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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GLOBAL

FAO REPORT TACKLES ROLE OF BIOTECH IN PROTECTING GENETIC RESOURCES

Developing countries should have the capacity to use biotechnology tools, when appropriate, to stop the decline of agricultural diversity and to use genetic resources in a sustainable way. Experts expound on “The role of biotechnology in exploring and protecting agricultural genetic resources”, a recent publication of the Food and Agriculture Organization (FAO). Biotechnology tools include molecular markers, cryopreservation, and reproductive technologies.

Edited by John Ruane and Andrea Sonnino of FAO’s Working Group on Biotechnology, the publication presents, among others, the status of the world’s genetic resources for food and agriculture; use of cryopreservation and reproductive technologies for conservation of genetic resources; and the use of molecular markers for characterization and conservation of genetic resources.

Presently, developing countries are unable to fully use these biotechnologies due to the lack of sufficient funds, human capacity, and adequate infrastructure. Hence, the authors suggest greater collaboration among research institutions worldwide.

A PDF version of the publication is available at ftp://ftp.fao.org/docrep/fao/009/a0399e/a0399e00.pdf. For an overview of the publication, read the FAO press release at http://www.fao.org.

DEVELOPING COUNTRIES’ PRODUCTIVITY NOT AT PAR WITH FOOD NEEDS

Despite an increase in the production and consumption of farm products by developing countries, productivity growth in many poor countries is not meeting their food requirements. This is the gist of a joint report by the Organization for Economic Cooperation and Development (OECD) and the Food and Agriculture Organization (FAO).

“OECD-FAO Agricultural Outlook 2006-2015” projects that the poorest developing countries will be increasingly dependent on world markets for their food security and be more vulnerable to price fluctuations in world markets. These poor countries will thus need to increase investments in education,

training, and infrastructure development to improve domestic production capacity.

The report further adds that there will be a shift in production and exports of farm commodities away from OECD countries towards other developing economies. This will result in tougher global competition among exporters. For example, while wheat exporters like Argentina, Australia, Canada, the European Union, and the United States will continue to dominate exports, Ukraine and Kazakhstan will penetrate markets.

Email Pierre Antonios of FAO at Pierre.antonios@fao.org for more information on this report or visit http://www.fao.org.

RESEARCH ON PLANT PHARMACEUTICALS PROGRESSES WITH TRANSGENIC TOBACCO

David R. Blais and Illimar Altosaarm, scientists from the University of Ottawa, report that they have expressed the human protein CD14 in tobacco cells. The molecule participates in the human immune response by detecting the presence of pathogens. Once detected, CD14 works with other receptors and molecules to recruit immune cells to destroy foreign invaders. CD14 is present at mucosal surfaces and secretions, such as tears, breast milk, and saliva, reflecting its importance in fighting infections caused by Gram-negative bacteria.

Expressing CD14 in plant cells has long since been hindered by low expression levels of the transgene, high production costs, and low protein stability and activity. Their achievement, Blais and Altosaarm write, can be the first step in producing plant-derived CD14, which may in turn be used to prevent ocular infection, as well as fortify infant milk formulas. The researchers are now working on expressing CD14 in rice.

For more information, contact the authors at David.Blais@nrc.ca and altosaar@uottawa.ca. Read the complete article in the Information Systems for Biotechnology news report at http://www.isb.vt.edu/news/2006/news06.jul.htm#jul0601.

DUPONT, BP TO WORK ON ADVANCED BIOFUELS

Dupont and BP have agreed to develop and market the next generation of biofuels to meet global demand for renewable transportation fuels. The first product to be commercialized will be biobutanol, a gasoline bio-component, which is set to be introduced in the United Kingdom in 2007. Dupont says that

biobutanol can be used in existing gasoline supply and distribution channels, and can be blended into gasoline without retrofitting vehicles. It also offers better fuel economy than gasoline-ethanol blends.

Biobutanol will be initially produced using an existing technology. It will eventually use a new biotechnology process using a higher conversion technology. A range of feedstocks such as sugar cane, corn, wheat, and cassava will be used in production. There is potential for future use of cellulosic feedstocks such as grasses or agricultural byproducts.

For details about the two companies' foray into biofuels, visit http://www.cropprotection.dupont.com. To know more about BP, visit http://www.bp.com.

AFRICA

UNEP SAYS AFRICA NEEDS TO HARNESS NATURAL WEALTH

"The Africa Environment Outlook-2", a report of the United Nations Environment Programme (UNEP) forwards the idea that if Africa can use and manage its wealth of natural resources well, poverty need not be a major issue in the region. Achim Steiner, UNEP's Executive Director, said "The report challenges the myth that Africa is poor. Indeed, it points out that its vast natural wealth can, if sensitively, sustainably and creatively managed, be the basis for an African renaissance—a renaissance that meets and goes beyond the internationally agreed Millennium Development Goals. But this is not inevitable and, as the AE0-2 points out, African nations face stark choices".

The region still has to address problems related to deforestation, land degradation, wasteful water use in agriculture, and climate change. Steiner adds that countries need to change policies, strengthen political will, and provide enough funding to meet challenges.

The report assesses the state of the environment and draws possible scenarios based on likely impacts of different policies over the coming decades. It dwells on the key priorities of the region and the policy options and actions needed to enhance investment, economic growth, and reduce poverty.

Read the full report at http://www.unep.org.

THE AMERICAS

BRAZIL'S NATIONAL BIOTECH STRATEGY UNVEILED

Various government agencies of Brazil, including those dealing with agriculture, science, and technology, recently presented the country's National Strategy for Biotechnology. It identifies the priorities of the government in the sector, and proposes actions by which its goals will be met.

The strategy aims to stimulate the competitiveness of Brazil's biotechnology industry, increase the country's participation in international trade, speed up its economic growth, and create new jobs. In the area of health, the strategy aims to develop production of vaccines and diagnostic kits. Brazil's health department will invest over R$ 146 million in research projects and biotechnology development.

Read the complete article (in Brazilian Portuguese) at http://www.radiobras.gov.br/materia_i_2004.php?materia=268891&editoria=.

ASIA

INDIA ADOPTS "EVENT BASED APPROVAL SYSTEM" FOR GM CROPS

In what could expedite commercial release of new genetically modified (GM) Crops, India's Genetic Engineering Approval Committee (GEAC) has decided to adopt the "Event Based Approval System" of GM crops in the country. Key decisions in this regard were taken during a recent GEAC Meeting, and include the following:

- In 2006, the projected area under official Bt cotton cultivation will be around 3.28 million hectares, or 38% of the total cotton area, as compared to1.3 million hectares in 2005. There will be 59 Bt cotton hybrids planted across India's three cotton growing zones. A total of 121 Bt cotton hybrids are currently in various field trial stages, and are likely to receive commercial approval in 2007.

- An "Event Based Approval System" will be adopted, after taking into consideration recommendations for streamlining the current regulatory framework for GM crops. This will speed up the introduction of new GM crops to the country without compromising bio-safety and environmental safety.

- Seed production and large scale trials of Bt brinjal (eggplant) will be granted, taking into consideration comments received by July 15th, 2006.

Read the official press release at
http://pib.nic.in/release/release.asp?relid=18683.
For more information, contact Bhagirath Choudhary of the ISAAA South Asia Office at b.choudhary@isaaa.org.

EUROPE

BELGIUM, NETHERLANDS TO PRODUCE BIOFUELS SOON

As the Netherlands and Belgium begin to follow the rules and standards set for members by the European Commission, they will begin to produce and import more finished biofuels and feedstocks. This is according to Bob Flach, an agricultural specialist with the Foreign Agricultural Service office of Agricultural Affairs, at the U.S. Embassy in The Hague, Netherlands. In a recently released report, Flach shows that local government support in both countries is encouraging biodiesel and biotethanol production.

Bioethanol is produced from agricultural feedstocks, such as sugarcane, corn, and wheat, and starchy agricultural industry byproducts. Biodiesel, on the other hand, is produced from vegetable oils, and can be mixed with or replace diesel fuel. Together, Belgium and the Netherlands produce a total of 20,000 tons of biodiesel annually – a volume bound to increase as the Netherlands opens two new biodiesel plants this year. By 2007, and with three more companies beginning production, Belgium will have an annual biodiesel capacity of 350,000 tons. Rapeseed is currently the input of choice, but as production increases, palm and soybean oil will also be used for manufacturing biodiesel.

Based on industry intentions to build plants, Flach says, production capacity will increase up to 450,000 metric tons of biodiesel and 375,000 tons of ethanol.

Email the author at agthehague@usda.gov. Read the complete article at
http://www.fas.usda.gov/info/fasworldwide/2006/06-2006/Biofuels.htm.

RESEARCH

ARTICLE STUDIES CASSAVA NETWORK EFFORTS

Cassava is an important food crop, especially in Africa. It is tolerant to drought, and can produce starch in a wide variety of environmental conditions. This versatility makes cassava the crop of last resort for farmer families and their domestic animals. Production, however, has declined in the last few years. The

worldwide Cassava Biotechnology Network (CBN) is addressing major challenges to the crop by bundling available resources, as well as uniting major stakeholders involved in cassava breeding, production, marketing, and consumption worldwide.

“Mobilizing Science and Technology for Development: The Case of the Cassava Biotechnology Network (CBN)” investigates the current state of cassava production and research based on surveys given to cassava experts from different research institutions, universities, farmer organizations, and companies around the world. Written by Philipp Aerni of the University of Bern and ETH Zurich, Switzerland, the article appears in the latest issue of the online journal AgBioForum.

Aerni collected the responses of 27 participants, who were surveyed on what they perceived were the problems the problems in cassava subsistence and cash crop agriculture, and the different approaches to solve the respective problems. According to the article: 1) the lack of clean planting materials is the most important problem of cassava farmers; 2) cassava tissue culture was assessed to have the biggest potential for solving the problem; 3) respondents believed that integrated management methods are seen as a possible answer to pests, diseases, abiotic stresses, contaminated stakes, and soil erosion; 4) modern biotech tools were perceived to be important in improving cassava root quality; 5) low starch composition for industrial purposes is perceived to be the most important problem in cassava commercial agriculture; and 6) investment in cassava improvement technology is seen to be the best solution for the problem.

Aerni also surveyed respondents on the CBN’s work. Findings show that the CBN is key to bringing researchers from all over the world together to join forces with local researchers and farmers to address the major challenges of cassava agriculture.

For more information, read the complete article at http://www.agbioforum.org/v9n1/v9n1a01-aerni.htm.

GENE CONTROLLING APHID RESISTANCE IN SOYBEAN REPORTED

The soybean aphid is a serious pest of the crop, and has caused millions of dollars in economic losses. Farmers controlled the pest by applying chemical insecticides, until scientists discovered that plants could be resistant to aphid infestation. Scientists are now busy mapping the gene or genes involved in aphid resistance, and Curtis B. Hilla and colleagues of the University of Illinois are no different. Their articles, “Soybean Aphid Resistance in Soybean Jackson Is Controlled by a Single Dominant Gene” and “A Single Dominant Gene for

Resistance to the Soybean Aphid in the Soybean Cultivar Dowling" appear in the latest issue of Crop Science.

Researchers aimed to determine the inheritance of soybean aphid resistance in two cultivars, Jackson and Dowling. They crossed the cultivars with Loda and Williams, soybean cultivars susceptible to aphids. By testing parents and F2 plants for aphid susceptibility in the greenhouse, and then performing statistical tests to determine inheritance patterns, researchers traced the soybean aphid resistance trait to a single dominant gene.

The gene is Rag1 in Dowling, but as yet unknown in Jackson. Because there is no known genetic relationship between the two resistant cultivars, it is possible that the resistance gene found in Jackson is unique and distinct from the Rag1 found in Dowling. Since aphid resistance is controlled by only one gene in soybean, however, breeders will have an easier time converting existing susceptible cultivars to resistant cultivars using backcrossing procedures.

Read more at http://dx.doi.org/10.2135/cropsci2005.11-0421 and http://dx.doi.org/10.2135/cropsci2005.11-0438.

REVIEW RECOUNTS DEVELOPMENTS IN STRESS TOLERANCE RESEARCH

A plant's growth and productivity depends largely on its ability to respond to environmental stresses. This is especially important when dealing with crop plants, since high salinity, water deficit, and temperature stresses can limit agricultural production. To deal with these stresses, some plants can produce stress-response molecules, activities which involve many stress-related genes. Because some plants respond to stress better than others, various approaches have been tested to produce stress-tolerant crops by both cross-breeding and modern genetic engineering techniques.

In "Transgenic plants with improved dehydration-stress tolerance: progress and future prospects," S. Cherian and colleagues from the Instituto de Tecnologia Quimica e Biologica, Portugal and Central Salt and Marine Chemicals Research Institute, India summarize the recent progress made toward the development of transgenic plants with improved tolerance to water stress and salinity. The review is published in the latest issue of Biologia Plantarum.

The authors recount recent research on the important genes involved in the manipulation of dehydration-stress tolerance and the performance of transgenic plants. These include the osmolyte biosynthesis genes, which synthesize molecules that can protect plans, or which accumulate during high stress conditions. Other research work mentioned deal with studies in plant protection

factors, membrane proteins, and regulatory proteins. According to the authors, the feasibility of transgenic approaches for improved abiotic stress tolerance in plants has been widely accepted, but single-gene transfer has hitherto brought marginal results. They mention other techniques that could result in better plant abiotic stress tolerance, such as multi-gene transfer and RNA interference technology (RNAi).

For more information, email the author at cherian@itqb.unl.pt. Read the abstract of the article at http://www.springerlink.com/link.asp?id=f6122205551620k8.

ANNOUNCEMENTS

SPAIN TO HOST CEREALS MEETING

Lleida, Spain will host the meeting "Cereal Science and Technology for Feeding Ten Billion People: Genomics Era and Beyond" from the 13th-17th November, 2006. Topics to be covered include biodiversity of useful genes, genetic control of limiting factors for cereal production, and marker assisted selection. For more information, visit http://www.eucarpia.org/02meetings/cerealsannouncement.pdf or send an email to joseluis.molina@irta.es.

WORKSHOP ON PEANUTS SLATED

An international workshop on groundnut (peanut) aflatoxin management and genomics will be held from the 30th of October to the 3rd of November, 2006, in Guangzhou, China. Co-organized by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the workshops aims to assess the current research state in control or elimination of groundnut aflatoxin; to share progress reports on development and accessibility of groundnut genomic research information, technology, and infrastructure; to identify future priorities and needs for groundnut genomic research; to provide a forum for international researchers to explore the issues relevant to groundnut aflatoxin and genomics; and to establish international collaboration and consortium. For more information, please contact: peanutworkshop@163.com or visit http://www.aflatoxin.info/workshop2006

DOCUMENT REMINDERS

UPDATED POCKET K

Pocket K No. 18 on Ethics and Agricultural Biotechnology has just been updated. It discusses some ethical issues raised about agri-biotech and how we can deal with such concerns. Pocket Ks are Pockets of Knowledge, packaged information on crop biotechnology products and related issues. They are produced by the Global Knowledge Center on Crop Biotechnology of the International Service for the Acquisition of Agri-biotech Applications. Download the Pocket Ks at http://www.isaaa.org/kc.

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