



**SOUTH ASIA**  
BIOSAFETY PROGRAM

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# NEWSLETTER

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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.

## CONFERENCE "SURROGATE SPECIES SELECTION FOR ASSESSING POTENTIAL ADVERSE ENVIRONMENTAL IMPACTS OF GENETICALLY ENGINEERED PLANTS ON NON-TARGET ORGANISMS" HELD IN WASHINGTON, DC

Michael Wach, J.D., Ph.D., Senior Scientific Program Manager, Center for Environmental Risk Assessment, ILSI Research Foundation, Washington DC

According to 2011 data, genetically engineered crops employing one or more genes for insect resistance were grown on approximately 60 million hectares globally. With studies showing that insect resistant crops provide growers with higher yields, cost savings, and a better quality crop, that number is expected to increase in the future. Most regulatory authorities require that genetically engineered, insect-resistant crops be evaluated for any potential to have adverse impacts on organisms not intended to be controlled by the trait, referred to as "non-target organisms" (NTOs). Devising and conducting tests to evaluate impacts to NTOs can pose both conceptual and logistical challenges for researchers, and the challenges are likely to increase as these crops are considered for commercial planting in a growing number of new geographic locations. A primary challenge is the selection of test species that best serve as surrogates for the valued NTOs in the area in which the GE crop is going to be introduced. There are many variables to be considered: surrogates must be either collected or purchased, as large, uniform populations; they must perform well on an artificial

diet and be amenable to manipulation under laboratory conditions; and validated test protocols must be available. But the most important goal, from the standpoint of regulatory decision making, is that the data derived from surrogates should accurately predict any adverse impacts likely to be observed from the use of the crop in the agricultural context.

To help identify and address the challenges facing researchers studying the effects of genetically engineered insect-resistant crops on NTOs, the Center for Environmental Risk Assessment (CERA) hosted the conference "Surrogate Species Selection for Assessing Potential Adverse Environmental Impacts of Genetically Engineered Plants on Non-Target Organisms." The Conference was held in the Washington, DC office of the International Life Sciences Institute Research Foundation, June 26-28, 2012. The Conference brought



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together 37 government, university, and private industry scientists from around the world representing the fields of entomology, ecology, agronomy, chemistry, and ecotoxicology. The objectives of the conference were to identify key criteria for surrogate species selection for laboratory, semi-field, and field testing and to identify best practices for surrogate testing, with a particular focus on facilitating data transportability. The conference included presentations, case studies, and breakout and plenary discussions. Presentation topics included

- Retrospective on the Evolution of Surrogate Species Selection for Pesticide Testing
- Host Range Testing for Natural Enemy Introductions
- Transportability of Ecological Toxicity Test Data for an Arthropod-Active GE Event in the Context of Using the Surrogate Species Approach for Non-target Organism Testing
- Practical Considerations for Surrogate Species Selection for Semi-Field and Field Tests
- Applying Problem Formulation to Help Identify Risk Hypotheses Relevant to Environmental Impact of Arthropod-Active GE Plants on Non-Target Organisms
- Arthropods Contributing to Ecosystem Services in Different Cropping Systems

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## Conference - continued from page 2

In addition, participants heard presentations on approaches to assessing NTO impacts used in the countries of the European Union, Argentina, Brazil, Mexico, the Philippines, and the United States.

The participants then engaged in two days of breakout discussion groups. During the first day, they determined which ecological functions should be represented in the assessment of arthropod-active GE crops—identifying herbivores, pollinators, predators, parasitoids, and decomposers. The group also discussed circumstances when the phylogenetic relatedness of a surrogate might be more relevant than the ecological function that the surrogate performed. Then, they discussed criteria for surrogate species selection. In developing these criteria, the participants focused on ensuring that NTO testing would be practicable, test results would be scientifically and statistically valid, and the data obtained would accurately predict any adverse impacts likely from the use of the crops. On the second day, the participants worked to develop appropriate NTO impact assessment approaches for two case studies: a Bt-rice variety and an aphid-resistant soybean variety. At the conclusion of the three-day meeting, the participants reconvened to derive a list of consensus points from the conference:

1. Provided adequate margins of safety, hazard testing that is used to inform the in-field assessment informs the off-field assessment.
2. Surrogate species are the appropriate test organisms for laboratory and semi-field studies.
3. Representative taxonomic groups are the appropriate level of resolution (test unit) for census field studies.
4. Measures of "surrogate" processes representative of ecological function in the field can be a valuable tool.
5. Identifying faunistic similarities across geographies supports data transportability.
6. Field studies should focus on the taxa that are one or two trophic levels away from the crop.
7. Sufficient information for robust/rigorous risk characterization can be developed through problem formulation, the tiered testing process, and the use of surrogate species.
8. Pests can be used as surrogates.
9. There was consensus on surrogate selection criteria for early tier tests.

The proceedings of the Conference include the presentations, case studies, summaries of the breakout and plenary discussions, and the points of consensus agreed to by the participants, and they are available on the CERA website at [http://cera-gmc.org/uploads/pub\\_01\\_2013.pdf](http://cera-gmc.org/uploads/pub_01_2013.pdf).

## DECISIONS FROM COP/MOP 6 IN THE CONTEXT OF BANGLADESH

Mohammed Solaiman Haider, Deputy Director (Technical), Department of Environment, Bangladesh, and Member Secretary to the National Committee on Biosafety. Email: [haider.doe@gmail.com](mailto:haider.doe@gmail.com)

The Sixth Meeting of the Parties to Cartagena Protocol on Biosafety (COP/MOP 6) was held during October 1-5, 2012 in Hyderabad, India. Headed by Dr. Hasan Mahmud, MP, the Minister for Environment and Forests, a five-member delegation was formed to attend the meeting.

The meeting adopted 16 decisions on: compliance; the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress (the Supplementary Protocol); subsidiary bodies; cooperation with other organizations, conventions and initiatives; the Biosafety Clearing-House (BCH); capacity building; the roster of experts; monitoring and reporting; assessment and review; notification requirements; handling, transport, packaging and identification (HTPI) of living modified organisms (LMOs); unintentional transboundary movements of LMOs; financial mechanism and resources; socio-economic considerations; risk assessment and risk management; and the budget.

Being the first COP/MOP after the completion of the Supplementary Protocol, the meeting revealed several substantive issues that the COP/MOP might focus on moving forward. The decision on socio-economic considerations, which establishes for the first time an Ad Hoc Technical Expert Group (AHTEG) to develop conceptual clarity, opens the way to developing guidelines in the future regarding socio-economic risk assessment.

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## UPCOMING FAO BIOTECHNOLOGY FORUM ON GENOMICS FOR AGRICULTURE IN DEVELOPING COUNTRIES FAO e-mail conference

The FAO Biotechnology Forum (<http://www.fao.org/biotech/biotech-forum/>) will host its next e-mail conference from March 4 to 24, 2013 and that its provisional title is "Current and future impacts of genomics for the crop, forestry, livestock, fishery and agro-industry sectors in developing countries".

Genomics is the study of all the genetic material (genome) of an organism. The genomes of several hundred species, including mammals, fish, trees, crops, bacteria and viruses, have already been sequenced or are currently being sequenced. For example, the rice genome sequence was published in 2002 and the chicken genome sequence in 2004. Over time, genome sequencing has become much cheaper and quicker. This e-mail conference will look at the impacts that genomics is currently having on food and agriculture in developing countries as well as the potential impacts that it may have for developing countries in the future.

As usual, the conference is open to everyone, is free and will be moderated. To subscribe to the conference, send an e-mail to [listserv@listserv.fao.org](mailto:listserv@listserv.fao.org) with the following one line in the body of the message (leave the subject line blank):

*subscribe biotech-room3-L firstname lastname*

Where firstname and lastname refer to the person's first and last name. For example, if the subscriber's name is John Smith, then the line should be:

*subscribe biotech-room3-L John Smith*

For more information, contact [biotech-mod3@fao.org](mailto:biotech-mod3@fao.org). A background document is being prepared and will be sent to Forum members before the conference begins. This is the 19th e-mail conference to be hosted by the FAO Biotechnology Forum since it was launched in the year 2000.

### Bangladesh and the Relevance of Decisions of COP/MOP 6:

**B**angladesh, in response to the decisions of COP/MOP in Hyderabad, is continuing its implementation of the Protocol. Bangladesh has expedited its efforts to put in place legal and administrative frameworks to meet obligations under the Protocol. To be noted here that Bangladesh developed the National Biosafety Framework (NBF) in 2007 and the country has taken the initiative to implement the NBF with the technical assistance of the GEF. Bangladesh has been also working on raising public awareness, education and participation on safe transfer, handling and use of LMOs in the country.

**T**he country has also established Biosafety Clearing-House (BCH), but more work has to be done to make it effective. In the negotiation, Bangladesh delegation stressed the importance of enhancing the technical assistance from GEF to achieve sustainable operation and activities of the Biosafety Clearing-House. Bangladesh also emphasized the need for coordination and network building between administrators in the central portal and country focal points of the BCH for regular updating and operationalization of the BCH. This could be addressed through further capacity building activities. Bangladesh is also working on fulfilling the obligations under the Protocol and the decisions of COP/MOP to update all incomplete published national records with the mandatory fields required by the common formats.

**B**angladesh continues to stress the need to streamline, simplify and expedite the process of accessing funds from the GEF Trust Fund; and make available, in a timely manner, adequate and predictable financial resources to eligible par-

ties in order to facilitate the preparation of their third national reports under the Protocol. Bangladesh has already submitted the second National Biosafety Report to the convention secretariat and to the BCH Central Portal.

**A**s a party to the Protocol, Bangladesh is looking for pragmatic actions to implement the Framework and Action Plan for capacity building and to share experiences through the BCH while the country would urge the developed country parties and donors and relevant organizations to take into account the Framework and Action Plan in providing financial and technical support. Bangladesh is also stressing the need for enabling activities to evaluate, apply, share and carry out risk assessments; develop capacity for HTPI of LMOs; and establish and apply rules and procedures on liability and redress for damage resulting from transboundary movements of LMOs as well as enhancing capacity to facilitate public awareness and promote education on safe transfer, handling and use of LMOs.

**B**angladesh is working towards addressing the gaps in domestic implementation of notification requirements related to intentional transboundary movements of LMOs. As a developing country party, Bangladesh is also working towards ratification, approval, acceptance of or accession to the Supplementary Protocol.

**T**he challenge for the COP/MOP in future will be to motivate countries to implement the preventive measures before a problem occurs from the use of LMOs. Bangladesh would follow these developments up with its regulatory system, which continues to move towards full functional operationalization.



## The Reading List

. . . new and notable articles

### **EXPRESSION OF CRY1AA IN CASSAVA IMPROVES ITS INSECT RESISTANCE AGAINST *HELICOVERPA ARMIGERA***

Duan X, Xu J, Ling E, Zhang P

Lepidopteran insects affect cassava production globally, especially in intercropping system. The expression of Cry toxins in transgenic crops has contributed to an efficient control of insect pests, leading to a significant reduction in chemical insecticide usage. *Helicoverpa armigera* is a Lepidopteran pest that feeds on a wide range of plants like cotton and cassava. In the present study, transgenic cassava plants over-expressing Cry1Aa, which we named as Bt cassava, were developed and used to evaluate its efficacy against *H. armigera* as a model. Insect feeding assays were carried out to test the effects of Bt cassava leaves on the development and survival of *H. armigera*. Significant reduction ( $P < 0.05$ ) in the survival and weight were detected on larvae fed with Bt cassava leaves in comparison with those fed with wild-type cassava leaves. The higher expression of Cry1Aa in transgenic cassava caused the lethal effect in larvae, in contrast to the normal growth and development of adults and pupation observed when fed with wild-type leaves. Morphological observation on the larval midguts showed that the consumption of Bt cassava affected the gut integrity of

*H. armigera*. The columnar cells of the midgut epithelium were dramatically damaged and showed loose or disordered structure. Their cytoplasm become highly vacuolated and contained disorganized microvilli. Our study demonstrated that the transgenic cassava expressing the Cry1Aa is effective in controlling *H. armigera*. Our Bt transgenic cassava plant would provide a long-term beneficial effect on all crops in intercropping system, which in-turn, will be profitable to the farmers.

PLANT MOLECULAR BIOLOGY (2013) JAN 17. [EPUB AHEAD OF PRINT]

SEE: [HTTP://LINK.SPRINGER.COM/ARTICLE/10.1007%2FS11103-012-0004-1](http://link.springer.com/article/10.1007%2FS11103-012-0004-1)

### **LABORATORY ASSESSMENT OF THE IMPACTS OF TRANSGENIC BT RICE ON THE ECOLOGICAL FITNESS OF THE SOIL NON-TARGET ARTHROPOD, *FOLSOMIA CANDIDA* (COLLEMBOLA: ISOTOMIDAE)**

Yuan Y, Xiao N, Krogh PH, Chen F, Ge F

Transgenic rice expressing *Bacillus thuringiensis* (Bt) endotoxins (Bt rice) for pest control is considered an important solution to food security in China. However, tests for potential effects on non-target soil organisms are required for environmental risk assessment. The soil collembolan *Folsomia*

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## CALENDAR OF EVENTS

Event	Organized by	Date and Venue	Website
<b>INDIA</b>			
International Conference on Advances in Biotechnology and Patenting (ICABP 2013)	Bharatidasan University	February 18 – 21, 2013 Tiruchirapalli, Tamil Nadu	<a href="http://icabp2013.webnode.com/">http://icabp2013.webnode.com/</a>
Workshop on Key issues in Commercialization of Biotechnology	Department of Biotechnology and Biotech Consortium India Limited	March 19, 2013 New Delhi	<a href="http://www.bcil.nic.in/DISC_Workshop.htm">http://www.bcil.nic.in/DISC_Workshop.htm</a>
BIRAC Foundation Day and BIRAC Grand Challenge Meet	Biotechnology Industry Research Assistance Council	March 20 - 22, 2013 New Delhi	<a href="http://www.birac.nic.in">http://www.birac.nic.in</a>
AP-TEC 2013@TIRUPATI	Confederation of Indian Industry (CII)	June 6 - 8, 2013 Tirupati, Chittoor, Andhra Pradesh	<a href="http://ow.ly/hOefY">http://ow.ly/hOefY</a>
<b>INTERNATIONAL</b>			
BIT's 6th Annual World Congress of Industrial Biotechnology (IBIO-2013)	Information Research Center of International Talent, SAFEA and China Medicinal Biotech Association	April 25 - 27, 2013 Nanjing, China	<a href="http://www.bitlifesciences.com/ibio2013/">http://www.bitlifesciences.com/ibio2013/</a>
Stakeholders' Dialogue on Biosafety Regulations in Asia-Pacific	Asia-Pacific Association of Agricultural Research Institutions (APAARI)	April 2013 Bangkok, Thailand (details to be posted soon)	<a href="http://www.apaari.org/events/dialogue-biosafety-201.html">http://www.apaari.org/events/dialogue-biosafety-201.html</a>
Strategic Approaches in the Evaluation of the Science Underpinning GMO Regulatory Decision Making	ICGEB	July 1 - 5, 2013 Trieste, Italy	<a href="http://www.icgeb.org/~bsafesrv/training/future.html">http://www.icgeb.org/~bsafesrv/training/future.html</a>

### Reading List - continued from page 3

*candida* L. (Collembola: Isotomidae) is a potential non-target arthropod that is often used as a biological indicator in bio-safety assessments of transgenic crops. In the present study, the roots, stems, and leaves of Bt rice were exposed to *F. candida* under laboratory conditions, with survival, reproduction and growth of the collembolan as ecological fitness parameters. Significant differences in ecological fitness were found among the different treatments, including differences in the plant parts and varieties of non-Bt rice, presumably as the result of three factors: gene modification, plant parts and rice varieties. The fitness of *F. candida* was less affected by the different diets than by the exposure to the same materials mixed with soil. Our results clearly showed that there was no negative effect of different Bt rice varieties on the fitness of *F. candida* through either diet or soil exposure.

TRANSGENIC RESEARCH (2013) JAN 16. [EPUB AHEAD OF PRINT]

SEE: [HTTP://RD.SPRINGER.COM/ARTICLE/10.1007/S11248-013-9687-6](http://rd.springer.com/article/10.1007/s11248-013-9687-6)

### TAKING TRANSGENIC RICE DROUGHT SCREENING TO THE FIELD

Gaudin AC, Henry A, Sparks AH, Slamet-Loedin IH

Numerous transgenes have been reported to increase rice drought resistance, mostly in small-scale experiments under vegetative-stage drought stress, but few studies have

included grain yield or field evaluations. Different definitions of drought resistance are currently in use for field-based and laboratory evaluations of transgenics, the former emphasizing plant responses that may not be linked to yield under drought. Although those fundamental studies use efficient protocols to uncover and validate gene functions, screening conditions differ greatly from field drought environments where the onset of drought stress symptoms is slow (2-3 weeks). Simplified screening methods, including severely stressed survival studies, are therefore not likely to identify transgenic events with better yield performance under drought in the target environment. As biosafety regulations are becoming established to allow field trials in some rice-producing countries, there is a need to develop relevant screening procedures that scale from preliminary event selection to greenhouse and field trials. Multilocation testing in a range of drought environments may reveal that different transgenes are necessary for different types of drought-prone field conditions. We describe here a pipeline to improve the selection efficiency and reproducibility of results across drought treatments and test the potential of transgenic rice for the development of drought-resistant material for agricultural purposes.

JOURNAL OF EXPERIMENTAL BOTANY (2013) JAN;64(1):109-17. EPUB 2012 DEC 1.

SEE: [HTTP://JXB.OXFORDJOURNALS.ORG/CONTENT/EARLY/2012/11/30/JXB.ERS313](http://jxb.oxfordjournals.org/content/early/2012/11/30/jxb.ers313).

ABSTRACT

### SABP CONTACTS

#### India

Dr. Vibha Ahuja  
General Manager  
Biotech Consortium India Limited  
Anuvrat Bhawan, 5th Floor  
210, Deendayal Upadhyaya Marg  
New Delhi 110 002 India  
Email: [vibhaahuja@biotech.co.in](mailto:vibhaahuja@biotech.co.in)

#### Bangladesh

Prof. Dr. M. Imdadul Hoque  
Department of Botany  
University of Dhaka  
Dhaka - 1000  
Bangladesh  
Email: [mimdadul07@yahoo.com](mailto:mimdadul07@yahoo.com)

#### Others

Center for Environmental  
Risk Assessment (CERA)  
ILSI Research Foundation  
1156 Fifteenth Street, NW  
2nd Floor  
Washington D.C.  
20005-1743 USA  
Email: [info@cera-gmc.org](mailto:info@cera-gmc.org)



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