

# Genetic Modification of Plants: Early History of Plant Genetic Engineering.

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I was editor of the weekly biotechnology news service BioEngineering News from 1980 through 1993. I covered plant genetic engineering from its inception and was even allowed (under secrecy agreement) to attend the first Gordon Research Conference on plant genetic engineering. (No reporter had ever been allowed to attend one of these conferences before—since the secrecy agreement later hampered me as to what I could write about the subject, I suspect that may have been the reason.)

The main push behind this technology was to move profit centers from agrichemicals into the seeds, thereby securing for the seed suppliers complete commercial control of food production. Seed companies dealing in nonreproducible seeds would supplant the current system of seeds, herbicides and pesticides and capture all the savings in terms of profits. Monopolizing the seed outlets could ensure a stake in these vast future profits.

In the U.S., seed companies traditionally were money losers and used as tax shelters by wealthy families. Starting in the early 1980s a Rothschild-backed company in Wisconsin, Agrigenetics, was formed ostensibly to develop genetically engineered cultivars. However, BioEngineering News discovered a large chunk of investors' monies being plowed into the rapid purchase of U.S. seed companies rather than the fertile soil of Wisconsin!

So angry was a top executive of this company that he would actually stand up at scientific meetings, redfaced, and yell at me, to the chagrin of his colleagues. He even sent mailings around calling my publication a "mendacious yellow rag". However, with the exposure, investment sources dried up and the company's scheme ran into financial difficulty. The assets and seed companies were ultimately sold to Lubrizol, a manufacturer of industrial adhesives' and specialty products and lubricants.

The USDA and FDA gave plant genetic engineering a big boost by recognizing the products of such research as GRAS (Generally Regarded as Safe) meaning they were not subjected to rigorous animal testing.

Initial genetic modification of plants was done with recombinant strains of crown-gall virus/*Agrobacterium tumefaciens*. Subsequently, other plant-disease vectors were developed as was non-disease "shotgun" genetic technology (which fired genes directly into plant cells whose cell walls had been enzymatically removed—so-called protoplasts.) Surprisingly (to some) it turned out many of the genetic modifications were passed on through the seeds. To help safeguard DNA technology, some companies developed "suicide gene" technology that would cause a seed line to self destruct after a few generations, preventing farmers from saving and planting their own seeds.

I have been out of the industry a long time and have not had time to review papers on cumulative health effects of GM (genetically modified) crop ingestion. My suspicion is that the culprit in ill-health effects could be proteins with altered conformation (same formula wrong shape) and/or mutant amino acids (resulting from genetic engineering) whose structure is different from those found in nature. Plant viral vectors that could infect animals, as some have recently claimed is possible, mean genes coding for such products could be spread via pollen or ingestion.

There have been cases of genetic engineering companies suing farmers-whose non-GM crops were contaminated by pollen from adjacent fields-for patent infringement and theft of trade secrets. I have suggested these farmers countersue the GM-crop companies for contaminating their crops!

In my estimation, there is a possibility that the spread of GM pollen around the world may be killing honeybees and bats (who ingest pollinating insects) through recombinant vectors, and that such vectors could spread through pollen to non-GM crops (and possibly even wild plants.) A worst-case scenario would be a large-scale dieoff of useful plant species, resulting in worldwide famine.

The negative economic aspect of GM crops could also become significant in rural areas. Since GM crops are rapidly spreading and cross pollinating with non-GM cultivars, it is unlikely that conventional agriculture will be able to safeguard itself. Rising oil prices will make petro-based herbicides and pesticides more costly, giving an advantage to GM farmers. Since GM seed companies will be in a position to charge top dollar for seed, this will increasingly favor large agribusiness/corporate farms that can negotiate favorable seed prices. Small- and mid-size farmers will become increasingly squeezed by the need to buy costly seed annually even if they do not want to (due to contamination from GM fields.) I believe they will be increasingly unable to compete with large corporate farms, leading to increasing centralization of food production.

I recently saw a farm publication touting the beneficial effects of GM crops in reducing agricultural contamination of groundwater. This certainly was the promise of genetic engineering of crops. The actuality is far different. The most popular brands of GM seed, at least when I last checked, were ones that either increased herbicide tolerance or made use of herbicides (such as Roundup(R)) possible on food crops that hitherto would have been killed by them. To me that would seem to enhance the use of herbicides rather than reducing them.

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