



SEARCH



Genetically Modified Organisms in Developing Countries: Risk analysis and Governance. Ed. Ademola A Adente, E Jane Morris and Denis J Murphy. Cambridge University Press, 2017; ISBN 978-1-107-15191-8, Hardback; DOI 10.1017/9781316585269.

Background

Agricultural technology attracts emotional reactions from many groups of people who feel food should be pure and traditional, despite widespread adoption of technical advances in other aspects of life. This is especially true in the case of biotechnology. It may seem strange, almost hypocritical, that gene editing for therapy seems to be quite acceptable in medical science, but attracts deep and emotional criticism and suspicion when applied to plants or animals, especially when used for food.

This is despite the fact that man has been manipulating the genes of food plants and animals for over 10,000 years, capturing and exploiting genes which cannot survive in the 'wild' by developing improved strains of crops and livestock.

Throughout this time we have also been modifying our environment through agriculture.

As society has developed, standards of living have improved during the last century. At the same time our knowledge and understanding of our world has improved. We have also become aware of the risks to human health and the natural world of our burgeoning human population. Inevitably, this has led to increasing awareness of potential threats to us and our environment and in the last 50 years, to development of the precautionary principle. All potential advances become subject to detailed scrutiny to consider possible impacts, most of which are almost impossible to explore or predict without the experience of widespread use of the relevant technology.

The aims

This book is a timely reminder of the sociological interactions of the advances in crop breeding techniques. It is compilation of 21 in-depth considerations of risk assessment and case studies. The editors are to be congratulated as they have they produced an impressive authoritative tome with a consistent, well written style.

Each the chapter is by an international specialist who has been involved in developing or regulating Genetically Modified Organisms (GMOs). They each explore the range of social, technical and potential environmental impacts of GMOs, how their risks and benefits may be quantified and the organisms regulated.

Overall, the book makes the point that for primary crops such as maize and soya, GMOs have become essential to maintain the supply of animal feed so essential to the livestock industry. Likewise significant areas of GM cotton are now produced globally. In each of these cases, adoption of the technology has reduced both production costs and losses owing to pests and weed competition.

The point is well made that greatest benefits often accrue to poorer or small scale farms where any gain no matter how small can improve significantly income and living standards. This topic was explored in a paper in *World Agriculture* in 2013 (paper 1318).

There is not space in this review, nor is it appropriate, to provide a synthesis of individual chapters, but rather to highlight issues raised. One chapter, for example, discusses the experiences of developing regulations for GM crops in Canada where it was recognised early on that environmental concerns are real.

Multiple traits in a plant raise issues of crop management for farmers and their advisors, rather than necessarily invoking additional regulatory steps. This explores how the best use may be made of this technology in integrated systems and thus how benefits may be accrued or risks reduced. In practice, it matters little to the practitioner whether the crop in question has a specific genetically modified trait or is a traditional cultivar; the effectiveness of the skills of the crop manager is what matters.

The book recognizes that these crops represent the first generation of this technology, where a gene from a different species is used to confer the desired trait. The approach is perceived as unacceptable by many influential groups. One chapter explores the next generation of gene editing technologies, where precise changes can be made within the genome of the target species, an approach in some ways indistinguishable from naturally occurring mutations. A key question arising is whether these precise techniques will be acceptable and if necessary regulated, to allow the potential of advanced breeding programmes to enhance crop performance, especially in the developing world.

Regulation

The authors discuss this dilemma from their own perspective. They explore the need for transparency, as far as consumers and environmentalists are concerned, and the collection of scientific evidence as opposed to opinions of risk. Evolution of the protocols governing use of GM technology is discussed at length and the background to the essential Cartagena Protocol agreed in the 1990s explained.

The point is made by several authors that socio-economic considerations, such as the precautionary principle were never intended to be used to regulate GMOs but to regulate environmental concerns, which became enshrined into international law by the 1992 Rio Convention.

Pressure to change the way such considerations were interpreted during the early 2000s pushed GMOs to be included in the Cartagena Protocol. The subsequent increase in regulatory burden, especially in developing countries, may well be responsible for the slow adoption of the technology in many instances.

There is no clear reason how this change occurred but it is possible to speculate that politicians in relatively affluent countries anxious to appease powerful lobby groups, may not have been fully cognisant of the scientific issues. Interestingly, the point is also made in the book that some consider the approach is in contravention of WTO agreements as it provides an opportunity to restrict trade in GMOs and could thus be considered protectionist.

The importance of transparency and public consultation is emphasised. The challenges of informing the general public about the complex issues are recognized. This is a real problem, as in many ways society seems unable to understand the implications or to grasp the limitations of much of modern science. Many of the comments seem to take as implicit the fact that, because it is impossible to prove a negative, one should not make a decision, especially where the burden of evidence is often ignored or deemed false if it does not fit perceived beliefs. Public opinion could thus be manipulated by powerful vested interests, which sometimes prey on fear of the unknown.

Technology and society

The challenges to the techniques from lobby groups are discussed by several authors. One of the complexities of adoption of the technology is that different approaches have evolved in different countries. The key question is how to communicate complex scientific evidence and the conclusions this allows one to draw in a world where opinions, however ill-informed, seem just as important and to carry just as much weight.

Several contributions observe that decisions which rest on the power of persuasion and often emotive argument rather than carefully researched evidence risk depriving society of the potential benefits of improved knowledge.

A key function of the book is to assess how modern societies assess risks to human health and the environment. It is interesting to note, however, that despite the concerns of many about the impact of GMOs on human health no impacts or reliable evidence of harm has been produced in over 30 years of GM crops.

Current exploitation of GMOs in agriculture is in crops which cannot survive outside the cultivated field and thus where environmental risks are small. The point is well made that we should explore the benefits of this technology throughout the agricultural industry. One chapter explores use of GM cotton in China, where almost 100% of the crop for around 10 years has been GM, bringing great benefits to the myriad small farmers who cultivate the crop. In addition in countries where there is large scale cultivation of GM crops reductions in carbon emissions and pesticide use are demonstrable.

The final chapter provides an essential synthesis of conclusions and recommendations. It recognizes that the Cartagena Protocol is probably outmoded and needs to be replaced or significantly modified. It is not a role of this book to examine the sociology of human populations and why, as we become more urbanised and detached from the natural world, we seem to crave for the simplicity of some perceived rural idyll. That requires another discussion of the social psychology surrounding man's decision making processes and thus of any new technology which has effects on a global scale but where the individual is unaffected.

The book ends positively, identifying the challenges facing agriculture and that the benefits of this technology are potentially greatest to small scale producers in developing countries. The book underlines the importance of evidence based assessment rather than arbitrary decisions which may be based on perceived risks or societal concerns.

The book is not an easy read, but it addresses real concerns, reviews experiences and provides sound guidance on how we might best exploit the potential of modern breeding techniques to help meet the challenges of agriculture over the next half century. The fact that it has been produced demonstrates the complexity of the problems and the need to find an international standard capable of evolving to cater for new techniques.

Anyone involved in assessing GMOs, or for that matter any new technology in agriculture will find important information, examples and guidance in this book. It will help regulators, lobby groups and technical staff to develop sensible and practical protocols.

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Comments

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