

CropBiotech Update

A weekly summary of world developments in agri-biotech for developing countries, produced by the Global Knowledge Center on Crop Biotechnology, [International Service for the Acquisition of Agri-biotech Applications SEAsiaCenter \(ISAAA\)](#), and [AgBiotechNet](#)

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In This Issue:

Moral Imperatives of Biotech Discussed in Conference	EC Approves Measures to Promote Agri Products Outside EU
Father of Green Revolution Speaks at Congress	Biologists Launch 'Open-Source Movement'
Generation Challenge Program for Developing Countries	Bt Proteins Explored, Engineered, Enhanced
Biotech in Mauritius	Italy Tests GM Grapes and Berries
DuPont Chair: Delivering Real Value Thru Biotech	Open Letter to FAO on Biotech
IITA: GE Essential to Improve Cowpea	

MORAL IMPERATIVES OF BIOTECH DISCUSSED IN CONFERENCE

"It is a moral imperative to investigate the potential of [agricultural biotechnology] to meet global food needs," so said Church officials during the recent conference on the Moral Imperatives of Biotechnology, held at the Pontifical Gregorian University, Rome last September 24. The conference, co-hosted by the U.S. Embassy to the Holy See and the Pontifical Academy of Sciences, brought together academicians, farmers, and religious to discuss their experiences with and views on biotechnology.

Peter H. Raven, Pontifical Academician and director of the Missouri Botanical Garden, stated, "While common sense must be a guiding principle, it is not logical to imagine consequences that have never been observed at the cost of denying people access to food or adequate economic return for their efforts."

Edwin Y. Paraluman, a corn farmer from the Philippines, reported that he planted genetically modified corn on his farm during a time of opposition; there was even a rumor, he said, that walking in a field with GMO crops could make someone gay. Yet his crop yield went up, the crops were safe, and as a result of his increased earnings, he was able to buy a refrigerator and a motorcycle for his family.

Sabina Khoza from South Africa, who described herself as "a very, very proud indigenous woman in agriculture," said that her genetically modified corn had a similar impact on her life. Khoza also insisted that the food is safe. "We are growers and farmers, and we are the very first consumers," she said. "Whatever I plant, I've eaten and consumed before it goes to the market. Here I am."

Fr. Gonzalo Miranda provided a theological framework, arguing that "it is not Christian" to argue that human beings are prohibited from altering plants and animals with technology, because there is an "ontological difference" between humans and the rest of creation. Hence there is no intrinsic problem with GMOs, Miranda suggested, and they should be evaluated on

a case-by-case basis.

Dr. C.S. Prakash, a professor of plant molecular genetics, said biotechnology is a very powerful tool that can be used in the developing world to grow more food in an environmentally friendly manner. "Biotechnology can improve farming," he said. "It can improve our food production by making farming more efficient, by reducing the use of chemicals on the farms, including pesticides and how much fertilizers that we apply. And, also, biotechnology can bring in an element of profitability to farming by producing novel products."

Read more at <http://vatican.usembassy.it> and <http://www.voanews.com/article.cfm?objectID=ADFB2C26-25E9-42C4-921B94DDDF8AA84B>

FATHER OF GREEN REVOLUTION SPEAKS AT CONGRESS

Professor Monkombu Swaminathan, who has been recognized as the father of the Green Revolution, said crop-yield growth rates had fallen below levels needed to overcome malnutrition in developing countries.

Speaking at the 4th International Crop Science Congress in Brisbane, Swaminathan remarked that crop yields had improved in the past century because of scientific breakthroughs, improved varieties and better farming techniques. However, huge population increases, a reduction in farming lands because of city spread, and degradation of the environment meant researchers had to concentrate on increasing crop yields.

This year's International Crop Science Congress was attended by more than 1000 delegates from 65 countries. With the theme "New Directions for a Diverse Planet," the conference recognized the need for new approaches to meet the challenges of maintaining and enhancing food, feed, and fiber supplies to a steadily increasing world population; and the associated challenge of sustaining the soil, water and biological resources that underpin global cropping impact on the wider environment. Embedded within the program was the 5th Asian Crop Science Congress, where symposia dealt with topics of particular relevance to crop science in Asia.

For more information on the conference, visit [http://www.cropscience2004.com/](http://www.cropsscience2004.com/)

GENERATION CHALLENGE PROGRAM FOR DEVELOPING COUNTRIES

The Generation Challenge Program (GCP) was formally launched during the Fourth International Crop Science Congress in Brisbane, Australia to propel the use of plant genetic diversity and genomics research for the resource poor.

A new initiative of the Consultative Group on International Agricultural Research (CGIAR), the program seeks to explore plant genetic diversity and create crops that better meet the needs of small farmers through partnerships with research organizations and implementing institutions around the world.

GCP uses genetic and genomic tools to harness the rich global heritage of plant genetic resources to bring improved stress tolerance to the staple foods of developing countries. GCP Director Robert Zeigler said that the time is ripe to bring biotechnology to bear on the agricultural constraints that plague the poorest farmers, such as drought, pests and diseases, and low soil fertility.

Research will be organized under five subprograms: germplasm, genomics, bioinformatics, and molecular breeding for agricultural development. A central principle of the GCP is that products must make it from the lab to the fields of resource-poor farmers.

For more information about the Program, email Jenny Nelson at j.nelson@cgiar.org and Dave Poland at d.poland@cgiar.org or visit <http://www.generationcp.org>.

BIOTECH IN MAURITIUS

Mauritius can serve as a regional production base for biotechnology products for the African market in the future and assume the role of a service provider and know-how disseminator in the field of biotechnology. This was the gist of an article by Daneshwar Puchooa of the Faculty of Agriculture, University of Mauritius, in the Electronic Journal of Biotechnology published by the Pontificia Universidad Catolica de Valparaiso.

In the article entitled "Biotechnology in Mauritius: Current Status and Constraints", Puchooa noted that the African country was engaged in, various biotechnology applications that include micropropagation, crop breeding particularly in sugarcane, and diagnosis of diseases. The author noted that biotechnology has not yet produced the expected impact of the country's economy due to several constraints. These are lack of funding for research and development, unavailability of qualified staff, chronic understaffing of laboratories, lack of infrastructures compatible with efforts in biotech, and absence of a regional technical cooperation network.

Despite these problems however, the government is in the process of setting up the Mauritius Agricultural Biotechnology Institute. Much of the issues, according to Puchooa, can be resolved with appropriate policies.

This paper is available online at <http://www.ejbiotechnology.info/content/vol7/issue2/issues/3/>.

DUPONT CHAIR: DELIVERING REAL VALUE THRU BIOTECH

Biotechnology represents the most significant technology adoption in agricultural history. This was stressed by Chad Holiday, Dupont Chairman and CEO, during his talk on "Biotechnology: Progress and Promise" during BioJapan 2004 in Tokyo, Japan.

Holiday said that the "World's corn growers have increased their production by 45 percent and done it on a less than a 5 percent increase in acres. In effect, we've added 130 million "virtual" acres by improving corn genetics, technology and management practices". He added that it took 30 years for hybrids to be fully adopted in the U.S. and more than 75 years for hybridization to be accepted globally, though still at only 60 percent. "In contrast, after only

eight years, plant biotech adoption now stands at 80 percent for soybeans in the U.S. and 55 percent worldwide. Cotton adoption in the U.S. is 73 percent and 21 percent worldwide. Corn is 40 percent of the U.S. market and 11 percent worldwide. This is, by far, the most rapid acceptance of any technology in agricultural history," Holiday explained.

The Dupont chair likewise clarified that despite experiencing a rapid increase in demand for genetically enhanced products, the company was also cognizant of the importance of societal choice, and that "we continue to offer non-genetically enhanced products where they are valued."

For the full speech of Chad Holiday, visit http://www1.dupont.com/NASApp/dupontglobal/corp/index.jsp?page=/content/US/en_US/news/speeches/holliday_09_28_04.html

IITA: GE ESSENTIAL TO IMPROVE COWPEA

The International Institute of Tropical Agriculture (IITA) has over the years tried, without much success, to improve cowpea, a protein -rich crop, through conventional breeding. Cowpea is an ideal crop for improving the nutrition of resource poor farmers, especially since animal protein is expensive. Dr. Christian Fatokun, IITA Cowpea Breeder, said that his institute had collaborated with advanced laboratories all over the world and committed substantial human and financial resources into cowpea improvement all to no avail because of abundant diseases and insect pest attacks on the crop.

Fatokun added that Nigeria is the leading producer of the crop but the yield is so poor that a farmer hardly realizes more than 300 kilograms of yield per hectare. To increase the yield, pesticides must be applied, but which are expensive and not environment- friendly. To achieve any success in controlling the insects, especially *Maruca vitrata*, that which destroys the cowpea flowers and causes severe yield loss, genetic engineering is essential to incorporate resistance in the crop, said Dr. Fatokun.

A few years ago, the Institute was instrumental in the development and subsequent adoption of the Nigerian Biosafety Guidelines, and the establishment of a national policy on biotechnology. Other stakeholders supporting the public awareness drive of biotechnology in Nigeria include the National Biotechnology Development Agency (NABDA) and several national universities with specific study programs in biotechnology.

For more of IITA's research and development work, email IITA Taye Babaleye, Head, Public Affairs, at t.babaleye@cgiar.org.

EC APPROVES MEASURES TO PROMOTE AGRI PRODUCTS OUTSIDE EU

The European Commission (EC) has approved measures to provide information on, and to promote, agricultural products outside the European Union (EU). Member States have submitted 10 promotion and information programmes to the Commission to be examined. The programmes that have been accepted include Denmark's pig meat for Japan, Greece's fresh and packaged peaches and nectarines for Romania, Russia, and Bulgaria; Italy's olive oil and table olives for Japan and potatoes for Russia; and the G7's wine for the USA, Canada,

Switzerland, Norway, China, and Japan.

"Improving the competitiveness of EU quality products on markets outside the EU is a major challenge. By investing in promotion and information campaigns for our agricultural products outside the EU, the European Union is showing its determination to take up this challenge", Commissioner Fischler, responsible for Agriculture, Rural Development and Fisheries, said.

Read the full press release at <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/1147&format=HTML&aged=0&language=EN&guiLanguage=en>

BIOLOGISTS LAUNCH 'OPEN-SOURCE MOVEMENT'

The Biological Innovation for Open Society (BIOS) initiative is being established with a US\$1-million grant from the Rockefeller Foundation to make research tools more readily available to biologists who could not otherwise afford them. BIOS seeks to do so by merging intellectual property analysis, innovation policy reform, and cooperative technology development activities, to foster democratic innovation in applications of biological technologies to sustainable development.

Richard Jefferson, the initiative's leader and chairman of the Center for the Application for Molecular Biology to International Agriculture (CAMBIA), a non-profit research institute based in Canberra, Australia, says BIOS could spur an "open source movement" in biotechnology, analogous to the one that has developed in the computer software industry.

Jefferson says that BIOS will encompass all forms of biological innovations, including agricultural and animal-breeding tools, genetic resources, medical treatments and environmental remedies. Its running costs will be covered by funds from sponsors and what he terms "non-compulsory" subscription fees paid by licensees.

Plant scientists in poor countries often complain that they are shut off from recent advances in agricultural biotechnology because they cannot afford licensing fees. The initiative's first activities will be to gather a portfolio of research tools that can be used for free, and to construct an easy-to-use database of patent information. It will also provide templates of licensing agreements for scientists who want to make their technologies freely available. In turn, users will be obliged to freely release innovations based on these techniques. Among these are new technologies that have been developed to bypass critical restrictions in plant genetics, such as gene transfer by *Agrobacterium*, or screening for transgene behaviour.

Read more about the BIOS initiatives and proposals at <http://www.bios.net/>.

BT PROTEINS EXPLORED, ENGINEERED, ENHANCED

Recent work on *Bacillus thuringiensis* (Bt) endotoxins has revealed that modifications in a few key protein domains may increase toxin activity, Nachimuthu Saraswathy and Polumetla Ananda Kumar report in the current issue of the *Electronic Journal of Biotechnology*.

The insecticidal properties of Bt are attributed to the presence of endotoxins, which are

synthesized during the sporulation phase of the bacterium. These endotoxins are composed of three main domains, each of which may contribute to forming pores in the cell membranes of larval midgut (Domain I), determining the insect specificity of a toxin (Domains II and III), and stabilizing protein structure (Domain III).

Saraswathy and Kumar, both of the National Research Centre for Plant Biotechnology in New Delhi, describe the protein engineering studies conducted on different endotoxins, which led to an understanding of their molecular mode of action, as well as the construction of novel toxins with enhanced insecticidal activity and specificity. Proteins were mutated at each domain and tested for binding capacity and toxicity. Mutations at Domain I resulted in low or no toxicity on tested insects, while mutations at Domains II and III resulted in altered toxin specificity and receptor binding.

Download the full paper at <http://www.ejbiotechnology.info/content/vol7/issue2/full/3/3.pdf>

ITALY TESTS GM GRAPES AND BERRIES

Italy has been field-testing genetically modified (GM) grapes, raspberries, and strawberries since 2001. GM strawberry and raspberry plants, transformed with the DefH9-iaaM gene, tend to grow more fruits, which are also larger and heavier than those of their non-GM counterparts. Similar experiments are also being carried out on grapes, and more projects are underway.

"Most of [my] projects are on strawberry and raspberry...both have specific problems such as increasing productivity, improving berry size and quality, and among fruits these berries are quite useful in biotech programs because [of] the short production cycle," Dr. Bruno Mezzetti, of the Universita Politecnica Della Marche in Ancona, said in an email interview, "In general the first problem with these crops is the development of [highly] efficient regeneration and transformation protocols; we [succeeded] in getting results in these different crops and it is now interesting to compare the effect of the same gene in different type of plants and fruits."

Italy's grape industry faces quite a number of problems, including viruses, fungi, and the complex yellowing called "Flavescence dorée." "At the moment there are no [alternatives], and the biotech tool could provide really useful alternatives," Dr. Mezzetti, said.

Read about Dr. Mezzetti's projects at <http://www.bioinformatica.unito.it/bioinformatics/Spena/index.html>.

OPEN LETTER TO FAO ON BIOTECH

The International Consortium of Agricultural Biotechnology Research (ICABR) is encouraging scientists to sign an open letter to the General Director of the Food and Agricultural Organization (FAO) supporting its recent report on biotech foods' potential role in developing countries. Over 300 scientists have signed the letter. Those who wish to be included in the letter of support can do so online at <http://www.economia.uniroma2.it/conferenze/icabr>.

Do not hesitate to tell other colleagues/contacts about this mail list. If they wish to join, they should send an e-mail message to knowledge.center@isaaa.org leaving the subject blank and entering the one-line text message as follows: SUBSCRIBE Crop

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