



INTERNATIONAL FOOD POLICY
RESEARCH INSTITUTE

sustainable solutions for ending hunger and poverty

Supported by the CGIAR

PRO-POOR BIOTECHNOLOGY AND BIOSAFETY RESEARCH IN PARTNERSHIP WITH DEVELOPING COUNTRIES

An Overview of Current IFPRI Initiatives

The majority of poor people in developing countries rely on agriculture for their food and livelihoods. However, they are increasingly vulnerable and food insecure due to declining agricultural productivity growth, climate change susceptibility, and volatile food and energy prices. As part of its commitment to improving livelihoods and reducing poverty, IFPRI is undertaking substantial work on food- and nutrition-related science and technology policy, with an emphasis on innovations that are relevant, safe, and accessible to poor people. Assessing the socioeconomic opportunities and risks of agricultural biotechnology for smallholder farming systems, poor consumers, biodiversity, and trade is a priority on IFPRI's research agenda. IFPRI's biotechnology research is also complemented by its work on biosafety policy issues.

BACKGROUND

Agricultural biotechnology encompasses a range of procedures for modifying biological organisms for human needs. New techniques enable scientists to recognize and target traits that both increase the efficiency of traditional breeding and offer significant benefits for farmers. While these technologies cannot eliminate hunger, poverty, and food insecurity, some have great potential to decrease their incidence in developing countries and ease high food prices.

Genetically modified (GM) crops are one product of biotechnology. Several developing countries have already adopted or are considering the use of GM crops to meet food needs and reduce poverty by improving productivity and enhancing environmental sustainability, without significant use of additional inputs. Next-generation genetic modifications—such as drought and salinity tolerance and enhanced use of soil nutrients—can reduce production constraints in areas affected by climate change volatility, particularly in developing countries.

Despite the prospects, the concerns surrounding the use of GM crops must be addressed. Frequently cited issues include food safety, decreased crop biodiversity, gene flow to wild and weedy species, and increased resistance among pests. IFPRI is supporting research into and the development of biosafety regulations in developing countries to address these points, helping to ensure that GM crops benefit the poor and pose minimal risks.

IFPRI'S WORK IN AGRICULTURAL BIOTECHNOLOGY

IFPRI supports developing countries by providing objective, research-based information and capacity development to increase the effectiveness of their decision making on biotech-



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nology and biosafety. IFPRI's research spans the spectrum from crop improvement to commercialization.

HarvestPlus: Breeding Crops for Better Nutrition

An estimated 2 billion people in the developing world suffer from micronutrient deficiencies, and women and children are especially at risk for disease, premature death, and impaired cognitive abilities. HarvestPlus, a CGIAR Challenge Program co-convened by IFPRI and the International Center for Tropical Agriculture (CIAT), is using modern agricultural research to breed nutrients into the staple foods the poor and undernourished eat. Although this is conducted primarily through conventional plant breeding, HarvestPlus recognizes that biotechnology can be one of several tools for introducing and increasing the levels of essential nutrients into staple foods. Once crops are developed, HarvestPlus turns them over to developing-country partners who then implement further testing, refinement, and dissemination.

Evaluating the Economic Impact and Potential of GM Crops

Ex ante evaluation. GM crops resistant to pests have the potential to decrease yield loss, income variability, labor, and pesticide use, contributing to long-term poverty reduction. An IFPRI study evaluated the outcomes of Uganda's efforts to

improve banana production—a staple crop—by addressing its pest and disease problems. IFPRI research is also assessing the social welfare impacts, consumer preferences and willingness to pay for GM banana, and policy implications of introducing improved banana. Results show that in delaying its approval, Uganda foregoes potential annual benefits in the hundreds of millions of dollars, although consumers' perceptions and attitudes should be considered. Another IFPRI study examining the potential adoption of insect-resistant (Bt) cotton in West Africa showed that the region would lose income by not adopting the technology if other producing nations do. Furthermore, lower seed and technology fees, as well as institutional issues such as improved access to credit and information, were found to be critical for success.

Ex post evaluation. Research on the impacts of GM crops (ex post) has been limited to a few developing countries and crops. An ongoing IFPRI project has established a set of “good practice” methods that will enable decision makers to assess the economic effects of GM crop varieties, make informed policy choices, and develop regulatory processes. Case studies in Bolivia, Honduras, and the Philippines assessed the impacts of GM crops on small-scale farmers. Preliminary results tend to show that the GM crops studied outperform their conventional counterparts by reducing the level of pesticide applications and/or by protecting the crop from insect damage and weeds. Furthermore, the insect-protected maize benefited farmers economically, although some were constrained by institutional factors such as limited access to credit, technology, and seed.

IFPRI has also developed a searchable, web-based bibliography—bEcon, a comprehensive collection of peer-reviewed applied economics literature that assesses the impacts of GM crops in developing countries.

Strengthening Biosafety Regulations and Improving Innovative Capacity

Effective biosafety systems protect consumers and the environment, as well as ensure safe access to products and technologies. The Program for Biosafety Systems (PBS), managed by IFPRI, supports partner countries in Africa and Southeast Asia in the responsible development and safe use of agricultural technologies through research and capacity building. IFPRI leads PBS's research and collaboration efforts on policy, legal, and regulatory analysis of biosafety regulations in partner countries, including evaluating the cost of compliance and alternative biosafety models. PBS also supports regional harmonization of biosafety policies and guidelines in Eastern and Southern Africa and Southeast Asia.

Globally, PBS is assessing the implications of regulatory options under the Cartagena Protocol on Biosafety for developing countries, particularly on issues related to trade, labeling, and socioeconomic considerations. For instance, an evaluation

of the economic costs and benefits of different implementation options of the Protocol's documentation requirements for GM commodity shipments in countries of the Asia Pacific Economic Cooperation (APEC) shows that the benefits of precise list requirements of genetic modifications in traded shipments are largely debatable, while the implementation cost for all of APEC would range between US\$100 and 900 million per year.

IFPRI also collaborates with partners under the South Asia Biosafety Program (SABP) in India and Bangladesh. Through SABP, IFPRI is addressing biosafety policy considerations within the context of agricultural, natural resource, macroeconomic, and trade policies.

Promoting Pro-Poor Biotechnology Research through Public-Private Partnerships

Public-private partnerships (PPPs) can leverage resources and expertise for conducting advanced research, commercializing technologies, and deploying products to benefit small farmers. To ensure the development and dissemination of technologies that both enhance yields and reduce poverty, a more pluralistic international system for agricultural research is needed that facilitates collaboration between the public and private sectors. IFPRI is broadening the knowledge base around PPPs by analyzing their role in stimulating investment in pro-poor biotechnology research for developing country agriculture. Recent work includes data analysis from a survey of 75 PPP projects, an examination of the risks that PPPs face in conducting agricultural biotechnology research, and a discussion of the mechanisms to manage these risks.

RELATED AND UPCOMING RESEARCH

Millions of small farmers are still unable to access seed-based technologies—from crop breeding to modern techniques—that could contribute to improving productivity and raising incomes. IFPRI's ongoing research is exploring which enabling conditions can increase farmers' access to well-adapted technologies. IFPRI is also initiating a research program to analyze issues around transferring genetic innovations to the poor in the context of intellectual property rights, and the potential implications for poor farmers of accessing technologies and benefit sharing, including effects on farmers' rights. Furthermore, IFPRI will explore the relationships among biotechnology innovations, biodiversity, gender, and climate change, and their impacts on farmer, household, and community resiliency and food insecurity.

Related Links:

HarvestPlus: <http://www.harvestplus.org/>

Genetic Resource Policies: <http://www.ifpri.org/themes/grp01.htm>

Program for Biosafety Systems: <http://www.ifpri.org/pbs/pbs.asp>

South Asia Biosafety Program: http://www.agbios.com/sabp_main.php

bEcon: <http://www.ifpri.org/pubs/bEcon/bEcon.asp>

For additional information, please contact ifpri-ept@cgiar.org.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street, NW • Washington, DC 20006-1002 USA

Tel.: +1-202-862-5600 • Skype: IFPRIhomeoffice

Fax: +1-202-467-4439 • Email: ifpri@cgiar.org

www.ifpri.org

IFPRI is one of 15 agricultural research centers that receive principal funding from governments, private foundations, and international and regional organizations, most of which are members of the Consultative Group on International Agricultural Research (CGIAR).