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GMO Seeds: A Colonial Industry

GMO stands for genetically modified organism and the agricultural world uses this acronym to refer broadly to crops and other plants which have been biologically engineered to exhibit certain traits not found within their genome. Bioengineers accomplish this by removing said trait from another non-related organism and "pasting" it into the chosen organism's DNA. Some common examples of traits used in bioengineering include resistance to glyphosate (round up) and the trait present in the bacteria *Bacillus thuringiensis* or "Bt" which allows it to create proteins which kill certain insects (Webber, 1995). Major seed and chemical corporations developed GM crops and sell their seeds, claiming that these plant varieties will increase land productivity and optimize farm efficiency. However, the realities of bioengineered crops create many serious concerns around their environmental and social impact. Furthermore, the monopolization of the industry by massive corporations and their claim to intellectual right over seed varieties has led to further concerns about the ethical repercussions of GMOs (Shiva, 2016).

Genetically modified crops were originally developed as a means for boosting land productivity by creating plant species which would be more resistant to threats like pests. These varieties would allow farmers to operate with fewer risks and become more financially stable as they could remain certain that their harvest would not be decimated by insects, funguses or other threats to their fields. The companies promoting the adoption of GMO's claimed that these crop varieties would produce more food while needing fewer chemical inputs. Additionally, there is thought to be some correlation between herbicide tolerant crops and no till or conservative till practices which have a significant environmental impact as they decrease carbon emissions of farms (Van Acker, et al., 2017). Bioengineers further proved the hopeful potential for genetic modification through examples like a bacterium which was engineered to produce human insulin. Yet data and experience with GM crops have shown that some of these optimistic claims have not proven true and many other disadvantages have been encountered.

There are many concerns with GMOs and the impacts they have on the ecosystems in which they are used, the farmers who grow them, and their long-term sustainability. One of the major concerns is horizontal gene flow from bioengineered crops into nearby wild plants or non-GMO crops on adjacent farms. As many crops which have been genetically modified are wind pollinated,

this transfer can happen very readably (Van Acker, et al., 2017). For example, though genetically modified wheat does not exist on the market, GMO traits have been found in farmer's fields who are growing non-GM varieties, these bioengineered traits have thus managed to "escape" research facilities through wind pollination. Another major concern with GMO farming is that it will lead to increased populations of "super-pests" which are resistant to the chemicals either produced by GM plants or sprayed on them (Van Acker, et al., 2017) (Shiva, 2016). Despite the presence of some guidelines on what proportion of a field a farmer should plant of non-bioengineered varieties for the sake of maintaining a susceptible pest population, they are rarely followed and an increase in herbicide resistant pests can be seen in relation to GM crop use. These modifications in crops can also cause problems harming non-target insects which provide important ecological services for agriculture and the surrounding ecosystems. Along with this harm to important insect species comes a threat to overall agricultural biodiversity as the increased use of GMO seeds is pushing out many historic and heirloom varieties of crops which have been specifically bread over long periods of time for valuable, locally specific traits which will be extremely difficult to regain once lost (Shiva, 2016). Despite the claims by the industry that bioengineering agriculture plants will decrease chemical use and boost productivity, these trends have not been observed. In fact, despite increased use of GM crops, chemical use has only increased as farmers can now spray their fields indiscreetly without fear of harming their chemically resistant varieties (Shiva, 2016). Lastly, the development of GMO's has led to many difficult questions surrounding their application, use, possible impacts on human health, and the extent to which this technology ought to be applied. Applications of genetic engineering to the meat industry have made these questions acutely pressing as they seem to exist in an ethical grey region. Many argue that simply because humans do not fully know or understand the repercussions of GMO's, they ought to be treated very cautiously (Myhr & Traavik, 2001).

The ethical concerns created by GMO use become more salient when the link between these organisms and the corporations which sell them is fully realized. Bioengineering was pursued aggressively by chemical companies like Monsanto and Purdue which saw these developments as an opportunity to make massive profits. These corporations have managed to create both vertical and horizontal monopolies within bioengineered agriculture by buying up smaller seed producers and investing in both GM seeds and agricultural chemicals. The threat of these monopolies has become an even greater concern as the industry managed to claim certain GM varieties as their intellectual property. This legal classification results in farmers being restricted from growing seed crops and instead must buy new seed every year. Additionally, GM crops are heavily reliant on chemical

fertilizers, pesticides, and herbicides as they lack the local adaption to ecology and climate which would be present in heirloom varieties (Shiva, 2016). This results in GMO farmers needing to return continuously to the corporations who sold them their seed to buy more chemicals. Chemical corporations' ability to manipulate farmers into using GM seed for the sake of increasing their own profit and creating monopolies demonstrates how GMOs are failing to live up to the promises originally made about their benefits. These issues have been exacerbated as organizations like the USDA refuse to listen to the advice of environmental activists or back farmers as they struggle to stay afloat under the pressure of chemical corporations. Instead, these federal agencies create legislation which protects and enables large chemical companies (Ericson, 2020). This willingness to side with big business was demonstrated in Canada in 1998 when Monsanto won a lawsuit against a small scale farmer who was accused of copyright infringement after "Roundup Ready" canola was found in his field which he had not planted, but had been spread there through wind pollination (Salvian, 2018).

The issue of seed justice, GMO's, and the fight between small scale farmers and industrial chemical interests has been taken up by Vandana Shiva, an Indian activist. Shiva studies and works with these issues largely within the microcosm of India which has suffered many of the worst ethical abuses at the hands of the bioengineering and agricultural chemical industry. She stresses various important topics surrounding this issue as they have been acutely felt in her home country. Of the cultural importance of seed and small-scale agriculture she writes in her book *Stolen Harvest: The Hijacking of the Global Food Supply*, "The seed for the farmer, is not merely the source of future plants and food; it is the storage place of culture and history… Seed is the ultimate symbol of food security." Shiva also describes how the ploys employed by seed and chemical corporations in India have led to many farmer suicides as a result of buying seeds which did not produce as promised and only led the farmers into debt. Hand in hand with this tragic loss of human life comes a devastating loss of crop biodiversity in India as the incredible abundance of local varieties, perfectly suited to their ecosystems, have been wiped away by big name hybrid and GMO varieties. She also addresses and debunks the idea that the green revolution, bioengineering, and monocropping have increased productivity of the land. Arguing that this prospect does not take into account the ecological cost of monocultures or the many inputs required to grow GM crops, like irrigation and chemicals, Shiva builds a convincing argument for the greater productivity of small-scale polycultures. Furthermore, shiva describes how the attitude and actions of the global seed and chemical companies have become just another example of colonialism and imperialism imposed on the "third world". Wealthy

countries, like the U.S., have been able to co-opt nations struggling with food scarcity into these corporations' schemes, which despite advertising, obviously hold profit as their ultimate goal. From her incredibly informed perspective, Vandana Shiva paints an stirring picture of what the issue of seed, bioengineering, and agricultural chemicals is all about, "We have to reclaim our right to save seed and to biodiversity… Food democracy is the new agenda for democracy and human rights. It is the new agenda for ecological sustainability and social justice" (Shiva, 2016).

Though there are undeniably some appealing GM crops traits, their many ecological and social repercussions seem to out-way their benefits. By looking at a case study like the oppressive system in India, the demoralizing and immoral results of the GMO industry become obvious. However, I intentionally place blame here on the "GMO industry" and not merely the act of creating bioengineered crops. Like with many destructive technologies, it is not that GM crops are inherently bad, but that they have been used by greedy corporations and profit prioritized individuals to create monopolies and abusive economic systems. Examples like the development of insulin producing bacteria create difficult to argue with proof of the advantages of genetic engineering. Yet, the ways in which the agricultural chemical industry applies this technology undeniably harms farmers, the environment, and global food security. Thus, I argue not that GMO's should be band, though they ought to be treated very cautiously, but that the national and international regulations on chemical and seed corporations should be increased and fervently enforced. To solve this issue, we need judicial and legislative systems which prioritize the farmer and the land over profit and corporations. Some important first steps for these regulations would be to roll back the decision on making GM crops intellectual property, create mandatory GMO packaging, dedicate land specifically to seed and biodiversity preservation and to create accurate educational material and programs for farmers considering GM crops. Furthermore, a judicial precedent needs to be set which will prioritize farmers, communities, and ecosystems over corporation. Also, those farmers who have been financially destroyed as a direct result of GMO corporations need to be compensated. Though these initiatives may seem like a tall order for our current capitalistic system, the bioengineered crop and seed crisis is critically important and will only grow more so as climate change worsens. Drastic steps are required to amend this system and restore healthy agricultural practices to the world's farms.

Works Cited

Anne Igneborg Myhr & Terje Traavik. (2001). The Precautionary Principle: Scientific Uncertainty and Omitted Research in the Context of GMO Use and Realease. *Journal of Agricultural and Environmental Ethics*.

Glenda D. Webber. (1995). Insect-Resistant Crops Through Genetic Engineering. *North Central Regional Publication*. https://extension.missouri.edu/publications/ncr553

Hailey Salvian. (2018, August 3). Percy Schmeiser looks back 20 years at fight against Monsanto. *CBC News*. https://www.cbc.ca/news/canada/saskatchewan/percy-schmeiser-monsanto legal-battle-1.4771673

Rene Van Acker, M. Motior Rahman, & S. Zahra H. Cici. (2017). Pros and Cons of GMO Crop Farming. *Oxford University Press*. https://doi.org/10.1093/acrefore/9780199389414.013.217

Vandana Shiva. (2016). *Stolen Harvest: The Hijacking of the Global Food Supply*. University Press of Kentucky.