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## Conclusions

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The contributions cover the wide and heterogeneous field of the environmental costs and benefits of transgenic crops. There are several important conclusions that emerge out of the contributions and comments with respect to the overall environmental costs and benefits. First of all, spatial aspects in planting transgenic crops are important. Second, rules and regulations governing the introduction and planting of transgenic crops have important implications for adoption over time and space. Third, the system of intellectual property rights can govern the direction of public and private-sector research incentives including research in transgenic crops with environmentally friendly traits. Fourth, public concern and consumer preferences will guide rules and regulations on transgenic crops. Fifth, rules and regulations have a global dimension and cannot be discussed in isolation. These conclusions lead to the following research themes for further investigation.

### **Theme 1. Spatial and structural effects of adoption with respect to agricultural biotechnology**

The introduction of transgenic crops will have an impact on the scale and scope of crop production, which will have an impact on the quantitative environmental impacts and on the up- and downstream sectors, changing the structure of the agricultural sector. This demands an interdisciplinary analysis by natural and social scientists. Important sub-themes include product differentiation, such as soybeans with specific processing traits, long-term implications for the environment, such as an accumulation of glyphosate use in herbicide-tolerant crops, implications for private-sector marketing as a result of spatial changes in production, impact of spatial changes for agricultural policies such as the reform of the Common Agricultural Policy, the multi-functionality of agriculture and the assessment and management of risk.

### **Theme 2. Governance management performance under heterogeneity, complexity and uncertainty: Integrating science and politics**

The introduction of transgenic crops is regulated by national governments. Governments can choose out of a portfolio of options to govern the introduction and planting of transgenic crops. The chosen management scheme will have an impact on the economic benefits and their distribution. Important aspects that need to be considered are regulation and self-governance, the supply chain and traceability, risk-sharing arrangements, power relationships, the political economy of regulating transgenic crops, monitoring and enforcement, incentive compatibility, learning and adaptive management, risk assessment and management, market power and anti-trust.

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**Theme 3. Research management and intellectual property rights**

The management of investment in research on transgenic crops at the national and international level and the protection of intellectual property rights (IPRs) is another area where stakeholders have an impact on the quantity and distribution of economic gains from transgenic crops. Analysing the impact of research management and IPRs one should consider the interaction between IPRs, bioprospecting and genetic resources, look at the dynamic aspects of public and private roles, the management of existing IPRs, the design of new IPRs, innovation and evolution of new technologies and the global implication of IPRs (TRIPs), and consider the limits of intellectual property in research management, the access to and the sharing of benefits from transgenic crops.

**Theme 4. Public concern and consumer preferences**

An important topic in the EU but also other places is to deal with public concerns about and consumer preferences towards transgenic crops. Important to consider here are consumer reaction to different traits of transgenic crops, risk-communication strategies, quality and risk perceptions, values, beliefs and trust, knowledge on consumer-preference dynamics, sources and distribution of heterogeneity, and the media and information industry.

**Theme 5. Global dimensions**

Stakeholders managing research on transgenic crops have to consider the global dimension the introduction of such crops will have. Important issues that need further investigation include the potential for developing countries, institutional requirements for successful introduction in developing countries, biosafety regulations, capacity building, the global implications of IPRs, national and international regulation and market access, biotechnology in the context of rural development, the role of the WTO and IEA, public access to genomics, improvement of global knowledge base.