Europe should rethink its stance on GM crops

Second-generation crop genetic-modification techniques avoid some of the issues that previously provoked hostility, argues **Brian Heap**.

Countries in the European Union (EU) are losing ground in the international race to grow more food on increasingly scarce land. This has serious and urgent implications for the EU science base and the environment, as well as for domestic food security, employment and economic growth. It is down to the slow and expensive way that the continent regulates genetically modified (GM) organisms.

Historical attitudes and actions of the EU have constrained the use of GM crops — both at home and in developing countries. The region must now base its regulations in this area on sound science, as it has promised to do. An early test of this commitment will be the EU's approach to the next generation of crop genetic-improvement technologies. These techniques allow scientists to generate plant varieties with desired traits more precisely, rapidly and efficiently than with conventional breeding.

A key feature of many of these techniques, which include some that induce epigenetic modifications (that is, modifications that do not cause changes to the DNA sequence itself), is that they leave the resultant crop free of genes foreign to the species. Indeed, the changes induced by modern genetic modification often cannot be distinguished from those produced by conventional breeding or natural genetic variation. This raises issues for regulators. Put simply, are these plants GM crops?

The difference is more than semantic. A GM classification raises regulatory hurdles and associated costs, which could put the commercial use of these techniques beyond the reach of smaller companies and public-sector researchers. The techniques have the potential to improve crop resistance to disease and to increase yields and nutritional content, but classification as GM would restrict their application to high-value crops, as happened with the first wave of GM crops. It would be perverse if the costs of regulation yet again lock up the promise of agricultural innovation within a few large companies.

As a report published this week by the European Academies Science Advisory Council (EASAC) in Halle, Germany, of which I am president, points out, expert groups have already concluded that many of these new breeding techniques do not constitute 'genetic modification' in the way that the term is usually used. As such, the plants that they produce should not be regulated as GM organisms. Work on these techniques is well advanced, in particular in the United States and Europe. The EU has not yet decided how to classify — and so regulate — plants produced by them, and this is hampering progress there.

The world faces major problems in food security alongside pressures from population growth, climate change and economic and social instability. The biosciences can play a big part in the sustainable intensification of agriculture, improving efficiency in production and avoiding further loss of biodiversity. As observed in the recent *Nature* special issue on genetic modification (nature.com/gmcrops), the world is changing and many developing countries are now actively engaged in research on advanced technologies in pursuit of their own priorities.

Researchers and plant breeders across Europe urgently need to know the legal status of these novel breeding techniques. Recent safety assessments by expert advisory groups of the European Food Safety Authority in Parma, Italy, have already judged that hazards are similar for conventionally bred plants and those produced by cisgenesis (in which only genes from the same species or a normally interbreeding relative are introduced), and that targeted mutagenesis (in which only specific nucleotides in a gene are changed) is also likely to minimize unintended effects associated with the disruption of genes or regulatory elements in the modified genome.

Confirmation by the EU that targeted techniques that leave no foreign DNA behind do not fall under the scope of GM legislation would give considerable support to agricultural innovation in Europe. Without this support, there is the risk that scientists and companies in this field will move elsewhere, accelerating the negative impact on the science base and on Europe's competitiveness.

The implications go further. An EU regulatory position not based on sound science could create damaging knock-on effects for developing countries, who may depend on the EU for export markets or look to it for leadership in managing bioscience innovation. There is an ever-greater requirement for consistent, harmonized, evidence-based policy worldwide to enable synchronous technology development and trade.

At the same time as addressing the proportionate management of these new techniques, the EU must recalibrate its broader approach to GM crop regulation. It must make it transparent, predictable and fit for purpose by taking account of the extensive evidence of safe use of these crops around the world.

In common with other innovation sectors, the objective must be to regulate the product and not the technology that produces it. By making better use of all crop-improvement techniques and so reducing dependence on food and animal-feed imports, the EU can help improve land use elsewhere, and allow more of the agriculture in developing countries to be used for local needs. ■

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