



SOUTH ASIA
BIOSAFETY PROGRAM

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SABP

The South Asia Biosafety Program (SABP) is an international developmental program initiated with support from the United States Agency for International Development (USAID). The program is implemented in India and Bangladesh and aims to work with national governmental agencies to facilitate the implementation of transparent, efficient and responsive regulatory frameworks for products of modern biotechnology that meet national goals as regards the safety of novel foods and feeds and environmental protection.

SABP is working with its in-country partners to:

- Identify and respond to technical training needs for food, feed and environmental safety assessment.
- Develop a sustainable network of trained, authoritative local experts to communicate both the benefits and the concerns associated with new agricultural biotechnologies to farmers and other stakeholder groups.
- Raise the profile of biotechnology and biosafety on the policy agenda within India and Bangladesh and address policy issues within the overall context of economic development, international trade, environmental safety and sustainability.

SABP AND BAS HOST INTERNATIONAL CONFERENCE ON ERA OF GE PLANTS

The South Asia Biosafety Program (SABP) and the Bangladesh Academy of Sciences (BAS) in collaboration with Bangladesh Department of Environment (DoE) and the Pakistan Strategy Support Program (PSSP) put on the International Conference on Environmental Risk Assessment (ERA) of Genetically Engineered (GE) Plants at the BRAC Center Inn, Dhaka, Bangladesh April 15 through 17, 2012. The 66 participants included scientists from the National Agricultural Research System (NARS), Department of Agricultural Extension (DAE), public and private universities, policymakers, members of the Biosafety Core Committee (BCC), representatives from private companies and students. Joining them were 13 participants from Pakistan's national research institutes, government departments and universities.

Bringing together scientists and professionals from Bangladesh and abroad to share experiences and knowledge of the science and practice of ERA, the conference focused on accumulated international experience; development and use of organized and rational methods for determining information needs; standards and best practices for collecting and interpreting data; and scientific issues related to the oversight of transgenic plants following risk assessment. Individual country experiences in Bangladesh, India, Pakistan and Sri Lanka were highlighted in the presentations and scientific sessions along with those of the OECD from 1980 to 2012.

The conference consisted of five main scientific sessions bookended by inaugural and concluding ceremonies.

Distinguished guests at the inaugural ceremony included: Mr. Architect Yeafesh Osman, State Minister, Bangladesh Ministry of Science and Technology; Mr. Mesbah ul Alam, Secretary, Ministry of Environment and Forests (MOEF); Dr. Wais Kabir, Executive Chairman, Bangladesh Agricultural Research Council (BARC); Prof. Dr. Shamsheer Ali, President of BAS; and Prof. Dr. Naiyyum Choudhury, Chair, Conference Steering Committee and Secretary, BAS. Dr. Andrew Roberts, Deputy Director of Center for Environmental Risk Assessment (CERA), gave an overview of the conference program and a brief introduction of the local and foreign speakers. The keynote speaker was Prof. Dr. Swapan Datta, Deputy Director General (Crop Science), Indian Council of Agricultural Research (ICAR).

SESSION I: INTERNATIONAL EXPERIENCE WITH ERA OF GE PLANTS

- Dr. Roberts covered a brief history of ERA for GE plants and the paradigm for risk assessment. He also gave introductions to the rest of the session talks.

(continued on page 2 - see ERA)

NEW PAPER PUBLISHED BY IFPRI

MEASURING THE CONTRIBUTION OF BT COTTON ADOPTION TO INDIA'S COTTON YIELDS LEAP

Guillaume P. Gruere and Yan Sun, International Food Policy Research Institute

While a number of empirical studies have demonstrated the role of Bt cotton adoption in increasing Indian cotton productivity at the farm level, there has been questioning around the overall contribution of Bt cotton to the average cotton yield increase observed these last ten years in India. This study examines the contribution of Bt cotton adoption to long-term average cotton yields in India using a panel data analysis of production variables in nine Indian cotton-producing states from 1975 to 2009. The results show that Bt cotton contributed 19 percent of total yield growth over time, or between 0.3 percent and 0.4 percent per percentage adoption every year since its introduction. Besides Bt cotton, the use of fertilizer and the increased adoption of hybrid seeds appear to have contributed to the yield increase over time. However, if official Bt cotton adoption contributed to increased yield after 2005, unofficial Bt cotton might also have been part of the observed increase of yields starting in 2002, the year of its official introduction in India.



Photo: Ray Witlin/The World Bank

The full length discussion paper can be downloaded from the IFPRI website.

ERA - continued from page 1

- Dr. Sally McCammon, USDA APHIS, Biotechnology Regulatory Services and Chair of the OECD Working Group, gave a detailed account of the contributions of the OECD to the international harmonization of ERA.
- Dr. Sol Ortiz-Garcia, Director of the Mexican Inter-ministerial Commission for Biosafety of Genetically Modified Organisms (CIBIOGEM), spoke about risk assessment under the Cartagena Protocol highlighting the developmental background of the Protocol and describing the salient features of the Protocol's articles and the activities of the Ad Hoc Technical Experts Group (AHTEG).
- The session's final presentation was by Dr. Vibha Ahuja, General Manager, Biotech Consortium India Ltd., who gave an overview of the comparative international requirements for the ERA of GE plants. Covering four top GE crop-producing countries, in hectares, in 2010, namely Australia, Argentina, Canada and the US, she added Brazil and the European Union and information from two international organizations working on the subject, *i.e.*, AHTEG and OECD.

SUMMARY POINTS

- Although countries have legal, regulatory and socio-political differences, the scientific considerations for ERA remain largely the same.
- Experience shows that the science that informs ERA garners broad agreement and is useful in separating the scientific aspects of ERA from policy or political considerations.

SESSION II: NATIONAL EXPERIENCES WITH ERA OF GE PLANTS IN SOUTH ASIA

- Dr. M. Khalequzzaman A. Chowdhury, Member Director (Crops), BARC, spoke about the state of GE plant trials in Bangladesh giving the status of confined field trials of Bt brinjal and LBR potato being conducted at Bangladesh Agricultural Research Institute (BARI) research stations.
- Prof. R.H. Sarker, Department of Botany, University of Dhaka, gave an overview on the trends in research and development of GE plants at various universities and research organizations.
- Mr. Mohammed Solaiman Haider, Deputy Director, DoE, gave a summary of the status of regulatory regimes for GE plants in Bangladesh.
- Dr. Yusuf Zafar, Director General, Pakistan Atomic Energy Commission gave a detailed description on the status of GE plant research and regulation of GE plants in Pakistan.
- Dr. Chandrika Nanayakkara, Senior Lecturer in the Department of Plant Sciences, University of Colombo, Sri Lanka, gave an overview on the status of GE plant research and regulation of GE plants in Sri Lanka.

SESSION III: SELECTED TOPICS IN ERA

- Dr. Roberts described the differences between ERA and ecological research in GE plants.
- Dr. Raymond Layton of Pioneer Hi-Bred spoke about the evaluation of adverse environmental impacts on non-target organisms.
- Dr. Joe Smith, Gene Technology Regulator, OGTR, Australia talked about gene flow to wild and weedy relatives and any resulting potential harms.
- Dr. Ariel Alvarez Morales, CIBIOGEM, Mexico, spoke about gene flow in centres of origin and biodiversity using gene flow in maize in Mexico as an illustration and the impacts if

GM maize is introduced in Mexico, part of its Mesoamerican centre of origin.

- Dr. Roberts concluded the session by talking about the challenges of addressing biodiversity as a protection goal in ERA covering topics like the definition of biodiversity, protection goals of biodiversity in agro- and other ecosystems, addressing biodiversity in ERA and the importance of a consistent national policy.

SUMMARY POINTS

- Collection of data for use in ERA should be based on a rational plan of analysis and appropriate experimental methods.
- Data can be derived from many different sources, but it should be carefully considered for utility.
- The unnecessary collection of data that will not be ultimately useful for ERA should be avoided.
- There is experience in addressing the issue of ERA as it relates to the potential for gene flow that can form the basis for a rational plan for the collection of information.

SESSION IV: STEWARDSHIP AND RESISTANCE MANAGEMENT FOR GE CROPS

- Dr. Michael Wach, CERA, spoke about the introduction to product stewardship practices for insect resistance management (IRM).
- Dr. Layton talked about the IRM of Bt crops, the goal of IRM and the conclusion that resistance will eventually occur, but it may be possible to delay the process by creating conditions that slow the increase of resistance genes in the insect population.
- Dr. Martin Gibson, CropLife Asia, spoke about herbicide resistance management of GE crops with an introduction to the global herbicide market, impact and costs of weeds, resistance management in the context of integrated pest management, some influencing factors and general principles of resistance management.

The session ended with a lively discussion on the day's presentations.

SESSION V: ENHANCING CREDIBILITY OF ERA AND SUBSEQUENT DECISION MAKING

Dr. Smith spoke about the importance of the regulatory process for enhancing credibility of ERA and subsequent decision making that showed that stakeholder confidence is very important for enhancing credibility of ERA and subsequent decision making that also needs a robust regulatory system and effective stakeholder engagement. He reinforced that the government mandate for legislation should reflect community values and expectations and demand accountability and responsibility for decisions and the need for high level regulatory criteria and enforcement provisions.

PANEL DISCUSSION: RECURRING ISSUES FOR ERA OF GM PLANTS

In the final session panelists were asked to comment on the utility of the regulatory process for enhancing credibility for ERA. The floor was then opened for discussion with questions from the participants covering all the program topics discussed.

The conference ended with closing remarks by Prof. Dr. Naiyyum Choudhury and a vote of thanks by Prof. M. Imdadul Hoque, Bangladesh country coordinator, SABP. Also in attendance was Mr. Monowar Islam, Director General, DoE. Dr. Roberts concluded by thanking the participants, foreign and local resources person and the BAS.



The Reading List

. . . new and notable articles

GENETIC TRANSFORMATION OF FRUIT TREES: CURRENT STATUS AND REMAINING CHALLENGES

Gambino G, Gribaudo I

Genetic transformation has emerged as a powerful tool for genetic improvement of fruit trees hindered by their reproductive biology and their high levels of heterozygosity. For years, genetic engineering of fruit trees has focussed principally on enhancing disease resistance (against viruses, fungi, and bacteria), although there are few examples of field cultivation and commercial application of these transgenic plants. In addition, over the years much work has been performed to enhance abiotic stress tolerance, to induce modifications of plant growth and habit, to produce marker-free transgenic plants and to improve fruit quality by modification of genes that are crucially important in the production of specific plant components. Recently, with the release of several genome sequences, studies of functional genomics are becoming increasingly important: by modification (overexpression or silencing) of genes involved in the production of specific plant components is possible to uncover regulatory mechanisms associated with the biosynthesis and catabolism of metabolites in plants. This review focuses on the main advances, in recent years, in genetic transformation of the most important species of fruit trees, devoting particular attention to functional genomics approaches and possible future challenges of genetic engineering for these species in the post-genomic era.

TRANSGENIC RESEARCH (2012) MAR 2. [EPUB AHEAD OF PRINT]

SURVEYING OF POLLEN-MEDIATED CROP-TO-CROP GENE FLOW FROM A WHEAT FIELD TRIAL AS A BIOSAFETY MEASURE

Foetzki A, Quijano CD, Moullet O, Fammartino A, Kneubuehler Y, Mascher F, Sautter C, Bigler F

Outcrosses from genetically modified (GM) to conventional crops by pollen-mediated gene flow (PMGF) are a concern when growing GM crops close to non-GM fields. This also applies to the experimental releases of GM plants in field trials. Therefore, biosafety measures such as isolation distances and surveying of PMGF are required by the regulatory authorities in Switzerland. For two and three years, respectively, we monitored crop-to-crop PMGF from GM wheat field trials in two locations in Switzerland. The pollen donors were two GM spring wheat lines with enhanced fungal resistance and a herbicide tolerance as a selection marker. Seeds from the experimental plots were sampled to test the detection method for outcrosses. Two outcrosses were found adjacent to a transgenic plot within the experimental area. For the survey of PMGF, pollen receptor plots of the conventional wheat variety Frisal used for transformation were planted in the border crop and around the experimental field up to a distance of 200 m. Although the environmental conditions were favorable and the donor and receptor plots flowered at the same time, only three outcrosses were found in approximately 185,000 tested seedlings from seeds collected outside the experimental area. All three hybrids were found in the border crop surrounding the experimental area, but none outside the field. We conclude that a pollen barrier (border crop) and an additional

isolation distance of 5 m is a sufficient measure to reduce PMGF from a GM wheat field trial to cleistogamous varieties in commercial fields below a level that can be detected.

GM CROPS AND FOOD. 2012 APR 1;3(2). [EPUB AHEAD OF PRINT]

HEAT-SHOCK-MEDIATED ELIMINATION OF THE NPTII MARKER GENE IN TRANSGENIC APPLE (*MALUS X DOMESTICA* BORKH.)

Herzog K, Flachowsky H, Deising HB, Hanke MV

Production of marker-free genetically modified (GM) plants is one of the major challenges of molecular fruit breeding. Employing clean vector technologies, allowing the removal of undesired DNA sequences from GM plants, this goal can be achieved. The present study describes the establishment of a clean vector system in apple *Malus x domestica* Borkh., which is based on the use of the neomycin phosphotransferase II gene (nptII) as selectable marker gene and kanamycin/paramomycin as selective agent. The nptII gene can be removed after selection of GM shoots via site-specific excision mediated by heat-shock-inducible expression of the budding yeast FLP recombinase driven by the soybean Gm_{hsp17.5-E} promoter. We created a monitoring vector containing the nptII and the flp gene as a box flanked by two direct repeats of the flp recognition target (FRT) sites. The FRT-flanked box separates the gusA reporter gene from the Cauliflower Mosaic Virus 35S (CaMV 35S) promoter. Consequently, GUS expression does only occur after elimination of the FRT-flanked box. Transformation experiments using the monitoring vector resulted in a total of nine transgenic lines. These lines were investigated for transgenicity by PCR, RT-PCR and Southern hybridization. Among different temperature regimes tested, exposure to 42 °C for 3.5 to 4h led to efficient induction of FLP-mediated recombination and removal of the nptII marker gene. A second round of shoot regeneration from leaf explants led to GM apple plants completely free of the nptII gene.

GENE. 2012 APR 25;498(1):41-9. (2012) FEB 14. [EPUB]

GENETIC MODIFICATION; THE DEVELOPMENT OF TRANSGENIC ORNAMENTAL PLANT VARIETIES

Chandler SF, Sanchez C

Plant transformation technology (hereafter abbreviated to GM, or genetic modification) has been used to develop many varieties of crop plants, but only a few varieties of ornamental plants. This disparity in the rate and extent of commercialisation, which has been noted for more than a decade, is not because there are no useful traits that can be engineered into ornamentals, is not due to market potential and is not due to a lack of research and development activity. The GM ornamental varieties which have been released commercially have been accepted in the marketplace. In this article, progress in the development of transgenic ornamentals is reviewed and traits useful to both consumers and producers are identified. In considering possible factors limiting the release of genetically modified ornamental products it is concluded that the most significant barrier to market is the difficulty of managing, and the high cost of obtaining, regulatory approval.

PLANT BIOTECHNOLOGY JOURNAL (2012) APR 27. [EPUB AHEAD OF PRINT]

CALENDAR OF EVENTS

Event	Organized by	Date and Venue	Website
INDIA			
Consultative Meeting for Preparation of MOP-6 and Stocktaking Assessment for Phase-II Capacity Building Project on Biosafety	Ministry of Environment and Forests (MoEF), Government of India and Biotech Consortium India Limited (BCIL)	May 29, 2012 New Delhi	
Inception Workshop of UNEP/GEF Supported Phase II Capacity Building Project On Biosafety	MoEF	June 18 - 19, 2012 New Delhi	
TERI-ITEC Courses 2012-13 Course II - Applications of Biotechnology and its Regulation	The Energy and Resources Institute and Indian Technical and Economic Cooperation (ITEC), Ministry of External Affairs	August 13 - 31, 2012 Gurgaon	http://www.teriin.org/index.php?option=com_events&task=details&sid=505
6th International Congress on Legume Genetics and Genomics	International Crops Research Institute for the Semi-Arid Tropics	October 2 - 7, 2012, Hyderabad	http://www.icrisat.org/gt-bt/VI-ICLGG/homepage.htm
Silver Jubilee International Symposium on "Global Cotton Production Technologies vis-à-vis Climate Change	Cotton Research and Development Association and CCS Haryana Agricultural University, Hisar	October 10 - 12, 2012 Hisar	http://www.crdaindia.com/
International Symposium on New Paradigms in Sugarcane Research	Society for Sugarcane Research and Development and Sugarcane Breeding Institute	October 15 - 18, 2012 Coimbatore	http://www.sugarcane.res.in/images/sbi/Centenary/1st_circular_int_symposium.pdf
INTERNATIONAL			
Workshop on Biosafety of Genetically Engineered Crops: Best Practices from Laboratory to Farmer's Fields	ICGEB in collaboration with GENETECH, Colombo, Sri Lanka, University of Colombo, Sri Lanka, Michigan State University, USA, The National Science Foundation, Colombo, Sri Lanka and Embassy of USA, Colombo, Sri Lanka	May 21 - 25, 2012 Colombo, Sri Lanka	http://www.icgeb.org/meetings-2012.html
The 3rd International Biotechnology and Biodiversity Conference and Exhibition (BIO JOHAR 2012)	Johor Biotechnology and Biodiversity Corporation (J-BioTech)	June 9 - 12, 2012 Johor Bahru, Malaysia	http://www.biojohor.my/2012/conferenceprogramme.html
Commercialization of Biotech Crops: Learning from Asia	Asia BioBusiness Pte. Ltd., the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), and the International Service for the Acquisition of Agri-Biotech Applications (ISAAA)	September 3 - 7, 2012 Los Baños, The Philippines	http://www.asiabiobusiness.com/?page_id=335
12th International Symposium on Biosafety of Genetically Modified Organisms (ISBGMO12)	International Society for Biosafety Research	September 17 - 20, 2012 St Louis, Missouri, USA	http://www.isbgmo.com/
Sixth meeting of the Conference of the Parties serving as the meeting of the Parties to the Cartagena Protocol on Biosafety (MOP-6)	Convention on Biological Diversity (CBD) and MoEF	October 1 - 5, 2012 Hyderabad	http://www.cbd.int/doc/?meeting=MOP-06
Eleventh meeting of the Conference of the Parties to the Convention on Biological Diversity (COP-11)	CBD and MoEF	October 8 - 19, 2012 Hyderabad	http://www.cbd.int/doc/?meeting=MOP-06

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