

<http://www.hindawi.com/isrn/ecology/2011/369573/ref/>  
<http://downloads.hindawi.com/isrn/ecology/2011/369573.pdf>  
<http://www.hindawi.com/about/>

**ISRN Ecology (Hindawi Publishing Corporation, Nasir City, Cairo, Egypt; NY, NY)**

Volume 2011 (2011), Article ID 369573, 13 pages

<http://dx.doi.org/10.5402/2011/369573>

Review Article

## **Risks and Precautions of Genetically Modified Organisms**

[Dhan Prakash](#),<sup>1</sup> [Sonika Verma](#),<sup>2</sup> [Ranjana Bhatia](#),<sup>1</sup> and [B. N. Tiwary](#)<sup>3</sup>

<sup>1</sup>Institute of Microbial Technology (CSIR), Sector 39A, Chandigarh 160036, India

<sup>2</sup>Department of Biotechnology, UIET, Punjab University, Chandigarh, India

<sup>3</sup>Department of Biotechnology, Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur 495009, India

Received 9 August 2011; Accepted 18 September 2011

Academic Editor: L. Chícharo

Copyright © 2011 Dhan Prakash et al. This is an open access paper distributed under the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### **Abstract**

Commercial potential of biotechnology is immense since the scope of its activity covers the entire spectrum of human life. The most potent biotechnological approach is the transfer of specifically constructed gene assemblies through various techniques. **However, this deliberate modification and the resulting entities thereof have become the bone of contention all over the world. Benefits aside, genetically modified organisms (GMOs) have always been considered a threat to environment and human health.** In view of this, it has been considered necessary by biosafety regulations of individual countries to test the feasibility of GMOs in contained and controlled environments for any potential risks they may pose. This paper describes the various aspects of risk, its assessment, and management which are imperative in decision making regarding the safe use of GMOs. Efficient efforts are necessary for implementation of regulations. **Importance of the risk assessment, management, and precautionary approach in environmental agreements and activism is also discussed.**

### **... 4. Risk Management**

Once a risk is assessed, it must be managed. The management of risk is an exclusively political action, resulting in a decision regarding whether to accept or not the risk previously estimated. It can take additional

aspects (e.g., socioeconomic or ethical) into consideration and concerns methods used to reduce the scientifically identified risk. Many frameworks of risk assessment methodology separate risk assessment from risk management. Some frameworks, however, consider only certain aspects of risk management (e.g., monitoring) as separate from risk assessment but other aspects of risk management (e.g., consideration of risk mitigation options) to be part of risk assessment methodology, since a final characterization of risks must take into account the effects of any mitigation options that reduce risks. The important aspect is, of course, the iterative and interlinked relationship between risk assessment and risk management [3].

(p.5)

... **Risk management process also forms a second focus of the economic/political component of the GMO biosafety issue. Whereas a risk/benefit analysis concludes that risks exist with regard to a GMO introduction or other activity, but are sufficiently outweighed by the benefits of that action, it will probably still be required both practically and legally to take steps to manage the risk and to ensure that damage will be minimized [45].** Elements of currently used and proposed risk management process include a variety of different kinds of activities. To a large extent, the specific protective measures imposed on the GMO user will be determined based on scientific factors linked to specific details of the GMO and the proposed use. These issues, too, turn on the ability of the decision maker to rely on unbiased scientific experts who are able to analyze each proposal or application and determine what controls are needed, and what the best available technologies and practices are [46].

**The three important components was design for risk management. These components are impact assessment, public awareness/participation, and the design of regulatory systems. These concepts, all very important in this field, are critically important for **GMO-related governance**.** It is not possible to overstate the importance of the public's contribution to effective decision making, as well as the importance of public awareness, within the context of government decisions on matters and activities affecting the environment [47].

(p. 6)

... 4.7. *Design of Regulatory Systems for GMO Development and Use.*

In many different fields of endeavour, technological capacity to act has moved significantly faster than has the governmental ability to oversee and regulate it. As a consequence, many concerns relating to the risk of GMOs are directed more closely to the apparent lack of societal and governmental restraints on GMO developers and users, rather than to addressing particular scientific issues. This suggests that **a third key element of the risk-management process involves a reconsideration of regulatory mechanisms and systems for governmental oversight of GMO development and use [51].**

4.8. *Sociocultural Impacts.*

**It is in the area of sociocultural impacts that the controversy over GMOs and biosafety takes on its most complex aspect. On one hand, food production, food security, and livelihood improvement are all critical elements of sustainable development, to which GMOs and other products of**

modern biotechnology are often cited as important contributions. **On the other hand, the introduction of GMOs can affect humans, (as well as animals and ecosystems), particularly at the community level, in many ways beyond direct physical sustenance, not all of which are beneficial [52].** The environmental questions surrounding biotechnology need to be addressed, yet the technology as a whole offers great promise of environmental, social, and economic benefits that should not be inhibited unnecessarily.

A number of concerns should be addressed through sociocultural assessment of the impact (sociocultural risks and benefits) of GMOs. These include the biodiversity impacts of extending GMO introductions into marginal areas (which are often centres of diversity not only of wild species but also of traditional agricultural species) and into protected areas and their buffer zones [53].

(p. 7)

#### ... References

... [51] R. I. Rose, "Tier-based testing for the effects of proteinaceous insecticidal plant-incorporated protectants on nontarget arthropods in the context of regulatory risk assessments," IOBC WPRS Bull, vol. 29, pp. 143–150, 2006.

**[52] L. A. Kogan, "World Trade Organization biotech decision clarifies central role of science in evaluating health and environmental Risks for regulation purposes," Global Trade and Customs Journal, vol. 2, p. 149, 2007.**

[53] J. D. Wolt and R. K. D. Peterson, "Agricultural biotechnology and societal decision-making: the role of risk analysis," AgBioForum, vol. 3, no. 1, pp. 291–298, 2000.

<http://www.hindawi.com/isrn/ecology/>

#### About this Journal

ISRN Ecology is a peer-reviewed, open access journal that publishes original research articles as well as review articles in all areas of ecology.

ISRN Ecology is part of the ISRN series of peer-reviewed, open access journals that are designed to provide a fast peer review process for all submitted manuscripts. Every ISRN journal is collaboratively run by a relatively large, international Editorial Board of experts in the subject area of the journal.