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GM Crops Do Not Increase Yield Potential

From the start, GM crops have performed no better than their non-GM counterparts. Evidence for the "yield drag" of Roundup Ready soybeans, for example, has been known for over a decade[1] —with the disruptive effect of the GM transformation process accounting for approximately half the drop in yield.[2] Field tests of Bt corn showed that they took longer to reach maturity and produced up to 12% lower yields than non-GM counterparts.[3] In spite of these and other studies, the biotech industry continues to claim that GMOs are the answer to higher yields. Two reports have conclusively contradicted these claims.

The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) report,[4] authored by more than 400 scientists and backed by 58 governments, stated that GM crop yields were "highly variable" and in some cases, "yields declined." The report noted, "Assessment of the technology lags behind its development, information is anecdotal and contradictory, and uncertainty about possible benefits and damage is unavoidable." This assessment was based on a comprehensive evaluation of yield since the introduction of commercial GM crops.

The Union of Concerned Scientists' 2009 report Failure to Yield is the definitive study to date on GM crops and yield.[5] Authored by former US Environmental Protection Agency scientist Doug Gurian-Sherman, PhD, it is based on published, peer-reviewed studies conducted by academic scientists using adequate controls. The study concludes that genetically engineering herbicide tolerant soybeans and herbicide-tolerant corn has not increased yields. Insect-resistant corn has only marginally improved yields. Yield increases both crops over the last 13 years were largely due to traditional breeding or improved agricultural practices. Dr. Gurian-Sherman states, "Traditional breeding outperforms genetic engineering hands down."[6]

Although there are few peer-reviewed papers evaluating the yield contribution of GM crops in developing countries, data from Argentina suggest that yields are the same or lower than conventional non-GM soybeans.[8]

In the West, crop failure is often accompanied by government bail outs. Sometimes even seed companies are forced to reimburse farmers, as happened when GM cotton was first grown in the US. Unanticipated plant deformities and failures caused Monsanto to pay farmers millions of dollars for their losses.[9]

> *"Commercial GE crops have made no inroads so far into raising the intrinsic or potential yield of any crop. By contrast, traditional breeding has been spectacularly successful in this regard; it can be solely credited with the intrinsic yield increases in the United States and other parts of the world that characterized the agriculture of the twentieth century."*[7]
> —Failure to Yield: Evaluating the Performance of Genetically Engineered Crops

In developing countries, crop failure can have severe consequences. This is illustrated in India, where a large number of cotton farmers, unable to pay back high interest loans, have committed suicide. Several investigations have implicated the unreliable performance of Bt cotton as a major contributor.[10]

> *"GE crops available for commercial use do not increase the yield potential of a variety. In fact, yield may even decrease.... Perhaps the biggest issue raised by these results is how to explain the rapid adoption of GE crops when farm financial impacts appear to be mixed or even negative."*[14]
> —US Department of Agriculture report

Bt cotton was also overrun by pests in Indonesia[9] and China[10]. In South Africa, farmers faced pest problems and no increase in yield. The 100,000 hectares planted in 1998 dropped 80% to 22,500 by 2002. As of 2004, 85% of the original Bt cotton farmers had given up. Those remaining had to be subsidized by the government.[11,12] Similarly in the US, Bt cotton yields are not necessarily consistent or more profitable.[13]

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The biotech industry promotes higher yield myths

It is common for the chemical/biotechnology companies to use conventional or marker assisted breeding to produce higher-yielding crops and afterward cross the variety with a GM crop to add herbicide tolerance or insect resistance. In these cases, higher yields are not due to genetic engineering but to conventional breeding.

There has also been substantial media coverage of supposed GM successes in Africa and elsewhere that never actually materialized. The GM virus-resistant sweet potato, for example, has been a showcase project for Africa, generating significant media coverage. Although Florence Wambugu, the Monsanto-trained scientist, claimed the GM sweet potato doubled output in Kenya, the actual field trial results showed the GM crop to be a failure.[15,16] By contrast, a conventionally-bred, high-yielding, virus-resistant variety in Uganda, developed in less time and at a fraction of the cost, has "raised yields by roughly 100%."[17] Similarly, conventional (non-GM) breeding produced virus resistant cassavas that do well in Africa even under drought conditions,[18] while the highly promoted GM cassava project has thus far been a failure.

What is the way forward?

A stunning multi-year study in Africa by the United Nations Environment Programme provides an answer. High external inputs of chemicals and fertilizers are needed for conventional industrial agriculture and it is for this kind of agriculture that GM crops are designed. UNEP found in side-by-side trials conducted in multiple countries that farmers using agroecological science outperformed farmers using conventional approaches by up to 179%. In addition, communities that were in the agroecological trials saw significant improvements in other indicators of food security.[19]

"Organic agriculture has clearly produced increases in food production. Moreover, a switch to organic farming has led to other improvements including environmental improvements, strengthened communities, improvements in the education and health of individuals and a reduction in poverty."[20]

The lesson here is that these gains did not require GM plants. In fact, the agricultural industry that promotes GM plants promotes a form of agriculture that is neither sustainable (IAASTD) nor conducive to promoting food security and food sovereignty. When asking whether or not to adopt GM, the question is not whether GM has benefits within a non-sustainable agroecosytem such as in the USA, but whether it has benefits when compared to agroecological approaches.

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