

## Benefits and risks of genetic modification in agriculture

**Mike Wilkinson, moderator for this, the first of the Nature Debates, surveys the terrains on which conflicting interests will do battle.**

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MIKE WILKINSON

Few things in science evoke stronger feelings than the commercial release of genetically modified crops. Views seem to have become polarised between those who advocate the benefits of the technology in a world with a rapidly expanding population and others who argue that the dangers transgenes pose to the natural environment are too poorly quantified to allow commercialization. Both viewpoints oversimplify what is a complex situation influenced by political, social and economic factors.

Sovereign states vary considerably in terms of the progress they have made towards the widespread release and use of genetically modified organisms (GMOs). Impetus has been strongest in the USA, where public and political opinion appears to have been largely in favour of the technology, while elsewhere where public opinion has often been more ambivalent. GMOs have become so widely grown in the USA, for example, that nearly all foods containing soya are also likely to contain some proteins originating from modified beans.

Technological progress leading to the production of new transgene constructs is producing a vast array of new lines with commercial potential. The transgenes in these plants fall into several categories, some conferring tolerance to herbicides or resistance to insects, viruses or fungal disease, others affecting crop fertility or fruit ripening, with a growing number improving product quality (for example, oil composition, carotenoid content or sugar metabolism). At the same time, the range of crops to which the technology is being applied is also growing year by year.

The combination of increased numbers of constructs and of crops into which these genes can be inserted imposes constraints on the practicality of existing regulatory practices. The environmental risks presented by a transgenic crop are influenced not only by the crop itself but also by the characteristics of the transgene construct. Lines belonging to the same species but containing different transgenes must be evaluated separately, as must different species containing identical constructs. Inevitably, a point will be reached when the sheer volume of new transgenic selections will force regulators into simplifying procedures or else face increasingly protracted delays for the registration of the GMOs.

This prospect may have led some environmental groups to advocate a moratorium on releases until the environmental risks have been adequately quantified. Equally, those advancing the benefits of the technology may argue that the economic and environmental benefits offered by genetic modification could be delayed or even lost should legislative restrictions significantly impede the economic viability of generating new GM lines. It is vital, therefore, that the potential benefits and dangers that genetic modified crops pose to the environment are fully explored so that reasoned decisions can be made about how to regulate them.

The purpose of this debate is to provide a forum in which the environmental hazards and benefits offered by genetic modification can be identified and, where possible, placed into an informed context. Debate will be stimulated by a series of six short essays by authors active in the field of GMO risk assessment.

Contributions from readers are encouraged, by email only, please, to [debates@nature.com](mailto:debates@nature.com). The rules are simple: contributions should be short and to the point. I reserve the moderator's right to select contributions to be posted on the site as part of the debate, and to normal editing for style, sense, length and, of course, good taste.

**Mike Wilkinson**

University of Reading, UK

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