



## Rejection of GM crops is not a failure for science

Governments maintaining their antipathy for transgenic crops are sensibly balancing public consent with scientific evidence, says Colin Macilwain.

Last week, Reuters reported that Germany is set to continue its moratorium on the cultivation of genetically modified (GM) crops. The decision will doubtless meet a well-orchestrated barrage of criticism. When the Scottish government made the same call last month, its decision was roundly condemned by plant biologists and scientific leaders such as Anne Glover, former chief scientific adviser to the president of the European Commission. Critics portray the ban as an affront to science and to the idea that regulation should be based on evidence.

I'm a big fan of the scientific method. You won't find me sitting in an Airbus 320 thanking the Lord for keeping the aircraft aloft. I happily attribute its successful flight to the scientists and engineers who mastered fluid dynamics. I also support the general principle of evidence-based policy.

Yet I'm relaxed about the pending decisions of Scotland, Germany, France, Italy and others to stand up to corporate pressure and keep GM crop technology out of the European countryside. I await with interest England's response to the deal that the European Union made last December that allows its member states to make their own choices on licensing GM crops.

Whatever these nations decide, the stakes are not as high as they once were. When the United States started to license GM soya beans and maize (corn) 20 years ago, many crop producers thought that global acceptance of the technology would rest heavily on European acceptance. That is probably no longer true. The global acreage of GM crops has grown consistently without broad acceptance from Europe. It is now topping out.

Last year, it grew by only around 3%, according to industry figures, to 181 million hectares — a little more than one-tenth of the 1.5 billion hectares of land that the United Nations estimates to be under crop cultivation.

Five-sixths of that GM acreage is in the Americas. The rest consists mostly of non-food crops (mainly cotton) grown in India and China. Little of the harvest is in nations that need improved yields to feed themselves. Twenty years in, the GM strains currently under cultivation are still best suited to the needs of large-scale industrial farmers who can afford the seeds and inputs that accompany them. Whatever Europe decides, the rest of the world isn't waiting to follow suit.

And this time, Europe's debate about GM crop cultivation isn't really over GM crops themselves, but over how nations should assess and manage risk. When Europe turned its back on GM crops 15 years ago, the pro-GM lobby warned that this signalled a continent in crisis, one unwilling to embrace the future. But there has been scant indication since then that Europe is technology-averse. It has not slowed itself down or tied itself

up by rejecting nanotechnology-based wound-dressings or mobile phones, of which it was the world's fastest adopter.

Despite the GM episode, evidence-based policy is alive and kicking in Europe. But good risk management involves early communication with the public and the careful weighing of many factors, not just scientific risk assessment. In general, however, industry — which usually holds most of the relevant data — favours scientific risk assessment as the be-all and end-all of regulation (see *Nature* 508, 289; 2014). Environmentalists — even gentle ones, such as the European Commission and former US vice-president Al Gore — prefer the precautionary principle, which places the burden of proof on the innovator.

In practice, all governments have to walk a line between the two.

But where to draw that line? In Europe, especially in countries that value the provenance of food, much of the general public doesn't want GM foods. The jury, too, remains out on their ecological impacts (see *Nature* 497, 24–26; 2013). Should they nonetheless be grown because the data say that they're safe to eat? Call me naive, but given the threadbare state of our democracy, it doesn't do to override public concern in that way.

In the United States, the key regulatory decisions were made in 1995, with scant public input. They clicked in place on the basis of 'substantial equivalence', which holds that GM foods are substantially the same as their component parts.

Substantial equivalence was the original sin that undermined public confidence in GM technology, and advocates have been over-compensating for it ever since. Genetic modification is a

blockbuster technology with a broad ability to mix and match genes; its use or misuse has profound implications for global ecology and the food supply. It is in no sense 'substantially equivalent' to plant breeding.

That sin may shortly be expunged. On 2 July, John Holdren, science adviser to US President Barack Obama, directed regulators to revisit the US framework for regulating agricultural biotechnology. Holdren is promising simpler rules for small producers, but also more transparency. Many US consumers have grown sceptical of the technology; in April 2014, Vermont became the first state to mandate labelling of products that contain GM crops. (The US House of Representatives has responded by passing a bill that would prohibit such state provisions.)

Some critics still hope that universal labelling on food packaging means the beginning of the end for GM crops. More probably, it will mark the end of the beginning — if it prises out a fresh approach from the scientific community and the agricultural biotechnology industry to come clean with the public on what they're doing. ■

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