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FINANCIAL TIMES

Agriculture and food: The genetically modified crop marches on

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By Clive Cookson // Published: May 4 2010 00:02

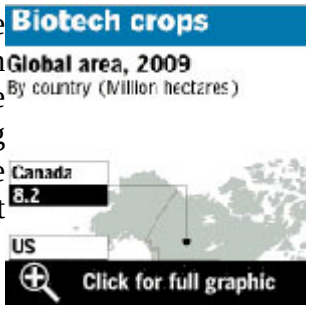
In agricultural biotechnology, the big theme is still the march of genetically modified crops across the world's farmland.

While farmers have yet to adopt genetic engineering or cloning of animals to a significant extent – even in the GM-friendly US, fears of consumer resistance to biotech meat and milk outweigh any likely benefits – they have embraced biotech plants in some of the world's most important growing regions.

The most authoritative annual survey of GM planting, carried out by the International Service for the Acquisition of Agri-biotech Applications, showed a 7 per cent annual increase last year in the area covered to 134m hectares (330m acres) in 25 countries.

But GM food crops are still concentrated in the western hemisphere. The US accounts for almost half the world's GM planting (64m hectares), followed by Brazil (21.4m ha) and Argentina (21.3m ha).

Although India and China are big biotech growers, their GM crops are almost entirely cotton, cultivated for fibre rather than food. The picture may change soon in China, where regulators issued biosafety certificates in November for insect-resistant rice and "phytase" maize (which has an added gene to make the crop more digestible in animal feed).



But GM food had a setback in India in February, when the government unexpectedly rejected an application to grow an insect-resistant strain of brinjal (aubergine) and demanded more safety tests. "Agbio" companies continue to face strong consumer and political resistance to GM crops in Europe, where only 95,000ha were grown last year – mainly insect-resistant maize in Spain.

The industry celebrated a success in March in its long struggle to get more crops approved in Europe. After a 13-year wait, the European Commission allowed BASF of Germany to plant its GM potato called Amflora to produce industrial starch – but not spuds for human or animal consumption.

Many other GM crops, approved elsewhere in the world, are still waiting for a go-ahead from the EC. Three more GM maize products are believed to be at the front of the

queue. Worldwide, the GM scene is dominated by four crops (soyabeans, maize, cotton and canola or oilseed rape), two traits (herbicide tolerance and insect resistance) and one company (Monsanto).

Herbicide-tolerant genes let the farmer spray a broad-spectrum weedkiller, usually Monsanto's RoundUp, to kill all weeds without harming the crop. The Bt insect resistance gene, derived from *Bacillus thuringiensis* bacteria, reduces the amount of pesticide required to protect the crop.

Crops with combined or "stacked" traits are becoming increasingly important. This year, Monsanto will launch SmartStax maize, which has eight added genes coding for three traits. It is herbicide-tolerant and protects against insects.

GM products so far have delivered their direct benefits to the farmer rather than the consumer. A report last month by the National Academy of Sciences in Washington DC said: "Many US farmers who grow genetically engineered crops are realising substantial economic and environmental benefits, such as lower production costs, fewer pest problems, reduced use of pesticides and better yields, compared with conventional crops."

A new wave of GM crops, to be released over the next few years, may bring more obvious benefits to the consumer, in the form of better nutritional qualities, and to agricultural production, in the form of more resistance to stresses such as drought, salinity and extremes of temperature.

An important development will be the commercial launch of drought-tolerant GM maize, scheduled for 2012. Although GM gets all the attention, there are alternative ways to use science to improve crops. For example Australia's CSIRO announced last month a salt-tolerant wheat that yields 25 per cent more on saline soils than its parent variety.

The Australian scientists isolated two salt tolerance genes in *Triticum monoccum*, a wheat species that grows on poor, arid soils in the Middle East, and introduced them into durum wheat, which is widely cultivated for pasta production – through non-GM breeding aided by the latest molecular marking technology.

Cibus has reached agreements with a variety of companies and organisations – most recently the Flax Council of Canada – to use RTDS on their crops. Stephen Evans-Freke, Cibus chairman, says the technology makes it possible to commercialise new traits more quickly than GM, because regulatory approval is much more straightforward when no external genes are introduced.