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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.

TRANSGENIC IMPROVEMENT OF PIGEONPEA AND CHICKPEA AT ICRISAT

Kiran K. Sharma and Pooja Bhatnagar-Mathur, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru 502 324, Andhra Pradesh, Email: k.sharma@cgiar.org

Pulses such as chickpea and pigeonpea form an important part of the diets of people in arid regions of the world, particularly the Indian subcontinent, and are an important source of vitamins, minerals and essential amino acids. However, these crops suffer heavy losses due to susceptibility to insect pests like pod borer, other diseases such as fungal pathogens, as well as a low tolerance to drought and low temperatures. Since there is little variability in the available germplasm for many of these constraints, the use of modern biotechnological approaches such as transgenic technology provides an attractive alternative for the development of enhanced germplasm in these crops.

Transgenic technology relies on the technical approaches of plant tissue culture and molecular biology for both research and to develop commercial products. ICRISAT has recognized the importance of the application of the genetic engineering technologies for the genetic enhancement of these important pulses and extensive efforts have been made over the past decade to develop *in vitro* tissue culture and *Agrobacterium*-mediated transformation systems for both pigeonpea and chickpea. Procedures that are efficient and reproducible are now available in both of these crops for routine applications. In addition, progress has been made in introducing specific traits into both pigeonpea and chickpea as detailed below.

The legume pod borer, (*Helicoverpa armigera*) is the major pest in these pulse crops, causing almost 50 per cent of the annual losses. Transgenic chickpeas and pigeonpeas expressing *cry1Ab*, *cry1Ac* and *cry2Aa* genes from *Bacillus thuringiensis* (Bt) have already been developed at ICRISAT and are being subjected to insect bioassays to identify events showing high Bt expression. ICRISAT conducted the world's first confined field trials on chickpeas with some of these selected transgenic events during 2003-2005 and events that showed promise in these trials have been advanced to further generations.

Projects are also underway to address nutritional aspects such as enhanced ß-carotene (provitamin A) production and seed-specific expression of sulfur-rich amino acids like methionine in pigeonpea. Preliminary studies showed a 2-6 fold increase in the total carotenoids and a 2-4 fold increase in the ß-carotene levels in some of the selected pigeonpea events. Biofortified pigeonpea has the potential to positively impact the health and nutrition of resource-poor people in the semi-arid tropics.

Chickpea

Since these pulse crops are grown in the rain-fed regions and are therefore exposed to severe climates in semi-arid tropic regions, at ICRISAT complex abiotic constraints like drought are also being addressed using transgenic approaches. The *P5CSF129A* gene encoding Δ1- *pyrroline-5-carboxylate synthetase* has been over-expressed in chickpea, under the control of the CaMV 35S promoter, for overproduction of proline. Proline acts as osmolyte and is known to have a role in osmotic adjustment and cell protection under water deficits. In another project, the *DREB1A* from *Arabidopsis thaliana* was introduced into a popular chickpea cultivar in order to improve both drought and salinity tolerance. The *DREB* gene is a transcription factor capable of transactivating DRE-dependant transcription in plant cells under the control of stress inducible *rd29* promoter. Several events over-expressing *DREB1A* showed superior water use efficiency when compared to their wild type counterparts. These transgenics are currently being evaluated under greenhouse conditions

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CALENDAR OF EVENTS			
Event	Organized by	Date and Venue	Website
INDIA			
National Symposium on Recent Developments in the Management of Plant Genetic Resources	Indian Society of Plant Genetic Resources and National Bureau of Plant Genetic Resources	December 17 - 18, 2009 New Delhi	http://www.nbpgr.ernet.in/
National Symposium on Climate Change, Plant Protection & Food Security Interface	Association for Advancement in Plant Protection Plant Health Clinic Laboratory, Directorate of Research, Bidhan Chandra Krishi Viswavidyalaya	December 17 - 19, 2009 Kalyani, West Bengal	http://www.aappbckv.org
International Conference on Biotechnology Based Sustainable Agriculture	International Life Sciences Institute (ILSI) – India and ILSI International Food Biotechnology Committee, Washington DC	December 19, 2009 New Delhi	http://www.ilsi-india.org/activities-events/forthcoming-activities.htm
International Conference on Food Security and Environmental Sustainability	Department of Agricultural and Food Engineering, Indian Institute of Technology (IIT), Kharagpur	December 17 - 19, 2009 Kanpur	http://www.ilsi-india.org
Biotechnology Fusion of Advanced Research and Teaching Conference	School of Biotechnology, Madurai Kamaraj University	January 2 - 4, 2010 Madurai	http://www.biotechmeet2010.in/
BioAsia 2010	Federation of Asian Biotech Associations	February 3 - 6, 2010 Hyderabad	http://www.bioasia.in/
Indian Seed Congress 2010	National Seed Association of India	February 12 - 13, 2010 Bangalore	http://www.indianseedcongress.com/
Annual Botanical Conference 2009	Department of Botany, Chittagong University & Bangladesh Botanical Society	January 9 – 10, 2010	http://www.bdbotsoc.org
2010 International Symposium on Cancer and Developmental Biology: Latest Biochemical Advances	Bangladesh Society for Biochemistry and Molecular Biology	January 29 – 31, 2010 Nabab Nawab Ali Chowdhury Senate Bhavan, University of Dhaka	http://www.bdsbmb.org
2010 International Conference on Biotechnology and Food Science (ICBFS 2010)	Food and Agricultural Society	February 9 - 10, 2010 Bangalore	http://www.iacsit.org/icbfs/index.htm

Pigeonpea - *continued from page 1*

in dry-down experiments that mimic the type of water stress to which plants would be exposed in a field-like situation.

These are examples of how transgenic technology could be used in chickpea and pigeonpea for the introduction of pest resistance, abiotic stress tolerance as well as value-added traits such as improved nutritional content. The transgenic plants referred to above are in different stages of development and are being studied further for their stability and efficacy. If successful, these events may be directly used in future breeding programs or in combination with other genes of interest.

Selected events will be further developed through the Platform for Translational Research on Transgenic Crops (PTTC), a collaborative effort between DBT and ICRISAT. This programme will facilitate collaborative efforts and provide a coordinated approach for translating these transgenic technologies into crop varieties that will be taken through the required food, feed and environmental safety studies prior to commercialization. Products developed through these advances will immensely benefit resource poor farmers in coping with productivity constraints in these crops as well as improving the value of the harvested pulses.

We welcome reader comments or suggestions.
E-mail your letters to: nringma@agbios.com

USDA CONTRIBUTION TO BIOTECHNOLOGICAL R & D IN PUBLIC UNIVERSITIES OF BANGLADESH

Zeba I. Seraj, Department of Biochemistry and Molecular Biology, University of Dhaka, Email: zebai@univdhaka.edu

The Bangladesh chapter of the United States Department of Agriculture (USDA) Agricultural Research Service (ARS) was started more than ten years ago with a reconnaissance visit by Dr. James Stevenson and Dr. Autar K. Mattoo to the different public universities. Since then these two amiable and dedicated scientists have worked tirelessly to harness scientific talent and put it to good use for Bangladesh.

Projects funded through this program have ranged from livestock improvement to setting up plant diagnostic clinics at Bangladesh Agricultural University, Chittagong University, Khulna University, Rajshahi University, Shahjalal University of Science and Technology as well as Dhaka University. Special attention has been given to projects important for food security such as abiotic stress tolerance in rice, jute, grains, legumes, wheat, spices and potatos and to the conservation of fruit and forest tree species. Other projects have included the improvement of the famous Chittagong Red Cattle and Bengal Black Goat. Funds have been provided to build up a biotechnology and molecular biology base in Bangladesh with modern machines like thermal cycler, biodocumentation systems and perishable consumables for sophisticated instruments like a DNA sequencer purchased by the University. As well, Bangladeshi scientists have been encouraged to

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CREAM OF THE (WEB) CROP

harvesting the best from the worldwide web

THIS MONTH'S PICK:

Council for Biotechnology Information

http://www.whybiotech.com/

The Council for Biotechnology Information (CBI) is a US-based non-profit organization that communicates science-based information about the benefits and safety of agricultural biotechnology and its contributions to sustainable development.

The site is divided into three sections. It also has a link to its YouTube channel.

Sections include:

Resources & Information: Contains areas with fact sheets, issue briefs, myths & facts, an activity book for children, third party studies, an experts list, which features information on the research of leading experts in the field, and an agricultural biotechnology timeline.

News & Events: This area includes sections for biotechnology stories from the news, a Reporter's Notebook and a press kit.

Links: Categorized by both geography and topic. Categories include:

- Africa
- Agriculture
- Australia and New Zealand
- Biofuels
- Environment
- Europe
- India
- International Organizations
- Member Companies
- Nutrition and Health
- Related Organizations
- Research Institutions
- Safety and Regulations

Using print, videos and podcasts the CBI website has stories about:

- How biotechnology could one day help people lead healthier lives through the development of new products such as cancer-fighting tomatoes and oils with reduced levels of saturated fats.
- How biotechnology can help boost farm yields and improve diets in poor, developing parts of the world.
- How biotechnology is helping to improve the environment by reducing plowing and the need for spraying, thus curbing erosion, conserving fuel and preserving wildlife habitats.
- How biotechnology can help farmers better manage water resources, particularly in the face of drought or water shortages.
- How biotechnology is helping to grow increased yields of crops used for both food and production of biofuels.
- How biotechnology has become one of the most rapidly adopted technologies in the history of agriculture.
- How biotechnology is improving farmers' bottom lines, whether it's a soybean farmer in Iowa, a cotton farmer in South Africa or a papaya farmer in Hawaii.
- How respected organizations from around the world have declared that foods developed with biotechnology are safe and hold great promise for improving diets and health.


BIOTECHNOLOGY AND DROUGHT

PRODUCING MORE CROP PER DROP

Nearly every year, some parts of the United States and other parts of the world suffer from drought, which can hamper the growth of crops and significantly reduce harvests. It is estimated that in any given year, one-third of all U.S. corn acres probably experience some level of yield-reducing drought stress. Climatologists believe that our changing global climate might produce even more severe and widespread dry conditions in the future, with potentially serious consequences for agriculture and food availability (Wenzel, 2008).

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Did You Know?

- Drought affects large parts of the United States every year and has been a persistent problem in agriculture for centuries. Now some experts predict the United States could face more erratic weather patterns that affect our daily lives, including food production.
- Adequate water is the most pressing challenge for the nation's farmers who provide us with essential crops and grains for food, fiber, and, increasingly, for the production of biofuels to enhance our nation's energy security. It is predicted that, if present consumption patterns continue, two out of three people will live in drought or water-stressed conditions by the year 2025 (UNEP, 2001).
- For over 12 years, farmers have been using plants improved through biotechnology to combat environmental stresses such as insects and to control weeds more effectively.
- Dealing directly with drought conditions is the next frontier. New developments in agricultural biotechnology can play a role in helping American farmers produce crops that use water more efficiently, thus reducing the negative consequences of drought. Climatologists, scientists and farmers today see biotechnology as having the potential to help address this challenge.

Council for Biotechnology Information
www.whybiotech.com

CBI YOUTUBE CHANNEL: WWW.YOUTUBE.COM/USER/CBIWASHINGTONDC
CBI AGBIOTECH BLOG: HTTP://AGBIOTECHBLOG.COM

Continued

An example of a CBI Fact Sheet

USDA - *continued from page 2*

RECENT USDA FUNDED PROJECTS ON BIOTECHNOLOGY

Name of the Project	Principal Investigator	Department & University
Development of Stress Tolerant Peanut (*Arachis hypogaea* L.) Breeding Lines Using Modern Biotechnology	Prof. M. Imdadul Hoque	Department of Botany, Dhaka University
Biotehnological Production of *Bacillus thuringiensis* Biopesticides for the Control of Major Vegetables' Pest in Bangladesh	Prof. M. Mozammel Haque	Department of Microbiology, University of Dhaka
Improvement of Some Vegetable Species of Cucurbitaceae Family Through Breeding and Biotechnological Approaches	Dr. Bishwanath Sikder	Department of Genetic Engineering and Biotechnology, Rajshahi University
In Vitro Regeneration of Orchids for Commercial Production and Conservation of Endangered Species	Prof. Md. Obaidul Islam	Department of Crop Botany, Bangladesh Agricultural University
Genetic Improvement of Teasle Gourd Through Biotechnological Approaches	Dr. Md. Abdul Karim	Department of Crop Botany, Bangladesh Agricultural University
Development of High Yielding Rice (*Oryza sativa* L.) Variety having Gene of Tolerant of Abiotic Stresses and Study of Their Molecular and Genetic Mechanism of Abiotic Stress Adaptation	Prof. Md. Al-Forkan	Department of Genetic Engineering and Biotechnology, Chittagong University
Molecular Taxonomy and DNA Barcoding of Agromyzid Leaf Miner Pests of Agricultural Crops and Their Control by Natural Enemies in Bangladesh	Prof. Badrul Amin Bhuiyan	Department of Zoology, Chittagong University
Evaluation of Fruit Germplasm Available in the South-Western Region of Bangladesh on the Basis of Their Physico-Chemical Characteristics and Genetic Variability by Random Amplified Polymorphic DNA (RAPD) Analysis	Dr. Md. Abdul Mannan	Agro-Technology Discipline, Khulna University
Carbon Sequestration Salt Tolerance and Growth of the Major Timber Species of the Sundarbans Mangrove Forest and Their Restoration Prospects in the Context of Climate Change	Dr. Mahmood Hossain	Forestry and Wood Technology Discipline, Khulna University
Multiplication and Conservation of Endangered Tree Species (*Xylocarpus granatum*) of Sundarbans Mangrove Forest Through Micropropagation Technique and Their Prospect in Restoration Programme in the Coastal Zone of Bangladesh	Dr. Md. Monirul Islam	Agro-Technology Discipline, Khulna University
Detection of Enterovirulent *Escherichia coli* strains by a Sensitive and Versatile Multiplex Polymerase Chain Reaction (PCR) System in Shrimp Farms	Dr. Md. Golam Sarwar	Fisheries and Marine Resource Technology Discipline, Khulna University
Molecular Detection of Bacterial, Fungal Diseases of Carp and Catfish and Herbal Treatment for Remedy of the Diseases	Dr. Md. Mahbubur Rahman	Department of Biotechnology, Shahjalal Science and Technology University

contact colleagues in the United States to arrange exchange visits, which has the double benefit of ensuring exposure of Bangladeshi scientists to sophisticated research and the sensitization of United States-based scientists to the problems of Bangladesh.

Funds for research at public universities are limited in Bangladesh where most available resources are spent for undergraduate practical laboratories. USDA research funds have been instrumental in setting up laboratories where graduate researchers have been able to work on up-to-date technologies. These funds have supported the Ph.D. work of more than a dozen students. Academic staff at the targeted public universities have been able to work on important and sophisticated research ideas relevant to Bangladesh's problems. Their findings have been published in international journals and many graduate students have been able to train in modern research methodologies.

Bengal Black Goats

Dr. Stevenson set up an innovative way of using the interest of the USDA grant money. The 'Young Women Scientists Award' at Dhaka University and 'Young Scientists Award' at BAU encouraged student researchers to attend conferences to present their works. Small grants were provided to the students for travel and accommodation costs at the conferences. More than a dozen post-graduate students have used these grants to attend international conferences and workshops.

The USDA-Bangladesh program not only resulted in the publication of important discoveries, it boosted the morale of scientists and resulted in tangible products for Bangladesh. Currently the USDA funds are being sourced to the Bangladesh Academy of Sciences and further scientific research will be managed by the Academy.

SABP CONTACTS

South Asia

Dr. Vibha Ahuja
General Manager
Biotech Consortium India Limited
Anuvrat Bhawan, 5th Floor
210, Deendayal Upadhyaya Marg
New Delhi 110 002 India
Tel: 23219064-67
Email: vibhaahuja@biotech.co.in

Others

Center for Environmental Risk Assessment (CERA)
ILSI Research Foundation
1156 Fifteenth Street, N.W., 2nd Floor
Washington D.C. 20005-1743 USA
Email: mmclean@ilsi.org

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