

# SOCIO-ECONOMIC IMPACTS OF NON-TRANSGENIC BIOTECHNOLOGIES IN DEVELOPING COUNTRIES

The case of plant micropropagation in Africa



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The case of plant micropropagation in Africa

by

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## Preface

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The world is currently facing a serious food crisis resulting from soaring food prices and climate change. Rising prices have plunged an additional 75 million people below the hunger threshold, bringing the estimated number of undernourished people worldwide to 923 million in 2007. Climate change affects in particular hundreds of millions of small-scale farmers, fishers and forest-dependent people, who are already vulnerable and food insecure, eroding the resource bases of their production systems and putting at risk their livelihoods.

There are no easy solutions to these challenges. While the measures needed extend well beyond the issue of producing more food and agricultural products, boosting the productivity of smallholders' farms through the appropriate application of good practices and improved technologies must be a key ingredient of development policies of developing countries.

Biotechnologies can play an important role in some of these elements and, given the tremendous breakthroughs that have been made in the life sciences in general, and the development of new and powerful biotechnologies in particular, over the last few decades, there have been very high expectations for the potential benefits of biotechnologies on humankind. A large number of biotechnology tools have been used, to varying degrees, for many years in different developing countries. Other tools are more recent and are only beginning to be adapted.

Information about the socio-economic impact of biotechnology application is crucial for policy-makers of developing countries to set priorities and adopt the most effective and efficient strategies to address food insecurity and poverty. The results of impact assessment are in fact instrumental to evaluate the potential effects of biotechnology-based projects on food security and poverty alleviation and therefore to optimize the allocation of resources.

This publication aims to contribute to the knowledge of socio-economic impacts of the adoption of biotechnologies, focusing on non-transgenic biotechnologies (i.e. biotechnologies other than genetic engineering). The first paper discusses some approaches used in innovations' impact assessment and presents a general overview of the literature about the impacts of non-transgenic biotechnologies. Some studies which have explored the extent of the application of micropropagation in Africa, with special attention to Gabon, Mali, Nigeria, Uganda, and Zimbabwe are presented in the second paper. The case studies from Uganda and Zimbabwe, included in the third paper, present the main findings of two field studies, carried out with an anthropological

approach, aimed at better understanding the motivations and conditions favouring the innovation process, and at identifying direct and indirect impacts on livelihoods, derived from the adoption of planting materials generated through micropropagation techniques.

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## List of abbreviations

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<b>ACTS</b>	African Centre for Technology Studies
<b>AGT</b>	Agro-genetic Technology
<b>AIDS</b>	Acquired Immune Deficiency Syndrome
<b>AKIS</b>	Agricultural Knowledge and Information Systems
<b>AKIS/RD</b>	Agricultural Knowledge and Information System for Rural Development
<b>ARD</b>	Agriculture and Rural Development
<b>ARDA</b>	Agricultural and Rural Development Authority (Zimbabwe)
<b>AREX</b>	Agricultural Research and Extension (Zimbabwe)
<b>ATE</b>	Average Treatment Estimation
<b>BAL</b>	Biotechnology Advanced Laboratory (Nigeria)
<b>BCR</b>	Benefit-Cost Ratio
<b>BNF</b>	Biological Nitrogen Fixation
<b>BRI</b>	Biotechnology Research Institute (Zimbabwe)
<b>BTZ</b>	Biotechnology Trust of Zimbabwe
<b>CABI</b>	Centre for Agricultural Bioscience International (United Kingdom)
<b>CENAREST</b>	Centre national de la recherche scientifique et technologie (Gabon)
<b>CEO</b>	Consultores en Economía y Organización (Argentina)
<b>CFA</b>	Compost fungus activator
<b>CGE</b>	Computable General Equilibrium
<b>CGIAR</b>	Consultative Group of International Agricultural Research
<b>CIAM</b>	Centre d'introduction et d'adaptation du matériel végétal (Gabon)
<b>CILSS</b>	Permanent Interstate Committee for Drought Control in the Sahel
<b>CIMMYT</b>	International Maize and Wheat Improvement Center
<b>CIP</b>	Centro Internacional de la Papa (International Potato Center)
<b>DALY</b>	Disability-adjusted Life Years
<b>DFID</b>	United Kingdom's Department for International Development
<b>DNA</b>	Deoxyribonucleic Acid
<b>DREAM</b>	Dynamic Research Evaluation for Management
<b>DSEEA</b>	Department of Economic Sciences and Food Sciences
<b>ECOSOC</b>	Economic and Social Council of the United Nations
<b>EPTD</b>	Environment and Production Technology Division
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FORMAT</b>	Forum for Organic Resource Management and Agricultural Technologies

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<b>FRIN</b>	Forestry Research Institute of Nigeria
<b>FSSP</b>	Farming Systems Support Project (Uganda)
<b>GDP</b>	Gross Domestic Product
<b>GM</b>	Genetically Modified
<b>GMB</b>	Grain Marketing Board
<b>GMO</b>	Genetically Modified Organism
<b>GTZ</b>	Gesellschaft für Technische Zusammenarbeit
<b>HIV</b>	Human Immunodeficiency Virus
<b>HRI</b>	Horticultural Research Institute (Zimbabwe)
<b>IAAE</b>	International Association of Agricultural Economists
<b>IAR&amp;T</b>	Institute of Agricultural Research and Training (Nigeria)
<b>IBS</b>	Institute of Biological Sciences (The Philippines)
<b>ICABR</b>	International Consortium on Agricultural Biotechnology Research
<b>ICARDA</b>	International Center for Agricultural Research in the Dry Areas
<b>ICIPE</b>	International Centre of Insect Physiology and Ecology
<b>ICRAF</b>	World Agroforestry Centre
<b>IDS</b>	Institute of Development Studies
<b>IFPRI</b>	International Food Policy Research Institute
<b>IGAD</b>	Intergovernmental Authority on Development
<b>IITA</b>	International Institute of Tropical Agriculture
<b>INIBAP</b>	International Network for the Improvement of Banana and Plantain
<b>IPGRI</b>	International Plant Genetic Resources Institute
<b>IPR</b>	Intellectual Property Rights
<b>IPR/IFRA</b>	Institut polytechnique rural de formation et de recherche appliquée
<b>IRAF</b>	Institut de recherches agronomiques et forestière
<b>IRR</b>	Internal Rate of Return
<b>IRRI</b>	International Rice Research Institute
<b>ISAAA</b>	International Service for the Acquisition of Agri-biotech Applications
<b>ISNAR</b>	International Service for National Agricultural Research
<b>KARI</b>	Agricultural Research Institute in Kawanda
<b>MAS</b>	Marker-assisted Selection
<b>MDGs</b>	Millennium Development Goals
<b>NAARI</b>	Namulonge Agricultural and Animal Production Research Institute (Uganda)
<b>NABDA</b>	National Biotechnology Development Agency (Nigeria)
<b>NACGRAB</b>	National Centre for Genetic Resources and Biotechnology (Nigeria)

<b>NARO</b>	National Agricultural Research Organization (Uganda)
<b>NARS</b>	National Agricultural Research System
<b>NEPAD</b>	New Partnership for Africa's Development
<b>NERICA</b>	New Rice for Africa
<b>NGO</b>	Non-governmental organizations
<b>NIFOR</b>	Nigerian Institute for Oil Palm Research
<b>NIHORT</b>	Nigerian Institute of Horticultural Research
<b>NPV</b>	Net Present Value
<b>NRCRI</b>	National Root Crops Research Institute (Nigeria)
<b>ODI</b>	Overseas Development Institute
<b>PCARRD</b>	Philippine Council for Agriculture, Forestry and Natural Resources Research and Development
<b>PRONAF</b>	Cowpea Project for Africa
<b>R&amp;D</b>	Research and Development
<b>RCT</b>	Rapid Composting Technology
<b>SARRNET</b>	Southern African Root Research Network
<b>SDR</b>	Research Extension and Training Division (currently: Research and Extension Division)
<b>SDRR</b>	Research and Technology Development Service (currently: Research and Extension Unit)
<b>SHESTCO</b>	Sheda Science and Technology Complex
<b>SIRDC</b>	Scientific and Industrial Research and Development Centre (Zimbabwe)
<b>SLA</b>	Sustainable Livelihoods Approach
<b>SPP</b>	Sweetpotato Project
<b>SSU</b>	Social Sciences Unit
<b>SU/SSC</b>	Special Unit for South-South Cooperation
<b>TRB</b>	Tobacco Research Board (Zimbabwe)
<b>UNBRP</b>	Uganda National Banana Research Programme
<b>UNDP</b>	United Nations Development Programme
<b>US</b>	United States of America
<b>USD</b>	United States Dollars
<b>USDA</b>	United States Department of Agriculture
<b>UZ</b>	University of Zimbabwe
<b>WARDA</b>	Africa Rice Center (previously: West African Rice Development Association)
<b>ZFU</b>	Zimbabwe Farmers' Union