect. Commercialized biotech varieties go through more screening and scrutiny, in advance, in depth and detail, than any other new crop varieties in history. The sort of instability alleged, which does happen rarely during product development, is routinely eliminated by companies for obvious reasons. In fact, data demonstrating stable Mendelian inheritance of the transgene are required as a matter of law by regulators.

*Myth 3. Activists say: "Triple herbicide-tolerant oilseed rape volunteers that have combined transgenic and non-transgenic traits are now widespread in Canada. Similar multiple herbicide-tolerant volunteers and weeds have emerged in the United States."*

**Facts:** Claims that herbicide-tolerant volunteer plants have become problematic for Canadian growers of oilseed rape (known as canola in North America) are both false and misleading. Most canola growers in Canada do not have any problem with herbicide tolerant volunteers, as different herbicides or cultivation remain satisfactory control measures. Unlike conventional or organic crops, biotech improved pest resistant crops have, from the beginning, been marketed with stewardship programs in place to forestall the evolution of the type of pest resistance scientists have in fact seen with conventional and organic crops. Indeed, as the activists note in the quoted passage above, the few cases of herbicide tolerant canola (oilseed rape) volunteers includes those that have inherited the herbicide-tolerance trait from conventionally modified, rather than bioengineered varieties.

*Myth 4. Activists say: "Extensive transgenic contamination [is] unavoidable. Extensive transgenic contamination has occurred in maize landraces growing in remote regions in Mexico despite an official moratorium that has been in place since 1998."*

**FACTS:** It is odd that some activists find the natural process of pollen flow to be alarming when it comes from precisely improved biotech crops that require fewer pesticide sprays, but are unremarkable from conventional crops or wild plants. To use this natural biological phenomenon as a tool to foment fear represents a significant departure from anything supportable by science. IF pollen from biotech crops has carried DNA from biotech improved varieties into Mexican landraces, it is because the landrace stewards have continued their age-old practice of importing foreign genetic material as a source of new variation to use in improving the ever dynamic and evolving manmade corn varieties. The biotech traits involved, if transferred, would not present any kind of threat; instead, they would add value to these varieties by enabling the landraces to resist insect pests or herbicides. If the landrace stewards do not find these traits desirable they can easily eliminate them through selection. A pure or static crop landrace has never existed and could not exist.

*Myth 5. Activists say: "GM crops [are] not safe."*

**FACTS:** Crops improved through biotechnology have undergone more safety and environmental testing than any crop varieties in history, and have been produced and consumed by humans and animals in millions of tons around the world for years. They have been proven as safe as the scientific method permits, by every valid method known to science and medicine. There is, to date, not a single solitary confirmed case of human or animal illness or disease associated with a biotech crop. Nor has a single negative environmental impact been credibly attributed to biotech-improved varieties. The entire body of this vast experience has shown these crops to be at least as safe as, and in many ways safer than, conventional crops and foods. See the recent International Council for Science report ([www.icsu.org](http://www.icsu.org)) for a synthesis of the scientific studies on this topic, or refer to the [bibliography of published scientific studies](http://www.agbioworld.org/biotech_info/articles/gen_safety.html) on the AgBioWorld Foundation website ([http://www.agbioworld.org/biotech\\_info/articles/gen\\_safety.html](http://www.agbioworld.org/biotech_info/articles/gen_safety.html)). Beyond the safety approval of three U.S. government agencies, both the American Medical Association and British Medical Association, as well as dozens of other scientific bodies, have said that there are no food safety concerns with currently commercialized biotech crops.

*Myth 6. Activists say: "The principle of 'substantial equivalence', on which risk assessment is based, is intended to be vague and ill-defined, thereby giving companies complete licence in claiming transgenic products 'substantially equivalent' to non-transgenic products, and hence 'safe'."*

**Facts:** The concept of "substantial equivalence" is misrepresented in the passage quoted above. Transgenic products are not assumed to be safe, allowing them to be exempt from safety testing. Substantial equivalence is a conclusion that can only be reached AFTER testing to ensure that the biotech improved crop is, in fact, equivalent to its conventional counterpart in nutritional and safety aspects.

*Myth 7. Activists say: "Dangerous gene products are incorporated into crops."*

**FACTS:** Bt proteins are used because of their excellent and well-documented specificity for narrow groups of insect pests, as well as their long history of safe use by organic and non-organic farmers. Activists inconsistently claim there are safety issues when used in biotech crops, but they make no such representations when they are used indiscriminately and without regulatory oversight by organic farmers. This appears to demonstrate that the activists do not believe their own arguments about safety.

*Myth 8. Activists say: "Food crops are increasingly used to produce pharmaceuticals and drugs."*

**Facts:** Food crops used to produce pharmaceutical compounds provide a highly promising way to increase the safe and effective production of vital medicines to treat crippling diseases at lower costs to producers and patients. Furthermore, scientists have vast experience deriving medicinal and industrial compounds from

plant sources. Indeed, canola (oilseed rape), which is one of the most important food crops in North America, is a conventionally modified variety of the same plant species used to produce industrial lubricants that are toxic to human beings. It is disingenuous to oppose the use of biotech improved food crops for producing medical or industrial substances, while condoning the use of canola. Perhaps activists do not oppose canola consumption precisely because growers and processors have an outstanding record of safe production and segregation.

***Myth 9. Activists say: "Terminator crops spread male sterility. Crops engineered with 'suicide' genes for male sterility have been promoted as a means of 'containing', i.e., preventing, the spread of transgenes. In reality, the hybrid crops sold to farmers spread both male sterile suicide genes as well herbicide tolerance genes via pollen."***

**FACTS:** Sterile plants, by definition, cannot leave offspring and so are incapable of "spreading sterility." Furthermore, no "terminator" plants have ever been marketed. They remain an abstract concept described in a patent application. But if some day in the future they are ever produced, or if other genetic use restriction technologies are developed and deployed, they are likely to be an excellent, safe, and robust method of mitigating potential gene flow in those rare instances where such gene flow might be undesirable.

***Myth 10. Activists say: "Broad-spectrum herbicides [are] highly toxic to humans and other species. Glufosinate ammonium and glyphosate are used with the herbicide-tolerant transgenic crops that currently account for 75% of all transgenic crops worldwide. Both are systemic metabolic poisons expected to have a wide range of harmful effects, and these have been confirmed."***

**FACTS:** Allegations that herbicides like glyphosate pose realistic safety threats to humans and animals are simply false, as can be ascertained by anybody who takes the time to consult the review documents prepared by government safety regulatory agencies or the toxicological literature. These compounds target cellular receptors and metabolic pathways unique to plants that are absent from animals. They have received the strongest findings of safety from regulatory agencies and none of the negative consequences alleged by activists for human health are confirmed from their use. Even the group Environmental Defense, rates glyphosate as among the least hazardous of the chemicals included in its extensive database (<http://www.scorecard.org/chemical-profiles/>).

***Myth 11. Activists say: "Genetic engineering creates super-viruses."***

**FACTS:** Recombinant DNA techniques for the first time enable researchers to study viruses in detail and in ways previously unavailable. These help scientists determine the functions and modes of action of virus genes as a prelude to developing effective new therapies and means of disease prevention. Recombination among viral strains is commonplace in nature, and this is neither new nor limited to crops improved through biotechnology. In order to ensure that biotechnology does not unwittingly

exacerbate this problem, regulators routinely follow the recommendation of experts in the field and prohibit the introduction of sequences from exotic viruses into crop plants being grown outside the natural ranges of those viruses.

*Myth 12. Activists say: "Transgenic DNA in food [is] taken up by bacteria in [the] human gut. There is already experimental evidence that transgenic DNA from plants has been taken up by bacteria in the soil and in the gut of human volunteers. Antibiotic resistance marker genes can spread from transgenic food to pathogenic bacteria, making infections very difficult to treat."*

**FACTS:** There is ZERO EVIDENCE to support concerns that functional genes might be taken up from food, transgenic or otherwise, by bacteria in soil or the human digestive tract. Even if the antibiotic marker genes occasionally used in early biotech crops were so absorbed, they would not even be detectable against the pre-existing background of antibiotic resistance genes found widely in human intestinal flora. There is a strong consensus among medical experts in microbial antibiotic resistance that the clinical problems of antibiotic resistance stem from medical or patient mishandling of antibiotics, to which the mechanics of agricultural biotechnology are wholly irrelevant.

*Myth 13. Activists say: "Transgenic DNA and cancer. Transgenic DNA is known to survive digestion in the gut and to jump into the genome of mammalian cells, raising the possibility for triggering cancer. The possibility cannot be excluded that feeding GM products such as maize to animals also carries risks, not just for the animals but also for human beings consuming the animal products."*

**FACTS:** This is a totally fabricated concern contradicted by vast experience and for which there is absolutely no supporting data. Any link between transgenes and cancer is purely fictional.

*Myth 14. Activists say: "CaMV 35S promoter increases horizontal gene transfer."*

**FACTS:** There are no data to support this fantasy. The ubiquity of widespread natural mosaic viruses in cauliflower and its close relatives, broccoli, cabbage, canola and others, and the demonstrated anti-cancer effects of a diet rich in such vegetables, eloquently refutes this manufactured concern.

*Myth 15. Activists say: "[There's] a history of misrepresentation and suppression of scientific evidence."*

**FACTS:** Activist claims have been thoroughly evaluated by the community of scientists and measured against replicable findings in published and peer-reviewed literature. Their speculative and sometimes bizarre claims routinely and repeatedly fail to survive this scrutiny. This is not because evidence is suppressed, but rather because activists are consistently frustrated in their search for credible evidence that might justify their claims.

**Myth 16. Activists say:** *"In conclusion, GM crops have failed to deliver the promised benefits and are posing escalating problems on the farm. Transgenic contamination is now widely acknowledged to be unavoidable, and hence there can be no co-existence of GM and non-GM agriculture. Most important of all, GM crops have not been proven safe. On the contrary, sufficient evidence has emerged to raise serious safety concerns, that if ignored could result in irreversible damage to health and the environment. GM crops should be firmly rejected now."*

**FACTS:** This "conclusion" has been shown to be false in each of its several components by the preceding refutations. The facts are that crops improved through biotechnology have, in advance of their use, been subjected to more rigorous scrutiny, in depth and detail, than any others in history. Wherever farmers have been allowed access to such crops they have adopted them at unprecedented rates and inspired the highest levels of farmer loyalty because they deliver value on multiple levels, to the farmer, to the environment, and to consumers. In the end, if genuine and systemic agricultural problems have arisen from, or ever do arise from, biotech enhanced crops, then farmers will abandon them.

The fact that farmers continue to embrace bioengineered crop varieties provides ample evidence that they **HAVE** been beneficial to the farm. And the fact that the overwhelming majority of scientists, as well as every major scientific organization that has evaluated the safety of biotech crops, find them to be as safe as or safer than conventional crops, provides ample evidence that health and environmental issues have been adequately addressed.