



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 the local governments to facilitate implementation of transparent, efficient and responsive regulatory frameworks that ensure the safety of new foods and feeds, and protect the environment.

Over the next three years, SABP will work 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 address policy issues within the overall context of economic development, international trade, environmental safety and sustainability.

TRANSGENICS IN THE IMPROVEMENT OF HORTICULTURAL CROPS

Prof. K.L. Chadha

Former Deputy Director General (Horticulture), Indian Council of Agricultural Research, New Delhi

E-mail: klchadha@yahoo.com

The rapid boom of biotechnology in the past two and a half decades has set in motion revolutionary changes in the field of applied biology. While the benefits of biotechnology have already been realized in several crops like maize, soybean, cotton and canola, these are yet to be exploited in a wide variety of horticultural crops. According to the latest ISAAA report published in 2005, the area under transgenic crops reached 90 million ha worldwide in 2005 with a 50-fold increase since 1994 and over 21 developed and developing countries have adopted transgenic crops covering 8.5 million farmers. The total estimated global aggregated GDP due to growing of transgenic crops is estimated at \$370 billion.

Indian farmers have also tided over the initial resistance to such crops in view of the manifold advantages in productivity, shelf-life and quality through resistance to diseases and pests and also abiotic stresses. Keeping in view global competitiveness, a number of initiatives have been taken all around the globe in the area of horticulture since the release of the Flavr Savr® tomato in 1994.

Genetically modified varieties and several transgenics in various horticultural crops have been released or are under field testing in different countries. At present, transgenics have been reported in over 50 horticultural crops. The next phase of commercial transgenics are expected in fruits like grape, apple (rootstocks), walnut, citrus, cranberry,

raspberry, strawberry, *etc.*; vegetables like broccoli, carrot, eggplant, pea, pepper, sweet potato, water melon, baby corn and flower crops like rose, gladiolus, carnation, *etc.*

Some present day genetic engineering advancements made in horticultural crops, with particular emphasis on Indian context, are as follows.

Tolerance to biotic stresses: Viruses form the major biotic stress in horticultural crops like citrus, banana and papaya; vegetables like tomato, chilli and summer squash; and tuber crops like potato, *etc.* With tomatoes, production is greatly hampered by the tomato spotted wilt virus, peanut bud necrosis virus (PBNV) and tomato leaf curl virus (TLCV) caused by a gemini virus. The nucleocapsid gene of PBNV and replicase gene of TLCV are two pathogen-derived genes developed for conferring viral disease resistance in tomato. Summer squash Freedom II from Asgrow and Prelude II from Seminis have been released for tolerance to zucchini yellow mosaic virus and watermelon mosaic virus. With chilli, leaf curl virus is the major concern and efforts are on to mobilize such genes in sweet and paprika pepper. With potato, antiviral coat protein expression for potato virus Y (PVY) is underway at CPRI, Shimla and CIP, Lima. Two transgenic varieties of papaya, namely 'UH Rainbow' and 'UH SunUp', tolerant to papaya ring spot virus (PRSV), were released for commercial cultivation in 1998 and they occupy 70% of the total papaya area in Hawaii, USA. 'Honey Sweet', a plum pox virus resistant plum transgenic, is due to be released for commercial exploitation from USDA, West Virginia, USA. Similarly, transgenic citrus rootstock is under field trial at IVIA, Valencia, Spain.

For combating fungal diseases in vegetable crops, antimicrobial peptide genes from radish, Four-o'clock plant and onion and anti-fungal genes like chitinase β -glucanase, osmotin, *etc.* are under exploitation for developing resistant varieties in different horticultural crops. Similarly, developing insect resistant transgenic plants using an array of *cry* genes from soil bacterium *Bacillus thuringiensis* and mobilizing them in crops like tomato, brinjal and chilli against fruit and shoot borer and other Dipteran and Lepidopteran pests is also being carried out at different labs. Colorado potato beetle resistant potato variety New Leaf with the *cry3A* gene has been released from Monsanto. Efforts are on for using gene pyramiding for the sustainability of transgenic varieties under cultivation.

Enhancing post-harvest shelf-life and quality: To minimize post-harvest losses the ethylene bio-synthetic pathway has been subdued by different approaches including anti-sense suppression of the enzyme ACC synthase and ACC oxidase or by reducing the level of poly-galactouronase (PG) enzyme. Flavr Savr® and Endless Summer tomato were produced by suppression of ACC oxidase with Zeneca and Petoseed developing thick pulp processing-type tomatoes incorporating this technology. JNU, New Delhi and CPRI, Shimla have developed potato lines with altered protein quality using *AmA1* gene for the production of value added potatoes. The

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CALENDAR OF EVENTS (INDIA)			
Event	Organization	Date	Place
Training Awareness programme for senior officials from State Departments of Environment and Agriculture	Ministry of Environment and Forests (MoEF). Contact: Dr. M. Hota, e-mail hota@nic.in	February 2006	TBD
Training Awareness programme for State Agriculture University and Farmers	Ministry of Environment and Forests (MoEF). Contact: Dr. M. Hota, e-mail hota@nic.in	February 2006	TBD
Training workshop for school children	Ministry of Environment and Forests (MoEF). Contact: Dr. M. Hota, e-mail hota@nic.in	February 2006	TBD
Short-term training programme on Law and Biotechnology	TERI School of Advanced Studies (see details below)	February 27 to March 10, 2006	New Delhi
Awareness programme for Media Personnel	Ministry of Environment and Forests (MoEF). Contact: Dr. M. Hota, e-mail hota@nic.in	March 2006	TBD
Communications Training for Agriculture Extension Personnel	South Asia Biosafety Program (SABP)	March 2, 2006	Punjab

SHORT-TERM TRAINING PROGRAMME ON LAW AND BIOTECHNOLOGY

A Short-term Training Programme on Law and Biotechnology is being organized by TERI School of Advanced Studies from February 27 to March 10, 2006, New Delhi.

This training workshop seeks to highlight key issues pertaining to the interface field of 'law and biotechnology'. The intensive certification course covers the following two independent modules.

- Health care Biotechnology and Law
- Agriculture Biotechnology and Law

Objectives

- To sensitize participants on the domestic and international laws relating to biotechnology in agriculture and health care;
- To learn, understand, and critically evaluate recent developments in law relating to biotechnology, especially with regard to bio-safety;
- To critically review the effectiveness of the existing legal and regulatory framework in India;
- To explore legal, ethical, and socio-economic issues pertaining to recent advances in biomedical and agriculture biotechnology;
- To understand the salient features of the IPR (Intellectual Property Rights) regime and associated trade issues involved in biotechnological research.

Who should attend?

- Policy-makers • Regulators • Scientists • Technologists
- Lawyers • Industry experts • Development practitioners

Course dates

- Health-care Biotechnology and Law: February 27 to March 3, 2006
- Agriculture Biotechnology and Law: March 6 to 10, 2006

Important dates

- Deadline for registration: February 16, 2006

Registration fee for early birds (per module)

- Industry/firm: 10 000 rupees
- University / research institution: 5000 rupees
- Students: 2500 rupees

Registration fee after February 16, 2006

- Industry/firm: 15 000 rupees
- University / research institution: 7500 rupees
- Students: 3500 rupees

Register early

Number of participants restricted to 20 per module.

For further information, contact:

- Dr. Anandita Singh: asingh@teri.res.in
- Mr. M P Ram Mohan: mpramohan@teri.res.in
- TERI School of Advanced Studies
IHC Complex, Darbari Seth Block
Lodhi Road, New Delhi – 110 003
Tel.: 011-2468 2100
Fax: 011-2468 2144, 2468 2145
Web: <http://www.terischool.ac.in>

SABP HOSTS MEETING WITH MEDIA

On January 16, 2006, SABP, India hosted a meeting for journalists in Ahmedabad. The meeting was held in collaboration with G-Publications and was attended by 13 journalists representing print and electronic media. A screening of "Story of Bt Cotton in India", a documentary video prepared by SABP and ISAAA, was held for the journalist.

The video and other communication programs of SABP have been designed to take an objective message to stakeholders and to strengthen their understanding of biotechnology. The media plays a very important catalytic role in bridging the lab-to-land gap by communicating science to society and therefore a meeting with media was an essential step in SABP's communication endeavour.

The outcome of this meeting was the media's interest in the video and the various activities carried out by SABP. Some positive discussions were held which were reflected in some of the press reports published as a result of this meeting.

CALENDAR OF EVENTS (BANGLADESH)

Event	Organization	Date	Place
Regional Workshop on the Awareness Building on the Recent Advances of Agricultural Biotechnology & Biosafety	South Asia Biosafety Program (SABP)	April 2006	Khulna & Barisal Divisions

AGBIOTECH AWARENESS BUILDING WORKSHOP

SABP, in collaboration with Bangladesh Agricultural Research Council (BARC), gave a workshop on the Recent Advances of Agricultural Biotechnology and Biosafety on February 1 and 2, 2006, in Dhaka. This was the first SABP / BARC awareness-building workshop of the year. The event was held at the BRAC Center Inn, Mohakhlai, Dhaka. The inaugural ceremony was held under the chairmanship of Dr. M. Nurul Alam, Executive Chairman, Bangladesh Agricultural Research Council (BARC). Mr. Kazi Abul Kashem, Secretary, Bangladesh Ministry of Agriculture was present as chief guest. Dr. Md. Abdur Razzaque, Member Director (Crops), BARC offered the address of welcome and Dr. Donald MacKenzie, Executive Vice President, AGBIOS highlighted the workshop programs and the SABP activities in Bangladesh.

The workshop participants were selected mostly from among the officers of the Agricultural Extension Department working at the District and Upazilla levels. Aside from the extension department, participants were selected from the scientists of the Bangladesh Rice Research Institute (BRRI), the Bangladesh Agricultural Research Institute (BARI), and Bangladesh Jute Research Institute (BJRI) working at regional stations/sub-stations in the Dhaka Division. There was also participation by the private sector, NGOs, college-level teachers and post-graduate students. There were, altogether, 65 participants at the workshop.

The two-day workshop covered presentations on recent developments in agricultural biotechnology, biosafety related issues including global status of biotech crops, benefits and potential risks of biotech crops, field trials of biotech crops and food safety assessment of biotech crops, etc. After the inaugural ceremony, participants were divided into several groups with Dr. M. Imdadul Hoque, SABP, Bangladesh Country Coordinator introducing the resource persons and workshop participants.

After a brief introduction, Dr. Md. Abdur Razzaque presented his paper on the Opportunities and Challenges of Agricultural Biotechnology: Bangladesh Perspective; Prof. Rakha Hari Sarker gave a presentation on the Principles of Genetic Engineering and their Application; Dr. M. Khalequzzaman A. Chowdhury, C.S.O. (Crops), BARC, highlighted the Status of Biotech Research and Development in Bangladesh. The invited speaker, Dr. Swapan Kumar Datta, Former Head, Biotechnology Division, IRRI presented a

paper on Improvement of Nutritional Quality of Crop Plants through Genetic Engineering. Dr. Donald MacKenzie gave a presentation on the Principles of Risk Analysis and Their Application to Experimental Field Trials of Biotech Crops for the Confined Field Trial of Transgenic Crops. He also introduced various issues to be considered during the group exercise on field trials of transgenic crops. Prof. Syed Hadiuzzaman of the Department of Botany, Dhaka University gave a presentation highlighting various contents included in the Biosafety Guidelines of Bangladesh. Dr. Emdadul Haque Chowdhury of the Department of Pathology, Bangladesh Agricultural University, Mymensingh presented his paper on the Safety Assessment of Foods derived from Transgenic Crops.

There were open discussions after each presentation. Participants raised several questions related to the benefits and possible risks associated with transgenic crops. Most of the concerns about biotech crops were on issues related to their effect on allergenicity, their effect on biodiversity, the high cost of biotech crops and their availability to poor farmers. The aim of the presentations and discussions was to demonstrate that genetic engineering technology may be one of the options for combating food deficiency through the development of improved crop varieties (disease and stress tolerant varieties as well as crops with improved nutrition).

Group exercises were used to illustrate the process of conducting confined field trials of transgenic crops. The participants were divided into six groups with three groups using Golden Rice and three using Bt Brinjal as examples. The task assigned to the groups was to develop an inspection protocol for their crop during planting, harvesting and post-harvest, including storage. Participants became quite engaged during the group work.

Prior to the conclusion, selected participants gave their views on the workshop, workshop certificates were awarded to the participants and votes of thanks were given by Dr. Donald MacKenzie and Dr. Khalequzzaman A. Chowdhury.



Awareness building workshop inaugural ceremony. (from left): Dr. D.J. MacKenzie, Dr. M. Nurul Alam, Mr. Kazi Abul Kashem, Mr. Md. Hamidur Rahman, and Dr. Md. Abdur Razzaque

Horticultural Crops - continued from page 1

plants are undergoing field testing. Using the cDNA clone of ACC oxidase, transgenic carnations have been produced by Florigene, USA with delayed senescence. Similarly, high sugar content sugar beet is also underway. Australian and Japanese researchers have developed the world's first blue rose by implanting a gene from pansy. Using gene silencing techniques, the activity of enzyme chalcone synthase gene was blocked by anti-sense suppression to produce pure white flowers in petunia. Similar success has been achieved in petunia, chrysanthemum, gerbera and carnation. In petunia, brick-red to orange coloured genotypes have been developed by introducing the DFR gene from gerbera and maize.

The ushering of the new findings and successes in horticultural crops is a reality through biotechnology and the same is poised and expected to play a key role in almost all sectors to meet the demands of the future. It is hoped that in times to come the horticultural crops will not only yield better and store well but also have better nutritional qualities to meet the challenges both of food and nutritional security.

GMOS MAY COME UNDER FTP AMBIT

The Economic Times - February 10, 2006

The Government is proposing to bring out comprehensive norms for exports and import of Genetically Modified Organisms.

The Commerce Ministry is planning to bring trade of GMO items under the ambit of country's Foreign Trade Policy and has initiated the process of consultation with the ministries concerned in this regard, official sources told the media.

The move is aimed at bringing about more clarity in the norms governing the trade of GMOs in face of Government allowing commercialisation of transgenics.

See the full article at: http://agbios.com/sabp_main.php?action=ShowNewsItem&id=7295

NATIONAL MEETING ON AGRO BIODIVERSITY

NT Bureau - February 09, 2006

A four-day national conference on agro biodiversity will be conducted in Chennai on 12 February by National Biodiversity Authority, a government of India organisation, which advises the government on matters relating to the conservation of biodiversity and related issues.

Addressing reporters here today, S Kannaiyan, chairman, National Biodiversity Authority, said the conference would discuss on plant, genetic resources, soil resources and conservation, agro-biodiversity and climate change, biotechnology and horticulture.

See the full article at: http://agbios.com/sabp_main.php?action=ShowNewsItem&id=7287

BANGLADESHI NATIONAL BIOSAFETY FRAMEWORK TO BE IN PLACE BY END-OF-YEAR

Checkbiotech - February 10, 2006

The National Biosafety Framework (NBF) will be readied by the year-end to kick start applications of genetic modification in crops and livestock in the country without causing any harm to the natural environment.

The decision to finalise the NBF by December 2006 was taken at the first meeting of the National Coordination Committee on Biosafety held at the Ministry of Environment and Forest yesterday.

Biosafety refers to the maintenance of safe conditions in biological research to prevent harm to labs, field workers and the environment.

Sources involved in the NBF drafting process told The Daily Star that once Bangladesh puts all regulatory set-ups in place under a full-fledged biosafety framework, the land-strapped country will be free to produce, transfer and research genetically modified (GM) crops.

Official sources confirm that Bangladesh has four varieties on its priority list of GM crops drought and saline tolerant rice, late blight resistant potato, fruit and shoot borer resistant eggplant and pod borer resistant chickpea.

See the full article at: http://agbios.com/sabp_main.php?action=ShowNewsItem&id=7295

OF CLIMATE CHANGE, HYBRID RICE & INDIAN TIE-UP

The Statesman - February 6, 2006

Against the backdrop of concerns that climate change due to Green House Gas effect could hit rice production in India, the International Rice Research Institute (IRRI) today said it was collaborating with Indian scientists to address the problem by trying to create a hybrid variety that can withstand global warming.

This was conveyed by IRRI director general Mr Robert Zeigler to President Dr APJ Abdul Kalam who visited a field in the IRRI complex.

"One of our future plans is collaboration with India in view of the problem of climate change resulting from Green House Gas effect. We will monitor the GHG and its impact on rice output," Mr Zeigler said.

IRRI officials said the concern over climate change affecting production stemmed from the fact that if the temperature goes up it could affect the yield, especially during the day which is the time for flowering.

See the full article at: http://agbios.com/sabp_main.php?action=ShowNewsItem&id=7266

SABP CONTACTS

India

Purvi Mehta-Bhatt
SABP Coordination Cell
The Science Ashram
2/7, BIDC, Gorwa, Vadodara
390016 India
Tel: 0265-3957368
Email: P_mehta_Bhatt@rediffmail.com

Bangladesh

Prof. Imdadul Hoque
SABP Country Coordinator
House 18, Road 4
Sector 4, Uttara
Dhaka 1230 Bangladesh
Tel: +880-2-8916929 Ext. 121
Email: imdadul@agbios.com

To receive an electronic copy of this newsletter send your name and e-mail address to: info@agbios.com

