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Out of the Lab

Biotech-Crop Battle Heats Up as Strains Mix With Others

Nations Seek Rules to Attempt To Keep Varieties Separate; Fears Hurt U.S. Farmers

Mr. Ballarin's Tainted Corn

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HUESCA, Spain -- For 15 years Felix Ballarin labored to perfect a strain of organically grown red corn. He figured the crop could fetch twice the price of traditional yellow corn because local chicken farmers say it gives their meat and eggs a rosy color.


Felix Ballarin

But when the ears first emerged late last year, the farmer made a horrifying discovery: Yellow kernels were mixed in with the red. As government scientists would later confirm with a DNA test, the kernels had been contaminated with a genetically modified strain. No longer considered "organic," Mr. Ballarin's corn lost its premium value and his decade and a half of careful breeding was down the drain. "Why me?" he asked, pointing out the field choked with weeds where the corn stood last year.

As genetically modified crops win a growing share of the world's farmland, they are increasingly altering the makeup of traditional crops like Mr. Ballarin's corn. "Biotech pollution," as critics call it, results when genetically modified plants are mixed with ordinary crops by mistake, carelessness or just the wind. With billions of dollars in crop sales at stake, the issue is becoming a significant one for governments around the world. And it is beginning to pit growers of nonbiotech crops against the big biotech producers, as each side battles to serve their very different markets.

U.S. farmers say they are losing out on exports because overseas customers are afraid of contamination by genetically modified, or GM, varieties. Farmers of organic produce in both Europe and the U.S. say their crops are frequently tainted by stray GM seeds, forcing them to buy seeds from as far away as China to ensure purity.

Growers of biotech crops in the U.S. increasingly worry the

struggle is hurting acceptance of their product both domestically and abroad. Three California counties have banned GM crops, and a fourth is considering doing so today. Beer-making giant **Anheuser-Busch** Cos. has demanded that its home state of Missouri keep a GM rice project 120 miles away from rice it buys to make beer. The European Union is now trying to establish buffer zones meant to halt the unwanted spread of GM crops. Spain is close to finalizing a law that would require GM crops to be grown at least 165 feet away from traditional varieties.

Such moves to restrict the spread of GM crops often are ineffective. Last month in Australia, government experts discovered biotech canola genes in two non-GM varieties despite a ban covering half the country. "Regretfully, the GM companies appear unable to contain their product," said Kim Chance, agriculture minister for the state of Western Australia, on the agency's Web site.

St. Louis-based **Monsanto** Co., the global GM leader, last year dropped plans to introduce the world's first bioengineered wheat amid fears by Northern Plains farmers in the U.S. that the new plant would contaminate the non-GM wheat they promise customers in Japan, Europe and South Korea. Increasingly those countries are enforcing strict rules on the makeup of non-GM products. Keeping out the GM strains that foreign customers don't want is a growing expense for American exporters. "It's just a mess for the grain traders," says M. Ann Tutwiler, chief executive of the International Food and Agricultural Trade Policy Council, a Washington think tank.

Future of Farming

Biotech crops have been held out by their producers and many scientists as the future of farming, improving agriculture and even human health. The first genetically modified plants made their own pesticides and tolerated exposure to herbicide, making it easier for farmers to spray weedkillers without hurting their crops. Scientists are now engineering plants to grow on less water and fertilizer, modifications that would reduce agriculture's toll on the environment.

Advocates argue that hardier plants could help Africa feed itself, and that future generations of the technology promise groundbreaking benefits. Already scientists have developed a strain of rice that could be used as a source of missing vitamin A for poor Asians. Monsanto is using genetic material from algae and fungi to modify plants so that they make healthier vegetable oil.

Biotech company officials say small leaks aren't a surprise. It's long been accepted in agricultural circles that farm fences are no barrier to plant reproduction. They argue that the biotech boom in the U.S. hasn't harmed the organic movement, pointing out that organic acreage has climbed in the U.S. since the first genetically modified crops were commercialized in the U.S. a decade ago. "We think co-existence is a reality," says Christopher Horner, a spokesman for Monsanto, which offers advice to buyers of its genetically modified seeds on avoiding problems with neighboring farmers.

To be sure, Monsanto and rivals such as **DuPont** Co. and **Syngenta** AG have a financial stake in how countries decide to deal with the leaky nature of crop biotechnology. Moves to shift liability to growers of biotech crops, or to the inventors, would slow the torrid growth of the market, which has more than doubled Monsanto stock over the past two years. Kevin McCarthy, an analyst at Banc of America Securities, New York, figures that crop farmers around the world paid a $2.2 billion premium for biotech crops this year, up from $1 billion in 2001.

GM critics have produced volumes of studies claiming to show that biotech food can cause allergies or that the world's biodiversity will be put at risk if biotech genes infect natural plants.

All such claims are adamantly rejected by the GM industry, which can call on an equally large body of research to back up its counterarguments.

There's no evidence to date that biotech crops have caused any health problems. And GM crops now make up a majority of the world market in soybeans, along with big portions of the market in cotton, canola and corn. Total GM acreage globally climbed 20% last year to 200 million acres in 17 countries, according to the industry.

The U.S. government takes a laissez-faire attitude on GM contamination. As long as the genetically modified material in question comes from plants approved for human consumption, Washington doesn't see any safety threat. "Why do they need to be treated any differently?" asks Cindy J. Smith, deputy administrator of biotechnology regulatory services at the U.S. Department of Agriculture. "They're not any more unsafe."

Some local communities have stepped in. Mendocino County in Northern California, known for wine and pears, was the first U.S. locality to ban GM crops in March 2004. Nearby Sonoma County, a major wine and dairy producer, could become the next when it votes today on whether to declare a 10-year moratorium on GM crops; advocates of a ban fear biotech grains being fed to milk cows could eventually cause some unforeseen health problems, such as allergic reactions. Legislatures in both California and Vermont, meanwhile, are considering measures that would hold makers of GM seeds legally liable for incidents of contamination. GM seeds carry a unique genetic sequence that can be identified by testing laboratories.

Many Precautions

In the Midwest, some similar measures have been considered but rejected. So Lynn Clarkson, president of Clarkson Grain Co., a Cerro Gordo, Ill., grain marketer that specializes in non-GMO crops, goes to great lengths to try to keep his crops that way. He sends inspectors to visit fields before they are harvested and requires the farmers he contracts with to send him sealed plastic bags with samples of their grain for testing before they are allowed to bring their harvest to the elevator.

He uses an optical scanner to sort through blue and white varieties of corn. Since the biotechnology industry has only genetically modified yellow corn, the optical scanner kicks out any yellow corn it finds.

Despite the precautions, Mr. Clarkson finds genetically modified organisms in 6% of the grain he contracts with farmers to grow. A survey of organic farmers about their 2001 crops by the Organic Farming Research Foundation in Santa Cruz, Calif., found similar results: About 7% of 270 growers of organic corn, soybeans and canola reported GM materials in their crops.

Such a problem can be costly: An Illinois farmer can charge roughly three times as much for organic corn as for genetically modified corn. "Once we had to kiss good-bye to 20,000 bushels that had gotten into our bins," says Mr. Clarkson. "If you are a biotech farmer and your pollen comes over my fence, you are taking away my choice."

Now Mr. Clarkson is mulling growing crops in desert areas in parts of South America where genetically modified crops have yet to penetrate. "I think of it as a leaky technology. It is the nature of the thing," says Mr. Clarkson. In addition to adding to his costs, the persistence of contamination is limiting his market, he says. "We could do five times as much business in South

Korea otherwise," Mr. Clarkson says.

Japan and the EU, the U.S.'s third and fourth largest agricultural exports markets, still allow small amounts of GM material in non-GM goods. But South Korea, the U.S.'s sixth-largest market, is moving toward forbidding genetically modified material of any kind in food that is supposed to be 100% organic. That limits what Mr. Clarkson can sell there.

Contaminated Seed

Craig Wedig, a Cuba City, Wis., farmer, blames contaminated seed for the GM crops that appeared on his organic cornfield in 2001. Mr. Wedig, 28 years old, had a contract to sell his crop to a mill making organic corn syrup for export. When the mill detected GMOs in the third and fourth truckload from his farm, he had to sell the corn for less money to a company making livestock feed.

The GMO discovery cost Mr. Wedig $2,250. He has since shifted his business so that the only food he sells comes from the milk and meat produced by his organic dairy herd. Genetically modified crops can't be detected in the milk or meat of the cows that eat them. "My advice to the organic farmers in Europe is to make sure that any GMO drift becomes the legal responsibility of the GM farmer," says Mr. Wedig. "Here, I'm responsible for my neighbor's pollen, and that's not fair."

In the 25-nation EU, most countries are working on rules governing how far GM crops can be grown from non-GM ones. Some are so strict that GM farmers worry they will amount to a virtual ban. European reluctance to allow wider planting of GM crops is part of a dispute the U.S. has brought against the EU at the World Trade Organization. A ruling is expected in January.

The debate over GM contamination has surfaced most passionately in Mexico. Four years ago, scientists from the University of California, Berkeley, discovered that GM corn had mingled with native varieties in the southern state of Oaxaca. The report, later supported by Mexican government research, staggered local farmers. Mexican peasants depend on corn for as much as 40% of their diet, using it in everything from tortillas to a hot drink called "atole."

On Agustin Leon Santiago's family farm in Oaxaca, maize seeds have been handed down from father to son for countless generations. "Each family has its own heritage, expressed in corn," said the 73-year-old patriarch, as three generations of Leons took a break from their chores. "We feel that the day our traditional corn is contaminated, we will lose a tremendous heritage going back thousands of years."

Mr. Leon's son, Jesus Leon Santos, is leading an anti-GM drive in the region, producing pamphlets and encouraging local farmers to plant only seeds that come from the region.

Nevertheless, the technology is spreading. In Europe, authorities have begun approving GM strains to be sold there after an effective ban on testing new biotech crops took effect in 1998. North of Barcelona in Spain -- the only European country with GM crops before the ban was instituted -- a trio of farmers took a late afternoon break recently to argue in favor of biotech. Leaning against a mud-caked Honda ATV parked next to rows of green corn stalks, Joaquim Paretas said his farm would be doomed without it. He plants a strain of biotech corn that defends itself against an insect known as the corn borer, a bug that burrows inside a corn plant, making it hard to combat with traditional insecticide. The GM plant produces a protein that, when eaten by

the insects, gives them a deadly ulcer.

Traditional strains of corn, Mr. Paretas says, are weakened by the bugs and are often destroyed by high winds that sweep over the region late in the growing season. "If we didn't plant GM, we would face fierce competition from countries like the U.S. and Argentina and others who do," Mr. Paretas said. "We would have to give up our land and raise goats."

Balancing the needs of Mr. Paretas and those of Mr. Ballarin, whose red-corn effort took place around 220 miles away, is tricky.

Spain's evolving plan to require separating the GM crops from non-GM varieties seems to satisfy neither side. Mr. Paretas says it will be impossible to follow the rules as some of his scattered corn plots are only a few rows wide. He says he'll instead work out agreements with his non-GM neighbors to stagger their planting seasons.

Meanwhile, Mr. Ballarin says the 165-foot barrier is woefully insufficient. Looking over his rolling field, he points to droplets from a sprinkler carrying at least that far on the late afternoon wind. Pollen, he believes, can easily float farther.

---- David Luhnow contributed to this article.

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