



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.

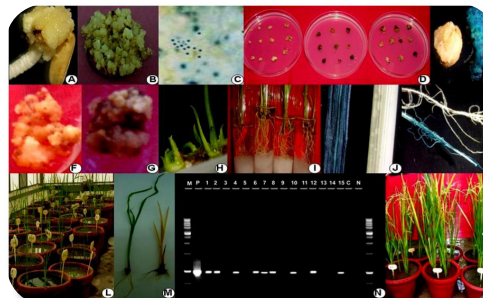
ENHANCING CROP PRODUCTIVITY USING BIOTECHNOLOGY TOOLS: INITIATIVES BY PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA

Dr. S.S. Gosal, Director, School of Agricultural Biotechnology, Punjab Agricultural University, Ludhiana

A series of research projects are underway at School of Agricultural Biotechnology, Punjab Agricultural University, Ludhiana, with support from the Department of Biotechnology, Government of India to develop transgenic crops using modern biotechnology tools for addressing the biotic and abiotic stresses, particularly in the context of the climate changes. Major attention is being focused on wheat, rice, maize and sugarcane. A brief overview of various initiatives follows.

1. **Physiology and biochemistry of heat tolerance at different stages of plant growth in wheat and germplasm development through biotechnological application:** During the past 15 years, in the North Western Plain Zone of India, particularly in Punjab State, the grain bowl of India, there is an increase in the average temperature up to 10°C. The increase in the minimum temperature during night at tillering stage and increase in the maximum temperature at flowering/grain filling stage in wheat is now severely affecting wheat productivity. Efforts are being made to identify heat tolerant genotypes using all possible: physiological, biochemical, DNA markers

GENETIC ENGINEERING OF RICE FOR GREATER WATER USE EFFICIENCY



coupled with field screening under natural and artificial conditions. The identified genes will be introgressed in upcoming breeding lines/varieties following doubled haploid breeding using wheat X maize crosses.

2. **Biotechnological interventions to enhance water-use efficiency in rice:** Depletion in the groundwater level has occurred due to large scale cultivation of anaerobic rice. Therefore, attempts are being made to improve the water-use efficiency of indica type rice following marker assisted selection and transgenic approaches. Transgenes such as *OsglyI*, *OsglyII* have been introduced into commercial rice varieties PR 116 and PAU201 through particle bombardment to develop abiotic stress tolerant transgenic rice. Transgenic plants have been grown to maturity in the transgenic glass house.

DIRECT PLANT REGENERATION IN SUGARCANE



3. **Molecular mapping and transgenic development for resistance to stem borer, and tolerance to abiotic stresses in maize:** Maize is very sensitive to both drought and flooding and lacks resistance against maize stem borer. To develop maize germplasm resistant to abiotic stresses and stem borer, DNA/protein markers and transgenic approaches are being used.

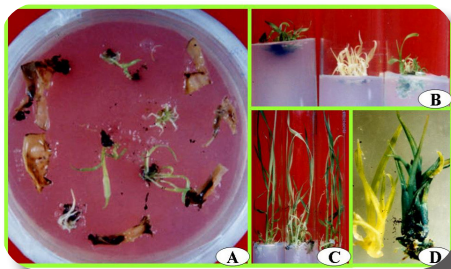
4. **Biotechnological inventions for resistance to *Phytophthora* and tolerance to salinity in rough lemon:** In several subtropical regions, the major cause of citrus decline is *Phytophthora*, a causal agent of gummosis and foot rot diseases. Some local strains of *Trichoderma* that are antagonistic to *Phytophthora* have been identified and a chitinase gene 301 (aa ORF from the 1050 bp T-1 PCR amplified DNA fragment) has been

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cloned from *Trichoderma*. A gene construct containing Chitinase ORF under the control of CaMV 35S promoter has been developed for citrus transformation.

5. Efficient plant regeneration and genetic transformation of sugarcane using tissue culture techniques: The tissue culture technique has been used to develop a highly reproducible and high frequency plant regeneration directly from

AGROBACTERIUM MEDIATED GENETIC TRANSFORMATION OF SUGARCANE



young leaves and via somatic embryogenesis for some popular sugarcane varieties. Genetic transformation using embryogenic calli and cultured young leaves has been achieved using *Agrobacterium* and particle gun methods.

BANGLADESH INTER-MINISTERIAL MEETING HELD ON FINALIZATION OF BIOSAFETY RULES

An inter-ministerial meeting on the finalization of Biosafety Rules of Bangladesh was held at the Bangladesh Ministry of Environment and Forests (MOEF) on September 8, 2010. Dr. Mihir Kanti Majumder, Secretary, MOEF presided over the meeting with representatives from various ministries including Ministry of Agriculture, Ministry of Science & ICT, Ministry of Commerce, Director General, Department of Environment, concerned officials of MOEF and members of the Biosafety Core Committee.

Dr. Majumder requested additional comments/suggestions on the draft Biosafety Rules from the members. Mr. Muhammad Solaiman Haider, Deputy Director, Department of Environment and Member Secretary, National Committee on Biosafety & Biosafety Core Committee gave an overview of the development process of the Biosafety Rules and pointed out all relevant stakeholder and individual suggestions/comments received during the consultation meeting had been incorporated into the document.

Following the discussion those in attendance were asked to send written comments/suggestions to MOEF within seven working days. If further comments/suggestions are not received then the documents will be considered final and will be sent to Ministry of Law for vetting before being gazetted.

A HARMONIZED APPROACH TO THE REGULATION OF BIOTECHNOLOGY IN EASTERN AND SOUTHERN AFRICA

The Common Market for Eastern and Southern Africa (COMESA) is set for a harmonized biotechnology policy to help provide centralized guidance on trade in genetically modified organisms (GMO) and their transit for sale within the region.

Dr. Getachew Belay, the COMESA senior biotechnology policy advisor, recently said the process of formulating the guidelines, which would also be applied for emergency food aid with GMO content, is at an advanced stage.

He was speaking at the recent Regional Approach to Biotechnology Policy in Eastern and Southern Africa (RABESA) National Workshop on Biosafety Policies and guidelines meeting in Kampala.

RABESA is an initiative by COMESA Ministers of Agriculture with the broad objective of supporting harmonization of biosafety policies among its member states. It was formed with the aim of helping to tackle the issues that GMOs raise for trade and access to emergency food aid across the region.

Many of the countries in the region are in the process of setting regulatory frameworks to guide the production and trade in GMOs. However, there is a worry that differences in national biosafety policies could hamper the cross-border movement of essential commodities such as food relief.

The policy harmonization move is therefore in response to a call by COMESA Ministers of Agriculture at their 5th meeting in Seychelles in 2008; for a uniform policy for handling commercial planting and trade in GMOs.

"A Commercial Trade Policy to guide COMESA countries in trade in the region and with other parts of the world with respect to GMO crops and their products is necessary," the Draft policy statement and guidelines that were presented at the RABESA meeting, reads in part.

"In the absence of such a regionally recognized policy, potential disruption of intra-regional trade would be a major threat."

Dr. Theresa Sengooba, the Program for Biosafety System (PBS) Regional Coordinator, said for countries with limited resources, regional cooperation is a realistic option for accessing and gradually building the necessary capacities for the effective implementation of international obligations and agreements such as the Cartagena Protocol on Biosafety.

However, Mr. Arthur Makara, the executive director of Science Foundation for Livelihoods and Development (SCIFODE), said the new rules will also accelerate the adoption of technology with enormous potential in reducing problems associated with food insecurity, meager household income and vulnerability resulting from climate change.

Source: allAfrica.com

COMESA is also advocating strategies such as 'maize without borders' to remove trade barriers in the movement of maize across member states. Maize is one of the most widely traded and distributed commodities accounting for 50 per cent of COMESA's total grain imports.



"Egypt, a COMESA member state, has approved commercialisation of genetically modified maize and a number of COMESA member states belong to the South African Development Community (SADC) where South Africa, a SADC member, grows both yellow and white GM maize on a commercial scale," said Mr. David Wafula, the country coordinator of PBS Kenya, while presenting a paper on commercial trade in GMOs.

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The Reading List

. . . new and notable articles

OCCURRENCE AND FIELD DENSITIES OF COLEOPTERA IN THE MAIZE HERB LAYER: IMPLICATIONS FOR ENVIRONMENTAL RISK ASSESSMENT OF GENETICALLY MODIFIED BT-MAIZE

S. Rauschen, F. Schaarschmidt and A. Gathmann.

Beetles (Coleoptera) are a diverse and ecologically important group of insects in agricultural systems. The Environmental Risk Assessment (ERA) of genetically modified *Bt*-crop varieties with insect resistances thus needs to consider and assess the potential negative impacts on non-target organisms belonging to this group. We analysed data gathered during 6 years of field-release experiments on the impact of two genetically modified *Bt*-maize varieties (*Ostrinia*-resistant MON810 and *Diabrotica*-resistant MON88017) on the occurrence and field densities of Coleoptera, especially the two families Coccinellidae and Chrysomelidae. Based on a statistical analysis aimed at establishing whether *Bt*-maize varieties are equivalent to their near-isogenic counterparts, we discuss the limitations of using field experiments to assess the effects of *Bt*-maize on these two beetle families. The densities of most of the beetle families recorded in the herb layer were very low in all growing seasons. Coccinellidae and Chrysomelidae were comparatively abundant and diverse, but still low in numbers. Based on their role as biological control agents, Coccinellidae should be a focus in the ERA of *Bt*-plants, but given the large natural variability in ladybird densities in the field, most questions need to be addressed in low-tier laboratory tests. Chrysomelidae should play a negligible role in the ERA of *Bt*-plants, since they occur on-crop as secondary pests only. Species occurring off-crop, however, can be addressed in a similar fashion as non-target Lepidoptera in Cry1Ab expressing *Bt*-maize.

Transgenic Research 19 (5): 727-744.

PLANT NATURAL VARIABILITY MAY AFFECT SAFETY ASSESSMENT DATA

R. Batista R and M. Oliveira

Before market introduction, GE food products, like any other novel food product, are subjected to extensive assessment of their potential effects on human health. In recent years, a number of profiling technologies have been explored aiming to increase the probability of detecting any unpredictable unintended effect and, consequently improving the efficiency of GE food safety assessment. These techniques still present limitations associated with the interpretation of the observed differences with respect to their biological relevance and toxicological significance. In order to address this issue, in this study, we have performed 2D-gel electrophoresis of five different ears of five different MON810 maize plants and of other five of the non-transgenic near-isogenic line. We have also performed 2D-gel electrophoresis of the pool of the five protein extractions of MON810 and control lines. We have noticed that, in this example, the exclusive use of data from 2D-electrophoresed pooled samples, to compare these two lines, would be insufficient for an adequate safety evaluation. We conclude that, when using "omics" technologies, it is extremely important to eliminate all potential differences

due to factors not related to the ones under study, and to understand the role of natural plant-to-plant variability in the encountered differences.

Regulatory Toxicology and Pharmacology. 2010 Sep 6. [Epub ahead of print]

COTTON BOLLWORM RESISTANCE TO BT TRANSGENIC COTTON: A CASE ANALYSIS

C. Liu, Y. Li, Y. Gao, C. Ning and K. Wu

Cotton bollworm (*Helicoverpa armigera*) is one of the most serious insect pests of cotton. Transgenic cotton expressing Cry toxins derived from a soil bacterium, *Bacillus thuringiensis* (Bt), has been produced to target this pest. Bt cotton has been widely planted around the world, and this has resulted in efficient control of bollworm populations with reduced use of synthetic insecticides. However, evolution of resistance to this pest threatens the continued success of Bt cotton. To date, no field populations of bollworm have evolved significant levels of resistance; however, several laboratory-selected Cry-resistant strains of *H. armigera* have been obtained, which suggests that bollworm has the capacity to evolve resistance to Bt. The development of resistance to Bt is of great concern, and there is a vast body of research in this area aimed at ensuring the continued success of Bt cotton. Here, we review studies on the evolution of Bt resistance in *H. armigera*, focusing on the biochemical and molecular basis of Bt resistance. We also discuss resistance management strategies, and monitoring programs implemented in China, Australia, and India.

Science China Life Sciences (2010) 53(8):934-41.

SUCCESSIVE SILENCING OF TANDEM REPORTER GENES IN POTATO (*SOLANUM TUBEROSUM*) OVER 5 YEARS OF VEGETATIVE PROPAGATION

E. Nocarova, Z. Opatrny Z and L. Fischer

Transgenic plants represent an excellent tool for experimental plant biology and are an important component of modern agriculture. Fully understanding the stability of transgene expression is critical in this regard. Most changes in transgene expression occur soon after transformation and thus unwanted lines can be discarded easily; however, transgenes can be silenced long after their integration. To study the long-term changes in transgene expression in potato (*Solanum tuberosum*), the activity of two reporter genes, encoding green fluorescent protein (GFP) and neomycin phosphotransferase (NPTII), was monitored in a set of 17 transgenic lines over 5 years of vegetative propagation in vitro. A decrease in transgene expression was observed mainly in lines with higher initial GFP expression and a greater number of T-DNA insertions. Complete silencing of the reporter genes was observed in four lines (nearly 25 per cent), all of which successively silenced the two reporter genes, indicating an interconnection between their silencing. The loss of GFP fluorescence always preceded the loss of kanamycin resistance. Treatment with the demethylation drug 5-azacytidine indicated that silencing of the NPTII gene,

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CALENDAR OF EVENTS

Event	Organized by	Date and Venue	Website
INDIA			
National Conference on Paradigm Shift in Cotton Research and Cultivation	Navsari Agricultural University	October 20 - 22, 2010	http://www.nau.in/n.pdf
Managing Agricultural Innovations in an Era of Globalization	Indian Agricultural Research Institute	October 25 - 30, 2010 New Delhi	http://www.iari.res.in/files/training-ag-eco-25-oct.pdf
National Symposium on Food Security in Context of Changing Climate	The Society of Agricultural Professionals and Chandra Shekhar Azad University of Agriculture and Technology, Kanpur	October 30 - November 1, 2010 Kanpur	http://www.csauk.ac.in/
World Cotton Research Conference-5	International Cotton Advisory Committee (ICAC) and Indian Society for Cotton Improvement	November 7 - 11, 2010 Mumbai	http://www.icac.org/meetings/wcrc/wcrc5/wcrc5_brochure.pdf
ICAR Winter School on Molecular Techniques in Gene Isolation and Characterization	National Research Centre on Plant Biotechnology	November 8 - 28, 2010	http://www.nrcpb.org/brochure_icar_winter_school.pdf
INTERNATIONAL			
An Introduction to the Risk Analysis of Current Genetically Modified Organisms (GMOs) and their Products, and to Possible Issues Raised by Novel GMOs in the Future	Biosafety Unit, International Centre for Genetic Engineering and Biotechnology (ICGEB)	September 27 - October 1, 2010 Trieste, Italy	http://www.icgeb.org/meetings-and-courses.html
Biosafety Course on Introduction to Risk Analysis of GMO	Kuwait Institute for Scientific Research	October 3 - 7, 2010 Safat, Kuwait	http://www.icgeb.org/meetings-2010.html
11th International Symposium on the Biosafety of Genetically Modified Organisms (ISBGMO)	International Society for Biosafety Research	November 15 - 20, 2010 Buenos, Argentina	http://www.isbgmo.info/
BIT's 4th Annual World Congress of GENE-2010: Gene Technology, Environment and Economic Growth	BIT Life Sciences, Inc.	December 1 - 4, 2010 Sanshui, Foshan, China	http://www.bitlifesciences.com/wcg2010/fullprogram.asp
6th International Plant Tissue Culture & Biotechnology Conference	Bangladesh Association for Plant Tissue Culture & Biotechnology (BAPTC&B)	December 3 - 5, 2010	http://www.baptc.org/ptcb_Conference_2010.pdf

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A harmonized approach is also expected to help member states to share the cost of testing biotechnology products, which is too high for many of the members to afford individually.

According to one of the guidelines stipulated in the draft, for a GMO from a non-member state to be traded as food in COMESA countries, approval thereof must have been granted by the National Competent Authority of one of the countries and an opinion on the risk assessment review conducted by a GMO Risk Assessment Sub-committee of COMESA.

The guidelines on GMOs in transit indicate that for a GMO approved in one COMESA country transiting through another, automatic approval should be given provided trans-boundary movement requirements of the Cartagena Protocol are observed such as advance informed agreement and notification.

JRC PUBLISHES AN OVERVIEW OF EU GMO LEGISLATION

The Joint Research Centre (JRC) has published a comprehensive overview of the EU regulatory framework for GMOs related to release into the environment, food and feed use, authorisation procedures, traceability and labelling, GMO detection, updated coexistence guidelines and the Cartagena Protocol on Biosafety.

The document can be downloaded from <http://mbg.jrc.ec.europa.eu/home/documents/2010-08-12%20EU%20Legislation%20Overview%20JRC%20Report.pdf>. The key regulatory texts can be found in the annex.

READING LIST - continued from page 3

but probably not of GFP, occurred directly at the transcriptional level. Successive silencing of the two reporter genes was also reproduced in lines with reactivated expression of previously silenced transgenes. We suggest a hypothetical mechanism involving the successive silencing of the two reporter genes that involves the switch of GFP silencing from the post-transcriptional to transcriptional level and subsequent spreading of methylation to the NPTII gene.

Annals of Botany 2010 Sep 8. [Epub ahead of print]

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