CENTER FOR FOOD SAFETY

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DEBUNKING POPULAR MYTHS ABOUT GE CROPS PORTRAYED IN THE MEDIA:

Response to The New Yorker "Seeds of Doubt" Article, August 25, 2014

The recent article, "Seeds of Doubt," in the August 25, 2014 issue of *The New Yorker* by Michael Specter echoes common myths about genetically engineered (GE) crops and omits legitimate scientific critiques of the technology. The resulting article fails to deliver the high level of integrity and journalism that is expected of *The New Yorker*.

Biotechnology corporations spend hundreds of millions of dollars in advertising and marketing each year. Monsanto, one of the leading biotech companies, spends from $87 million to $120 million[1] annually on advertising, much of it focused on GE crop technology. The industry spends millions more on lobbying,[2] opposing ballot initiatives[3] to label GE foods, and further promotional activities. Such massive spending has effectively framed a favorable narrative about GE crops and foods in several major media outlets, including *The New Yorker*.

The frame of this particular article presents Vandana Shiva, Ph.D., as the leader of an international movement in opposition to GE crops at the expense of science-based solutions to feed the world's poor. However, it is the *failure of this technology*—not Luddite fear mongering—that has prompted scientists, academics, policymakers, governments and regular people to question the biotech industry.

Rather than fully examining important scientific literature on genetic engineering, the author reasserts some of the most common—and most debunked—myths about the technology. Here are a few of the myths that *The New Yorker* perpetuated:

MYTH: Genetically Engineered (GE) Crops Are a Solution to Hunger and Malnutrition—After spending hundreds of millions of dollars and over 30 years of research, the promises that GE crops would feed the world and provide enhanced nutrition have failed.

MYTH: GE Crops Use Fewer and Safer Chemicals—Instead, GE crops have increased overall usage of pesticides by hundreds of millions of pounds, and next generation GE crops will further increase pesticide usage of even stronger, more toxic herbicides such as 2,4-D and dicamba.

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MYTH: GE Crops Increase Yields—Research has demonstrated that herbicide-resistant corn and soybeans in the U.S. have shown no yield increases. Yield increases seen in Bt crops, including *The New Yorker* article's citation of yield increases for Bt cotton in India, are primarily due to conventional breeding or other factors, not genetic engineering.

Major studies affirm that inexpensive agro-ecological farming methods can increase yields as much or more than industrial agriculture systems while also reducing use of chemicals and water, and improving social and economic well-being.

These myths are debunked in further detail below and some of the great successes of ecological farming are highlighted.

MYTH: GE Crops Are a Solution to Hunger and Malnutrition—*The New Yorker* article cites golden rice as an example of a GE crop that could alleviate malnutrition in poor countries. For at least two decades, biotech proponents have promoted golden rice—engineered to have high levels of carotenoids, which are precursors of vitamin A—as the solution to blindness due to vitamin A deficiency.

However, *golden rice is not on the market because a host of intellectual property issues and technical problems have inhibited its development for over a decade*. Only a few months ago, the International Rice Research Institute (IRRI)—charged with research, analysis, and testing of golden rice—released a report revealing that the "average yield [of GE golden rice] was unfortunately lower than that from comparable local varieties already preferred by farmers."[4] IRRI also stated: "It has not yet been determined whether daily consumption of golden rice does improve the vitamin A status of people who are vitamin A deficient and could therefore reduce related conditions such as night blindness."[5] Golden rice is not an anomaly. In early 2000, based on work carried out as a post-doctoral fellow at Monsanto, African plant pathologist Florence Wambugu directed a project to develop a virus-resistant GE sweet potato to be grown in Kenya. *New Scientist* reported on the project: "In Africa [GE] food could almost literally weed out poverty."[6] *Forbes* magazine reported, "While the West debates the ethics of genetically modified food, Florence Wambugu is using it to feed her country."[7] However, these articles were published a few years *before* field trials were even completed. The results of the failed field trials were quietly published in 2004. Kenya's *Daily Nation* reported: "Trials to develop a virus resistant sweet potato through biotechnology have failed."[8]

Around the same time, breeders in Uganda and Mozambique successfully developed disease-resistant sweet potatoes[9] with high beta-carotene content using conventional breeding, and which also had much higher productivity.

Similarly, the biotech industry touted that cassava, one of the most important starch crops in Africa, was enriched with greatly increased protein content using genetic engineering. However, the research article claiming the elevated protein was later retracted when it was found that the purported increased protein did not exist.[10]

But, as with sweet potato and many other crops, non-GE breeding is making progress toward improving cassava for many traits, from yield and nutritional[11] enhancement to drought tolerance.[12] Several of these improved varieties are already being grown by farmers in Africa. Yet these successes are not often reported.

MYTH: GE Crops Use Fewer and Safer Chemicals—Over 99 percent of GE crop acres are either: 1) herbicide-resistant (HR) crops that withstand repeated broad spectrum dousing of one or more herbicides to kill weeds without harming

the crop; and/or 2) insect-resistant, *Bacillus thuringiensis* (Bt) crops that produce toxins in their tissues that kill target pests.[13]

Over five of every six acres of GE crops planted in the world today (85 percent) are herbicide-resistant; nearly all of them are Monsanto's Roundup Ready corn, soybeans, cotton, alfalfa, canola and sugar beets.[14] The active ingredient in Roundup, the company's flagship herbicide, is glyphosate. Roundup Ready crops have had several negative environmental impacts. A recent, peer-reviewed assessment based on pesticide data from U.S. Department of Agriculture (USDA) shows that Roundup Ready crops have resulted in 527 million pounds more herbicides being sprayed in the U.S. than would likely have been the case without these crops (based on figures from 1996 to 2011).[15]

The enormous use of glyphosate with Roundup Ready crops has also generated an epidemic of glyphosate-resistant weeds, sometimes referred to as "super weeds."[16] Virtually unknown prior to Roundup Ready crops, these weeds now infest over 60 million acres of cropland in the U.S., an area the size of Wyoming, and represent one of the major challenges facing North (and South) American farmers.[17] *The rapid rate of Roundup resistant weeds contradicts the claims of the biotech industry that resistance would not be a problem.* In its submission to the USDA for approval of the first GE soy crop, Monsanto stated, "…glyphosate is considered to be an herbicide with low risk for weed resistance."[18] It also claimed that several university scientists agreed "that it is highly unlikely that weed resistance to glyphosate will become a problem as a result of the commercialization of glyphosate-tolerant soybeans."[19]

Next Generation of GE Crops—Stronger Chemicals

The New Yorker article omits that in response to the weed epidemic, biotech companies are now seeking approval for new GE crops that are resistant to older, toxic herbicides such as 2,4-D, developed in the 1940s. Dow AgroSciences is seeking USDA approval of corn and soybeans resistant to 2,4-D, which is linked to increased rates of immune system cancer,[20] Parkinson's disease[21] and other health problems.[22] Likewise, Monsanto is planning to seek approval for transgenic, dicamba-resistant soybeans, corn, and cotton. Dicamba has been tentatively linked to increased rates of colon and lung cancer in farmers by the National Cancer Institute.[23]

Although advertised as the solution to glyphosate-resistant weeds, USDA projects that 2,4-D-resistant corn and soybeans *will lead to a two- to seven-fold increase, from 26 million pounds per year currently to 176 million pounds per year*.[24] In addition to the health concerns raised by next-generation GE crops, USDA and weed scientists agree that weed resistance to 2,4-D would rapidly occur. Further, an Environmental Protection Agency (EPA) risk assessment of 2,4-D resistant crops identifies numerous potential risks to the environment[25] as well as economic impacts to farmers from 2,4-D drift, which can damage sensitive crops.[26]

MYTH: GE Crops Increase Yields—Biotech corporations claim that GE crops result in higher yields and thus are an important tool for feeding the world and raising farmer incomes. An important precursor to discussing yield data is to note that *the majority of today's GE crops are not grown for humans but are instead cultivated for livestock feed and ethanol for cars*.[27]

Regarding yield, a landmark report, *Failure to Yield*, by Dr. Doug Gurian-Sherman, found that herbicide-resistant (GE) corn and soybeans have shown no yield increase in the U.S.[28] This report and a major peer-reviewed research paper[29] also show that since GE corn was introduced in 1996, the majority of increased corn productivity was due to conventional breeding and improved cultivation. Data from Europe suggests that productivity

increases of corn have been about as high as in the U.S. without using genetic engineering.[30]

Contrary to *The New Yorker* article's claims, most of the increases in cotton yield in India are from sources other than genetic engineering. According to the primary cotton scientist of the Indian Central Institute for Cotton Research, K.R. Kranthi, almost all of the 59 percent yield increase in cotton between 2002 and 2011/12 occurred by 2005, when only about 5.6 percent of cotton acres were Bt varieties.[31] Kranthi attributes most cotton yield increases in India during this period to the introduction of hybrid cotton, increased irrigation and other factors unrelated to Bt. In fact, between 2007/08 and 2011/12, when Bt cotton acreage went from 67 percent to 92 percent of India's cotton acreage, cotton yields steadily fell.[32] This is a far different scenario than *The New Yorker* article's suggestion that Bt cotton was responsible for a 150 percent increase in cotton yield in India.

THE WAY FORWARD—Agroecological Farming Successes

The author of *The New Yorker* article is apparently unfamiliar with, or failed to include, information about the increasing body of research demonstrating that a variety of agroecological methods outperform GE and conventional crops in generating higher yields while reducing chemical and water usage.[33]

GE crops require costly seeds,[34] chemicals, and synthetic fertilizers that farmers in food insecure regions can ill afford, along with significant water resources not available in many developing countries. Further, GE crops perpetuate an industrial agriculture system that is responsible for at least 30 percent of global greenhouse gas emissions.[35] The emerging consensus among scientists and international development experts is that solutions to hunger must work with local resources and be viable, inexpensive, low-input, and resilient, especially in times of climate change.

Research coordinated by the Department of Biological Sciences and Centre for the Environment and Society at the University of Essex has shown that *agroecological methods on 286 farm projects in 57 poor countries covering 37 million hectares (3 percent of the cultivated are in developing countries) have increased the average crop yield by 79 percent*.[36] All crops had water use efficiency gains, carbon sequestration, and reduced pesticide use.

Further, the *International Assessment of Agricultural Knowledge, Science and Technology for Development* (*IAASTD*) is an authoritative source for the best way forward to address developing country agricultural issues. Funded by the United Nations and the World Bank, *IAASTD* was an exhaustive, four-year effort that engaged some 400 experts from multiple disciplines. *IAASTD* concluded that GE crops have little potential to alleviate hunger and poverty, and instead recommended agroecological approaches as the best means to achieve food security.[37] And, in the U.S. corn belt, long-term research has shown that using agroecological farming can reduce fertilizer and herbicide use by over 90 percent, while increasing yields and maintaining or increasing profits.[38]

There are several other issues in the article that were incorrectly represented, but these are too numerous to address in a concise response. One can come to different conclusions about proper risk assessment and regulation for genetic engineering, among other topics, but it is not scientifically justified to simply dismiss concerns and legitimate critiques.

If we are serious about feeding the hungry, raising standards of living, and protecting ecosystems for future food security we need honest, robust discussion. Instead of spending the majority of resources on high-cost technologies, we need to redirect substantial means toward food and farm systems that are sensitive to the complexities of local ecosystems, and incorporate broad criteria such as socio-economic policies, cultural histories, resource conservation, and social equity.

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