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.

FEATURES OF UPDATED BANGLADESH NATIONAL BIOTECHNOLOGY POLICY, 2010

Dr. Md. Saidul Islam, Director General (additional charge), National Institute of Biotechnology (NIB), Ganakbari, Savar, Dhaka-1349

Bangladesh has taken significant initiatives to promote biotechnological research and infrastructure development to meet the present and future challenges of food security, poverty alleviation and livelihood protection. Several research organizations; public and private universities; private companies; and NGOs are involved in biotechnology research in Bangladesh. It is worth noting that many Asian and neighbouring countries, namely India, China, Philippines, Thailand, Pakistan, Malaysia and Vietnam have recognized the potential of biotechnology in contributing to economic growth in an environmentally safe manner.

A national policy on biotechnology is projecting consistent and long term support to science and technology by strengthening human resources, establishing scientific institutions, improving science education, integrating science into national culture, and promoting innovative technology.

The National Biotechnology Policy has already been formulated. To keep pace with recent progress in various areas of biotechnology, the Bangladesh Government decided to update it. In the updated National Biotechnology Policy, 2010 more attention has been given to the development of the appropriate human resources and refining the priority areas of biotechnology. With the implementation of the national biotechnology policy it would be possible to keep pace with Bangladesh's huge population.

According to the policy, the tools and techniques of biotechnology will be used for food security, poverty alleviation, health, nutrition and livelihood improvement, and conservation of the environment. National capacities in all areas of conventional and modern biotechnology, biodiversity and biosafety will be developed to achieve world class competence in biotechnology. The main goal of the policy is to ensure sustainable development of agricultural crops; nutrition; health; environment and livelihood of people; and enhance agricultural competitiveness relative to global standards. Other important goals include strengthening national modern biotechnology and biosafety capabilities and bioethics to ensure judicious use of biotechnology for national socio-economic development.

The policy also emphasizes protecting indigenous community knowledge, collective innovations and community rights. To ensure this the Community Knowledge Protection Act will be enacted to give guidelines for innovations of any form that use natural and biological resources.

To assist local scientists and policy makers, an international biotechnology advisory committee with internationally recognized biotechnology experts will be formed.

In addition to this, the Ministry of Science and Information & Communication Technology (MSICT) will develop a priority plan for the different areas of biotechnology to keep pace with the fast advancing fields of biotechnology and genetic engineering.

The policy will encourage universities to introduce and strengthen biotechnology and genetic engineering at the undergraduate and post graduate levels. At the same time biotechnological courses will be introduced at the secondary and higher secondary levels by modifying existing biology course curricula. Legal measures will also be taken to achieve a balanced system for protecting intellectual property rights without compromising public interest.

The following ideas have been included in the updated National Biotechnology Policy, 2010:

- A biotechnology cell with five members, three of whom are from the biotechnology discipline, will be formed under MSICT as a contact point to coordinate all the biotechnological activities in Bangladesh.
- With the aim of encouraging commercialization of biotechnology products, tax, CD/VAT exemption should be given on chemicals and equipment to government research institutions and public universities for at least five years.
- In each fiscal year at least 5% of ADP budget and 1% of revenue budget should be allocated for R & D activities and short, medium and long germ capacity building/ training for researchers, scientists and academics from different research organizations and universities working in the field of biotechnology and genetic engineering.
- Public-Private Partnerships for growth of biotechnology industries and international collaboration in this regard will be encouraged.

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- Competitive 'lab to market funding' and incentives to promote committed participation by academia, private sectors and government linked companies will be applied along with the implementation of sufficient exit mechanisms for investments in biotechnology.
- Creation of biotechnology incubator parks in collaboration with experienced foreign organizations with focus on agricultural food and cash crops, medical biotechnology including herbal medicine and industrial products having market demand in Bangladesh and abroad.
- Formation of a commercial wing in biotechnology research organizations to facilitate commercialization of research achievements.
- Simplification of procedures for approvals and clearances in the commercialization of any new biotechnology product and process.
- Encouragement, incentives and impetus to private entrepreneurs to commercialize research findings.

An action plan, addressing the short, medium and long term, will also be formulated for the following sectors: plant, animal, medical, industrial, environmental biotechnology, biodiversity conservation, human genetics and genomics, bioinformatics, biosafety and bioethics and intellectual property rights. Other important areas with opportunities include herbal plants, animal feeds, diagnostics and development of post harvest technology to minimize loss of agricultural produce. The programmes will reflect urgent national needs and requirements in terms of funding, manpower and facilities.

A 15-member committee that meets semi-annually will be formed under the Secretary of MSICT. The Director General of NIB will act as the member secretary of the committee, which will consist of one representative each from the ministries of agriculture, education, environment and forest, finance and planning, in addition to MSICT; one scientist each from the biotechnology disciplines of plants, fish, animal, medicine, environment and industry; and one member from a Bangladesh biotechnology professional society.

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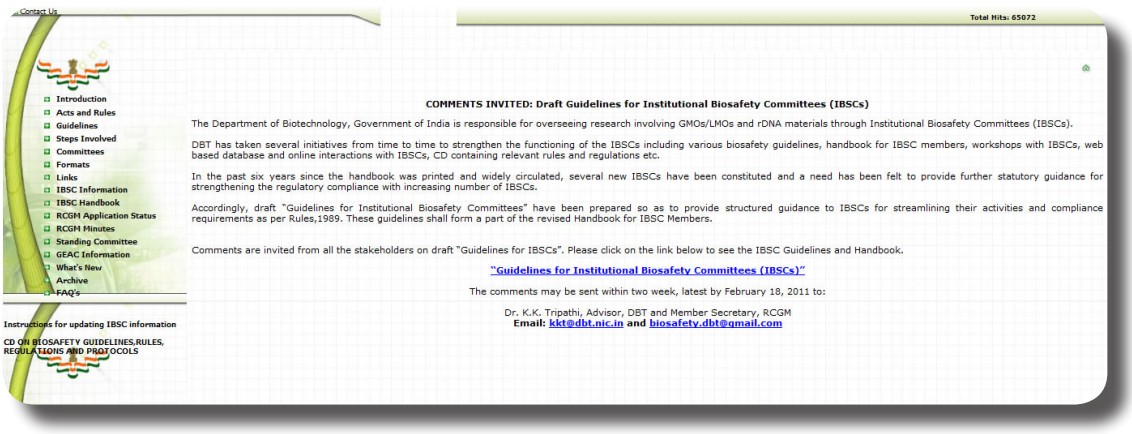
ROLE OF IBCS IN REGULATION OF GMOS

Dr. Vibha Ahuja, General Manager, Biotech Consortium India Limited

In India Institutional Biosafety Committees (IBSCs) are a pre-requisite for organizations conducting research with genetically modified organisms (GMOs). As per "Rules for the Manufacture, Use/Import/Export and Storage of Hazardous Microorganisms/ Genetically Engineered Organisms or Cells, 1989" (hereinafter referred as Rules, 1989) notified by the Ministry of Environment and Forests (MoEF), Government of India under the Environment (Protection) Act, 1986, an IBSC has to be constituted by an occupier or any person including research institutions handling microorganism/genetically engineered organisms. Functions of IBSCs have been elaborated in the "Recombinant DNA Safety Guidelines, 1990" and "Revised Guidelines for Research in Transgenic Plants & Guidelines for Toxicity and Allergenicity Evaluation of Transgenic Seeds, Plants and Plant Parts, 1998" issued by the Department of Biotechnology.

IBSC is the nodal point for interaction within an institution for the implementation of the guidelines. The ISBC needs to be notified of any research project that is likely to have a biohazard potential (as envisaged by the guidelines) during the execution stage or that involves the production of either microorganisms or biologically active molecules that might cause bio-hazard. The IBSC allows genetic engineering activity on classified organisms only at places where such work should be performed as per guidelines. Provision of a suitable safe storage facility of donor, vector, recipient and other materials involved in experimental work should be made and may be subjected to an accountability inspection by IBSC.



As a statutory committee that operates from the premises of an organization, IBSC is in a position to conduct institution-level onsite evaluations, assessments and monitoring of adherence to the biosafety guidelines with overall oversight of the regulatory process. The decisions taken by the next higher committee, i.e., Review Committee on Genetic Manipulation (RCGM), which operates from DBT are based on the applications submitted by the investigators with the approval of IBSC. Therefore, it is pertinent that IBSCs have expertise in evaluation, assessment and monitoring of projects and ensure compliance with the Rules, 1989, Recombinant DNA Safety Guidelines, 1990 and other guidelines issued by DBT from time to time.

Currently there are more than 400 IBSCs in various industries and research institutions in India. To streamline their activities and strengthen compliance, DBT has issued a draft set of guidelines for IBSCs, which are available for comments at **http://dbtbiosafety.nic.in** and **http://www.igmoris.nic.in** up to **February 18, 2011**. The purpose of these guidelines is to provide guidance to organisations that have IBSCs or intend to set up an IBSC in compliance with Rules, 1989. These guidelines describe the constitution, composition, role and functions of IBSCs and provide compliance requirements by IBSCs and processes to be followed while dealing with GMOs/LMOs and rDNA materials in line with Rules, 1989 and guidelines issued by DBT from time to time.

The Reading List

. . . new and notable articles

TRANSCRIPTION FACTORS AS TOOLS TO ENGINEER ENHANCED DROUGHT STRESS TOLERANCE IN PLANTS

Hussain SS, Kayani MA, Amjad M.

Plant growth and productivity are greatly affected by abiotic stresses such as drought, salinity, and temperature. Drought stress is one of the major limitations to crop productivity worldwide due to its multigene nature, making the production of transgenic crops a challenging prospect. To develop crop plant with enhanced tolerance of drought stress, a basic understanding of physiological, biochemical, and gene regulatory networks is essential. In the signal transduction network that leads from the perception of stress signals to the expression of stress-responsive genes, transcription factors (TFs) play an essential role. Because TFs, as opposed to most structural genes, tend to control multiple pathways steps, they have emerged as powerful tools for the manipulation of complex metabolic pathways in plants. One such class of TFs is DREB/CBF that binds to drought responsive cis-acting elements. Transgenic plants have been developed with enhanced stress tolerance by manipulating the expression of DREB/CBF. Recently the functions of an increasing number of plant TFs are being elucidated and increased understanding of these factors in controlling drought stress response has lead to practical approaches for engineering stress tolerance in plants. The utility of the various TFs in plant stress research we review is illustrated by several published examples. The manipulation of native plant regularity networks therefore represents a new era for genetically modified crops. This review focuses on the recent understanding, latest advancements related to TFs and present status of their deployment in developing stress tolerant transgenic plants.

Biotechnology Progress (2010) doi: 10.1002/btpr.514. [Epub ahead of print]

TRANSGENIC BIOFORTIFICATION OF THE STARCHY STAPLE CASSAVA (MANIHOT ESCULENTA) GENERATES A NOVEL SINK FOR PROTEIN

Abhary M, Siritunga D, Stevens G, Taylor NJ, Fauquet CM.

Although calorie dense, the starchy, tuberous roots of cassava provide the lowest sources of dietary protein within the major staple food crops (*Manihot esculenta* Crantz). (Montagnac JA, Davis CR, Tanumihardjo SA. (2009) Compr Rev Food Sci Food Saf 8:181-194). Cassava was genetically modified to express zeolin, a nutritionally balanced storage protein under control of the patatin promoter. Transgenic plants accumulated zeolin within de novo protein bodies localized within the root storage tissues, resulting in total protein levels of 12.5% dry weight within this tissue, a fourfold increase compared to non-transgenic controls. No significant differences were seen for morphological or agronomic characteristics of transgenic and wild type plants in the greenhouse and field trials, but relative to controls, levels of cyanogenic compounds were reduced by up to 55% in both leaf and root tissues of transgenic plants. Data described here represent a proof of concept towards the potential transformation of cassava from a starchy staple, devoid of storage protein, to one capable of supplying inexpensive, plant-based proteins for food, feed and industrial applications.

PLoS One. 2011 Jan 25;6(1):e16256.

AN EFFICIENT AND RAPID TRANSGENIC POLLEN SCREENING AND DETECTION METHOD USING FLOW CYTOMETRY

Moon HS, Eda S, Saxton AM, Ow DW, Stewart CN Jr.

Assaying for transgenic pollen, a major vector of transgene flow, provides valuable information and essential data for the study of gene flow and assessing the effectiveness of transgene containment. Most studies have employed microscopic screening methods or progeny analyses to estimate the frequency of transgenic pollen. However, these methods are time-consuming and laborious when large numbers of pollen grains must be analyzed to look for rare transgenic pollen grains. Thus, there is an urgent need for the development of a simple, rapid, and high throughput analysis method for transgenic pollen analysis. In this study, our objective was to determine the accuracy of using flow cytometry technology for transgenic pollen quantification in practical application where transgenic pollen is not frequent. A suspension of non-transgenic tobacco pollen was spiked with a known amount of verified transgenic tobacco pollen synthesizing low or high amounts of green fluorescent protein (GFP). The flow cytometric method detected approximately 75% and 100% of pollen grains synthesizing low and high amounts of GFP, respectively. The method is rapid, as it is able to count 5000 pollen grains per minute-long run. Our data indicate that this flow cytometric method is useful to study gene flow and assessment of transgene containment.

Biotechnology Journal (2011) 6(1):118-23.

APHID–PARASITOID COMMUNITY STRUCTURE ON GENETICALLY MODIFIED WHEAT

von Burg S, van Veen FJ, Alvarez-Alfageme F, Romeis J.

Since the introduction of genetically modified (GM) plants, one of the main concerns has been their potential effect on non-target insects. Many studies have looked at GM plant effects on single non-target herbivore species or on simple herbivore-natural enemy food chains. Agro-ecosystems, however, are characterized by numerous insect species which are involved in complex interactions, forming food webs. In this study, we looked at transgenic disease-resistant wheat (*Triticum aestivum*) and its effect on aphid-parasitoid food webs. We hypothesized that the GM of the wheat lines directly or indirectly affect aphids and that these effects

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CALENDAR OF EVENTS

Event	Organized by	Date and Venue	Website
INDIA			
Indian Seed Congress 2011	National Seed Association of India (NSAI)	February 22 - 23, 2011 Hyderabad	http://www.nsai.co.in/ISC_2011_Delegate.pdf
Bio Asia 2011: The Global Bio Business Forum	Government of Andhra Pradesh, Federation of Asian Biotech Associations, All India Biotech Association, University of Hyderabad	February 21-24, 2011 Hyderabad	http://www.bioasia.in/
Workshop on Commercialization of Biotechnology	Department of Biotechnology (DBT), Government of India, and Biotech Consortium India Limited (BCIL), New Delhi	March 17, 2011 New Delhi	
World Congress on Biotechnology	OMICS Publishing Group, USA	March 21-23, 2011 Hyderabad	http://omicsonline.org/biotechnology2011/
8th International Safflower Conference: Safflower Research and Development in the World - Status and Strategies	Indian Society of Oilseeds Research and Indian Council of Agricultural Research	January 19 - 23, 2012 Hyderabad	http://www.dor-icar.org.in/downloads/Conference1.pdf
INTERNATIONAL			
South Africa – Argentina Joint Regional Biosafety Workshop and Seminar: Biosafety of GM Crops: Emerging Issues and Challenges Affecting Regulatory Decision Making	The International Centre for Genetic Engineering and Biotechnology in collaboration with the South African Department of Agriculture, Forestry and Fisheries & Argentinean Secretariat of Agriculture, Livestock and Fisheries (SAGyP)	March 7 - 11, 2011 Pretoria, South Africa	http://www.icgeb.org/tl_files/Meetings/2011/ICGEB%20Workshop%20SA%202011-%20Notification.pdf
First International Workshop on the Food and Environmental Safety Assessment of Genetically Modified Animals	Argentine Ministry of Agriculture, Livestock and Fisheries, (SAGyP, Biotechnology Directorate); ICGEB; United Nations University Biotechnology Programme for Latin America and the Caribbean (UNU-BIOLAC) and International Life Sciences Institute (ILSI Argentina)	September 5 - 9, 2011 Buenos Aires, Argentina	http://www.agrobiotecnologia.gov.ar/gmanimal2011/

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The terms of reference will include:

- Identification of national biotechnology priorities;
- Issuance of requests for project proposals;
- Promotion of venture capital investment in biotechnology and the search for industrial partners;
- Biotechnology skills, funds and facility resource mobilization;
- New and emerging technologies benefit awareness building; and
- Implementation of policy programs and goals

For details please visit: http://www.nib.org.bd/.

READING LIST - *continued from page 3*

cascade up to change the structure of the associated food webs. Over 2 years, we studied different experimental wheat lines under semi-field conditions. We constructed quantitative food webs to compare their properties on GM lines with the properties on corresponding non-transgenic controls. We found significant effects of the different wheat lines on insect community structure up to the fourth trophic level. However, the observed effects were inconsistent between study years and the variation between wheat varieties was as big as between GM plants and their controls. This suggests that the impact of our powdery mildew-resistant GM wheat plants on food web structure may be negligible and potential ecological effects on non-target insects limited.

Biology Letters (2011) [Epub ahead of print]

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