

South Asia Biosafety Program

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BANGLADESH

Status of the Implementation of the National Biosafety Framework of Bangladesh

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Bangladesh adheres to the conservation of its indigenous biodiversity, including the traditional knowledge and practices. The potential of biotechnology must be fully exploited by the country, while taking into account the possible impact on human health and the environment, especially the impact on biodiversity. Unless prevention and mitigation measures are put in place, there is a possibility that biotechnology may be used without safeguards to address potential harm to wild and cultivated species or overall conservation of biodiversity. Since adoption of genetically modified crops is imminent in Bangladesh, measures must be established to address this eventuality to ensure the conservation and sustainable use of biodiversity and contribute to environmental benefits.

Being a party to the Cartagena Protocol on Biosafety (CPB), Bangladesh is internationally committed to develop and implement the biosafety regulatory systems. Bangladesh has already developed the National Biosafety Framework (NBF). However, the NBF provides only the basic elements of biosafety systems to be implemented for the sake of conservation of biodiversity and prevent potential risks to human health.

The main constraints to implement a biosafety regulatory system in Bangladesh are the absence of standards, well-managed infrastructures, adequate laboratories, and above all, insufficient trained manpower on risk assessment and management of genetically modified organisms (GMOs). To overcome these constraints, the government of Bangladesh, with the financial assistance from Global Environmental Facility (GEF), has taken initiatives to implement the NBF to fulfill the objective of having a workable and dynamic framework in place in Bangladesh that will contribute to the conservation and sustainable use of biodiversity by enabling full implementation of the Cartagena Protocol and the national biosafety regulations.

Implementation of the NBF is very crucial and will be accomplished through development of capacity building in technical training, improved infrastructure for monitoring and detection of GMOs, and enhancing public awareness and capacity to a level of active participation in decision-making on GMOs. The implementation project will pave the way to institutionalize the biosafety regulations and strengthen infrastructural facilities for risk assessment and management of GMOs, including decision-making.



Scott Wallace/ World Bank

This will provide global environmental benefits on the safe use of modern biotechnology and conservation of the endemic uniqueness of Bangladesh's biodiversity.

To ensure harmonization of biosafety standards and regulatory systems at the regional level and to further the implementation of the Cartagena Protocol, collaboration and networking for the exchange of technological and technical aspects of biosafety management have to be strengthened. To this end, the implementation project would undertake effective initiatives towards strengthening regional cooperation of SAARC and ASEAN countries.

During the project preparation a stocktaking exercise was conducted to find out the needs of various public and private organizations engaged in research and development activities on modern biotechnology. The various components of the project were chosen based on the needs of these organizations.

The Department of Environment under the Ministry of Environment and Forests is the national executing agency responsible for operations of the implementation of the NBF project in Bangladesh. UNEP is the GEF agency responsible for overseeing the implementation of the project. The project is at the final stage to be approved by the Planning Commission of Bangladesh for being internalized into the government planning system. After completion of the project, the government will be able to manage and operate day-to-day biosafety related activities with stronger and enhanced capacity.

New eLearning Course: Compliance Management of Confined Field Trials of GE Crops

Confined field trials (CFTs) are an essential part of the research and development of genetically engineered (GE) crops. In India, CFTs are a regulated activity and, as such, it is essential that all parties who may undertake or monitor CFTs have a clear understanding of the rules, guidance and standard operating procedures that prescribe how such trials should be managed. In order to facilitate this, the South Asia Biosafety Program has developed an e-learning (online) course where participants can gain the practical knowledge needed to ensure that CFTs are managed to be compliant with the relevant procedures and regulations in India.

The course is broken up into modules that include an introduction to confined field trials, guidance for filling applications for confined

field trial permits, standard operating procedures and guidelines for the monitoring of confined field trials of regulated GE plants. To access this course, go to <http://cft.biotech.co.in/>

Before you begin, please read the "Getting Started Guide." This informational document provides basic details about the program and the tools available to maximize the learning experience.

To log in to the course, enter your user credentials. Click on the link titled "Compliance Management of Confined Field Trials." As you begin the first module of this course, you will see the learning objectives, which provide an overview of the course content.

Upon completing a module, you will take a self-assessment that will test your knowledge and understanding of the content.

FEATURES

Getting Started Guide

HELPS YOU GET COMFORTABLE WITH
THE PROGRAM'S TOOLS

Four Modules

ORGANIZED TO PROVIDE EASY
NAVIGATION THROUGH THE ROBUST
CONTENT

24 Hours a Day/ 7 Days a Week

ACCESS THE COURSE ANYTIME IT MEETS
YOUR SCHEDULE

Languages

AVAILABLE IN ENGLISH AND HINDI

Self-Assessments

PROVIDE INSTANT FEEDBACK ON YOUR
UNDERSTANDING AFTER EACH MODULE

Glossary

COMPILES DEFINITIONS OF KEY TERMS
FROM THE COURSE



Save the Date! The Biosafety Research in Pakistan Grants Program Workshop

The Biosafety Research in Pakistan Grants Program Workshop will be held in Islamabad on December 13, 2013. The workshop is being organized by the Center for Environmental Risk Assessment, which administers the grants program as part of the Pakistan Strategy Support Program (PSSP). The PSSP is funded by the United States Agency for International Development and led by the International Food Policy Research Institute.

The conference sessions include:

- An Introduction and Background on Biosafety
- Biosafety Research in Pakistan Grants Program

This workshop will introduce participants to the important concepts of environmental risk assessment that are necessary for formulating a research plan to address biosafety issues related to genetically engineered plants. The Biosafety Research in Pakistan Grants Program will also present the 2014 Request for Pre-Proposals. Presentations will address the focus of the program as well as providing advice on what the advisory committee hopes to see in future proposals.

The Biosafety Research in Pakistan Grants Program supports research that will:

1. Strengthen the scientific basis for risk assessment in Pakistan by addressing important gaps in local knowledge so that regulatory decisions can be based on a platform of sound science
2. Improve biosafety research capacity in the public sector
3. Improve the scientific knowledge base within public sector research institutes where this will improve the quality of science advice that is provided to regulators and decision makers
4. Promote inter-institutional research partnerships as biosafety-related research is, by necessity, inter-disciplinary
5. Provide opportunities to identify, support, and train talented scientists which will have positive spillovers to other areas of agricultural research and development.

For more information for this event, contact Dr. Anwar Nasim, SABP's Country Coordinator in Pakistan, dranwarnasim@gmail.com or (+9251) 9204843.

Biotechnology in the News: Journal Articles and Publications

IMPROVED MOLECULAR TOOLS FOR SUGAR CANE BIOTECHNOLOGY

KINKEMA M, GEIJSKES J, DELUCCA P, PALUPE A, SHAND K, COLEMAN HD, BRININ A, WILLIAMS B, SAINZ M, DALE JL.

PLANT MOLECULAR BIOLOGY. 2013 OCT 23. [EPUB AHEAD OF PRINT]

[HTTP://LINK.SPRINGER.COM/ARTICLE/10.1007%2Fs11103-013-0147-8#](http://link.springer.com/article/10.1007%2Fs11103-013-0147-8#)

Sugar cane is a major source of food and fuel worldwide. Biotechnology has the potential to improve economically-important traits in sugar cane as well as diversify sugar cane beyond traditional applications such as sucrose production. High levels of transgene expression are key to the success of improving crops through biotechnology. Here we describe new molecular tools that both expand and improve gene expression capabilities in sugar cane. We have identified promoters that can be used to drive high levels of gene expression in the leaf and stem of transgenic sugar cane. One of these promoters, derived from the *Cestrum* yellow leaf curling virus, drives levels of constitutive transgene expression that are significantly higher than those achieved by the historical benchmark maize polyubiquitin-1 (*Zm-Ubi1*) promoter. A second promoter, the maize phosphoenolpyruvate carboxylate promoter, was found to be a strong, leaf-preferred promoter that enables levels of expression comparable to *Zm-Ubi1* in this organ. Transgene expression was increased approximately 50-fold by gene modification, which included optimising the codon usage of the coding sequence to better suit sugar cane. We also describe a novel dual transcriptional enhancer that increased gene expression from different promoters, boosting expression from *Zm-Ubi1* over eightfold. These molecular tools will be extremely valuable for the improvement of sugar cane through biotechnology.

DO TRANSGENESIS AND MARKER-ASSISTED BACKCROSS BREEDING PRODUCE SUBSTANTIALLY EQUIVALENT PLANTS? - A COMPARATIVE STUDY OF TRANSGENIC AND BACKCROSS RICE CARRYING BACTERIAL BLIGHT RESISTANT GENE XA21

GAO L, CAO Y, XIA Z, JIANG G, LIU G, ZHANG W, ZHAI W.

BMC GENOMICS. 2013 OCT 29;14(1):738. [EPUB AHEAD OF PRINT]

[HTTP://WWW.BIOMEDCENTRAL.COM/1471-2164/14/738/ABSTRACT](http://www.biomedcentral.com/1471-2164/14/738/ABSTRACT)

The potential impact of genetically modified (GM) plants on human health has attracted much attention worldwide, and the issue remains controversial. This is in sharp contrast to the broad acceptance of plants produced by breeding through Marker Assisted Backcrossing (MAB).

Focusing on transcriptome variation and perturbation to signaling pathways, we assessed the molecular and biological aspects of substantial equivalence, a general principle for food safety endorsed by the Food and Agricultural Organization and the World Health Organization, between a transgenic crop and a plant from MAB breeding. We compared a transgenic rice line (DXT) and a MAB rice line (DXB), both of which contain the gene *Xa21* providing resistance to bacterial leaf blight. By using Next-Generation sequencing data of DXT, DXB and their parental line (D62B), we compared the transcriptome variation of DXT and DXB. Remarkably, DXT had 43% fewer differentially expressed genes (DEGs) than DXB. The genes exclusively expressed in DXT and in DXB have pathogen and stress defense functions. Functional categories of DEGs in DXT were comparable to that in DXB, and seven of the eleven pathways significantly affected by transgenesis were also perturbed by MAB breeding.

These results indicated that the transgenic rice and rice from MAB breeding are substantial equivalent at the transcriptome level, and paved a way for further study of transgenic rice, e.g., understanding the chemical and nutritional properties of the DEGs identified in the current study.

DEVELOPMENT OF TRANSGENIC SWEET POTATO WITH MULTIPLE VIRUS RESISTANCE IN SOUTH AFRICA (SA)

SIVPARSAD BJ, GUBBA A.

TRANSGENIC RESEARCH. 2013 OCT 25. [EPUB AHEAD OF PRINT]

[HTTP://LINK.SPRINGER.COM/ARTICLE/10.1007%2Fs11248-013-9759-7#](http://link.springer.com/article/10.1007%2Fs11248-013-9759-7#)

Multiple infections of Sweet potato feathery mottle virus (SPFMV), Sweet potato chlorotic stunt virus (SPCSV), Sweet potato virus G (SPVG) and Sweet potato mild mottle virus (SPMMV) cause a devastating synergistic disease complex of sweet potato (*Ipomoea batatas* Lam.) in KwaZulu-Natal, South Africa. In order to address the problem of multiple virus infections and synergism, this study aimed to develop transgenic sweet potato (cv. Blesbok) plants with broad virus resistance. Coat protein gene segments of SPFMV, SPCSV, SPVG and SPMMV were used to induce gene silencing in transgenic sweet potato. Transformation of apical tips of sweet potato cv. Blesbok was achieved by using *Agrobacterium tumefaciens* strain LBA4404 harboring the expression cassette. Polymerase chain reaction and Southern blot analyses showed integration of the transgenes occurred in 6 of the 24 putative transgenic plants and that all plants seemed to correspond to the same transformation event. The six transgenic plants were challenged by graft inoculation with SPFMV, SPCSV, SPVG and SPMMV-infected *Ipomoea setosa* Ker. Although virus presence was detected using nitrocellulose enzyme-linked immunosorbent assay, all transgenic plants displayed delayed and milder symptoms of chlorosis and mottling of lower leaves when compared to the untransformed control plants. These results warrant further investigation on resistance to virus infection under field conditions.

A NEW METHOD FOR EVALUATING FLOWERING SYNCHRONY TO SUPPORT THE TEMPORAL ISOLATION OF GENETICALLY MODIFIED CROPS FROM THEIR WILD RELATIVES

OHIGASHI K, MIZUGUTI A, YOSHIMURA Y, MATSUO K, MIWA T.

JOURNAL OF PLANT RESEARCH. 2013 OCT 12. [EPUB AHEAD OF PRINT]

[HTTP://LINK.SPRINGER.COM/ARTICLE/10.1007%2Fs10265-013-0592-0#](http://link.springer.com/article/10.1007%2Fs10265-013-0592-0#)

Hybridization between crops and their wild relatives potentially threatens the genetic identity of the wild plants, particularly in the case of genetically modified crops. Only a few studies have examined the use of temporal isolation to prevent hybridization, and the indices used in those studies (e.g., the days of flowering overlap) are not precise to evaluate the degree of synchrony in flowering. Here we propose a flowering similarity index that can compare the degree of flowering synchrony between two relevant species and measure the efficiency of temporal isolation. The results showed that the flowering similarity index predicts the likelihood of hybridization much better than the number of flowering-overlap days, regardless of different flowering patterns among cultivars. Thus, temporal isolation of flowering or flowering asynchrony is the most effective means in preventing hybridization between crops and their wild relatives.

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CALENDAR OF EVENTS

EVENT	ORGANIZED BY	DATE	WEBSITE
INDIA			
Workshop on the Application of Genetic Engineering in Grain Legumes and Its Translation	International Crops Research Institute for Semi-Arid Tropics (ICRISAT)	November 18-27, 2013, ICRISAT Headquarters, Andhra Pradesh	http://www.icrisat.org/what-we-do/learning-opportunities/Application.pdf
International Conference on Advances in Biotechnology and Bioinformatics 2013	Dr. D.Y. Patil Vidyapeeth, Pune's Dr. D. Y. Patil Biotechnology & Bioinformatics Institute along with The Biotech Research Society, India	November 25-27, 2013, Pune	http://icabb2013.dpu.edu.in/
International Conference on Role of Plant Biochemistry and Biotechnology in Food and Nutritional Security	Sri Venkateswara University, Tirupati	December 11-14, 2013, Tirupati	http://www.svuniversity.in/circular/bchemistry.pdf
National Conference of Plant Physiology- 2013 on "Current Trends in Plant Biology Research"	Directorate of Groundnut Research, Indian Society for Plant Physiology and Junagadh Agricultural University	December 13-16, 2013, Junagadh	http://www.nrcg.res.in/index.php?option=com_content&view=article&id=66&Itemid=67
National Seminar on Recent Advances and Challenges in Sugarcane Research	Directorate of Research & Zonal Agricultural Research Station, Mandya and University of Agricultural Sciences, Bangalore	January 17-18, 2014, Bangalore	http://www.uasbangalore.edu.in/images/attachments/home/nssr-2014.pdf
Bangalore India Bio	MM Activ Sci Tech Communications Pvt. Ltd.	February 10 - 14, 2014 Bangalore	http://www.bangaloreindiabio.in/Index_New.php
International Conference on "Probing Bioscience for Food Security & Environmental Safety"	Applied Zoologists Research Association (AZRA) and Central Rice Research Institute	February 16-18, 2014, Cuttack, Odisha	http://www.crri.nic.in/azra_first_circular.pdf
INTERNATIONAL			
7th International Rice Genetics Symposium	International Rice Research Institute (IRRI)	November 5-8, 2013, Manila, The Philippines	http://rice-genetics.com/
Global Conference on Entomology – 2013	V S Research Foundation and University of Technology MARA, Sarawak; Directorate of Agriculture, Govt. of Sarawak	November 8-12, 2013, Kuching, Sarawak, Malaysia	http://www.gce2013.com/about-conference/
Conference on the Biosafety of Genetically Engineered Plants	SABP, the Center for Environmental Risk Assessment (CERA), ILSI Research Foundation, USAID, & IFPRI Pakistan Strategy Support Program	December 13, 2013 Islamabad, Pakistan	http://www.cera-gmc.org/index.php?action=upcoming_meetings
2013 International Conference on Agriculture and Biotechnology (ICABT 2013)	Asia-Pacific Chemical, Biological & Environmental Engineering Society (APCBES)	December 29-30, 2013, Kuala Lumpur, Malaysia	http://www.icabt.org/



SOUTH ASIA
BIOSAFETY PROGRAM

The South Asia Biosafety Program (SABP) is an international developmental program implemented in India, Bangladesh and Pakistan with support from the United States Agency for International Development. SABP aims to work with national governmental agencies and other public sector partners 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.



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