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Special Issue on Agri-biotech Studies from Policy and Regulatory Perspectives: Preface

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Genetically modified (GM) crops, often referred to as biotech crops, have made phenomenal progress in both industrial and developing countries during the last 18 years (1996 to 2013). The first biotech crops with two commercial traits—insect resistance (IR) and herbicide tolerance (HT)—were commercially planted by six founding countries in 1996, and this led to a new era of crop production. The United States, Canada, Argentina, Mexico, China, and Australia were the first to approve the commercial planting of Bt cotton and HT soybean. In 1996, a few thousand pioneer farmers planted Bt cotton and HT soybean on 1.7 million hectares, followed later by biotech maize and canola. The policy and regulatory framework, nascent at that time, evolved rapidly around the concept of 'substantial equivalence' in the United States and Canada and a few developing countries, which included Argentina, Brazil, South Africa, the Philippines, and India. The adoption of biotech crops soared from 1.7 million hectares in 1996 to 175 million hectares in 2013, more than a hundred-fold increase, which makes biotech crops the fastest-adopted crop technology in the recent history of agriculture, reflecting the trust and confidence of millions of farmers world-wide in the technology.

In 2013, as many as 27 countries, including 19 developing countries, approved and adopted IR, HT, and stacked IR/HT biotech crops, notably with more hectarage of biotech crops planted in developing countries than industrial countries. A European study by Klümper and Qaim (2014) reconfirmed that yield gains of biotech crops are significantly higher in developing countries than in industrial countries due to the fact that crops in developing countries suffer more from pest damage due to resource constraints experienced by small farmers. The International Service for the Acquisition of Agri-biotech Applications (ISAAA) estimates that more than 90% of the 18 million farmers who planted biotech crops in 2013 were small farmers from developing countries, thus underscoring the relevance of biotech crops to the small resource-poor farmers in Africa, Asia, and Latin America. The benefits conferred by biotech crops, both in terms of the reduced cost of production and increased productivity, is a vital component of a crop production system that contributes substantially to the alleviation of poverty of small farmers and their families who represent some of the poorest people in the world.

By 2013, biotech crop adoption reached a near-optimal level of around 90% in mature markets in both industrial countries (United States, Canada, and Australia) and developing countries (China, India, the Philippines, and South Africa). The principal developing countries adopting biotech crops act as role models for neighboring countries that have similar constraints and are instrumental in facilitating the expansion of biotech crop hectarage. Based on experiences gained during the last two decades, ISAAA foresees both an expansion of current biotech crops and an extension of "new" biotech crops in additional countries in Asia (for example, Bangladesh, Vietnam, and Indonesia) and Africa (Kenya and Uganda). This expansion of biotech crop hectarage can only be realized if countries have a science-based policy, legal framework, and a regulatory system in place to approve biotech crops in a timely manner. Responsible and rigorous, but not onerous, regulation is urgently needed to suit the needs of small famers and poor developing countries.

Given that lack of science-based policy and cost- and time-effective regulatory systems are the major constraints to adoption in developing countries (and regrettably the EU), this special issue on agri-biotech policies and regulations edited by Brad Gilmour, Hugh Dang, and Jennifer Ma is a timely and important initiative. The focus on policy and regulatory uncertainty is appropriate because they are the major constraints. Building political will and support for the technology is critical. The collection of articles in this special issue will help readers understand the implications of unsound policies, regulations, and governance in the process of approval and adoption of biotech crops and provide guidance for improvement.

In the absence of a cost-effective or timely science-based and predictable regulatory system, small resource-poor farmers in developing counties—who have the greatest need—will be denied the substantial agronomic, economic, and environmental benefits that biotech crops offer. Country analyses of India, China, and Pakistan presented in this special issue reveal that

small farmers can benefit from biotech crops in the same way as they have benefited from previous productivity-enhancing technological innovations, like the Green Revolution. This special issue is an invaluable treasure-trove of knowledge—it also provides a set of improvement tools that can contribute to the 2015 Millennium Development Goals which, in turn, will lead to a more just society where more appropriate policies for biotech crops can contribute to global food security and the alleviation of poverty.

References

Klümper, W., & Qaim, M. (2014). A meta-analysis of the impacts of genetically modified crops. *PLoS ONE*, *9*(11), e111629.