CROP BIOTECH 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

EU COURT: AUSTRIA CAN'T BAN GM PLANTING

The European Union (EU) Court of First Instance dampened the draft law set by the Upper Austria Region to ban the planting of genetically modified crops. The Court said Austria failed to present science-based data to justify their case and arguments invoking the precautionary principle lacked merit.

Simon Barber, Director of the Plant Biotechnology Unit at EuropaBio, EU's association for bioindustries, said that the "ruling confirms that Member States may not abuse safeguard procedures to prohibit the use of safe, licensed GM products in their territory."

Austria notified the Commission in March 2003 of the Oberösterreichisches Gentechnik-Verbotsgesetz 2002, a draft law of the Land Oberösterreich (Province of Upper Austria) banning genetic engineering. The measure prohibited the cultivation of GM seed and planting material and secured a derogation from EU rules.

The EuropaBio website at http://www.europabio.org provides a link to the court order.

Meanwhile, Friends of the Earth (FOE) Europe has issued a statement calling for a new EU law that would allow individual European regions to ban all genetically modified (GM) crops within their territories. Their press release can be viewed online at http://www.foeeurope.org/GMOs/publications/EFSAreport.pdf

VIETNAM CONFERENCE SETS SOLUTIONS TO BOOST BIOTECH

Proposals to boost biotechnology in Vietnam were forwarded during a conference organized by the Vietnamese Party's Commission of Science and Education and the Ministry of Science and Technology. These include: building of research and training centers of international standards, establishing venture investment funds for production, and setting up suitable mechanism and policies for the development of biotechnology.

Minister of Science and Technology Hoang Van Phong requested relevant ministries and local units to assure implementation of the Government's action plan on biotechnology.

The action plan specifies that the country will focus on developing and applying bio-technology in agriculture, aquaculture, medicine, processing, and environmental protection.

In the same conference, Tran Duy Quy, Director of the Vietnam Agricultural Genetics Institute, noted that biotechnology products developed by Vietnamese research institutes generate some 50 billion Vietnam Dong (US $3M) annually. These products include agbiotech products, enzyme proteins, and biofertilizers.

More news summaries from Vietnam are available from Le Hien of Biotech Vietnam at hienbiotechvn@pmail.vnn.vn.

INTERNATIONAL EXPERTS DISCUSS FOOD SAFETY IN AFRICA

Experts from 50 countries have converged in Harare, Zimbabwe to discuss ways to ensure safer food for better health and agricultural trade opportunities in Africa. They note that an improvement in the food safety system could reduce about 2000 deaths daily as a result of food and water contamination.

Organized by the Food and Agriculture Organization and the World Health Organization, the Regional Food Safety Conference will discuss an Africa-wide Strategic Plan of Action for Food Safety to reduce future threats to public health and international trade caused by contaminated food and food products that do not meet international quality and safety standards. An example is the control of mycotoxins in staple African crops such as maize, groundnuts, and dried fruits.

Contact John Riddle of FAO for more information at John.Riddle@fao.org or see the FAO release at
http://www.fao.org/newsroom/en/news/2005/107908/index.html

BRAZIL BIOSAFETY CONGRESS YIELDS MANIFESTO

The 4th Brazilian Congress on Biosafety , and the 4th Latin-American Symposium on Transgenic Products were held last September 26-29 in Porto Alegre , Brazil. The events were presided over by 95 lecturers, and attended by 720 participants from 20 different countries, along with representatives from the Food and Agriculture Organization (FAO), the World Health Organization (WHO), the United Nations Environment Program (UNEP), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

Organized by ANBio, the National Biosecurity Association, the meeting aimed to strengthen the cooperation amongst Latin American countries in terms of biosecurity, biosafety regulations, and public communication and perception. Talks were delivered explaining the approaches of different countries regarding the issues, as well as similarities in the ways by which the same countries developed their laws, regulations, and communication strategies. The meeting also featured a regional workshop that aimed to work on a Technical Platform for Regional Cooperation on Biosafety.

The program covered the different aspects of biosecurity, from biosafety in human health, to biosafety in the use of genetically modified organisms. Speakers included Dr. Mirian Gallardo of the National Institute of Agricultural Research in Argentina, who presented the results of nine years of feeding studies on animals who were fed with feed products derived from genetically modified (GM) organisms. Her research showed that GM feed is as safe as its conventional counterparts.

Dr. Graham Brookes of the United Kingdom also presented his nine-year study of the environmental and economic benefits received by countries which have been planting Bt cotton, Bt corn, and RR soybean. Other speakers included Dr. Klaus Amman, and Dr. Peter Bennett.

Congress participants also signed and approved a Manifesto, recommending urgent regulation of the Biosafety Law approved last March, as well as development of GM research in the country. The Manifesto was sent to Brazil's President Lula.

See the Manifesto and news from the meeting in ANBio's web site: http://www.anbio.org.br.

FIRST BIOTECH INSTITUTE IN ETHIOPIA

The first biotechnology institute in Ethiopia, Africa is currently being constructed. Made possible through a World Bank loan, the research complex will do research on both crops and animals. Aside from research laboratories, the institute will also house offices, staff living quarters, and guest houses.

Yohannes Gojjam, Manager of the Holeta Agricultural Research Center, said that the research complex will be operational next year. Meanwhile, senior research personnel have completed intensive training and foreign experts are expected to provide assistance when the buildings are ready for use.

Additional details may be obtained by emailing Dr. Tilahun Zeweldu, regional coordinator of the Agricultural Biotechnology Support Project II East and Central Africa Advisor, Uganda at either tila@apepuganda.org or zeweldu@msu.edu.

COTTTECH TO RAISE LEVEL OF COTTON RESEARCH IN AUSTRALIA

CottTech, a joint venture of cotton research groups in Australia, including the Commonwealth Scientific and Industrial Research Organization (CSIRO), and the Cotton Research Corporation, is set to implement innovative research approaches to improve the cotton industry in the country.

CSIRO Plant Industry Chief Jeremy Burdon said that existing cotton research provides regular but step-by-step gains to cotton growers. “CottTech will concentrate on the fundamental science and allow researchers to be more creative and original in their research.” Research will focus on removing “constraints on production and ultimately deliver beneficial traits faster through improved breeding techniques.”

See CSIRO’s release on CottTech at http://www.csiro.au/index.asp?type=mediaRelease&id=187cottTech&style=mediaRelease

ORIGIN OF POTATO IS PERU, SAYS TAXONOMIST

A single origin in southern Peru is the original home of the cultivated potato. So says a team led by David Spooner of the United States Department of Agriculture. The team wrote in the Proceedings of the National Academies of Sciences that they had analyzed DNA markers in 261 wild and 98 cultivated potato varieties to assess whether the domestic potato arose from a single wild progenitor or whether it arose multiple times.

Spooner said that "The multiple-origins theory was based in part on the broad distribution of potatoes from north to south across many different habitats, through morphological resemblance of different wild species to cultivated species, and through other data. Our DNA data, however, shows that in fact all cultivated potatoes can be traced back to a single origin in southern Peru." Email David Spooner at dspooner@wisc.edu for additional information.

RESEARCH

FIRST NINE YEARS OF GM ASSESSED

Graham Brookes and Peter Barfoot of PG Economics Ltd., UK take stock of how biotech crops have made an impact in the first decade of their use. Their article, “GM Crops: The Global Economic and Environmental Impact - The First Nine Years 1996-2004,” appears in the online Agbioforum journal.

Both researchers found that the use of biotech crops in the last nine years has brought substantial net economic benefits at the farm level amounting to a cumulative total of $27 billion. They pointed out gains in important crop sectors such as cotton, which has benefited from an additional $6.5 billion in terms of farm income levels since 1996.

They also found that the use of biotech crops has reduced pesticide spraying by 172 million kg, as well as the environmental footprint associated with pesticide use by 14%. In the maize sector, pesticide use decreased by 24 million kg; while farmers reduced herbicide use by 5 million kg in the canola sector.

Researchers also found that the technology has significantly reduced the release of greenhouse gas emissions from agriculture, which is equivalent to removing five million cars from the roads.

Read the complete article at
http://www.agbioforum.missouri.edu/v8n23/v8n23a15-brookes.htm.

COMPUTER SIMULATION PREVIEWS MAS COST

Marker assisted breeding (MAS) makes use of molecular markers to ensure that a specific gene is incorporated into a specific locus in a plant cell. This high precision technique, however, is perceived to be costly compared with traditional breeding methods.

In "Genetic and economic analysis of a targeted marker-assisted wheat breeding strategy," Haydn Kuchel, of Australian Grain Technologies, and colleagues use computer simulation to design a genetically effective and economically efficient marker-assisted breeding strategy aimed at producing rust resistant wheat. Their findings are published in Molecular Breeding.

Researchers used the QU-GENE simulation software to examine how best to maximize MAS at lowest cost. The results of their simulation showed that the

economic success of MAS will vary with the stage at which the markers are deployed and the number and value of genes selected. MAS, in fact, could provide not only genetic gain but reduced overall cost by as much as 40%.

Read more about the research findings by downloading the complete article at http://dx.doi.org/10.1007/s11032-005-4785-7. If you are not a Molecular Breeding subscriber, you may still view the abstract at the same site.

SUBSTANTIAL EQUIVALENCE BETWEEN GM, CONVENTIONAL POTATOES STUDIED

The concept of substantial equivalence is important when studying the safety of biotech crops. This involves comparing the biotech crop with its conventional counterpart. If both are nearly the same in terms of nutritional content, water content, metabolite composition, etc., then they are deemed substantially equivalent, or satisfactorily one and the same.

Gareth S. Catchpole of the Max Planck Institute for Molecular Plant Physiology, and colleagues explore the concept in greater detail in “Hierarchical metabolomics demonstrates substantial compositional similarity between genetically modified and conventional potato crops.” Their work appears in the latest online issue of Proceedings of the National Academy of Sciences.

By fingerprinting the total metabolites of field-grown biotech and conventional potato tubers, and comparing the data, researchers found that apart from the changes expected in the genetically modified potatoes, all the potatoes in the study were substantially equivalent to each other. They also found large variations in the metabolite profiles of conventional cultivars – but the metabolite profiles of the biotech potatoes were well within the natural metabolite range of the conventional lines, and were similar to the Désirée progenitor line as well.

Read the complete article at http://www.pnas.org/cgi/content/full/102/40/14458.

BARLEY GIVES SALT TOLERANCE TO GM OAT

Oat is a major cereal crop important to human and animal diets. A successful oat harvest is highly dependent on osmotic stress, which in turn may be affected by drought or soil salinity. Most oat cultivars are moderately tolerant to such stresses, but soil salinity can decrease oat seed germination and stunt subsequent development in some cultivars.

Due to the complexity of the salt tolerance trait, traditional breeding has hitherto been unsuccessful in oat improvement. Hesham F. Oraby, of Michigan State University, and colleagues take the first step in genetic enhancement of the crop as they find that “Barley HVA1 Gene Confers Salt Tolerance in R3 Transgenic Oat.” Their work is published in the Crop Science journal.

Researchers introduced three genes into oat: HVA1, from barley, for stress tolerance; B-glucoronidase; and the bar herbicide resistance gene. An analysis of the transgenic plants showed that the genes had been stably transferred and expressed. The plants also showed increased tolerance to salt stress conditions, as well as better growth during the recovery period. Researchers also found that higher salinity levels significantly reduced plant growth of both transgenic and control plants

Subscribers to Crop Science can download the article at http://crop.scijournals.org/cgi/content/full/45/6/2218. Other readers can take a look at the abstract at http://crop.scijournals.org/cgi/content/abstract/45/6/2218.

UPDATES FROM THE BIOTECHNOLOGY INFORMATION CENTERS

BIOTECH SEMINAR IN MAKASSAR

A challenge for the world is to feed an increasing population, forecasted to reach 11 billion by 2050, out of whom 90 % will be in developing countries including Indonesia. Thus, a method that can complement conventional breeding and produce agricultural products more efficiently and competitively in the global market to feed a burgeoning population is highly desired. To facilitate the discussion on that topic, the Indonesia Biotechnology Information Center (IndoBIC) based in Bogor collaborated with the agriculture and forestry department of Hasanuddin University, Makassar to conduct a seminar on "Application of Biotechnology for Sustainable Agriculture Development Based on Agribusiness". The seminar was attended by 130 participants coming from different research and academic institutions in Sulawesi.

Indonesian experts gave talks on quality improvement of plant genetics through biotechnology application; development of transgenic plans; role of biotechnology to support environment-based agriculture; and activities of IndoBiC.

Details of the seminar may be obtained from Bambang Purwantara of IndoBic at b.purwantara@biotrop.org.



DHAKA EDITORS URGED TO FORM BIOTECH JOURNALISTS FORUM

Kazi Shiraz, editor of the Bangladesh newspaper Dinkal called for the formation of a Biotech Journalists Forum during a roundtable discussion on "Biotech Communication: Potential Role of Journalists" in Dhaka, Bangladesh. Around 50 journalists joined the discussions, which were presided by the editors of the New Nation, the Dinkal, and the Khaborpatro.

Organized by the Bangladesh Biotechnology Information Centre (BdBIC), the roundtable discussion enabled local scientists, led by Dr. Lutful Hassan of Bangladesh Agriculture University, to share information with journalists on the importance and prospects of biotech in Bangladesh, and the global status of commercial biotechnology. Dr. Donald MacKenzie, executive vice president of AgBios Canada, discussed food, health, and food safety of biotech crops. In return, newspaper editors talked about the potential role of journalists in science and biotech communication, as well as on the contribution of mass media for awareness building and public perception of biotech. Email BdBIC head Kondoker Nasiruddin (nasirbiotech@yahoo.com) for additional information on the media forum.



DOCUMENT REMINDERS

DATABASE OF STUDIES ON BIOTECH BENEFITS

CropLife International has launched a Database of the Benefits and Safety of Biotechnology. The database includes peer-reviewed studies that discuss the impacts of agricultural biotech products and technologies. Searchable areas are by crops, traits, countries, regions, and/or beneficial impact area (agronomic, environmental, safety and health, socio-economic, developing countries or co-existence).The database is available through CropLife International's website at http://www.croplife.org/biotechdatabase.

FAO RELEASES CONFERENCE DOCUMENT

Although the use of biotech crops is widespread throughout the world, those living in rural areas in developing countries are often far removed from involvement in important decision-making processes. In light of this, the Food and Agriculture Organization (FAO) Biotechnology Forum hosted an email conference entitled "Public participation in decision-making regarding GMOs in developing countries: How to effectively involve rural people," held from January 17-February 13 of this year.

Participants broadly agreed that 1) all peoples should be involved in decision making regarding biotech crops and 2) information on the nature and consequences of the use of biotech crops should be widely disseminated and communicated effectively. Participants underscored the importance of extension services, radio, and the use of local language when considering what channels to use in disseminating information.

Over 500 people subscribed to the conference, and 116 messages from 70 people living in 35 different countries were posted. Half of these messages were from people living in developing countries. The summary document of the conference is now available online.

Read more at http://www.fao.org/biotech/logs/C12/summary.htm.

DID YOU KNOW?

BIOTECHNOLOGY IN AGRICULTURE

Did you know that there is a lot more to biotechnology in agriculture than just GM crops? What many do not realize is that there are many other important applications of biotechnology that have made (and will continue to make) a tremendous impact on agricultural productivity. Biotechnology encompasses a number of tools and elements of conventional breeding techniques, bioinformatics, microbiology, molecular genetics, biochemistry, plant physiology, and molecular biology. To know more about these interesting fields, visit http://www.isaaa.org/kc/bin/publications/agribiotech/index.htm

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ANNOUNCEMENTS

BOOK ON WHITEFLIES

Whiteflies and their viruses are two of the worst crop pests that impact on agricultural sustainability, environment and human health. "Whitefly and Whitefly-borne Viruses in the Tropics: Building Knowledge Base for Global Action", is a collection of three decades of research on the topic by an international team of experts. The book is available online at http://www.tropicalwhiteflyipmproject.cgiar.org/book-wf.jsp

INTERNATIONAL RICE GENETICS SYMPOSIUM

The EDSA Shangri-la Manila, Philippines is the site of the 5th International Rice Genetics Symposium on November 19-23, 2005. The Symposium, held every 5 years, explores developments in rice genetics and their applications. The 3rd International Symposium on Rice Functional Genomics will also be held under the auspices of the International Rice Functional Genomics Consortium. More details of the symposium are available at http://www.irri.org/rg5.

CONFERENCE ON THE FUTURE OF FOOD

Join a discourse on the future of the food industry such as health and wellness, market access, regulation, emerging science and innovation, during the GMA Conference on the Future of Food on November 29-December 1, 2005. This will

be held at the Ronald Reagan Building, International Trade Center, Washington, D.C.

Those interested to register online may visit https://www.seeuthere.com/rsvp/invitation/invitation.asp?id=/m2c79e-416061647196

NOMINATIONS OPEN FOR INTERNATIONAL RICE PRIZE

Nominations are now being accepted for the 2006 Koshihikari International Rice Prize award. Two institutional rice researchers will be given a cash prize of 500,000 Japanese yen in a ceremony in Koshihikari in Fukui-City. For more information, visit http://www.geocities.jp/koshihikarinet/.

CBU NOW AVAILABLE IN PORTUGUESE

The Portuguese (Brazil) edition of the Crop Biotech Update is now available online. The newsletter features agricultural biotechnology news and research, translated by the AnBio team. You may download the file from http://www.isaaa.org/kc or from http://www.anbio.org.br

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CBT NEWS FEATURE

On The Peaks of Misty Mountains: Agricultural Practices of the Incas

They conquered a region nearly as harsh and forbidding as the Himalayas. They ruled over a world of mountains and mist, rivers and drought, clouds and grass. They thought themselves descendants of the Great Sun, and thus worshipped it, as they would a father who gifted them with food, clothing, and gold.

And yet, for all their advancements, and the skill of their race, their civilization lasted for no more than a hundred years.

The Incas ruled South America at the same time that Europe was slowly rising out of the Medieval Ages. For a century, the race dominated the Andes, with its cold peaks; the South American lowlands, with its alternating decades of drought and rain; and the midlands, home to both cropland and mines. They called their world the Land of the Four Quarters, the Tahuantinsuyu, an empire home to 15 million people scattered across the Andean Cordilleras, the Atacama Desert, and the Amazon rainforest.

In any case, and in any environment, the Incas found a place to plant their crops, to feed their people and keep a surplus.

The secret to the Inca's success was mita, an efficient system of forced labor imposed upon every Inca by the Incan king and his wives. Only 65 days of the year were needed for a family to tend to its needs. On the rest, people were tasked to work on temple-owned fields, bridges, roads, terraces, temples, and palaces, or extract gold, silver, and other precious metals from the mines.

It was mita that made the Incan empire a vast, formidable network. Two major roads crossed the empire from North to South, plunging deep into mountain-darkened valleys; then wending dangerously through steep precipices looking down upon gray, rocky ravines; before diving once more into coastal plains whose air was barely salted by the nearby Pacific. It was through these roads that goods traveled, sometimes on the backs of workers, sometimes borne by the llama, the Incan beast of burden.

The Incas had no wheels or carriages, nor paper, nor a system of writing, but they were able to build palaces and shrines on any terrain their empire presented. Their architects and masons built clay models to plan their work, then, during construction, used plumb bobs, sliding scales, and bronze and stone implements. The stone blocks to be used for fortresses and temples were brought high up the mountains on ramps and rollers. Despite the "primitive" set-up, every brick and stone was laid out and fitted with extraordinary precision.

As impressive as the roads and palaces was Incan agriculture, which, as it thrived in environments as diverse as frost and drought, was a miracle all its own. Each clan, or ayllu, was a farming community, and each family had to work cooperatively to make the most of the land. The adults plowed the fields, while the children worked by keeping the pests and birds out of the cropland. At the end of each harvest was a Sun festival, held as thanksgiving, and as supplication that the earth would yield even better crops in the following season.

Since the empire was composed mainly of high, snowy mountains, the Incas employed terracing, to shape the land for their needs; irrigation, to draw water constantly to the fields, even in times of drought; drainage, to empty the fields in times of heavy rain; and fertilization, using animal droppings, or guano, or the remains of slaughtered llamas.

Incan terraces are an architectural, as well as agricultural marvel. The Incas built a system of moisture retention into their terraces by layering sand and stone, clay, and then fertile soil upon each other. If the harvest exhausted the layering, they turned to the Three-Sisters system, first, planting corn; then beans, when the corn reached a certain height, so that the bean vines could be anchored on the corn stalks; and last, squash, to fill in the spaces between the crops. If either

system would not work, then fertile soil was carried from kilometers away, through the Incan highway, and used to fill the terraces.

One such terrace system survives in Moray, where concentric circles rise up from the earth, as though in a grain-carpeted amphitheatre. Each step is a “microclimate,” simulating the sweltering humidity of the lowlands, then rising to the temperate cool of the midlands, before going up to the snow-bitter heights of the mountains. At the bottom, they planted peppers and fruit. In the middle, they sowed beans and maize. At the very top were the hardy potatoes. Moray, in a sense, was an Incan experimental station.

The most important Incan crop was the potato, which could withstand heavy frosts and the low pressure of high altitudes. The Incas kept their tomatoes outside, exposing them to the alternating frost of night and sun of day, until the vegetable was completely rid of moisture. At this point, they reduced it to potato flour, or chuno, which could be stored for a long time. Corn was another important Incan crop. They ate it fresh, dried, or popped – and even fermented it to make an alcoholic beverage called saraiaka, or chichi.
With agriculture producing an overwhelming array of food, and the mines yielding gold and silver beyond all measure and reason, the Incas had everything they needed. As a result, they rarely stole, and if so, they had no prison to be locked into. Their crime could be repaid by throwing the perpetrator off a cliff.

This array of abundance and wealth ultimately led to the Inca’s demise. In the 15th century, pale skinned newcomers arrived, taking with them the knowledge of a burgeoning, Renaissance Europe – and bringing with them diseases hitherto unknown to the isolated empire. The Incas were nearly wiped out with plagues. Those who survived found that their conquerors shared their love for gold and silver, and would overpower an entire continent, destroy its temples and palaces, and subdue its peoples if only to bring glory to a king across the seas.

In the end, the Inca disappeared into myth, their language into history, their tales and peoples into the forests and mountains of South America.

In the meantime, their work in agriculture yielded more than 20 varieties of corn, 240 varieties of potato, and an overwhelming spread of squash, beans, pepper, peanuts, cassava, and the grain quinoa. Their work produced more than half the agricultural products that the world eats today. Their legacy lives, rooted in the faraway heights of the Andes, and spanning the world as widely and diversely as the Incan empire itself: from land to land, and from dinner plate to dinner plate.