

# Future Food

by David Appell

Starving people mass in front of an African warehouse, desperate for food. Ignoring their pleas, a guard stands before the doors, behind which are hundreds of bags of corn. The doors are locked, and the food inside, donated by the United States, is slowly rotting. It's been labeled "poison" by Zambian president Levy Mwanawasa, even as more than half the children in his country suffer from malnutrition. Disappointed and frustrated, the crowd eventually disperses, mumbling to one another, wondering if they will eat tonight or must wait yet again until tomorrow.

Welcome to the front lines of this century's most important and controversial science, biotechnology. Why did Zambians go hungry in the midst of a drought-induced famine last year while millions of tons of food aid were allowed to go to waste? Because the corn was genetically modified. Scientists have added a gene to the corn's genome, isolated from a naturally occurring soil bacterium called *Bacillus thuringiensis* (B.t.), an organism that farmers have used for decades as an externally applied insecticide. The inserted gene allows the corn itself to produce a substance toxic to insects.

At the peak of the Zambian crisis last fall, as cargo ships bearing food were being turned back, Andrew Natsios, administrator of the U.S. Agency for International Development, skewered environmental groups for spreading fears about the dangers of genetically modified (GM) food. "They can play these games with Europeans, who have full stomachs," Natsios told *The Washington Times*, "but it is revolting and despicable to see them do so when the lives of Africans are at stake."

"It is arrogant to tell the Zambians what food they must accept," countered Doreen Stabinsky of Greenpeace. Activists argue that Washington could send money rather than in-kind aid, and accuse it of favoring the interests of the U.S. agriculture industry over the needs of malnourished people overseas. Meanwhile, the fear of GM foods appears to be spreading. In January, India rejected a \$104 million U.S. food aid consignment of corn and soya and called for suppliers to submit documents attesting to the food's bearing on human and animal health.

There are more than 800 million people in the world who are too undernourished to carry out the tasks of daily living. They're caught in the ugly middle of this fight, as are the nonprofit relief agencies that aim to help them. "We're not the scientific arbiters of whether the food is safe or not," said Helen Palmer of Oxfam. "We're inclined to take a cautious approach, and we don't think that the situation these governments have been put in is a fair one. On the other hand, people with no food have a right to food, and life must always be paramount, and if people on the ground are saying give us anything, then they should be given anything."

In the United States, meanwhile, the food that the governments of Zambia and India find too dangerous to touch is consumed like, well, popcorn. Hundreds of millions of Americans eat GM food every day. Up to 75 percent of all food sold

in U.S. supermarkets, from breakfast cereals to frozen pizza, contains ingredients (such as corn syrup) derived from GM plants. The products of the first wave of GM food research have been on your dinner plate since the mid-1990s, and a second wave of more sophisticated products—crops with multiply altered genes, genetically engineered fish and trees, and “biopharm” plants that yield drugs and chemicals rather than food—is nearing commercialization.

Developed in the 1980s, GM crops have been grown commercially in the United States since 1996. They include B.t. corn and cotton, and soybeans modified to withstand applications of the herbicide Roundup. In the five years after 1996, GM crop acreage grew from near zero to 130 million acres, an area nearly the size of Texas. GM crops are grown in 13 countries by about five million farmers. But the lion’s share of them (more than two-thirds) is grown in the United States.

Biotech companies are now on the cusp of commercializing the past decade’s worth of research. The technology’s advocates envision a cornucopia of benefits: increased yields, lower prices for food and other products, and reduced need for pesticides and herbicides. On the near horizon are crops engineered with multiple new genes, or more complex genes, to express multiple traits: a plant with novel genes that make it resistant to multiple herbicides; a B.t. crop that is also resistant to Roundup; plants with increased tolerance of frost, drought, and salt. Genetically altered animals are coming, too, designed to reproduce faster, grow larger, or make more milk. (“Weapons-grade salmon,” activists quip.)

Also in the pipeline are “nutraceuticals,” foods that have been genetically altered to supply critical micronutrients. Consumers in developed countries get many micronutrients—vitamins, iron, iodine—from foods that have been fortified during processing, such as milk, bread, and breakfast cereal. But in the developing world, with its poverty and decentralized food production and distribution systems, it’s not easy to fortify foods on a mass scale. By putting the micronutrients in the crop itself, GM foods could accomplish that task, proponents say. “Golden rice,” for example, containing Vitamin A, is touted as a solution to a vitamin deficiency that can cause blindness. The late D. Gale Johnson, a noted agricultural economist at the University of Chicago, has argued that in India alone, golden rice could spare perhaps 50,000 children a year the fate of lost sight. Poor farmers would reap other benefits from growing GM crops, Johnson said, and improved crop varieties better suited to local conditions would allow many farmers to stay on the land.

Viewed from another angle, however, the genetic revolution is cause mostly for foreboding. Environmental activists, organic farmers, and assorted others consider GM foods a product of science gone amok, a suspicious technology pushed on unsuspecting consumers by big corporations seeking to control the world’s food supply. And poor farmers, they argue, won’t be able to afford the high-tech seeds that are supposed to save them.

In Europe, where more traditional foodways prevail, there is strong resistance to GM foods. It’s been intensified by some spectacular failures of government oversight of food safety, notably the outbreak of mad cow disease in Britain in

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*The Farm 2000, by Alexis Rockman*

the mid-1990s. In 1998, the European Union imposed a highly controversial moratorium on the approval of new GM crops for sale within its borders. Critics blame the moratorium, along with Europe's general hostility to the new technology, for persuading starving countries such as Zambia to turn away GM food aid. The countries are afraid that Europe will reject their agricultural exports as contaminated, or impose costly restrictions on them.

The moratorium has also become a major irritant in transatlantic relations. Washington sees it as unsupported by any real scientific evidence, a devious trade barrier that is illegal under international trade law. The ban has cost U.S. agricultural producers hundreds of millions of dollars annually. While the European Commission has moved to lift the moratorium, it's also moving toward a requirement that GM foods be labeled and traceable, with a clear paper trail stretching from field to grocery store shelf. That's unnecessary and virtually impossible to accomplish, says the Bush administration. Along with several other nations, the United States has begun proceedings against the EU with the World Trade Organization. Given the high stakes and the fact that few things arouse more intense emotions than the food we eat, there's a distinct possibility that another major transatlantic blowup is in the works.

Last year, on a rainy Friday night in an old hotel along the Ohio River, Dan McGuire, director of the American Corn Growers Association, spelled out the sorry state of U.S. corn exports. "We estimate that the U.S. has lost about 400 million bushels of corn exports in total since GM corn varieties were introduced in 1995–96," McGuire said, speaking in Louisville, Kentucky, at a public forum sponsored by the Genetic Engineering Action Network. (Prices paid to

farmers fell as much as a dollar a bushel in 2002; corn now sells for less than \$2.50 per bushel.) The crowd consists mainly of local farmers worried about their livelihood and activists adamantly opposed to GM-anything. McGuire himself is no fan of Big Ag, and, to loud applause, he criticizes the power of the large agricultural companies and their close links to the federal agencies that are responsible for regulating biotech crops and public food safety.

Despite shrinking exports of GM corn, American farmers don't appear to be abandoning the crop, which, to varying degrees, saves money on pesticides, increases yields, and reduces fieldworkers' exposure to unwelcome chemicals. A dual system—GM crops grown for the domestic market, non-GM crops for export—seems impractical, because it would be costly and probably ineffective. Pollen drifts from one field to another, and grains cling to machinery and get transferred to other fields.

**T**here is little evidence that eating today's GM foods is unhealthy, except in rare cases of allergenicity. Scientific panels sponsored by the National Academy of Sciences, the British Royal Society, the World Health Organization, and other reputable bodies, while emphasizing the need for careful research and oversight, have concluded that biotech crops are safe for both humans and the environment.

Still, there are lingering concerns about America's food supply—about pesticides, an epidemic of obesity and diabetes, and growing corporate control over food that was once produced locally. "There are a lot of changes in the disease spectrum of the U.S. population within the last 10 years," says Martha Crouch, "such as increases in certain kinds of cancers, in autism, in Parkinson's disease—and an extreme increase in obesity." Crouch is a plant molecular biologist, a former consultant to biotechnology corporations, and a retired University of Indiana professor who abandoned her research in dismay over the uses to which it was being put. "PCBs, dioxins, the effects of endocrine disruptors, attention deficit disorder, contaminated fish. There are lots of theories about foods that have been on the market for 30 or 40 years and may be having extremely serious health consequences, and it's been difficult to link those foods to the health consequences because of how ubiquitous they are in the food stream and how little of that kind of testing was done when they were put on the market," Crouch says. "And I consider our GM foods to be in that category—they could be having very widespread and serious consequences that we won't know for 30 years."

Critics also raise the possibility of gene transfer between GM and non-GM crops, a process that could have unpredictable results. Last August, scientists at the University of Lille in France discovered that their experimental GM sugar beets had swapped genes with other sugar beets, making the beet "weeds" potentially harder to control. The French scientists admitted they had underestimated the likelihood of such contamination.

But even though the biotech world is getting more difficult to police, the larger world can't afford to turn its back on the vast potential GM foods offer. In the absence of scientific evidence showing that they are harmful, it's a tragedy that, when readily available, they've been denied to desperately hungry people around the world.

Yet critics do raise important questions about this unprecedented experiment with the world's food. Do scientists and governments know enough? Are regulatory agencies up to the task, and can their staffs keep up with the leapfrogging feats of academic and corporate scientists? Can policymakers resist the powerful commercial pressures to charge full speed ahead? For example, many trials of GM products in the regulatory process are kept confidential by government regulators. Such secrecy is typical in evaluations of commercial products, and there are often good reasons for it. But given the stakes involved in manipulating the genome, a higher level of transparency may well be justified. Biopharming—using genetically modified plants as a medium for creating drugs and chemicals—is an area of particular concern. Among the biopharm experiments now being discussed or attempted are sporicide-producing corn and tobacco plants that can be harvested and processed to yield the abortion-inducing compound trichosanthin or growth factors such as erythropoietin. “There are some 400 biopharm products in the pipeline,” says

Bill Freese, a policy analyst with Friends of the Earth, “and over 300 open-air field trials have already been conducted in unidentified locations across the country.”

The Genetically Engineered Food Alert Campaign, a coalition of activist groups, has called for an end to open-air biopharming. Their demands grew louder last year after an incident in which a small quantity of biopharm corn engineered to include a vaccine against diarrhea in pigs came close to entering the food supply. In the wake of the incident, the U.S. Department of Agriculture and the U.S. Food and Drug Administration wrote new regulations to keep pharm crops separate from crops bound for the food supply. And the Biotechnology Industry Organization, a trade association, announced a moratorium among its members on growing biopharm crops in major food-producing areas. Perhaps what's needed in addition is a policy restricting biopharming to plants that are not used, even in their unaltered state, to produce foods that humans eat.

Many activists see the debate over GM foods in apocalyptic terms. Jessica Hayes, director of the Genetic Engineering Action Network, speaks of “a crisis in democracy.” Yet the solid science behind the conclusion that GM foods are safe to eat does not justify such claims. There are good reasons to be vigilant, to demand accountability, and to ask questions about the impact of this new technology on farmers, consumers, and the worldwide agricultural system. At a time when millions still cry out for food, and when genetic technologies offer so many potential health and environmental benefits, these debates should be only beginning, not ending. □

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