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Commentary Open Access

Risks of GMOs

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Commentary

October 2nd, 2015: A landslide victory for the Environmental groups and the anti-GM brigade. More than half the 28 countries in the European Union, including France and Germany, voted to forbid farmers from growing genetically modified crops. Italy, Austria, Greece, Hungary, Latvia, Lithuania and Poland also joined the exodus. Other regions within member states, including Scotland, Wales and Northern Ireland, along with Wallonia, the French-speaking region of southern Belgium, also followed suit. For years there has been a de facto ban on growing GM crops in many of the countries that opted out. Some say, on a practical level, the latest decisions will have little impact on the lives of farmers on, while others say it's a moral victory, a step in a new, healthier direction. Early in 2015, Chipotle, the health-conscious fast-food empire, was the first major restaurant chain to go GMO-free. After announcing the plan to remove genetically modified organisms from its menu, some asked if the decision was taken just to satisfy the demands of its young target audience. After all, young people love organic food, even if some don't really know what organic means.

GMO supporters speak about the rigorous examination process, how specific foods are tested for safety and allergen potential before they go to market. Basing their conclusions on peer-reviewed evidence, the World Health Organization, the American Medical Association and the British Royal Society, among others, have all said that foods containing GM ingredients are as safe as the same foods containing ingredients from crop plants modified in more traditional ways. Two arguments that have been put forward for the use of GMOs include the potential benefits for agricultural productivity and the potential benefits for the environment.

Potential benefits for agricultural productivity

If crops can be made more resilient and resistant to pest outbreaks, then this will reduce the danger of crop failure. Furthermore, resilience and resistance to harsher weather, such as extreme heat or drought, is argument alone for genetic engineering of crops, even if this requires the manipulation of complex combinations of genes. Lastly, by modifying crops such as rice and wheat, we can increase their nutritional benefit.

Potential benefits for the environment

Cultivating less land to produce more food, with the advancements in science, conceivably, farmers will be able to harvest and provide the world with more crops, using less land in the process. Another pro argument relates to genetically engineered foods ability to better resist pests and diseases. More farmers are growing crops like maize, cotton and potatoes that no longer need to be sprayed with the bacterial insecticide Bacillus thuringiensis. Why? They have the ability to produce their very own insecticidal agent. Also, the genetic modification of fruits and vegetables leads to longer shelve lives, thus making food products less likely to spoil or lose their nutritional values as fast.

Pro GMO groups speak about biotechnology and how it can be used to make foods more nutritious. After all, aren't researchers using biotechnology to make genetically modified foods that provide real benefits to the lives of humans and livestock? The DNA altering process will help feed the extra 2 billion people that will fill the planet by 2050. GMOs help plants live through droughts and cold snaps, they say. And this may very well be the case. However, if all this happens to be true, why are so many experts speaking out against GMOs? If this DNA reshaping process lowers farmers' need for toxic chemical pesticides, thus resulting in less stress on the environment, why such antipathy and suspicion? Is genetic modification the very essence of life, or is it a perverse practice intent on destroying our food systems?

For the past couple of decades, especially within the realms of academia, serious concerns have been expressed about the lack of any impact assessment regarding GMOs. Indeed, knowing whom to ignore and whom to heed on the controversial issue of GMOs (biotechnology) is a difficult task, to say the very least. But the recent disagreements between the U.S. and Europe over genetically modified foods should raise some concerns. Basically, the U.S. exports them, but many countries within European Union no longer want to import them, believing their safety - rightly or wrongly - remains unproven. And this brings us on to a very important question. Are genetically modified foods the answer to world hunger? In order to try and reach a meaningful conclusion, we must start by asking the most basic of questions.

What exactly are genetically modified organisms?

GMOs are living organisms whose genetic material has been artificially manipulated in a laboratory through genetic engineering, or GE. In the realms of science, this is a relatively new practice. It creates combinations of plant, animal, bacterial and viral genes that do not occur in nature or through traditional crossbreeding methods. In the US alone, it is estimated that 80% of food contains GMOs, [1] and as a growing body of evidence from the academic community connects GMOs with various health problems, environmental damage and direct violations of consumers' and farmers' rights, we ask the following question: Are genetically engineered foods promoting illnesses? Let's first focus on autism, the mental condition, present from early childhood, that hinders the ability to communicate and form relationships with other people. In the words of Arden Anderson, MD, PhD, MPH, "It appears there is a direct correlation between GMOs and autism." Scientific studies have shown that chemical exposure consumed through household products and food, negatively impacts human health. Where a pre-existing genetic risk is already present, the consumption of GMOs seems to catalyse the risk of autism [2]. Dr. David Wallinga, the Director of the Food and Health Program

at the Institute for Agriculture and Trade Policy, in his own words, attempted "to better address the explosion of autism," adding that "it's critical that we consider how unhealthy diets interfere with the body's ability to eliminate toxic chemicals." [3] An inability to rid one-self of toxins can lead to an increase in health problems, present from early childhood, such as autism. In the U.S., staggeringly, one in every eighty-eight children is autistic [4].

Many within the scientific community are now focusing on the factors contributing to the rise of autism across America, specifically focusing on the correlation between the prevalent use and consumption of GMOs and the rise in complex disorders of brain development. Furthermore, soy is the premium GMO crop, and most milk is laden with rBGH hormone, a genetically engineered artificial hormone injected into dairy cows [5]. This genetically engineered artificial hormone, created by the Monsanto Corporation for injecting into cows so they produce more milk, has been the source of growing concern and controversy amongst farmers, consumers, and scientists. The consumption of GMOs has become incredibly difficult to avoid, and this means that the possible health risks associated with GMOs are also becoming more difficult to avoid.

Why are GMOs problematic?

The genetic engineering process has raised many concerns, largely because it involves mutations in hundreds or thousands of locations throughout the plant's DNA, [6] thus changing the DNA blueprint. This alteration can then be passed down over generations. Just one single change at the DNA level can result in pleiotropic effects [7]. Pleiotropy occurs when one gene influences two or more seemingly unrelated phenotypic traits. A mutation in a pleiotropic gene may have an effect on some or all traits, sometimes simultaneously. Phenylketonuria, for example, caused by a solitary gene defect, is a human disease that affects multiple systems. Commonly known as PKU, Phenylketonuria is an inherited disorder that increases the levels of a substance called phenylalanine in the blood. As an amino acid, phenylalanine is a building block of proteins, and is obtained through the human diet. If PKU, often found in meat and an array of artificial sweeteners, is not treated, phenylalanine can build up to dangerous levels in the body, sometimes resulting in intellectual disabilities and other serious health problems.

In 2013, a study carried out by Dr. Michael C.R. Alavanja and colleagues focused on the increased risk of cancer associated with the consumption of GMOs treated with certain pesticides [8]. The scientists echoed the sentiments previously voiced by a number of well-versed epidemiological and molecular researchers. Substantial evidence was provided showing that certain pesticides used in agricultural and commercial applications were associated with an increased risk in various cancers. In this study, the epidemiological, molecular, biological, and toxicological evidence appeared to reinforce the findings of recent literature. After assessing the link between specific pesticides and several cancers, prostate cancer, non-Hodgkin lymphoma, leukaemia, multiple myeloma, and breast cancer included, the findings strongly suggested that the public health problems posed by GMOs and pesticides are very real.

An even more recent study, carried out in 2015, suggested honeybees - specifically those in the vicinity of GMO crops-were losing their ability to navigate back to their hives, and glyphosate, once marketed by Monsanto as "the ultimate killing machine," was highlighted as the prime cause [9]. Few studies have focused on the overall effects of glyphosate, a herbicide that is widely used in agriculture for weed control, in non-target organisms such as the honeybee. The scientists tested whether or not exposure to three sub-lethal concentrations of GLY (2.5, 5 and 10 mg/L corresponding to 0.125, 0.250 and 0.500 µg/animal) significantly affected the homeward flight path of honeybees in an open field. In this particular experiment, forager honeybees were trained to approach an artificial feeder, and when captured, fed with sugar solution containing GLY traces. After releasing the bees, using harmonic radar technology, homeward trajectories were tracked. The researchers found that honeybees that had been fed with solution containing the highest concentration of GLY (10 mg) spent more time performing homeward flights than control bees or bees treated with lower levels of GLY concentrations. As the "10 mg bees" also performed more indirect homing flights, the research seemed to suggest that exposure to GLY doses regularly found in agricultural settings poses significant dangers. The honeybees suffered impairments to the cognitive capacities needed to compute spatial information and ensure a successful return to the hive.

Another study from last year focused on a new breed of glyphosate-tolerant plants [10]. The researchers felt it was relevant "to review the scientific evidence that documents the quality and safety of such biotechnology," as most of this research has been "planned, performed and reported by researchers employed by biotech industry companies." The researchers reviewed 15 reports on compositional analyses of glyphosate-tolerant cultivars and 15 reports from animal feeding studies. On completion, rather worryingly, the final verdict was both damning and conclusive. Dr. Marek Cuhra, the main researcher involved, noted that the "reviewed industry studies show methodological flaws. In the studies where glyphosate herbicides were applied to growing plants, the produced plant material was not analysed for glyphosate residues. This review has failed to identify industry studies that mention glyphosate residues in glyphosate-tolerant plants. This indicates that questions and evidence of importance for regulatory assessment have been systematically ignored. Independent research has investigated this issue and found that glyphosate-tolerant plants accumulate glyphosate residues at unexpected high levels. Glyphosate residues are found to have potential to affect plant material composition. Furthermore, these residues are passed on to consumers."

Wuhan, the most populous city in Central China, was home to a well-documented experiment. In an effort to study the effects of GM feed on the reproduction systems of rodents, scientists fed Kunming white mice GM feed [11]. After one month of consuming GM feed, the scientists observed changes in the testicular structure of the male mice. Results showed that the both the structural integrity and testicular tissue of experimental mice were gravely impaired.

In the words of the author, a scientific study from 2014 focusing on the health damages associated with GMO crops in Argentina, specifically in the city of Cordoba, "confirmed what we already know -- that smallholders and farm workers living and working in areas where there are extensive GMO soy plantations suffer ill health" [12]. The researcher noted that birth defects were "much more abundant" in areas where pesticide applications (mainly Roundup) were made several times a year, "in conditions which can only be described as primitive, with few people abiding by the "best practice" guidance and hardly any enforcement of standards." The statistical findings speak for themselves. Exposure rates were high, and a list of medical conditions were investigated. Among smallholders and farm workers, 36% suffered from chronic fatigue, 52.6% from prolonged headaches, 30.6% from nervousness or depression, and 16.7% from excessive sweating.

Furthermore, over half of all workers associated with crop management and harvesting suffered severe skin irritation.

The increased crop yield fallacy

Biotech companies have repeatedly promoted the idea of GMOs feeding the world and alleviating poverty. However, the IAASTD report on the future of agriculture, to name just one example, found that GM crops have little to offer global agriculture and the challenges posed by poverty and mass hunger, because better alternatives are already available [13]. Integrated pest management (IPM), in addition to agroecological farming and organic, sustainable, low-input, non-chemical pest management (NPM) have already produced impressive increases in crop yields and food safety [14,15]. After examining more than two decades of GMO aggregate yield effects, the Union found that of all the genetically modified crops, GE corn has only marginally increased its yield. Overall, according to the report, any improvements in corn and soybean yields over the past fifteen years are mainly down to an improvement in agricultural practices. Furthermore, a near 600-page report from the World Bank and the UN concluded that GE crops have absolutely "no role to play in relieving world poverty". The report stressed that the only notable increase to come from GMO crops is a massive worldwide increase in the use of the toxic glyphosate herbicide.

Concluding thoughts

Although there's still so much left to be discovered, and further GMO studies are most definitely needed, the findings appear to be both incriminating and largely one sided. Sadly, even if someone wants to abide by their values and avoid GMOs, it is becoming increasingly hard to do so. GMOs, when compared to conventional crops, contain new proteins, and any new protein could quite possibly be an allergen or toxin, especially if consumed over an extensive period of time, and to say it is almost impossible to avoid eating GMOs is not an exaggeration. In addition to threatening the health of future generations, more and more GMOs are being engineered to be "herbicide tolerant." Genetic engineering, it seems, creates injurious side effects, often by mixing genes from totally unrelated species, and the very process of creating GM food can bring about both toxins and allergens, along with a host of nutritional deficiencies. Finally, contrary to seemingly fallacious beliefs, GMOs do not increase yields, and actually do very little to feed a hungry world.

References

1. GMO Facts (2015) Non GMO Project.
2. Health Effects from Chemical Exposure (2015) Missouri Department of Health and Senior Services.
3. Autism Prevalence Rises to 1 in 88.
4. GMO Risks (2015) GMO Awareness.
5. Jonathan RL (2006) The Mutational Consequences of Plant Transformation. JBB 1-7.
6. Allan C (1990) "Epistatic and Pleiotropic Effects on Genetic Manipulation" in SCOPE 44: Introduction of Genetically Modified Organisms into the Environment. In Harold A (eds.). Mooney and Giorgio Bernardi, Scientific Committee on Problems of the Environment (SCOPE).
7. Michael CR, Alavanja PH, Matthew KR, Matthew RB (2013) Increased Cancer Burden among Pesticide Applicators and Others due to Pesticide Exposure. Cancer J Clin 2: 120-142.
8. Balbuena MS, Tison L, Hahn ML, Greggers U, Menzel R, et al. (2015) Effects of sub-lethal doses of glyphosate on honeybee navigation. J Exp Bio. pii: dev.117291.
9. Marek C (2015) Review of GMO safety assessment studies: Glyphosate residues in roundup ready crops are an ignored issue. Environ Sci Eur 27: 20.
10. Xiao-long W, Liu L, Tang Y, Zhu ZL (2015) Effect of GM feed to reproduction system of male mice, Gansu. Medical Technology and Healthcare College, Wuhan Light Industry University, Wuhan, Hubei Province, China Animal Husbandry & Veterinary.
11. Butinof M, Fernández R, Lantieri MJ, Stimolo MI, Blanco M, et al. (2014) Pesticides and Agricultural Work Environments in Argentina, Pesticides: Toxic Aspects. ISBN: 978-953-51-1217-4.
12. Beintema N (2008) International Assessment of Agricultural Knowledge, Science and Technology for Development: Global Summary for Decision Makers (IAASTD).
13. Altieri MA (1999) Applying Agroecology to Enhance the Productivity of Peasant Farming Systems in Latin America. EDS 1: 197-217.
14. Pretty J (1999) Can Sustainable Agriculture Feed Africa? New Evidence on Progress, Processes and Impacts. EDS 1: 253-274.
15. Zhu Y (2000) Genetic diversity and disease control in rice. Nature 406: 718-722.