Seconde, DNL, How to feed the world debate : **Shall we ban the GMOs ?**

## Debate 2: "Shall we ban the GMOs?"

Sources available on **dnlrenoir.fr** too.

### Videos

Vidéo european commission : http://www.youtube.com/watch?v=B8p7M0WF_7A

Vidéo monsanto usa : http://www.youtube.com/watch?v=wZU3uYzWTqU

Vidéo monsanto brazil : http://www.youtube.com/watch?v=t8cGgyypdA0

Vidéo greenpeace : http://www.youtube.com/watch?v=2x5ftpGK1UI

### Articles

Are Genetically Modified Organisms (GMO) A Blessing Or A Curse?
From GMO Answers website.
https://gmoanswers.com/article-are-genetically-modified-organisms-gmo-blessing-or-curse

Are G.M.O. Foods Safe?
By Jane E. Brody, April 23, 2018, New York Times
https://www.nytimes.com/2018/04/23/well/eat/are-gmo-foods-safe.html

'Silent revolution' in biotech farming is overtaking GM, says Greenpeace
Tracy McVeigh, The guardian, 25th October 2014
http://www.theguardian.com/environment/2014/oct/25/silent-revolution-farming-gm-greenpeace-biotech-genetic-modification

10 reasons why GM won't feed the world
Mark Anslow The Ecologist March 1, 2008
https://theecologist.org/2008/mar/01/10-reasons-why-gm-wont-feed-world

Seconde, DNL, How to feed the world debate : **Shall we ban the GMOs ?**

## 'Silent revolution' in biotech farming is overtaking GM, says Greenpeace

**Tracy McVeigh, The guardian, 25th October 2014**

Pressure group accused of hypocrisy by geneticists who say the same science is behind genetic modification and Greenpeace-approved Marker Assisted Selection

A field of oilseed rape in Perthshire, Scotland. Greenpeace has long been against GM methods. Photograph: Christopher Furlong/Getty Images

The row over genetically modified crops should be a thing of the past because they have failed to live up to their promise, according to Greenpeace, which will publish a report this week highlighting the successes of biotechnology projects it claims are outstripping GM in improving food production around the world.

The environmental campaign group – which has long been against GM foods – claims that a "silent revolution" in agriculture is showing a stronger track record than the GM process, which it labels as having shown disappointing results.

"Whilst the debate between GM and non-GM has used up most of the political oxygen, this report shows it is not the only – or indeed, the best – show in town. There is a growing range of non-GM biotechnologies which show how a growing world population can be fed at a time when natural environments are increasingly stressed," said Greenpeace chief scientist Dr Doug Parr.

"It's a silent revolution, making huge strides on the ground for the world's farmers without the novel risks of GM," he said. "The debate is not about GM any more; things have moved on."

However, the group has been accused of "bizarre" hypocrisy by several leading geneticists who point out that the same science is behind both GM and the biotechnologies Greenpeace are backing. Known as MAS – Marker Assisted Selection – they combine genetics and molecular biology to pick out and control the best traits of an individual plant. Essentially, it is using gene technology to improve what is already there rather than introducing new elements as GM does, for example in the "golden rice" project which added vitamin A to rice.

"This is bizarre. What they are talking about is essentially the suite of technologies that spearhead the 'green revolution', which eco groups such as Greenpeace have steadfastly rubbished for decades. Now they see it as agriculture's saviour," said Johnjoe McFadden, professor of molecular genetics at the University of Surrey.

"If GM is not up to much then why has it been so successful that crops such as soya are now nearly all GM worldwide. Who knows best how to grow their own crops – farmers or Greenpeace?

"Genetic-assisted breeding is certainly very important and will help to generate new crops but it can't, for example, replace golden rice. Vitamin A-rich rice cannot be bred because it isn't a trait which already occurs in rice. This places strict limitations on this form of breeding."

But Greenpeace insisted Vitamin A rice was still "years away" from being ready for use and pointed to MAS successes with rice, wheat and in increasing resistence to disease to crops that are of key importance in their own small geographical areas – such as Indian millet and sorghum in Sudan.

"Our report shows how MAS has a much stronger track record of delivery than GM technologies on properties that genuinely help poorer families globally, yet currently receives little attention," the group said.

The Greenpeace report on biotechnology will be launched at the International Rice Congress in Bangkok later this week.

Seconde, DNL, How to feed the world debate : **Shall we ban the GMOs ?**

**Are Genetically Modified Organisms (GMO) A Blessing Or A Curse?**

From GMO Answers website.

The following is an excerpt of an article by chief editor Rob Wright on the Life Science Leader website discussing the misinformation surrounding GMOs, refering GMO Answers as a resource.

Back in March of this year, a reader of Life Science Leader magazine submitted the above question for our popular monthly Ask The Boardcolumn. Started in our February 2011 issue, the column enables readers to submit questions, which are then posed to a member of Life Science Leader's editorial advisory board (EAB). Board members are asked to provide a 160-word written response, which is published on p. 8 in our print edition. When receiving the question, "Are genetically modified organisms (GMO) a blessing or a curse?" I thought it might be a little outside the scope of our publication, as we typically focus on the biopharmaceutical and medical device industries. And while GMOs can involve animal, bacteria, plant, and virus genes, we often tend to think of GMOs with the production of food and farms. This made me wonder, did the reader have an axe to grind? Was there some sort of hidden political agenda? I don't believe so, as the person has worked in the biopharmaceutical industry for more than two decades, and presently serves as the chief medical officer for a CRO. Besides, when you think of the evolution of cell & gene therapy, and the future of personalized medicine, when it comes to GMOs, aren't we also talking about genetically modifying humans toward improving health? Which then leads to the penultimate question: When it comes to GMOs, are we playing God?

The Controversy Surrounding GMOs

Since the advent of GMOs in the early 1990s, they have been surrounded by controversy. Genetic engineering differs from conventional plant and animal breeding, as it allows genes to be moved across taxonomic boundaries. Thus, genes cannot be transferred only between closely related organisms (e.g., wheat to rice), but between entirely different organisms (i.e., animals to plants). In conventional breeding, nature imposes limits on genetic recombination between biologically distinct organisms. However, genetic engineering enables the bypassing of barriers, which is why some people consider GMOs to be unnatural and potentially unsafe.

The publication of a 2013 study on GMOs, which involved the evaluation of 1,783 research papers, reviews, relevant opinions, and reports published between 2002 and 2012 found no "significant hazards directly connected with the use of genetically engineered crops." Further, organizations such as the National Academy of Sciences, the American Association for the Advancement of Science, and the European Commission have publicly proclaimed GMO foods safe to eat. Yet public skepticism remains, and will likely continue, thanks to organizations like the Non-GMO Project, and movies like Jurassic Park that portray worst-case (fantasy) scenarios of what happens when scientists mess with that which they don't fully understand. Here's a fun fact as to why some companies can get behind producing non-GMO products. According to the Non-GMO Project website, retail partners report that Non-GMO Project Verified products are the fastest dollar growth trend in their stores, with total annual sales exceeding $19.2 billion! But here's the thing. Consumers will truly have to work to avoid foods containing GMOs, because according to the USDA, there are already a number of GMO crops that have been genetically modified:

94 percent of soybeans

92 percent of corn

94 percent of cotton

95 percent of sugar beets, one of our main sources of sugar

90 percent of canola oil, commonly used in prepared foods and to deep-fry things like French fries

77 percent of Hawaiian papayas

Soybeans are used in a variety of foods for humans, and feed for animals. But soybeans have a wide range of uses, such as a component of biodiesel fuel for vehicles, included in biocomposite building materials, furniture, flooring, countertops, adhesives, carpets, crayons, lubricants, soy-based foams in cooler, refrigerators, automotive interior, footwear … you get the idea. In other words, GMOs are all around us, including the air we breathe.

GMO Question Asked And Answered

Knowing all of the above, I decided to pose the question to a member of Life Science Leader's EAB. The first person I reached out to is a trained scientist with broad expertise. They responded, "Hmmm…I think this is too broad a question for a 160-word answer. It's probably both." They thought I might want to run it by someone else. I decided to reach out the Chandra Ramanathan, Ph.D., who heads up Bayer's East Coast Innovation Center. I didn't necessarily expect Ramanathan to have an answer, but thought, being he is at Bayer, and as Bayer has a large crop science organization, perhaps he can get an expert to weigh in with some thoughts. So I rephrased the question a bit, "What are the pros and cons of GMOs?" as I felt blessing or a curse left very little middle ground. And with the help of Adrian Percy, Ph.D., head of R&D for Bayer Crop Science, here is the response Ramanathan submitted.

## Are G.M.O. Foods Safe?

## By Jane E. Brody, April 23, 2018, New York Times

It's human nature, it seems, to resist change and fear the unknown. So it is no surprise that genetic engineering of food and feed crops resulted in their resounding condemnation as "Frankenfoods" by many consumers, who seem as terrified of eating an apple with an added anti-browning gene or a pink pineapple genetically enriched with the antioxidant lycopene as I am of self-driving cars.

Trek down the grocery aisles of any large market and you'll find many products prominently labeled "No G.M.O.s." It's much harder to spot the small print on many other foods stating "Partially produced with genetic engineering," a result of a 2016 federal law that mandated uniform labeling of all food products containing genetically engineered ingredients.

The labeling requirement arose in response to public pressure and a confusing array of state rules. But while I endorse the public's right to know and honest labeling of all products, in an important way it is very misleading. Farmers and agricultural scientists have been genetically engineering the foods we eat for centuries through breeding programs that result in large and largely uncontrolled exchanges of genetic material. What many consumers may not realize: For many decades, in addition to traditional crossbreeding, agricultural scientists have used radiation and chemicals to induce gene mutations in edible crops in attempts to achieve desired characteristics.

Modern genetic engineering differs in two ways: Only one or a few new genes with a known function are introduced into a crop, and sometimes the new genes come from an unrelated species. Thus, a gene meant to instill frost tolerance into, say, spinach, might come from a fish that lives in icy waters.

In the decades since the first genetically modified foods reached the market, no adverse health effects among consumers have been found. This is not to say there are none, but as hard as opponents of the technology have looked, none have yet been definitely identified.

Although about 90 percent of scientists believe G.M.O.s are safe — a view endorsed by the American Medical Association, the National Academy of Sciences, the American Association for the Advancement of Science and the World Health Organization — only slightly more than a third of consumers share this belief.

It is not possible to prove a food is safe, only to say that no hazard has been shown to exist. The fears of G.M.O.s are still theoretical, like the possibility that insertion of one or a few genes could have a negative impact on other desirable genes naturally present in the crop.

Among commonly expressed concerns — again, none of which have been clearly demonstrated — are unwanted changes in nutritional content, the creation of allergens and toxic effects on bodily organs. According to an interview in Scientific American with Robert Goldberg, a plant molecular biologist at the University of California, Los Angeles, such fears have not yet been quelled despite "hundreds of millions of genetic experiments involving every type of organism on earth and people eating billions of meals without a problem."

Establishing long-term safety would require prohibitively expensive decades of study of hundreds of thousands of G.M.O. consumers and their non-G.M.O. counterparts.

Meanwhile, a number of impressive benefits have been well established. For example, an analysis of 76 studies published in February in Scientific Reports by researchers in Pisa, Italy, found that genetically engineered corn has a significantly higher yield than non-genetically modified varieties and contains lower amounts of toxins commonly produced by fungi.

Both effects most likely stem from the genetically engineered resistance to a major insect pest, the western corn rootworm, which damages ears of corn and allows fungi to flourish. The researchers said that the change has had little or no effect on other insects.

By engineering resistance to insect damage, farmers have been able to use fewer pesticides while increasing yields, which enhances safety for farmers and the environment while lowering the cost of food and increasing its availability. Yields of corn, cotton and soybeans are said to have risen by 20 percent to 30 percent through the use of genetic engineering.

Billions of edible animals are raised in this country each year on feed containing G.M.O.s, with no evidence of harm. In fact, animal health and growth efficiency actually improved on the genetically engineered feed, according to a 2014 review in the Journal of Animal Science.

Wider adoption of genetic engineering, especially in African and Asian countries that still spurn the technology, could greatly increase the food supply in areas where climate change will increasingly require that crops can grow in dry and salty soils and tolerate temperature extremes. I continue to be distressed by the resistance to Golden Rice, a crop genetically engineered to supply more vitamin A than spinach that could prevent irreversible blindness and more than a million deaths a year.

Nonetheless, gene modification scientists are focusing increasingly on building health benefits into widely used foods. In addition to pink pineapples containing the tomato-based antioxidant lycopene, tomatoes are being engineered to contain the antioxidant-rich purple pigment from blueberries.

And people in developing countries faced with famine and malnutrition are likely to benefit from attempts to improve the protein content of food crops, as well as the amount of vitamins and minerals they provide.

This is not to say that everything done in the name of genetic engineering has a clean bill of health. Controversy abounds over the use of genetically modified seeds that produce crops like soy, corn, canola, alfalfa, cotton and sorghum that are resistant to a widely used herbicide, glyphosate, the health effects of which are still unclear.

In the latest development, resistance to a second weed killer, 2,4-D, has been combined with glyphosate resistance. Although the combination product, called Enlist Duo, was approved in 2014 by the Environmental Protection Agency, 2,4-D has been linked to an increase in non-Hodgkin’s lymphoma and a number of neurological disorders, researchers reported in the International Journal of Environmental Research and Public Health.

The bottom line: Consumers concerned about the growing use of G.M.O.s in the foods they depend on might consider taking a more nuanced approach than blanket opposition. Rather than wholesale rejection, take some time to learn about how genetic engineering works and the benefits it can offer now and in the future as climate change takes an ever greater toll on food supplies. Consider supporting efforts that result in safe products that represent improvements over the original and focusing opposition on those that are less desirable.

## 10 reasons why GM won't feed the world

## Mark Anslow The Ecologist March 1, 2008

Genetic modification can't deliver a safe, secure future food supply. Here's why...

1. Failure to deliver

Despite the hype, genetic modification consistently fails to live up to industry claims. Only two GM traits have ever made it to market: herbicide resistance and BT toxin expression (see below). Other promises of genetic modification have failed to materialise. The much vaunted GM 'golden rice' – hailed as a cure to vitamin A deficiency – has never made it out of the laboratory, partly because in order to meet recommended levels of vitamin A intake, consumers would need to eat 12 bowls of the rice every day.1 In 2004, the Kenyan government admitted that Monsanto's GM sweet potatoes were no more resistant to feathery mottle virus than ordinary strains, and in fact produced lower yields.2 And in January 2008, news that scientists had modified a carrot to cure osteoporosis by providing calcium had to be weighed against the fact that you would need to eat 1.6 kilograms of these vegetables each day to meet your recommended calcium intake.3

2. Costing the Earth

GM crops are costing farmers and governments more money than they are making. In 2003, a report by the Soil Association estimated the cost to the US economy of GM crops at around $12 billion (£6 billion) since 1999, on account of inflated farm subsidies, loss of export orders and various seed recalls.4 A study in Iowa found that GM soyabeans required all the same costs as conventional farming but, because they produced lower yields (see below), the farmers ended up making no profit at all.5 In India, an independent study found that BT cotton crops were costing farmers 10 per cent more than non-BT variants and bringing in 40 per cent lower profits.6 Between 2001 and 2005, more than 32,000 Indian farmers committed suicide, most as a result of mounting debts caused by inadequate crops.7

3. Contamination and gene escape

No matter how hard you try, you can never be sure that what you are eating is GM-free. In a recent article, the New Scientist admitted that contamination and cross-fertilisation between GM and non-GM crops 'has happened on many occasions already'.8 In late 2007, US company Scotts Miracle-Gro was fined $500,000 by the US Department of Agriculture when genetic material from a new golf-course grass Scotts had been testing was found in native grasses as far as 13 miles away from the test sites, apparently released when freshly cut grass was caught and blown by the wind.9 In 2006, an analysis of 40 Spanish conventional and organic farms found that eight were contaminated with GM corn varieties, including one farmer whose crop contained 12.6 per cent GM plants.

4. Reliance on pesticides

Far from reducing dependency on pesticides and fertilisers, GM crops frequently increase farmers' reliance on these products. Herbicide-resistant crops can be sprayed indiscriminately with weedkillers such as Monsanto's 'Roundup' because they are engineered to withstand the effect of the chemical. This means that significantly higher levels of herbicide are found in the final food product, however, and often a second herbicide is used in the late stages of the crop to promote 'dessication' or drying, meaning these crops receive a double dose of harmful chemicals.10 BT maize, engineered to produce an insecticidal toxin, has never eliminated the use of pesticides,11 and because the BT gene cannot be 'switched off' the crops continue to produce the toxin right up until harvest, reaching the consumer at its highest possible concentrations.12

5. 'Frankenfoods'

Despite the best efforts of the biotech industry, consumers remain staunchly opposed to GM food. In 2007, the vast majority of 11,700 responses to the Government's consultation on whether contamination of organic food with traces of GM crops should be allowed were strongly negative. The Government's own 'GM Nation' debate in 2003 discovered that half of its participants 'never want to see GM crops grown in the United

Kingdom under any circumstances', and 96 per cent thought that society knew too little about the health impacts of genetic modification. In India, farmers' experience of BT cotton has been so disastrous that the Maharashtra government now advises that farmers grow soybeans instead. And in Australia, over 250 food companies lodged appeals with the state governments of New South Wales and Victoria over the lifting of bans against growing GM canola crops.13

6. Breeding resistance

Nature is smart, and there are already reports of species resistant to GM crops emerging. This is seen in the emergence of new 'superweeds' on farms in North America – plants that have evolved the ability to withstand the industry's chemicals. A report by then UK conservation body English Nature (now Natural England), in 2002, revealed that oilseed rape plants that had developed resistance to three or more herbicides were 'not uncommon' in Canada.14 The superweeds had been created through random crosses between neighbouring GM crops. In order to tackle these superweeds, Canadian farmers were forced to resort to even stronger, more toxic herbicides.15 Similarly, pests (notably the diamondback moth) have been quick to develop resistance to BT toxin, and in 2007 swarms of mealy bugs began attacking supposedly pestresistant Indian cotton.

7. Creating problems for solutions

Many of the so-called 'problems' for which the biotechnology industry develops 'solutions' seem to be notions of PR rather than science. Herbicide-resistance was sold under the claim that because crops could be doused in chemicals, there would be much less need to weed mechanically or plough the soil, keeping more carbon and nitrates under the surface. But a new long-term study by the US Agricultural Research Service has shown that organic farming, even with ploughing, stores more carbon than the GM crops save.16 BT cotton was claimed to increase resistance to pests, but farmers in East Africa discovered that by planting a local weed amid their corn crop, they could lure pests to lay their eggs on the weed and not the crop.17

8. Health risks

The results of tests on animals exposed to GM crops give serious cause for concern over their safety. In 1998, Scottish scientists found damage to every single internal organ in rats fed blightresistant GM potatoes. In a 2006 experiment, female rats fed on herbicide-resistant soybeans gave birth to severely stunted pups, of which half died within three weeks. The survivors were sterile. In the same year, Indian news agencies reported that thousands of sheep allowed to graze on BT cotton crop residues had died suddenly. Further cases of livestock deaths followed in 2007. There have also been reports of allergy-like symptoms among Indian labourers in BT cotton fields. In 2002, the only trial ever to involve human beings appeared to show that altered genetic material from GM soybeans not only survives in the human gut, but may even pass its genetic material to bacteria within the digestive system.18

9. Left hungry

GM crops have always come with promises of increased yields for farmers, but this has rarely been the case. A three-year study of 87 villages in India found that non-BT cotton consistently produced 30 per cent higher yields than the (more expensive) GM alternative.19 It is now widely accepted that GM soybeans produce consistently lower yields than conventional varieties. In 1992, Monsanto's own trials showed that the company's Roundup Ready soybeans yield 11.5 per cent less on harvest. Later Monsanto studies went

on to reveal that some trials of GM canola crops in Australia actually produced yields 16 per cent below the nonGM national average.20

10. Wedded to fertilisers and fossil fuels

No genetically modified crop has yet eliminated the need for chemical fertilisers in order to achieve expected yields. Although the industry has made much of the possibility of splicing nitrogen-fixing genes into commercial food crops in order to boost yields, there has so far been little success. This means that GM crops are just as dependent on fossil fuels to make fertilisers as conventional agriculture. In addition to this, GM traits are often specifically designed to fit with large-scale industrial agriculture. Herbicide resistance is of no real benefit unless your farm is too vast to weed mechanically, and it presumes that the farmers already farm in a way that involves the chemical spraying of their crops. Similarly, BT toxin expression is designed to

counteract the problem of pest control in vast monocultures, which encourage infestations. In a world that will soon have to change its view of farming – facing as it does the twin challenges of climate change and peak oil – GM crops will soon come to look like a relic of bygone practices.

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