



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.

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 address policy issues within the overall context of economic development, international trade, environmental safety and sustainability.

CRY GENES AND BT TRANSGENIC CROPS

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The incorporation of *Cry* genes into major crops, providing insect-resistant transgenic plants, is one of the most important applications of *Bacillus thuringiensis* (*Bt*) in agriculture. The entomopathogenic activity of *Bt* is principally due to the presence of proteinaceous inclusions that can be distinguished as distinctively shaped crystals under phase contrast microscopy. These inclusions are comprised of proteins known as insecticidal crystal proteins (*Cry* proteins) or delta-endotoxins. *Cry* proteins have been used as biopesticide sprays on a significant scale for more than 40 years, and their safety has been demonstrated.

The *Cry* genes are among the most intensively studied group of genes in living organisms. More than 150 *Cry* genes have been sequenced and characterized from the *Bt* isolates worldwide, including USA, Brazil, Spain, Argentina, China, Mexico and India. *Cry* toxins constitute a family of related proteins that can kill insects belonging to the Lepidoptera, Coleoptera, Diptera, Hymenoptera, Homoptera, and Mallophaga, as well as other invertebrates. The proteins toxic for lepidopteran insects belong to the *Cry*1, *Cry*9, and *Cry*2 groups; toxins active against coleopteran insects are the *Cry*3, *Cry*7, and *Cry*8 proteins as well as the *Cry*1B and *Cry*1I proteins, which have dual activity. The *Cry*5, *Cry*12, *Cry*13, and *Cry*14 proteins are nematocidal, and the *Cry*2, *Cry*4, *Cry*10, *Cry*11, *Cry*16, *Cry*17, *Cry*19, and *Cyt* proteins are toxic for dipteran insects. The revised *Cry* toxin nomenclature is available on the World Wide Web at http://epunix.biols.susx.ac.uk/Home/Neil_Crickmore/Bt/index.html. These toxins can be grouped according to the degree of amino acid homology. *Cry* proteins with the same primary rank in a phylogenetic tree often affect the same order of insects.

Despite the abundance of literature on the *Cry* proteins, the search for novel *Cry* genes continues, since there is a need for *Cry* proteins with specificity and toxic potential against a much broader range of insect-pests and to provide potential alternatives to those *Cry* genes that are widely deployed in developing transgenic crops. Novel approaches have been designed in recent years for effective search of *Cry* genes, based on a combination of molecular biology, molecular systematics and bioinformatics. Using such approaches, it is possible to identify coding sequences for known proteins, as well as for unknown proteins, that are members of different *Cry* families widespread in a phylogenetic tree.

There is an increasing realization that *Bt* resistance management should effectively take into account the genetic plasticity of the insect populations. The adaptive evolution of insect resistance to *Cry* genes is presently a subject of intensive research. There are some core assumptions, such as (a) insects resistant to only one toxin can be effectively controlled by a second toxin produced in the same plant; (b) strains resistant to two toxins with independent actions cannot emerge through selection pressure with one toxin alone; and (c) it is less likely that a single gene confers resistance to two toxins that are immunologically distinct and that have different binding targets, which are being ascertained/challenged by different research groups.



Resistance development in insect populations (particularly with respect to *Bt*) is a complex phenomenon, involving genetic and environmental factors, besides genotype x environment (G x E) interactions. The factors influencing resistance development include natural frequencies of resistance alleles, dominance of the trait, mating and migratory behavior of moths, natural mortality factors, susceptibility to insecticides, fitness cost for single/multiple resistance mechanisms, feeding habits and extent of availability of host crops and biology of pests. Therefore, it is important to note that the dynamics of interplay of these factors in nature (in the field conditions) could be different both qualitatively and quantitatively from those seen under controlled conditions (laboratories). Various strategies, including two-toxin *Bt* crops (developed through the pyramiding approach), use of multiple-toxin genes with different modes of action, hybrid

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CALENDAR OF EVENTS

Event	Organization	Date	Place
INDIA			
Series of workshops on 'Management and Monitoring of Field Trials of Genetically Modified Crops'. Organized by Department of Biotechnology (DBT), Ministry of Environment & Forests (MoEF) and Biotech Consortium India Limited (BCIL).	Workshops are being held at the following SAUs: <ul style="list-style-type: none"> - Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal (January 16, 2009) - Rajendra Agricultural University, Samastipur, Bihar (February 5, 2009) - Rajasthan Agricultural University, Bikaner (February 10, 2009) - Dr. Y.S. Parmar University of Horticulture and Forestry* - Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu* * <i>Dates to be finalized.</i>		
Series of workshops for DBT nominees and IBSC members for 'Strengthening Regulatory Compliance by IBSCs'. Organized by DBT and BCIL.	Workshops will be held as follows: <ul style="list-style-type: none"> - University of Calcutta, Kolkata (January 17, 2009) - The Atria Hotel, Bangalore (January 23, 2009) - Kamatlingapur Hotel, Hyderabad (January 24, 2009) - The Ambassador Hotel, New Delhi (January 29, 2009) - M.S.S.S.R.F., Chennai (February 2, 2009) 		
National seminar on 'Genetically Modified Crops: Status, Issues and Awareness'.	School of Life Sciences North Maharashtra University	January 20 - 21, 2009	Jalgaon, Maharashtra
Winter school on 'Biosecurity and Biosafety: Policies, Procedures and Issues'.	National Bureau of Plant Genetic Resources	January 14 - February 3, 2009	New Delhi
BioAsia 2009: The Global Bio Business Forum.	Federation of Asian Biotech Associations, Government of Andhra Pradesh, University of Hyderabad and All India Biotech Association	February 2-4, 2009	Hyderabad
6th Global Knowledge Millennium Summit 'Bio-Nano: The Global War on Hunger' Opportunity- Indian Farmers.	The Associated Chambers of Commerce & Industry of India (ASSOCHAM)	February 12 - 14 2009	New Delhi
BANGLADESH			
4th International Botanical Conference.	Bangladesh Botanical Society	January 16 - 18, 2009	Botany Department, Dhaka University
International Conference on Plant Breeding and Seed for Food Security (ICPBSFS) 2009.	Genetics and Plant Breeding Society of Bangladesh For more information please contact: Prof. Dr. Md. Shahidur Email: srbhuiyansau@yahoo. com	March 10 - 12, 2009	China Bangladesh Friendship Conference Centre, Agargaon, Dhaka

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toxins, etc., are being intensively researched as an integral part of resistance management of *Bt* transgenic crops.

One of the important goals of crop biotechnology is to engineer a durable, multi-mechanistic resistance to insect pests through an understanding of the diversity of plant responses to insect attack on one hand and understanding of the genetic plasticity of the insect populations on the other. Studying *Cry* genes and their corresponding insecticidal proteins is an important and fruitful part of this research.

COTTON PRODUCTION TO FALL SHORT OF 3.5 MILLION BALES

Daily Times (Pakistan) - January 5, 2009

KARACHI - The country will face a shortfall of 3.5 million cotton bales as its production remained below the target during this season, Pakistan Cotton Ginners Association (PCGA) and Karachi Cotton Association (KCA) said Monday.

"Irrigation water scarcity and inadequate policies of the federal government besides non professional approach by Central Cotton Committee setting the parameters to achieve

target of crop will cost textile sector to import lint worth Rs 45 billion," they said.

According to figures of PCGA, total arrival of cotton in the country is 9,744,546 running bales. Out of which 7,432,543 bales were bought by the spinners, 254,431 bales by the exporters and TCP has taken 97,400 bales. Remaining stock available is 1,472,600 bales (pressed). A member on KCA Board, Ghulam Rabbani said due to reduction in Pakistan's crop, imports of the country would also jump 25 percent during 2008-09.

He said Standard Operating Procedures (SOPs) were required to evaluate and monitor the release of biotech varieties in Pakistan. The SOPs should be more transparent, efficient and professional and they should be streamlined without compromising on principles of bioenvironmental safety. Since bio-safety rules and guidelines were approved and promulgated in the year 2005 so the whole process of legalising the matter and devising of standard procedures took some time to delay the matter mainly due to this being a multi-stake inter-ministerial task. He said around 45 percent of the total cultivation in the country is BT type cotton. Nearly 90 percent of this type is cultivated in Sindh and about 30 percent is cultivated in Punjab. The production remained low

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CREAM OF THE (WEB) CROP

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THIS MONTH'S PICK:

International Food Policy Research Institute website

<http://www.ifpri.org/>

The International Food Policy Research Institute (IFPRI) is one of 15 centers supported by the Consultative Group on International Agricultural Research (CGIAR), an alliance of 64 governments, private foundations, and international and regional organizations. IFPRI's vision is a world free of hunger and malnutrition. Its mission is to provide policy solutions that reduce poverty and end hunger and malnutrition.

There are many aspects to public policy on sustainable food security and nutritional improvement however, as with all research in a policy setting, wide dissemination of results and related information is critical. Thus, the IFPRI website is more than just a place to inform the public of their activities, being instead an integral part of its activities. The website contains:

- Results of current and past research on food, agriculture and nutrition policies;
- Details on IFPRI's 2020 Vision Initiative whose objective is to develop and promote a shared vision and consensus for action for meeting food needs while reducing poverty and protecting the environment; and generating information and encouraging debate to influence action by stakeholders.
- A breakdown, on a country-by-country basis, of information about IFPRI research programs, data sets and publications on a country-by-country basis.
- An archive of IFPRI and ISNAR publications, including search and browse functions, and a mechanism for ordering copies of these publications.
- Data sets of primary and secondary data compiled, in collaboration with IFPRI, by institutions throughout the world. Use of the data, which provides a wealth of information at the local, national and global levels, is encouraged for research and policy analysis.
- The IFPRI Library, which provides reference services and produces and maintains value-added information

products. These products include CD ROMs and full text bibliographic databases of policy research by IFPRI and its partners. Online tools include access to more than 11,000 records held by the IFPRI Library; a global link to leading research on food crops, livestock, fisheries, water resources, forestry, plant genetics, and food and nutrition policy; access to current research information for researchers in the developing world; economics literature about genetic resources; and the library collection for ISNAR as of 2004.

- Details of forthcoming and past conferences, seminars and workshops given by IFPRI as well as selected non-IFPRI events that concern food security.
- Resources for journalists including highlights of recent research, press releases and IFPRI issue briefs.
- Links to learning materials, workshops and events.

What makes the IFPRI website a valuable resource is the breadth of topics that are covered in their research portfolio and the large amount of primary data that has been collected through this research. The availability of primary data ranging from geospatial mapping data sets to household and community-level surveys can facilitate impact assessment by providing a baseline on which introduction of new products or policies can be determined. This kind of *ex ante* analysis is an important part of IFPRI's work and will continue to play a critical role in its operation.



Cotton - continued from page 2

on the poor production of quality seeds, inadequate supply of quality inputs and uncertified sowing of *Bacillus Thuringiensis* (BT) variety of cotton in the country.

In Pakistan, most of the BT cotton varieties were marketed with wrong notation of resistance to all pests. In some instances this variety was mixed with non-BT cottonseed and affected the yield.

The national seed requirement of cotton in the country is 62,000 metric tonnes while its availability from local seed sector is about 39,845 metric tonnes (64 percent of the total seed requirement). The remaining 36 percent of seed is produced and distributed through informal sector like grower-to-grower exchange. He said in the last season target of 14.11 million cotton bales was revised from 14.14 million bales, which also could not be met.

Chief Executive Officer Drechenderg Trading Company in Lubbock, Texas USA Fazal Ahmad, dealing in cotton and pesticides, said lack of expertise in fighting CLCV attack and minimising reddening of leaf inflicted losses to the cotton yield.

He said Pakistan spends about more than Rs 10 billion on import of various kinds of pesticides and about 75 percent of them were used in cotton. The country's economy depends to a great extent on cotton and its products. Cotton crop required an intensive use of pesticides as various types of pests that attack these crops cause extensive damage. Chairman PCGA, Chuadhry Muhammad Akram Jatt said world consumption would face a decline of 7.1 percent while consumption in China, India and Pakistan would also stand below.

BIOTECHNOLOGY, BIOSAFETY AND THE CGIAR

The Consultative Group on International Agricultural Research (CGIAR) has made available a pre-publication report "Biotechnology, Biosafety and the CGIAR: Promoting best practice in Science and Policy". This is the report of a workshop held 22-24 April 2008 in Los Banos, the Philippines, jointly organised by the Science Council (SC) of the CGIAR, the International Rice Research Institute and Bioversity International. It reviewed biotechnology-related work in the CGIAR and partner National Agricultural Research Systems (NARS) and focused discussion on three major issues: i) How CGIAR Centers can best work with NARS to ensure a smooth and timely delivery of research products to target farmers; ii) CGIAR's need for a Biotechnology Research Support Network, its roles and functions; and iii) How CGIAR should deal with policy issues related to biotechnology and be represented in international fora.

The report states:

"Currently no CGIAR Center has reached the release stage for a genetically modified (GM) crop; the most advanced project is that of IRRI and its partners with golden rice, with staged release planned for 2011/2012. However, progress in this area is providing lessons for all involved as it goes hand-in-hand with the establishment of biosafety regulations and their operation in partner developing countries.

The workshop's main outcomes can be summarized into three points:

1. There is a clear need for special procedures, particularly involving key NARS at the earliest stage, to ensure efficient flow from research to use.

2. A network to improve the delivery of CGIAR biotech products is imperative. The Network should involve NARS and other partners. Its functions should include identification of best practices, development of business plans, and other aspects of product development and delivery.
3. System-wide representation at international policy fora should be coordinated (possibly through the CGIAR Biotechnology Research Support Network), particularly in providing technical contributions and highlighting research options/scenarios."

The document is available at http://www.sciencecouncil.cgiar.org/fileadmin/user_upload/sciencecouncil/Priorities_and_Strategies/BiosafetyWorkshop_for_web.pdf.

PLANT GENOMICS LAND BIG PRIZES

Nature Biotechnology - January 2009

The winners of one of the US's largest annual competitive grant program for plant genome research have been announced. The National Science Foundation (NSF) has awarded nearly \$60 million to 20 projects focused on gene function and the interactions between genomes and the environment in economically important plants. Winning projects each receive up to \$6.8 million over the next two to five years, and many involve multi-institution collaborations with international partners. Since its inception 11 years ago, the NSF's grant program has infused nearly \$800 million into plant genomics. "I'm not sure if we would've ever been able to sequence the maize genome without this program," says plant genetics researcher and past recipient Clifford Weil, of Purdue University in West Lafayette, Indiana. In addition to the NSF awards, the Department of Agriculture doles out each year about \$13 million in competitive grants through its plant genome program, which began in 1991, and the Department of Energy in recent years has awarded more than \$7 million annually in such grants. Much of this national funding is coordinated by the National Plant Genome Initiative. The effort began in 1998 after "recognition in 1998 that there wasn't a large amount of public resources for plant genomics," so NSF's budget was increased, says Jane Silverthorne, a spokesperson deputy division director for the foundation.

See the full article at <http://www.nature.com/nbt/journal/v27/n1/full/nbt0109-5.html>

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