

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)

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NEWS

Global

POSITIVE SIGNS FOR GLOBAL COTTON PRODUCTION

World cotton supply and demand particularly in China, India, Pakistan, and Turkey favor the growth of the cotton industry. This was the scenario forwarded by CEO Joe Nicosia of the Allenberg Cotton Company in an address to delegates of the Australian Cotton Conference in Broadbeach, Queensland, Australia.

Nicosia added that demand is generally increasing at a faster rate than production, and that cotton yields rose 44% between 1886 and 2005 mainly due to biotechnology. "At current production rates, to keep up with current demand projections, new cotton production of 20 million bales will be required, hence if yields and acreage do not keep rising, cotton prices will," he said.

In the same conference, Monsanto's Kristen Knight focused on the need to preserve the benefits of biotechnology and protect the risk of resistance emerging in the field. In particular, she noted the need to comply with regulatory requirements, conduct regular monitoring for insect pests, and enhance refuge efficiency and best management practices.

Read more on the Cotton Conference at
<http://www.seedquest.com/News/releases/2006/august/16574.htm>

MONSANTO TO ACQUIRE DELTA AND PINE LAND CO

Monsanto Company signed an agreement with Mississippi-based Delta and Pine Land Company for the former to acquire the largest and longest global running private cotton seed breeding program. Monsanto reports that Delta and Pine Land's strong cotton genetics will enhance the company's goal of providing high quality cotton varieties for farmers. Delta and Pine Land Company's extensive plant breeding programs, including its diverse base of international germplasm, has enabled the development of cotton varieties for the last 90 years.

Both companies believe that the merger will strengthen both domestic and international cotton seed business by enhancing efforts to produce second-generation biotech trait offerings.

See Monsanto's press release at

<http://www.monsanto.com/monsanto/layout/media/06/08-15-06.asp>

FUNGUS KEEPS GRASS COOL, SCIENTIST REPORTS

A fungus protects grasses and some plants from heat and salinity by simply living with the plant. Rusty Rodriguez, a microbiologist at the U.S. Geological Survey in Seattle, Washington, reported this at the fourth International Symbiosis Society Congress held in Halifax, Nova Scotia, Canada.

The fungus, Rodriguez and colleagues found, protected panic grass from geothermal heat in Yellowstone Park, and coastal dune grass from salinity in Washington State. They also found that corn, tomatoes, watermelon, and other plants became quite heat tolerant when they took up fungi from panic grass, but not when they took up fungi from grasses growing in slightly cooler soil. In addition, these species acquired salt tolerance only when they carried the fungi from grasses that grow close to saltwater. These findings suggest a way to give crops a boost in unfavorable soils.

Read the complete articles at Science Now, through <http://sciencenow.sciencemag.org/cgi/content/full/2006/810/4> and <http://www.sciencemag.org/cgi/content/full/302/5646/774>.

Africa

GHANA URGED TO BOOST AGRI PRODUCTION

Ghana has to be innovative in addressing problems of land preparation, low yielding crops, livestock, and water management, among others. This was stated by Mr. Sylvester Adongo, Northern Regional Director of the Ministry of Food and Agriculture (MOFA), as he addressed agricultural extension officers in a recently concluded two-day training workshop.

“Conservative estimates show that the country imports 100 per cent of wheat, 90 per cent of sugar, 66 per cent of rice, 50 per cent of meat, 33 per cent of chicken and 15 per cent of milk. This shows that we are virtually eating outside and not at home. How long can we depend on other people to feed us?” Mr. Adongo asked.

With reports from <http://allafrica.com/stories/200608150629.html> and <http://www.accra-mail.com>. For more information, contact Daniel Otunge of the Eastern and Central Africa Biotechnology Information Center (ECABIC) at d.otunge@cgiar.org.

The Americas

BIOTECH CROPS FOR MEXICO

Jorge Kondo López, Secretary for Agriculture for the State of Sinaloa, Mexico, stated his support for the planting of transgenic maize, soybean, and cotton varieties in the region. Kondo López also said it is essential to carry out contained trials of new biotech varieties, in conformity with biosafety rules, in order to develop crops with suitable characteristics for the country, and to ensure the preservation of biodiversity.

The presence of transgenic maize plantations in the north of Mexico, said Kondo López, would not represent a threat to the preservation of native maize varieties and related wild landraces, as these are mainly confined to the center of the country.

It is important not to refuse technology, but to accept it in a regulated way, added Kondo López. Genetic engineering is an extraordinary new tool that can raise the levels of agricultural productivity, and the technology cannot be ignored in the face of the progressive decrease in the land available for agriculture.

Read more at:

<http://www.agronet.com.mx/cgi/notes03.cgi?Action=View&Note=1&Active=1>

BRAZIL, BIOTECH CROPS AND GLOBALIZATION

In Brazil, only one transgenic cotton variety, Bollgard event 531, will be available for cotton farmers to use in the 2007 growing season. Two other events with herbicide resistance have been approved by the National Technical Commission for Biosafety (CNTBio) in 2006. However, these events still need to undergo variety registration, and seeds have to be reproduced and distributed before farmers can use them.

Reginaldo Minaré, legal director for the Brazilian National Association for Biosafety (ANBio), says it is important to remember that cotton biotech varieties have been approved as safe and are grown commercially in a number of countries. In an increasingly globalized world, it is not surprising that farmers may

attempt to import improved varieties that are not yet approved in the country, but reduce the costs of production,. However, the correct biosafety measures may not be applied in illegal plantings, and farmers pay no royalties for the technology. Instances of illegal plantings of biotech crops were reported for soybean, maize, and cotton, and if the situation remains unchanged, adds Minaré, it will likely happen for sugar cane, rice, and wheat.

There is no doubt that the law must be respected, argues Minaré, but the State must act pro-actively to prevent a repeat of the situation. The role of the CNTBio, and of the National Council for Biosafety (CNBS), is not only to approve safe events, but also to prohibit the use of certain applications, providing sound and transparent scientific arguments for doing so. In this scenario, the State would have increased authority for punishing those who fail to comply with the law.

For more information visit: <http://www.anbio.org.br/>

WORKSHOP PROCEEDINGS SHOW INFO BACKLOG FOR GM

Information sharing about genetically modified (GM) crops must occur at all government levels, and between all authorities involved, especially with the current scenario showing otherwise. This conclusion was reached in “Agricultural Biotechnology Information Disclosure: Accommodating Conflicting Interests within Public Access Norms,” the first workshop in a series organized by the Pew Initiative on Food and Biotechnology and the National Association of State Departments of Agriculture (NASDA).

Held in December 2005, the first workshop saw participants from both federal and state governments in the U.S. gathering to find solutions to the issues that disrupt cooperation between state and federal agencies in their efforts to share information necessary for effective oversight of agricultural biotechnology. It examined how confidential business information (CBI) conflicts can impede cooperation between state and federal regulatory agencies. Key points included the following: 1) State and federal regulatory authorities are not always able to share important information with each other about the field trials they regulate due to the need to protect CBI; 2) State regulators often do not have sufficient information from federal agencies to understand and assess the safety and containment measures associated with a particular field trial; 3) State agricultural officials have difficulty providing assurances to concerned citizens inquiring about GM crops, due in part to the lack of information from their federal counterparts; and 4) In terms of agricultural biotechnology regulation, there is a clear need for the relevant federal government agencies to forge strong relationships with the relevant state agencies and to find ways to be conduits for information sharing and collaborative oversight of GM crops and experimental field trials of those crops.

The paper based on the workshop is available for download at <http://pewagbiotech.org/events/1214/WorkshopReport.pdf>. Read more about the conference at <http://pewagbiotech.org/events/1214>.

NICARAGUA MODEL SHOWS PROMISE FOR DROUGHT INSURANCE

Using a model based on a study of drybean farmers in Nicaragua, scientists from the International Center for Tropical Agriculture (CIAT) found that a practical method of drought insurance can benefit farmers in rural areas. The project is supported by the German Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ) and the Gesellschaft für Technische Zusammenarbeit (GTZ), with the collaboration of Catholic Relief Services (CRS).

Most rural farmers cut corners in order to maximize profit. This may include avoiding risks, such as planting fewer crops to avoid most of them being damaged by drought, or applying fewer fertilizers or pesticides to save money. Such measures might actually take away profit rather than increase it, and insurance might be the answer.

CIAT scientists examined production of drybeans in Nicaragua to test the feasibility of weather insurance, since rainfall determines final crop yield. By canvassing drybean farmers who participated in CIAT workshops in 2005, making models, and simulating various scenarios, the scientists were able to formulate a crop insurance scheme based on weather. They found that once a weather index was established, and the probabilities of events happening are calculated, then a main part of the insurance premium price could be arrived at.

Read about the insurance scheme at http://www.ciat.cgiar.org/news/pdf/drought_insurance_report.pdf.

Asia and the Pacific

PRSV-RESISTANT PAPAYA COMING TO BANGLADESH

Papaya resistant to the Papaya Ringspot Virus (PRSV) can benefit Bangladesh once the crop is approved. This was stated by Dr. Craig Meisner of Cornell University in an article published in the latest issue of the South Asia Biosafety Program (SABP) newsletter. A project is currently underway to place transgenic papaya in the hands of the Bangladesh Agricultural Research Council (BARC).

The last two decades of papaya production in Bangladesh have seen lower yields due to the effects of PRSV. Transgenic papaya shows promise, and

applications for field trials have already been reviewed by the Bangladesh Agricultural Research Institute (BARI), BARC, and the country's national biosafety committee.

Read Dr. Meisner's article, "Salient Features and Potential Impact of PRSV-Resistant Papaya for Bangladesh" at <http://www.agbios.com/sabp>.

FABA MALAYSIA CHAPTER LAUNCHED

The Malaysia Chapter of the Federation of Asian Biotech Associations (FABA) was officially launched during the Biotechnology Asia 2006 Exhibition and Conference held recently at the Putra World Trade Center in Kuala Lumpur. The Chapter will be headed by Abdul Latif Ibrahim, Director of Universiti Industri Selangor and biotechnology advisor to the Selangor State Government.

FABA aims to safeguard the overall interest of biotechnology as a science and profession within the industry, and to promote it within member countries. Other FABA member countries are Iran, Israel, Pakistan, India, the Philippines, Saudi Arabia, Singapore, Sri Lanka, Thailand, South Korea, Japan, and Indonesia.

For more information, contact Mahaletchumy Arujanan of the Malaysia Biotechnology Information Center (MABIC) at maha@bic.org.my.

SRI LANKA APPROVES GM LEGISLATION

The Government of Sri Lanka has approved a law that requires all genetically modified (GM) food items to be prominently labeled. The legislation will come into effect January 1, 2007. All GM food importers will also be required to apply for a permit from the Food Advisory Committee, chaired by the Health Services Director General, to import GM products in the future. A permit will be issued only after the GM product is verified as safe for human consumption, and with the condition that the product will be properly labeled.

Read the regulations at <http://www.documents.gov.lk/Extgzt/2006/Pdf/Aug/1456-22/1456-22e.pdf>.

COTTON BREAKTHROUGHS REPORTED IN AUSTRALIAN CONFERENCE

Cotton growers and scientists convened at the recently-concluded Australian Cotton Conference, where cotton experts reported on breakthroughs in cotton

research, as well as on current market demands for Australian cotton. Bruce Pyke, general manager research and extension with the Cotton Research and Development Corporation, reported that Bt cotton is doing very well in its 10th season in Australia. "Beneficial species in general are much more abundant, unless broad spectrum insecticides are used for other pests," he said.

Dr. Fred Perlak, director of Cotton and Specialty Crop Technology for Monsanto, announced that the company is researching the development of drought tolerant cotton in both the US and Australia. Twenty-four transformed cotton events are currently in the testing program. In a separate talk, Dr. Perlak stated that Australia's cotton biotechnology pipeline is driven by a lengthy product development cycle and a large investment process, which slows down product release.

James Dale, director of the Center for Tropical Crops and Biocommodities at the Queensland University of Technology, spoke on the next generation of transgenic cotton. He stated that the new cotton could contain significant benefits in terms of gossypol reduction, wider insect and disease resistance, greater stress tolerance, and biofuels adoption.

Read the press releases at

http://www.acgra.net.au/13thACC_files/Fred%20Perlak%20CONF.pdf,
http://www.acgra.net.au/13thACC_files/Bruce%20Pyke%20CONF.pdf, and
http://www.acgra.net.au/13thACC_files/James%20Dale%20CONF.pdf.

Europe

EUROPEAN COUNCIL AGREE ON R & D FRAMEWORK PROGRAM

The European Competitiveness Council reached an agreement between member states on the Seventh Framework Programme for Research and Development, which is the European Union's main instrument for funding research and technological development from 2007 to 2013. This program is expected to develop a knowledge-based bio-economy and society in Europe.

EuropaBio, the European Association for Bioindustries, reports that approximately EUR 7 billion is allotted for research in 2007, about EUR 2 billion more than this year. Small and medium enterprises and public non-profit organizations could receive funding for 75% of their costs, compared to the previous 50%. Dr. Johan Vanhemelrijck, Secretary General of EuropaBio, said that the implementation of the Programme will "provide a significant contribution to the competitiveness of the European bio-industry, as well as to the public welfare and economic growth across Europe."

The new program is expected to provide a boost for biotech companies to fund their innovative research in key areas such as health, food, agriculture, energy, and environment.

See EuropaBio's press release at

http://www.europabio.org/articles/EBIoPR_FP7andstemcells_240706.doc

RESEARCH

RESEARCH TESTS GENE EFFECTS ON PLANT MICROBE RESISTANCE

Plants will be immune to a majority of microbial pathogens due to several methods of defense deployed by the plant. These may involve signaling molecules; in *Arabidopsis*, for instance, *EDS1* and *PAD4* are known regulators of plant defense signaling. How exactly they affect plant immune responses is investigated in a recent issue of *Plant Science*, where Denghui Xing and Zhixiang Chen of Purdue University take a look at the "Effects of mutations and constitutive overexpression of *EDS1* and *PAD4* on plant resistance to different types of microbial pathogens."

Researchers over-expressed *EDS1* and *PAD4* in *Arabidopsis*, and compared resistance of transgenic plants to bacterium *Pseudomonas syringae* and the fungus *Botrytis cinerea* to those of wild type controls, as well as *Arabidopsis* lines with mutations in the *EDS1* and *PAD4* genes. Researchers found that the *eds1* and *pad4* mutants were highly susceptible to virulent strains of *P. syringae*, but *Arabidopsis* lines overexpressing the genes were more resistant to the pathogen. Bacterial growth was reduced 10-fold in overexpressing plants, relative to the wild type; and the over-expressing plants developed less severe disease symptoms.

On the other hand, the *eds1* and *pad4* mutants were highly tolerant to *B. cinerea*, while overexpressing plants were highly susceptible to the pathogen. The *eds1* and *pad4* mutants also developed less severe disease symptoms than wild type plants. Scientists also found that the mutations and over-expressions of the genes resulted in changes in the levels of plant signaling molecules salicylic acid and jasmonic acid, whose levels correspond with a plant's ability to tolerate pathogens. These findings thus give new insight into the plant immune system, and can aid scientists in developing disease-resistant crops.

Journal subscribers can access the whole article through

<http://dx.doi.org/10.1016/j.plantsci.2006.03.022>

“SUPER-WEEDS” IN THE MAKING

The development of “super weeds”, due to the development of herbicide tolerance and insect resistance in wild populations, is regarded as one of the main biosafety concerns of biotech crops. Is it only biotech crops we should worry about, or is the development of resistance in pests and pathogens an intrinsic characteristic of modern agricultural practices? A commentary of a series of studies on the development of herbicide resistance in weeds by Gressel and Avraham of the Weizmann Institute of Science, Israel, discusses the effects of the huge selection pressures that operate in agricultural fields. The commentary, “Agriculture: The selector of improbable mutations”, is published in the latest issue of the scientific journal PNAS.

The authors comment on the development of reported cases of herbicide resistance in fields, often the result of two independent mutations with multiple origins. The latest example is the development of herbicide tolerance in weeds involving the loss of an entire amino acid (the building blocks of proteins) that requires the removal of three nucleotides, and the loss of a gene encoding an isozyme of the target of the herbicide. Such levels of mutation were not only previously unreported, they were also considered impossible in practical terms. The study reviewed, “A codon deletion confers resistance to herbicides inhibiting protoporphyrinogen oxidase”, by Patzoldt and his colleagues, is published in the same issue of PNAS.

The chances of such mutations arising in laboratory conditions are less than one per quintillion (10¹⁸), that is, virtually nil. But why do they happen in nature? The answer: sheer numbers. Herbicides are used over million hectares per year, weed seeds are everywhere, and herbicides apply huge selection pressures. The findings reviewed by Gressel and Avraham are a reminder that agriculture will remain, by nature, a highly dynamic system, regardless of whether conventional or novel biotechnological applications are used. Crop improvement initiatives for the development of herbicide tolerance, and for improved resistance to pests and pathogens, will always be an arms race with the development of mechanisms in target organisms that evade such defenses.

Read the abstract of the commentary “Agriculture: The selector of improbable mutations” at: <http://www.pnas.org/cgi/content/extract/103/33/12215>. To view the abstract of the article by Patzoldt and co-workers, visit: <http://www.pnas.org/cgi/content/abstract/103/33/12329>

ANDEAN FARMERS READY FOR GM POTATO, PAPER FINDS

Potato production in Peru is affected by a high number of pests and diseases, all of which result in low yields or extensive use of pesticides. Is it time for

genetically modified (GM) potatoes to enter the scene? Jasper Buijs and colleagues of the International Potato Center (CIP), Peru, report on the “Potential adoption and management of insect-resistant potato in Peru, and implications for genetically engineered potato” in a recent issue of Environmental Biosafety Research, where they survey farmers in Peru’s major potato producing areas and use their data to analyze important issues surrounding the possible adoption of the GM crop in the country.

According to the survey, farmers considered insect damage (mainly due to Andean potato weevil and potato tuber moth) the biggest constraint to potato cultivation. In addition, the team reports: 1) 97% of smallholder farmers would be willing to pay more for an insect-resistant potato variety, although a majority would buy it only once every 2-4 years; 2) Farmers would be willing to pay a premium of 50% on seed cost for insect resistant potatoes, which would still increase their net income, assuming insect resistance is high and pesticide use is strongly reduced; 3) 55% of farmers indicated preference for insect-resistant potato over their current varieties; 4) 68% of farmers would not always be able to sow insect-resistant varieties next to one of their current susceptible varieties; and 5) 89% stated that they could refrain from mixing insect-resistant lines with conventional varieties.

The survey, the authors write, indicates that smallholder farmers in Peru are interested in new varieties, and have a positive perception of improved varieties. The authors propose that a variety-based segregation scheme be developed to separate GM from conventionally-bred potatoes. They also advise that a two-gene approach be used to engineer GM potatoes; and that male-sterile lines be used to control of gene flow without preventing farmers from multiplying their own planting materials clonally.

Subscribers to the journal can read the complete article at <http://www.edpsciences.org/articles/ebr/pdf/2005/03/ebr0511.pdf>. Other readers may take a look at the abstract at <http://dx.doi.org/10.1051/ebr:2006002>.

ANNOUNCEMENTS

BIO-EUROPE 2006

Congress Center, Duesseldorf, Germany is the site of Bio-Europe, the 12th Annual International Partnership Conference on November 6-8, 2006. The conference brings together people in biotechnology, pharmaceutical and financial sectors to discuss collaborative endeavors. Activities include networking opportunities, workshop participation, and private, pre-scheduled one-on-one

meetings. For more information on the conference, go to <http://www.ebdgroup.com/bioeurope/index.htm>.

SYMPOSIUM ON "SEARCH FOR NEW GENES" SLATED

India's National Academy of Agricultural Sciences (NAS) plans to celebrate the Birth Centenary of the late Dr. B.P. Pal during September 1-2, 2006. To mark this occasion, "Search for New Genes," a symposium will also be held. Eminent scientists have been requested to present papers on various aspects of the theme. Honorable President of India Dr. A.P.J. Abdul Kalam will inaugurate the Birth Centenary celebrations. For more information, visit <http://www.naas-india.org/naas/bppalannouncement.doc>, or contact person Mr. Vijaya Kumar at naas@vsnl.com.

DOCUMENT REMINDERS

NEW POCKET K ON BIOFUELS RELEASED

Pocket K No. 24, Biofuels, is the newest Pocket K in the popular series, and is currently available online at the ISAAA KC Website. This Pocket K discusses the issue, and how biotechnology can contribute to better biofuel production.

Pocket Ks are Pockets of Knowledge, packages of information on crop biotechnology products and related issues. They are available in 12 languages. Pocket Ks are produced by the Global Knowledge Center on Crop Biotechnology (KC) of the International Service for the Acquisition of Agri-biotech Applications (ISAAA). Twenty-three other topics are available at <http://www.isaaa.org/kc>

GURTS POCKET K TRANSLATED TO SWAHILI

Pocket K No. 21 on Gene Switching and GURTs is now available in Swahili. It explains what gene switching and Generic Use Restriction Technologies (GURTs) technologies are, how they work, and why public and private sector scientists, as well as governments, are pursuing further research and development in this area. Download the Pocket K at <http://www.isaaa.org/kc/bin/pocketk/index.htm>.

MABIC WORKSHOP PROCEEDINGS AVAILABLE

The proceedings of a workshop conducted in July 2005 by the Malaysian Biotechnology Information Center in collaboration with the Ministry of Natural Resources and Environment on “The Sustainable Utilization of Biodiversity and the Related Issues on Biosafety in an Islamic Perspective” has been released. For a PDF version of the proceedings, go to <http://www.bic.org.my/?action=news&do=display&go=Policy&id=280705NRE-0>.

SABP NEWSLETTER PUBLISHED

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. The SABP’s latest newsletter is now available at <http://www.agbios.com/sabp>.

FROM THE BICS

ISAAA AND ICRISAT HOLD WORKSHOP FOR TELUGU NEWS MEDIA IN INDIA

The International Service for the Acquisition of Agri-Biotech Applications (ISAAA) and the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) organized a media workshop on reporting agri-biotechnology for journalists from Andhra Pradesh reporting in Telugu and English news media. The workshop was conducted in both the languages.

The workshop featured presentations from the representative of the Indian Council of Agricultural Research (ICAR), Department of Biotechnology (DBT), farmers’ representatives, the Andhra Pradesh-Netherlands Program on Biotechnology, and the Indian seed industry. In addition, the journalists had hands-on experience of transgenic technology through visits of advanced biology, transformation, and biotech labs, as well as greenhouse and contained field trials at ICRISAT.

For more information, contact Bhagirath Choudhary of the ISAAA South Asia office at b.choudhary@cgiar.org

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