PF Topic Analysis- Con
November 2014

The November topic for Public Forum debaters is **Resolved: On balance, the benefits of genetically modified foods outweigh the harms.** This topic offers a number of interesting points of debate for both sides. This guide will focus on debating the con side of the resolution, but don't forget to also check out the pro analysis!

We will begin by covering the key terms in the resolution. If you have already read the pro guide, you can skip to page 5.

First, **on balance** suggests that debaters should use a cost vs. benefits frame for approaching these debates. When considering both the advantages and disadvantages associated with genetically modified foods (GMF), which ends up outweighing? This is the central question you will be debating on this resolution. It is probably very familiar to most of you.

The definitions of the terms **benefits** and **harms** should be obvious. Keep in mind, however, that lots of things can be considered benefits or harms. Human health, the economy, the environment, poverty, happiness, etc can all be involved in these discussions. You will need to be prepared to weigh these disparate concerns against each other and persuade the judge which is most important. That is precisely what **outweigh** means.

Although weighing benefits versus harms seems very straight-forward, do keep in mind that you will need to do work explaining to your judge why certain kinds of impacts are more important than others. For example, if the pro says “GMFs reduce famine” and the con says “GMFs cause long-term health problems,” it will not be immediately obvious which of those outweighs the other. That’s where you come in—you have to debate it out! Make sure you are always not just explaining why your impacts matter, but also comparing them to your opponents’ impacts and determining which concerns should be evaluated first. As the con in the above example, you may say something like “long-term health problems outweigh because they potentially affect the entire population of the earth, relative to the smaller population at risk for malnutrition” or “there are other solutions to hunger we could pursue; we shouldn’t use food that potentially makes people sick.”

The key phrase in the resolution is **genetically modified foods** (GMF). GMFs are food products (think grains, fruits, and vegetables) that have been genetically engineered by scientists to develop traits that are desirable for one reason or another. Humans have been doing a simple version of this since the dawn of agriculture, by selectively breeding plants with desirable traits to on another, in order to encourage seeds to carry that trait. This process accounts for a large amount of the genetic variation we see in plants today (i.e. all the different varieties of tomatoes available). GMFs, however, accelerate this process, by allowing bioengineers to directly insert new traits into the genetic code of an existing organism. These are changes that do not otherwise exist in nature.

There are many reasons food may be genetically modified, but the most common ones are to make a crop hardier, more resistant to pests or disease, to grow larger or faster or with more nutrients, etc. It is also possible to genetically modify livestock to achieve desired size, fattiness/leanness, etc. Generally, modifications result in making the product less labor-intensive, more profitable, or both.

You can find a list of which crops are most likely to be genetically modified here. Knowing these may help improve the specificity of your claims on either side.

It is also important to note that **this resolution is global** in scope—it is not restricted to the United States. Many of the best pro arguments for GMFs involve the interests of people in foreign nations. Those impacts are fair game, since the resolution does not specify any particular countries. As the con, you will want to be prepared to answer these types of arguments.

However, keep in mind that some nations have much stricter laws regarding GMFs than the United States does. If you want to make arguments about a particular nation, you should look into what their GMF laws look like.

Now that we know what all of the terms in the resolution mean, let's discuss what the **ground** for both sides looks like.

The **pro** must defend that genetically modified foods are more good than bad. This does not mean they have to win that GMFs are *always* good, or that they have no downsides. Moreover, the pro doesn't necessarily have to advocate any kind of change to the status quo or *increase* in the use of GMFs. The pro team is fully within their rights to simply defend the status quo, because we have GMFs now. They *can* argue that GMF usage should be increased if they want to, but it's not necessarily their burden to do so. Another strategic consideration for the pro is that nothing in the topic forbids them from acknowledging risks and advocating increased scientific study of GMFs. Pro teams may occasionally find it useful to frame their argument as "we must continue researching and developing new GMFs that will be better than existing ones." Additionally, any future development will always be subject to rigorous testing, safety regulations, and oversight. Supporting GMFs doesn't have to mean supporting totally unregulated GMF anarchy!

The **con**, of course, must win that GMFs are more bad than good. They don't need to win that GMFs are *always* bad in every instance, or that GMFs do not offer any advantages. This topic is somewhat complicated for the con due to the fact that GMFs are the status quo, so negating them seems to invite the con to advocate some kind of counter-proposal. That is something you don't usually see in PF. Depending on your debate circuit, you may or may not want to play around with this type of strategy. The vast majority of con teams, however, will likely just default to status quo minus GMFs. That is the method this paper will focus on.

Either side could easily concede a handful of opponent arguments about why GMFs are good/bad and still win the debate, as long as they win "on balance" that the good/bad outweighs. So, strategic teams will isolate some big impacts for their side, then make some defensive mitigation arguments against their opponents' other impacts. They will also set up a weighing mechanism for deciding which impacts are "most important." This should involve traditional timeframe/magnitude/probability discussions, but some teams may also want to introduce arguments about ethics or other more nebulous concerns.

Clearly, both sides are going to be looking to rack up some big impacts. Next, we're going to cover some **key arguments for the con**, along with some evidence to get you started.

One of the first results you will get when beginning your research on problems with GMFs is that they **aren't safe to eat**. The problem with this argument is that there is a pretty strong scientific consensus that GMFs pose no health risk. If you read an article from the "organicfoodisawesome.com" blog (I made that up) and your opponent reads evidence from a peer-reviewed journal, you're going to have a tough time. However, all of that doesn't mean you can't make this type of argument if you want to. You just have to be smart about it.

Rather than trying to win that GMFs definitely cause a laundry list of crazy health effects by reading evidence from a questionable source, a better method is to argue that we simply can't be sure they're safe at this time, and it's better to be safe than sorry. You can point out that GMFs have only been around for ~20 years, which isn't enough time to determine their long-term health effects. Even though no studies have shown problems so far, **"the absence of evidence isn't evidence of absence."** Lots of things that are now known to be unhealthy were once thought to be perfectly fine (or even good for you!), such as cigarettes and drinking lots of cola.

Moreover, existing studies may not be methodologically sound. One recent literature review on the subject found that **many studies on GMFs are flawed**. Perhaps more importantly, they found that many GMFs approved for human consumption haven't been studied at all! Both of these findings should call into question the pro's supposed certainty that GMFs are safe to eat.

Here is **evidence** from the literature review referred to above:

(I.M. Zdziarski, J.W. Edwards, J.A. Carman, J.I. Haynes, "GM crops and the rat digestive tract: A critical review," Environment International Journal, Volume 73, Pages 423-433, http://www.sciencedirect.com/science/article/pii/S0160412014002669, December 2014)

Genetically modified crops have been approved for human and animal consumption for nearly 20 years (Clive and Krattiger, 1996) yet the debate about their safety continues. Fifty-three crops are known to possess at least one of the genes investigated in this review (herbicide tolerance via the *EPSPS* gene and insect resistance via the *cry1Ab* or *cry3Bb1* genes). Forty-seven of these crops have been approved for animal and/or human consumption, yet published toxicity studies could be found for only nine of these crops (19%) (Table 1). Of greater concern is that for eight of these crops, publications appeared after the crop had been approved for human and/or animal consumption. We understand that other studies may exist that are commercial in confidence, but these studies are not accessible to the scientific community. Other than the few studies mentioned in the EFSA reports, where histopathological results were not reported, our review of the published literature wasn't able to identify or locate any reported safety evaluations performed on rats on these eight crops prior to their approval. Our literature review also did not identify or locate published reports on rats for the remaining 38 crops.

The present review limited the search to only include feeding studies done on rats so that the results may be comparable. It is possible that more studies may be found if the search were to be extended to other animals. However, based on what has been found for rat studies, it is unlikely that any additional studies would involve a thorough safety investigation and a detailed report of all of the 47 approved GM crops possessing one or more of the three traits. Moreover, the rat model is the accepted OECD standard for toxicological studies of this type.

Whilst the safety of a GM crop is primarily and sometimes solely evaluated by government food regulators using the test for substantial equivalence, this is likely to be inadequate to fully assess the safety of the crop for reasons stated above. Animal feeding studies provide a more thorough method of investigating the unintended effects of the GM process or the unintended effects of ingesting GM crop components. Animal feeding studies can identify target organs as well as predict the chronic toxic effect of an ingested compound (OECD, 2008).

5. Conclusions

The evidence reviewed here demonstrates an incomplete picture regarding the toxicity (and safety) of GM crops consumed by humans and animals. The majority of studies reviewed lacked a unified approach and transparency in their methodology and results, making it impossible to properly review or repeat these studies. Furthermore, such lack of detail makes it difficult to generate evidence-based guidelines to aid in the delivery of an optimum safety assessment process for GM crops for animal and human consumption.

Another option would be to argue that **safety studies are biased** because there is enormous financial and professional pressure for scientists not to speak out against GMFs. Therefore, studies claiming safety cannot necessarily be trusted.

Here is **evidence** on that:

(David H. Freedman, science & technology writer, Scientific American, "The Truth About Genetically Modified Food," http://www.scientificamerican.com/article/the-truth-about-genetically-modified-food/?page=1 8/20/13)

Across campus, David Williams, a cellular biologist who specializes in vision, has the opposite complaint. "A lot of naive science has been involved in pushing this technology," he says. "Thirty years ago we didn't know that when you throw any gene into a different genome, the genome reacts to it. But now anyone in this field knows the genome is not a static environment. Inserted genes can be transformed by several different means, and it can happen generations later." The result, he insists, could very well be potentially toxic plants slipping through testing. Williams concedes that he is among a tiny minority of biologists raising sharp questions about the safety of GM crops. But he says this is only because the field of plant molecular biology is protecting its interests. Funding, much of it from the companies that sell GM seeds, heavily favors researchers who are exploring ways to further the use of genetic modification in agriculture. He says that biologists who point out health or other risks associated with GM crops—who merely report or defend experimental findings that imply there may be risks—find themselves the focus of vicious attacks on their credibility, which leads scientists who see problems with GM foods to keep quiet.

The above evidence suggests that the health threats from GMFs may come from unpredictable gene transformations in later generations of an organism. However, this is not the only internal link available. Those who are interested in pursuing this component of the debate at length can look into the literature on allergies, chelation, animal fertility, and plenty more.

Additionally, note that many of the observed possible health effects of eating GMFs have more to do with the rampant use of the herbicide glyphosate (better known by its commercial name "Roundup") than the genetic modification itself. The pro team may point this out. In response, you should argue that GMFs increase the use of glyphosate, because one of the most popular GMF strains is Monsanto's "Roundup Ready" corn, which has been engineered to withstand liberal doses of glyphosate. The result is increased usage of the chemical.

Here is a long, but good, piece of **evidence** discussing an MIT study concerned with the increasing use of Roundup on GMFs:

(Robyn O'Brien, Prevention, "MIT Paper Links Chemicals Used on Genetically Modified Foods to Infertility and Cancer," http://blogs.prevention.com/inspired-bites/2013/04/26/a-new-study-highlights-the-risks-of-genetically-modified-foods-and-the-chemicals-used-on-them/, 4/26/13)

According to Reuters News, a report released out of MIT suggests that heavy use of the world's most popular herbicide, Roundup, could be linked to a range of health problems and diseases, including Parkinson's, infertility and cancers.

The peer-reviewed report, published last week, said evidence indicates that residues of "glyphosate," the chief ingredient in Roundup weed killer, which is sprayed over millions of acres of crops, has been found in food.

Many Americans are more familiar with RoundUp than we realize. It is a weed killer, used on lawns and gardens, with precautionary measures taken by parents to keep it locked in cabinets and out of the reach of children. What most Americans don't realize is that this chemical is routinely used on the foods we eat, most notably corn and soy.

It is now so widely used in modern agriculture that a recent article about glyphosate, the chief ingredient found in RoundUp, from the global news organization, Reuters, highlighted that these chemicals are part of an enormous market, with world annual sales totaling $14 billion, with more than $5 billion of that spent in the US alone.

But what are they doing to us? Especially given their pervasive use on the foods we eat?

Well, MIT aimed to find out.

According to the report, authored by Stephanie Seneff, a research scientist at the Massachusetts Institute of Technology, the research suggests that the RoundUp residue now found on our food enhance the damaging effects of other food-borne chemical residues and toxins in the environment to disrupt normal body functions and induce disease,

Negative impact on the body is insidious and manifests slowly over time as inflammation damages cellular systems throughout the body," the study says.

We "have hit upon something very important that needs to be taken seriously and further investigated," Seneff said.

MIT is not alone in their concern.

In the mid 1990s, using a new technology, our soy was genetically engineered with new organisms to make it able to withstand increasing doses of weed killer, chemicals and glyphosate. The business model makes perfect sense. It enhances profitability of the chemical companies by enabling the increased sale of their chemical treatments and weed killers.

But according to the work of Professor Miguel A. Altieri of the University of California, Berkeley who had looked into unforeseen risks that might be associated with genetically engineered crops and these chemicals being sprayed on them:

"Exactly how much glyphosate is present in the seeds of corn or soybeans (genetically engineered to withstand this chemical) is not known, as grain products are not included in conventional market surveys for pesticide residues. The fact that this and other herbicides are known to accumulate in fruits…raises questions about food safety, especially now that million pounds of this herbicide, ($5 billion worth) are used annually in the United States alone. Even in the absence of immediate (acute) effects, it might take 40 years for a potential carcinogen to act in enough people for it to be detected as a cause. Moreover, research has shown that glyphosate seems to act in a similar fashion to antibiotics by altering soil biology rendering bean plants more vulnerable to disease".

In other words, it might take a generation for these effects to show up. In light of the escalating rates of infertility, pediatric cancer and inflammatory bowel diseases, it begs the question: since the introduction of this new technology in the 1990s, is that happening now?

So why are we using a chemical that is too dangerous to store under our kitchen sinks in the reach of children on the foods we feed our families?

Monsanto is the developer of both Roundup weed killer (an "herbicide") and a suite of crops that are genetically altered to withstand being sprayed with it. These genetically engineered crops, introduced into our food in the 1990s and 2000s, have the unique ability to withstand increasing doses of the weed killer and are known as "RoundUp Ready". In other words, it helps them sell more chemicals.

Since the introduction of these genetically engineered crops, Environmental Protection Agency (EPA) data reveals that between 2001- and 2007, as much as 185 million pounds of glyphosate was used by U.S. farmers, double the amount used six years ago.

So in the past, where we may have been getting a sprinkling of this chemical on our food crops prior to the introduction of RoundUp Ready crops, with the recent introduction of genetically engineered foods, designed to withstand this signature product, the doses are at unprecedented levels.

So what is this product doing to us?

Glyphosate, found in RoundUp, is the world's most popular herbicide and is designed to kill pests and insects, anything but the genetically engineered "Roundup Ready" plants, such as genetically engineered corn, soy, beet, cottonseed and canola.

These genetically engineered crops , including genetically engineered corn, genetically engineered soybeans, genetically engineered canola and genetically engineered sugarbeets, are planted on millions of acres in the United States annually and widely and generously in the US food supply, particularly processed foods, without labels.

When these crops were first introduced in the late 1990s and early 2000s, it was conjectured that farmers would like them because they could spray Roundup weed killer directly on the crops to kill weeds in the fields without harming the crops. And they did. But about three planting cycles in, it appears that Mother Nature has Monsanto figured out and it is now reported that over half of the farmers using these products are experiencing a resistance to the chemical company's signature product and suffering from what are known as "superweeds" in their fields.

It was not only the unknown impact of environmental and crop disruption that caused countries around the world to exercise precaution around the use of these chemicals, it was also the uncertainty of the long-term impact that these crops and the chemical products applied to them would have on both the environment, soil, a developing fetus or human health that resulted in their use being banned in 27 countries around the world and labeled in 64 more.

In light of the study out of MIT, this precautionary measure seems well-founded, as with the approval of every new RoundUp Ready crop, there is a 2-5 times increase in the amount of glyphosate that is applied.

And while that may help drive profitability for the chemical industry, there are social costs: lost yields in food production and any health care costs that may be associated with the harm that these chemicals might cause.

The authors of the MIT report are concerned that RoundUp, for which these genetically engineered crops are named, and the chemical used in it, glyphosate, are contributing to diseases as far-ranging as inflammatory bowel disease, cancer, infertility, cystic fibrosis, cancer, Alzheimer's and Parkinson's disease, going so far as to suggest that it "…may be the most biologically disruptive chemical in our environment."

Besides effects on human health, con teams can also argue that **GMFs harm the environment**. As with health, there are many internal links to environmental impacts to choose from. You may want to argue that the aforementioned increased use of pesticides leeches into soil and groundwater, harming ecosystems in a variety of ways. Literature on this claim is widely available. Another option is to argue that GMFs use more water than conventional crops, exacerbating water shortages. This can also be used to turn pro claims surrounding adaptation to climate change and drought, etc.

Here is **evidence**:

(Food & Water Watch, "Genetically Engineered Foods: An Overview," http://documents.foodandwaterwatch.org/doc/Genetically_Engineered_Food_2014.pdf#_ga=1.230313434.756381438.1411932055 DOA 9/28/14, 2014)

Expanding thirsty GE crops to more arid developing countries will exacerbate water scarcity. The developing world faces the most pronounced environmental degradation. Global agriculture uses nearly 2 quadrillion gallons of rainwater and irrigation water annually — enough to flood the entire United States with two feet of water. In the developing world, 85 percent of water withdrawals go toward agriculture.

Already, parts of Northern India pump 50 percent more water than the aquifers can refill. Even Nobel Laureate Norman Borlaug, the father of the Green Revolution, noted that the rapid rise of ill-planned irrigation schemes to accommodate new crops in Asia often led to waterlogged or salty fields, which reduced agricultural productivity. In the United States, 23 percent irrigated corn acreage increased 23 percent and irrigated soybean acreage increased 32 percent between 2003 and 2008. The rising U.S. cultivation of GE corn and soybeans further threatens the strained High Plains Aquifer, which runs beneath eight western states and provides nearly a third of all groundwater used for U.S. irrigation.303 Ninetyseven percent of High Plains water withdrawals go to agriculture, and these withdrawals now far exceed the recharge rate across much of the aquifer.304 The worldwide expansion of industrial-scale cultivation of water-intensive GE commodity crops on marginal land could magnify the pressure on already overstretched water resources. But these are the crops the biotech industry has to offer.

Relatedly, there is plenty of evidence suggesting GMFs actually hurt the farming industry more than they help. There are a number of reasons why **GMFs harm agriculture**.

One such argument is that GMFs result in genetic uniformity in plants. The rationale here is that the more farmers plant GMFs, the less genetic diversity will be present in the environment. Unlike plants grown from conventional seeds, GMFs have consistent genetic codes-- they are clones (that, after all, is their whole point). This makes landscapes more vulnerable to disease and infestation, without the natural built-in mitigation system of genetic diversity present in conventional plants.

Here is **evidence**:

(Scott C. Lucas, "Halting the Downward Spiral of Monoculturization and Genetic Vulnerability: Toward a Sustainable and Biodiverse Food Supply," Journal of Environmental Law and Litigation, Spring, pp 169-170, 2002)

<u>Genetic Diversity in Food Sources</u> Genetic diversity <u>is crucial to a species' ability to survive changes in the environment, resist disease, combat predation by other species, and generally evolve.</u> The reason for this is grounded in Darwin's theory of evolution. <u>When a species' survival is challenged by disease, predation, weather or other changes in its environment, some members may survive the threat due to their genetic makeup. Their offspring are more likely to carry the resistant genetic makeup and are therefore also more likely to survive similar threats.</u>

Over time, the overall population of the species is strengthened and able to survive future threats because of the increased resistance of its genetic makeup. The overall adaptability of the species and its prospects for long-term survival are thus inextricably tied to the genetic variability of its individual members. Hence, the genetic variability of the species humans utilize for food is key to both the survival of the species and its availability as a food source for humans.

More **evidence**:

(Migues Altieri, Associate Professor of Environmental Science @ Berkeley, "The Environmental Risks of Transgenic Crops: an Agroecological Assessment," http://www.pmac.net/miguel.htm, 1/12/98)

Although biotechnology has the capacity to create a greater variety of commercial plants, the trends set forth by TNCs is to create broad international markets for a single product, thus creating the conditions for genetic uniformity in rural landscapes. In addition, patent protection and intellectual property rights spoused by GATT, inhibiting farmers from re-using, sharing and storing seeds raises the prospect that few varieties will dominate the seed market. Although a certain degree of crop uniformity may have certain economic advantages, it has two ecological drawbacks. First, history has shown that a huge area planted to a single cultivar is very vulnerable to a new, matching strain of a pathogen or pest. And, second, the widespread use of a single cultivar leads to a loss of genetic diversity (Robinson 1996). Evidence from the Green Revolution leaves no doubt that the spread of modern varieties has been an important cause of genetic erosion, as massive government campaigns encouraged farmers to adopt MVs and to

> abandon many local varieties (Tripp 1996). The uniformity caused by increasing areas sown to a smaller number of varieties is a source of increased risk for farmers, as the varieties may be more vulnerable to disease and pest attack and most of them perform poorly in marginal environments (Robinson 1996).

If you are interested in pursuing genetic diversity as a component of your strategy, other good search terms are "monoculture" and "monocropping." The literature on this subject is abundant and persuasive.

In fact, the idea that genetic uniformity could cause a plant to succumb to disease so rapidly that it becomes extinct is not just conjecture; *it has actually happened*. The strain of banana known as "Gros Michel" ("Big Mike") was popular in the mid-20th century due to its superior flavor and resistance to spoilage. However, the plant's popularity led to monoculture-style growing. It didn't take long for "Big Mike" to succumb to disease that spread rapidly through banana farms. As a result, the strain became extinct. Today's popular commercially-grown banana strain ("Cavendish") is currently threatened by the same kind of situation. This kind of example can be useful in illustrating the very real threat of genetic uniformity in the food supply.

Also related to agriculture are arguments about **"superbugs" & "superweeds."** The argument here is about evolution. While technology can kill insects and weeds initially, Mother Nature is not so easily defeated. Evolution dictates that some organisms will develop genetic mutations that allow them to survive the chemical. Since these survivors are most likely to breed with other survivals, the risk of creating a new strain of resistant bugs or weeds is significant.

Here is **evidence** on GMFs and superbugs:

(Dan Charles, NPR, "insects find crack in biotech corn's armor," http://www.npr.org/blogs/thesalt/2011/12/05/143141300/insects-find-crack-in-biotech-corns-armor, 12/5/12)

But <u>from the beginning, scientists worried that biotech companies were</u> overusing Bt and <u>increasing the chances that it would eventually stop working. Why? The key word is resistance.</u>

<u>The more widely you spray any insecticide, the more likely you are to uncover and promote the growth of a new strain of insects that's resistant to your insect killer. It has happened with one insecticide after another over the decades. Eventually, scientists said, the same thing would happen to a crop that carries its own insecticide. Covering fields with Bt crops would lead to a strain of insects that the crops didn't kill.</u>

Here is **evidence** on superweeds:

(Science Daily, Washington State Univ., "'Superweeds' linked to rising herbicide use in GM crops, study finds," http://www.sciencedaily.com/releases/2012/10/121002092839.htm, 10/2/12)

A study published this week by Washington State University research professor Charles Benbrook finds that the use of herbicides in the production of three genetically modified herbicide-tolerant crops -- cotton, soybeans and corn -- has actually increased.

This counterintuitive finding is based on an exhaustive analysis of publicly available data from the U.S. Department of Agriculture's National Agriculture Statistics Service. Benbrook's analysis is the first peer-reviewed, published estimate of the impacts of genetically engineered (GE) herbicide-resistant (HT) crops on pesticide use.

In the study, which appeared in the open-access, peer-reviewed journal *Environmental Sciences Europe*, Benbrook writes that the emergence and spread of glyphosate-resistant weeds is strongly correlated with the upward trajectory in herbicide use. Marketed as Roundup and other trade names, glyphosate is a broad-spectrum systemic herbicide used to kill weeds. Approximately 95 percent of soybean and cotton acres, and more than 85 percent of corn, are planted to varieties genetically modified to be herbicide resistant.

"Resistant weeds have become a major problem for many farmers reliant on GE crops, and they are now driving up the volume of herbicide needed each year by about 25 percent," Benbrook said.

The annual increase in the herbicides required to deal with tougher-to-control weeds on cropland planted to GE cultivars has grown from 1.5 million pounds in 1999 to about 90 million pounds in 2011.

Herbicide-tolerant crops worked extremely well in the first few years of use, Benbrook's analysis shows, but over-reliance may have led to shifts in weed communities and the spread of resistant weeds that force farmers to increase herbicide application rates (especially glyphosate), spray more often and add new herbicides that work through an alternate mode of action into their spray programs.

The above card also contains the warrant that GMFs increase pesticide usage, which can also be used to support the previously-discussed health and environmental impacts.

As touched on at the beginning, many pro teams will build their cases around the argument that GMFs can increase yields, solving the global hunger problem and/or mitigating the effects of climate change. Smart cons will want to be prepared to challenge these claims.

Here is **evidence** arguing that GE crops have not increased yields:

(Doug Gurain-Sherman, senior scientist @ the Union of Concerned Scientists (UCS), UCS food & environment program, "Failure to Yield: evaluating the performance of genetically engineered crops," http://www.ucsusa.org/sites/default/files/legacy/assets/documents/food_and_agriculture/failure-to-yield.pdf, April 2009)

It is also important to keep in mind where increased food production is most needed—in developing countries, especially in Africa, rather than in the developed world. Several recent studies have shown that low-external-input methods such as organic can improve yield by over 100 percent in these countries, along with other benefits. Such methods have the advantage of being based largely on knowledge rather than on costly inputs, and as a result they are often more accessible to poor farmers than the more expensive technologies (which often have not helped in the past).

So far, the record of GE crops in contributing to increased yield is modest, despite considerable effort. There are no transgenic crops with increased intrinsic yield, and only Bt corn exhibits somewhat higher operational yield. Herbicide-tolerant soybeans, the most widely utilized GE crop by far, do not increase either operational or intrinsic yield. Genetic engineers are working on new genes that may raise both intrinsic and operational yield in the future, but their past track record for bringing new traits to market suggests caution in relying too heavily on their success.

It is time to look more seriously at the other tools in the agricultural toolkit. While GE has received most of the attention and investment, traditional breeding has been delivering the goods in the all-important arena of increasing intrinsic yield. Newer and sophisticated breeding methods using increasing genomic knowledge—but not GE—also show promise for increasing yield.

This card suggests that other farming practices (using conventional seeds) can dramatically increase yields, but GMFs cannot. If you want to read a true counter-advocacy, this (as well as the rest of the article it comes from) may be useful to you. Even if you don't, you can make a simple trade-off argument: the more we focus our time, money, and research efforts on GMFs, the less we will spend pursuing other, more effective means of increasing crop yields. This is supported by the evidence.

Another argument you can use to counter the pro's famine impacts is that GMFs tend not to be the sort of foods needed to actually make a dent in global hunger. Cotton is obviously not food, GM corn and soybeans are primarily suitable for animal rather than human consumption, and the other most common GM crops tend to be processed into cooking oils or other commercial goods. None of these put food in any mouths, especially not those of the world's most needy. Therefore, GMFs cannot really be considered a solution for food insecurity.

Here is **evidence**:

(Charlie Furniss, Geographical Dossier, "The New GM Revolution," http://www.geographical.co.uk/Magazine/Dossiers/The_new_GM_revolution_-_July_2006.html, July 2006)

One of the main criticisms of GM crops is that they haven't been developed to tackle the needs of the poor directly. And in this respect, the environmental groups are right. Although Bt cotton has improved the livelihoods of millions of poor farmers in China, India and South Africa, none of the principal biotech food crops will help reduce hunger and malnutrition in the developing world: soya and rape are both grown primarily for processing into vegetable oil, while GM maize is used for cattle feed. These crops, says FOE's Clare Oxborrow, have been developed to cater for the commercial agriculture market. "But millions of small-scale farmers still face starvation every year because they have difficulty growing staple crops such as sweet potato and cassava. The technology hasn't been implanted into these types of foods."

In response to this, the pro team is likely to say that development of GM food crops for the poor will be possible in the future. You can answer that they should be required to prove that technology is feasible and likely to be developed. Further, you can say this development is not likely, since the GM development market is largely driven by companies like Monsanto, who have more to gain from producing seeds attractive to wealthy farmers than concerning themselves with creating, say, a more nutritious sweet potato. If the pro team cannot prove that GM crops to feed the world are in the works, they should not be able to win on arguments about what hypothetically could happen in the future. You can also point out that the resolution is in the present tense, so potential future impacts aren't relevant.

The pro team may also discuss the GM crop "golden rice," which has been developed as a more nutritious alternative to standard rice. It is enriched with vitamin A, a nutrient many impoverished children are missing from their diets. However, a plant having a better nutritional profile is not the same as increasing yield. Therefore, while these might play a role in mitigating malnutrition in certain areas, they cannot be claimed to solve the problem of overall *shortage* of food supplies.

Moreover, some experts say golden rice is more about public relations for the GM industry than a truly beneficial solution. Other, non-GMF nutrition assistance programs would be less expensive and more effective.

Here is **evidence** on that:

> *(Dan Charles, NPR, "In a grain of golden rice, a world of controversy over GMO foods," in-a-grain-of-golden-rice-a-world-of-controversy-over-gmo-foods, 3/7/13)*
>
> Neth Daño, who works in the Philippines for the ETC Group, an advocate on behalf of small farmers, says <u>the main purpose of genetically modifying crops has not been to help people; it's been driven by profit.</u>
>
> <u>"A handful of corporations in developing countries has reaped billions in profits selling genetically modified seeds and proprietary herbicides</u>," she says. Yet <u>those companies have always claimed that this technology would benefit the poor.</u> "The poor have always been at the

center of each and every assertion about the importance of genetically modified organisms to mankind."

So this is the real significance of golden rice, she says. It gives biotech companies a chance to say, "See, biotechnology *is* good for the poor!"

"Some proponents are already announcing that the debate is over, that the golden rice product is the clincher."

Don't misunderstand me, Daño says: Golden rice is not purely public relations. It is, indeed, supposed to help malnourished people — although she doesn't think it's a very good way to help. She thinks it will be more expensive and less effective than traditional nutrition programs.

This rice is mainly going to help the image of biotechnology, she says.

If you want to go in-depth on the debate over improving agriculture in the world's poorest nations, there is also a huge body of evidence on the question of whether GMOs help or harm farmers and their profits in these countries. A significant amount of people write that growing GMFs hurts the livelihoods of small farmers in impoverished countries. That line of argumentation may offer yet another way to make inroads against pro offense.

Finally, all of the other arguments covered in this guide can also be used to counter pro arguments about hunger. If the agricultural process is disrupted by weeds and pests, there will be even less food security worldwide. Similarly, depleting or polluting water and soil will reduce crop yields. Monocropping could wipe out entire strains. And, if you win that GMFs are harmful to human health, then they are clearly a bad method for solving world hunger.

That covers the basics. You should now be ready to write a solid con case!

As always, don't forget that this guide is only an introduction, not a comprehensive account of all possible strategies. You can use this evidence to begin building your case, but you should continue researching and exploring on your own. Get creative!

When you complete your con case, send it to **Rachel.Stevens@NCPA.org** for a free, confidential critique! We'll get them back to you, with personalized comments, within 3 business days.

Good luck, PFers!