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Feb 21st 2008 | NEW YORK
From The Economist print edition

Europe may not like it, but genetic modification is transforming agriculture**[Get article background](#)**

FOR a decade Europe has rebuffed efforts by biotechnology firms such as America's Monsanto to promote genetically modified crops. Despite scientific assurances that genetically modified organisms (GMOs) are safe for human consumption, and a ruling by the World Trade Organisation against national import bans in the European Union, many Europeans have yet to touch or taste them. But that may soon change, according to Iain Ferguson, boss of Tate & Lyle, a British food giant. "We sit at a moment of history when GM technology...is a fact of life," he said this week.

Mr Ferguson, who is also the head of Britain's Food and Drink Federation, argues that because many large agricultural exporters have adopted GMOs, it is becoming expensive to avoid them. Copa-Cogeca, a farmers' lobby, this week warned that the rising cost of feed could wipe out Europe's livestock industry unless bans on GMOs are lifted. Meanwhile, European agriculture ministers failed to agree on whether to allow imports of GM maize and potatoes; the decision will now be made by the European Commission, which is likely to say yes.

If it does, it will be a victory for Monsanto. But the firm is already enjoying an even sweeter form of revenge: huge commercial success. It has had three straight years of revenue and profit growth, and on February 12th it raised its profit forecast for the fiscal year for the second time in two months. Monsanto made a profit of \$993m in the year to August, on revenues of \$8.6 billion. The global commodity-price boom helps (see [article](#)), but Brett Begemann, a senior executive at Monsanto, insists that it is the firm's advances in GMO technology that are fetching premium prices and will help it to double profits by 2012.

The firm's fortunes have been boosted by the success of GMOs outside Europe. A new report from the International Service for the Acquisition of Agri-biotech Applications (ISAAA), a non-profit outfit that tracks industry trends, charts the dramatic growth in the 12 years that GMOs have been commercially available. The area under cultivation increased by 12% last year, to 114m hectares globally. America topped the list, but there is rapid growth in Argentina, Brazil, India and China (see map). Thomas West of Pioneer Hi-Bred, a division of DuPont, says Europe should get on board, as "the train is leaving the station."



According to Croprosis, an industry consultancy, the market for agricultural biotechnology grew from about \$3 billion in 2001 to over \$6 billion in 2006, and is expected to reach \$8.4 billion by 2011. Hans Kast, chief executive of Germany's BASF Plant Science, thinks the figure could reach \$50 billion by 2025, as a second generation of GMO technology, now in the pipeline, reaches the market.

Proponents of GMOs are optimistic because a confluence of social, commercial and technological forces is boosting the case for the technology. As India and China grow richer, the world is likely to need much more food, just as arable land, water and energy become scarcer and more expensive. If they fulfil their promise, GMOs offer a way out of this bind, providing higher yields even as they require less water, energy and fertiliser.

Early incarnations of the technology, such as Monsanto's Roundup Ready maize and soyabeans, were genetically engineered to be resistant to herbicides and pesticides, making it easier for farmers to control pests without damaging crops. The second generation will have further traits, such as drought resistance, "stacked" on top. Michael Mack, chief executive of Switzerland's Syngenta, reckons that farmers will pay extra for these new features.

Moore's law for maize

Indeed, farmers can expect ever-faster cycles of product upgrades, thinks David Fischhoff, a senior executive at Monsanto. He likens the industry's situation to the early days of the personal computer, now that the underlying technology is in place. Monsanto predicts that the yield from maize grown in America, which has doubled since 1970, can double again by 2030.

Mr Mack draws a similar analogy. "Like in the software industry," he says, "intellectual-property rights give our technology value." Farmers paying big licence fees to use the new technology would no doubt agree. But just as with software, GMOs suffer from piracy. In Argentina and China, the hostile stance toward intellectual-property rights has been blessed by the government itself.

The dirty little secret of the software industry, however, was that companies quietly tolerated some piracy on the basis that once customers went legal, they would probably stick with the products they were already using. The same may be happening with GMOs. Ask Syngenta's boss if he is worried about piracy, and he answers "yes and no". As countries grow richer or embrace WTO rules, he says, their farmers will start paying. Argentina has already headed in that direction, he reckons, and last year his firm set up a joint venture with a Chinese biotechnology centre.

The most important reason to think that GMOs have a brighter future, however, comes not from any of the benefits they offer farmers, large though those will be. The big difference with the next generation of technology, argues Mr West of Pioneer Hi-Bred, is that it will also provide benefits to consumers. As an example, he points to his firm's high-oleic soyabean oil, which it expects to have on the market in 2009. Through genetic manipulation, he claims, his firm's researchers have been able to improve soya oil so that it tastes better, is healthier and produces no trans-fats during cooking.

Could such an innovation even persuade sceptical Europeans? The lack of consumer benefits with first-generation GMOs made it easy for activists to whip up opposition. But if future products offer things consumers want, such as healthier food, and address problems that European regulators are worried about, such as obesity and climate change, then GMOs may yet have their day in Europe.

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