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NATURE | EDITORIAL

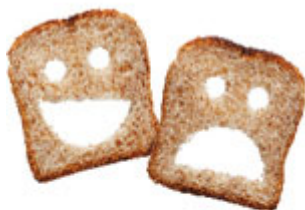
Fields of gold

Research on transgenic crops must be done outside industry if it is to fulfill its early promise.

01 May 2013

It was 30 years ago this month that scientists first published the news that they could place functional foreign genes into plant cells. The feat promised to launch an exciting phase in biotechnology, in which desired traits and abilities could be coaxed into plants used for food, fibers and even fuel. Genetically modified (GM) crops promised to make life easier and nature's bounty even more desirable.

As a series of articles in this week's *Nature* explores, things have not worked out that way (see [page 21](#)). The future matters more than the past, but when it comes to GM crops, the past is instructive.



GM CROPS:
PROMISE & REALITY
A *Nature* special issue

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Soon after the 1983 breakthrough, biotechnology companies developing GM crops became hugely attractive to investors. Calgene in Davis, California, for example, developed the Flavr Savr tomato — engineered to remain firm after ripening — which captured attention, especially when the iconic Campbell Soup Company invested in its development. Like many at the time, Campbell's was

fascinated by the promise that tomatoes could be ripened on the vine to accentuate their flavour and still make the trip to the supermarket and the dinner table without turning to mush.

In early 1992, analysts predicted regulatory approval for the GM tomato within a month, and a market of at least US\$ 500 million a year. But less than a decade after their birth, GM crops were already facing a difficult adolescence. What was once deemed biological wizardry was increasingly being labeled Frankenfood. Consumers in Europe were bristling at the aggressive marketing of GM giant Monsanto, based in St Louis, Missouri. The Flavr Savr suffered more than a year of delays at the US Food and Drug Administration, and Campbell's began to state that it had no intention of putting the tomatoes in its soups without approval from the public. What had gone wrong? According to one analyst quoted at the time, the biotech sector had failed to prepare consumers appropriately: "Now, they realize that they have to be articulate and educate an uninformed public."

The Flavr Savr was approved in 1994 but never took off commercially. In the meantime, the biotech industry had shifted much of its attention to traits that aimed not to delight consumers, but rather to increase farm yields. Herbicide-tolerant and pest-resistant crops proliferated in the United States and more than two dozen other countries. GM organisms were to become agricultural tools.

In many places where they are planted, these GM crops have replaced conventional planting almost entirely. Yields and profits have increased, farmers have been generally happy to adopt the transgenic seeds and the technology has even made good on some of its promises to help the environment by reducing the amount and variety of pesticides needed.

GM crops, of course, still face a public-relations problem. Fears of the unfamiliar and 'unnatural', and concerns about [health](#) or environmental impacts, have frequently prevented approval and adoption of the crops, especially in Europe, where protesters have destroyed experiments. The United States, the world's most active user of GM crops, has seen renewed backlash as calls grow for foods with GM ingredients to be clearly labeled.

The analyst who spoke of an uninformed public may have been correct in 1993, but such a claim no longer applies. People are positively swimming in information about GM technologies. Much of it is wrong — on both sides of the debate. But a lot of this incorrect information is sophisticated, backed by legitimate-sounding research and written with certitude. (With GM crops, a good gauge of a statement's fallacy is the conviction with which it is delivered.)

Armed with misinformation, debaters have taken to the streets, the supermarkets and social media. With a topic as sensitive and dear to people as the food they eat and give to their children, those who play to the fears, concerns and uncertainty surrounding GM crops often seem to have the upper hand. And the fears are entwined with mistrust of the seed companies. Supporting GM crops can seem a thankless job: it is worthwhile to stand up for good science and the promise that it holds, but defending profit-hungry corporations feels less rewarding.

Still, there is reason to stand up for the continued use and development of GM crops. Genetic modification is a nascent technology for which development has moved very quickly to commercialization. That has forced most research into the for-profit sector. Without broader research programs outside the seed industry, developments will continue to be profit-driven, limiting the chance for many of the advances that were promised 30 years ago — such as feeding

the planet's burgeoning population sustainably, reducing the environmental footprint of farming and delivering products that amaze and delight. Transgenic technologies are by no means the only way to achieve these aims, but the speed and precision that they offer over traditional breeding techniques made them indispensable 30 years ago. They still are today.

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Comments

1. 2013-05-01 02:45 AM

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Wayne Parrott said:

Your editorial implies that GM crops have failed to deliver due to their intrinsic properties or lack thereof, combined with public opinion. Nowhere do you mention the role of regulations, which have a stranglehold on the technology. Furthermore, these regulations continue to increase, and long ago lost any pretense of evaluating real hazards or of even having a scientific foundation. All those traits that were promised 30 years ago did not fall victim to profit-driven industry as implied by this editorial. They were priced out of existence by regulations that are totally disproportional to risk. And, without regulatory reform, most public-sector research can only lead to crops that will never make it to a farmer's field.