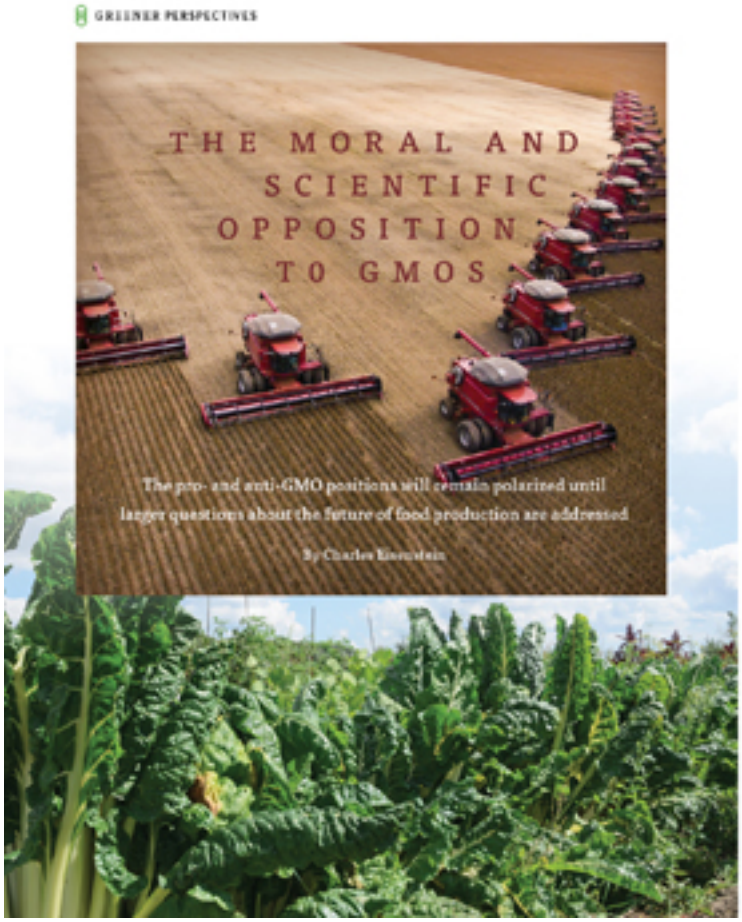
Is the engineering of genetically modified organisms (GMOs) a dangerous technology posing grave risks to human and ecological health? Or are GMOs a potent new tool in the onward march of modern agricultural technology in its race to feed the world?

In a recent opinion piece in the Washington Post, “Avoiding GMOs Isn’t Just Anti-science, It’s Immoral,” Purdue University president Mitch Daniels offers an impassioned plea that we embrace GMOs in agriculture. Daniels’s argument runs as follows: The health and ecological safety of GMOs is unquestionable “settled science.” Therefore, it is immoral to deny developing countries the agricultural technology they need to boost food production and feed their growing populations. It seems an open-and-shut case: The self-indulgent anti-GMO fad among rich consumers threatens the less fortunate with starvation. As Daniels says, it is immoral for them to “inflict their superstitions on the poor and hungry.”




But let's look at some of the assumptions that this argument takes for granted: (1) That GMOs are indeed safe, and (2) that GMOs and industrial agriculture in general allow higher yields than more traditional forms of agriculture.

The ecological and health safety of GMOs is more controversial scientifically than Daniels' piece asserts. The problem is that it is hard to know which science— and which scientists—to trust. In the United States, most university agronomy departments receive massive funding from agritech companies who, according to Scientific American, "have given themselves veto power over the work of independent researchers." Since GMOs are proprietary, those companies can and do restrict who can perform research on their products. When a study does document harm, it and its authors are subjected to intense scrutiny, career-ending attacks, and even lawsuits. Imagine yourself as a graduate student at, say, Purdue University. How welcome do you think a research proposal on the health hazards of GMOs would be?

Nonetheless, there is a large and growing body of research that casts serious doubt on GMO safety, mostly published in Europe and Russia, where support for GMOs is weaker. For a methodical and comprehensive overview of the topic, see GMO Myths and Truths, which, with hundreds of citations of peer-reviewed articles, cannot be easily dismissed as "superstition."

Nonetheless, it is easy to see how from Daniels's seat, opposition to GMOs is unscientific. By and large, the scientific establishment does support GMOs. To oppose them, one must also question the impartiality and soundness of scientific institutions: universities, journals, and government agencies. Opposition to GMOs only makes sense as part of a larger social critique and critique of institutional science. If you believe that society's main institutions are basically sound, then it is indeed irrational to oppose GMOs.

Similar observations apply to the second assumption, that only high-tech agriculture can feed the world. Again, opposition makes sense only by questioning larger systems.

Certainly, if you compare one monocropped field of GMO corn or soybeans to another field of

non-GMO corn or soybeans, keeping all other variables constant, the first will outyield the second. But what happens if you compare not just one field to another, but a whole system of agriculture to another?

Such comparisons show that the assumption that more technology equals higher yield may not be justified. One indication is that around the world, small farms far outperform large farms in terms of yield. First observed by Nobel Prize– winning economist Amartya Sen in 1962, it has been confirmed by numerous studies in many countries. The best-known recent study looked at small farms in Turkey, which still has a strong base of traditional peasant agriculture. Small farms there outproduced large farms by a factor of 20, despite (or because of?) their slower adoption or non-adoption of modern methods.

Yet it is also true that scientific studies typically show organic crop yields to be lower than conventional yields. Here again, we must look at what these studies take for granted. The high yields of small mixed farms are hard to measure because they typically produce multiple crops that may not find their way to commodity markets, but instead are consumed locally, sometimes outside the money economy. Moreover, traditional forms of agriculture often employ multicropping and intercropping. So while an organic cornfield will underperform a GMO cornfield, what about the total yield of a cornfield that also grows beans and squash, and is patrolled by free-ranging chickens who eat the bugs? What about when insect-damaged fruit or vegetable seconds feed pigs or other livestock?

Optimal results come from long, even multi-generational, experience applied in intimate relationship to each farm. Comparisons of organic and conventional agriculture often use organic farms recently converted from conventional practices; rarely do they consider the most highly evolved farms where soil, knowledge, and practices have been rebuilt over decades.

Another overlooked factor is that organic agricultural methods are also constantly improving. Newer forms of organic no-till horticulture can actually match and even outperform conventional methods. One of the best-known innovators, Brown’s Ranch of North Dakota, uses a complex mix of cover crops and multilayered intercropping to maximize sunlight utilization and establish synergies among various plants. Such practices are highly specific to local soil conditions and microclimate, making them difficult to standardize and therefore difficult to scientifically study. Science depends on the control of variables. If you want to study the efficacy of a certain practice, it must be applied uniformly to several test plots and compared to several control plots. But organic agriculture at its best would never treat two plots of land exactly the same.

For organic agriculture to work, the factory model of standardized parts and procedures must give way to a relational model that recognizes the uniqueness of every piece of earth. So-called "organic" practices that use the factory model are simply an inferior version of conventional agriculture.

Taking that model for granted, Daniels is right. We do need an endless succession of new chemicals and GMOs to compensate for the consequences of mechanized chemical agriculture, which include depletion of the soil, herbicideresistant weeds, and pesticide-resistant insects. To keep the current system working, we need to intensify its practices.

The alternative is to transition to a truly organic system of agriculture. That is no small undertaking. For one thing, it would require far more people devoted to growing food, because high-yield organic practices are often highly laborintensive. (On the bright side, labor on small, diversified farms need not involve heavy, routine drudgery, as is the case on large industrial-style farms.) Today, thanks to extreme mechanization, about 1 or 2 percent of the population in developed countries works in the agricultural sector. That number might need to increase to 10 percent—about the proportion of farmers in the U.S. in the 1950s. It would also require a lot more food to be grown in gardens. In World War Two, "victory gardens" provided some 40 percent of all produce consumed in the U.S.; in Russia to this day, small dachas produce 80 percent of the country's fruit, two-thirds of its vegetables, and nearly half its milk.

Gardening on this scale does not fit easily into existing consumerist lifestyles and mindsets. If we take for granted the framing of food security as "stocking the supermarket shelves," then there is little alternative to the current system. If we take for granted disengagement from land, soil, and place, then there is little alternative to the current system.

If we take for granted continued rural depopulation in the less-developed world, then there is little alternative to the current system.

In other words, if we take for granted large-scale, industrialized agriculture growing commodity crops, then absolutely it helps to use the full complement of agricultural technology, such as GMOs, herbicides, chemical fertilizers, fungicides, insecticides, and so on.

Establishment science by and large takes these things for granted. Sentiments like Daniels's

are the sincere, exasperated protests of highly intelligent people doing their best to make the system work, according to their understanding of the world.

A different vision of the future is emerging, however— one that takes none of the above for granted. It is a future where food production is re-localized, where many more people have their hands in the soil; where farming is no longer seen as a lowly profession, and where agriculture seeks to regenerate the land and become an extension of ecology, not an exception to ecology. The pro- and anti-GMO positions will remain irreconcilably polarized as long as these larger questions remain unexamined. What is at stake here is much more than a choice about GMOs. It is a choice between two very different systems of food production, two visions of society, and two fundamentally different ways to relate to plants, animals, and soil.


This article appeared in *Pathways to Family Wellness* magazine, Issue #58.

View Article Resources .

View Author Bio .

To purchase this issue, Order Here .