Superstition fuels the war on GMOs, not science

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Biotech opponents rely on the precautionary principle to suggest that GMOs are intrinsically dangerous, arguing that it is an unnatural process which needs additional scrutiny. But in doing so, these groups gloss over how natural processes and human activity can both produce GMOs. Sweet potatoes are an excellent example, which naturally contain genes from the bacterium Agrobacterium with no human intervention. But had humans caused this change, anti-GMO interests would have attacked the sweet potato as a "Frankenfood." This points to a pseudo-religious or mystical view of the sanctity of nature, in which humanity's actions are immediately viewed as necessarily destructive or disruptive, and ignores the significant positive impacts of genetically modified crops. Rational risk management, not the precautionary principle, can encourage the safe use of GMOs and promote agricultural innovation. Harnessing the technological advancements possible with genetically modified organisms will benefit everyone and ensure we meet the challenges of feeding a growing population while preserving our planet's resources, argue Craig Orji and Jason Hayes of the Michigan-based Mackinac Center for Public Policy.

The European Union's process-based regulations on genetically modified organisms might seem to stem from a reasonable concern for public safety. Special interests and regulators have pointed to the supposedly unnatural process of genetic modification since GMOs began to see widespread use in the early 1990s. They warn about the potential or unknown risks of genetically modified foods and claim these organisms damage the natural environment. Activists also predict economic harm as farms consolidate and small farmers get squeezed out.

These arguments have little connection to reality, but GMO opponents in the United States and worldwide are not concerned with rationally managing risks to minimise potential concerns and enhance benefits. Activists rely instead on the precautionary principle, presuming that GMOs are intrinsically dangerous. In the process, they are pushing misinformation to muddy the discussion about these organisms and what they do.

"A GMO is a plant, animal, or microorganism that has had its genetic material (DNA) changed using technology that generally involves the specific modification of DNA,

including the transfer of specific DNA from one organism to another," explains the U.S. Food and Drug Administration. This sophisticated process can introduce new traits or enhance existing ones to improve an organism's productivity and resistance to disease or pests.

Opponents say this unnatural process needs additional scrutiny. However, these groups gloss over how natural processes and human activity both produce GMOs.

The sweet potato provides an excellent example. "Sweet potatoes from all over the world naturally contain genes from the bacterium Agrobacterium," researchers at Ghent University reported in 2015. With no human intervention, Agrobacterium transferred a portion of its genetic makeup into the sweet potato plant, which resulted in a gall or tumour forming on the plant's root, creating what we call the sweet potato today. That plant is prized as an important food source worldwide. Sweet potatoes provide billions of people with essential calories and nutrients, such as Vitamins A (from beta carotene), B, C, and E, as well as minerals like iron, manganese, potassium, and iron.

Had humans caused this change, anti-GMO interests would have attacked the sweet potato as a "Frankenfood," a deliberately frightening label applied first by Boston College English professor Paul Lewis in a 1992 letter to the New York Times. Because of its ability to cause "trans-kingdom DNA transfer" and to "transfer its genetic material" to other organisms, Agrobacterium is referred to in many research papers and textbooks as "nature's genetic engineer."

Depending on how you use the term "technology," the FDA's definition fits this situation well, making the sweet potato a "natural GMO." Other plant species like tobacco and several flowering plants have experienced similar genetic transfers and are called "natural transformants" in the research literature. Natural DNA transfer means that genetic modifications, like those done in labs today, are relatively common.

The science of natural modification did not slow down the European Union, which simply excluded GMOs originating from 'natural processes' from its ban. But this semantic twist indicates that regulators are concerned with human activity, not the biological realities of genetic modification. Once again, we see the influence of a pseudo-religious or mystical view of nature driving opposition to human intervention in an idealised pristine nature. In this fantastical world, only Mother Nature is given deference to change, whether to enhance or to harm. Humanity's actions are immediately viewed as necessarily destructive or disruptive.

When anti-GMO activists move beyond their desire to preserve what they believe to be the sanctity of nature, they often shift their arguments to a seemingly scientific realm, focusing on perceived or potential unknown risks. However, there is even less room for debate here. GMOs have undergone decades of rigorous and consistent study.

Activists have little interest in that research. "Decisions on the future of our food and agriculture should not be based on misleading and misrepresentative claims that a 'scientific consensus' exists on GMO safety," argues the European Network of Scientists for Social and Environmental Responsibility.

Opponents of genetically modified organisms sometimes shift the argument to claims that limiting the use of GMOs will protect the natural environment. But they don't explain the environmental benefits, and they ignore the significant positive impacts of genetically modified crops. Studies conducted on GMO use from 1996 to 2016 show that widespread use has led to an 8.2% reduction in pesticide use and cut fuel use (and

consequent greenhouse gas emissions), equivalent to removing 16.7 million cars from the roads.

When science and logic fail, anti-GMO proponents switch to claims of economic harm, claiming that market consolidation will harm farmers. However, from 1996 to 2020, genetically modified crops increased farm incomes by $261.3 billion, "equat[ing] to an average farm income gain across all GM crops grown in this period of about $112/hectare." In 2020 alone, farm income gains were $18.8 billion. Small farmers, especially in developing nations, have seen substantial benefits, with a reported return of $5.22 for each dollar invested in GM seeds.

The romantic allure of an idealised world unspoiled by human activity and the bucolic notion of traditional farming inform the rhetoric of anti-GMO activists. Greenpeace and other environmental organisations employ political imagery, depicting disenfranchised peasant farmers struggling against the tyranny of industrial capitalism. This vivid portrayal grabs headlines but ignores the environmental and economic benefits of GMO technologies, especially for those peasant farmers in the developing world.

Rational risk management, not the precautionary principle, can encourage the safe use of GMOs and promote agricultural innovation. Harnessing the technological advancements possible with genetically modified organisms will benefit everyone and ensure we meet the challenges of feeding a growing population while preserving our planet's resources.

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