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), and AgBiotechNet

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BRAZIL TO DO FIELD TRIALS FOR GM BEANS

The Empresa Brasileira de Pesquisa Agropecuária (EMBRAPA), Brazil’s organization for agricultural research, together with the Ministry of Agriculture, Cattle and Supply, got the go-signal from the Brazilian Institute of the Environment (IBAMA) to conduct field trials with transgenic beans.

Marcus Barroso Barros, IBAMA president, announced that the field research will involve genetically modified (GM) beans (Phaseolus vulgaris) that are resistant to the bean golden mosaic virus. The virus is transmitted by whitefly and is considered the most important disease that attacks the beans.

The tests will be conducted at EMBRAPA's research station at St Antonio de Goiás. Aside from monitoring the plots regularly, EMBRAPA is also required to develop an environmental education project on GM beans for the local community.

This is the second license granted to the EMBRAPA, the first being given to conduct research on GM papaya resistant to the papaya ringspot virus. The next transgenic product license being worked out by EMBRAPA will be a virus resistant potato.

More on EMBRAPA at http://www.embrapa.br/english/index.htm.

POTENTIALS AND LIMITATIONS OF GM RICE

Transgenic technologies under development for rice have bright prospects for developing countries. These are herbicide tolerance, biotech stress resistance, abiotic stress resistance, and nutritional traits. However, some countries may be concerned about the effect of genetically modified (GM) rice on their markets. This was pointed out by Ronnie Coffman and his colleagues from the Cornell University in a paper entitled “Potentials and Limitations of Biotechnology in Rice” presented during the Food and Agriculture Organization Rice Conference in Rome, Italy on February 12-13, 2004.

The impacts on rice trade, according to the Cornell University professors may be that:

* Unauthorized technologies that offer a production advantage will spread through the informal sector in most rice-growing countries;

* High quality markets and/or markets with concerned consumers will require segregated, certified non-GM rice, resulting in additional costs;

* GM and other technologies will lower the price of rice in the world market; and

* Biotechnologies will be utilized to combine productivity and adaptation with quality traits, affecting the monopoly of certain geographies for certain traits.

“How the potential of the human imagination and creative spirit should be nurtured, guided, interpreted and ultimately directed and controlled with respect to biotechnology is a question of profound social, economical and ethical dimensions. It deserves to be discussed, contemplated and digested at all levels of society,” Coffman and colleagues concluded.

For the full paper and other papers presented during the FAO Rice Conference, visit http://www.fao.org/rice2004/en/e-001.htm.

BIOTECH AND CLIMATE CHANGE IN DEVELOPING COUNTRIES

Modern biotechnology, including the use of transgenic plant cultivars, may offer opportunities to strengthen the arsenal of adaptive responses to climate change. However, developing countries’ preparedness for adaptation to climate change are not apparent. This is the view of Joel Cohen of the International Service for National Agricultural Research, and Norman Rosenberg of the Joint Global Change Research Institute.

Cohen and Rosenberg said that the technology can impart tolerance or resistance to heat and moisture stress and/or resistance to pests and disease. Molecular technologies can also be used to isolate and insert genes coding for traits that convey the needed tolerance or resistance. However, agricultural biotechnology still faces problems in developing countries. These are:

* Fears that multinational companies will dominate technologies, crops, regulatory approvals and intellectual property rights;

* Trade, regulatory, and political problems that complicate the approval process

* Willingness of developing countries to approve only transgenic fiber crops but not food crops; and

* Limited and uncertain financial resources that jeopardize regulatory and research capacity.

Cohen and Rosenberg shared further insights in their paper “Addressing Effects of Climate Change: Realities and Possibilities for Plant Biotechnology in the Developing World” in Applications of Biotechnology to Mitigation of Greenhouse Warming: Proceedings of the St. Michaels II Workshop held in Maryland, USA.

Visit the Joint Global Change Research Institute at http://www.globalchange.umd.edu.

ANALYSIS OF BIOSAFETY SYSTEM IN KENYA

Kenya, as a signatory to the Cartagena Protocol for Biosafety, needs to develop the biosafety expertise of key government officials within existing regulatory agencies to help them handle increasing volumes of applications. This was one of the main findings of a country report on the status of the national biosafety system in Kenya.

Patricia Traynor and Harrison Macharia of the International Service for National Agricultural Research, and National Council for Science and Technology in Kenya, respectively, noted also in their report entitled “Analysis of the Biosafety System for Biotechnology in Kenya: Application of a Conceptual Framework” that:

* There is a concern about the entry of transgenic organisms into Kenya outside of regular channels, such as genetically modified (GM) grain arriving as food aid, which could subsequently be planted by farmers.

* The National Biosafety Committee currently takes a cautious approach to risk assessment. It needs to look at the potential benefits of GMOs and also the risks associated with not adopting some GM products.

* Public understanding of biotechnology and GM is limited.

* Kenya is well placed to take the lead in biosafety initiatives in the region.

Traynor and Macharia’s report is available in hard copy as ISNAR Country Report 65, The Hague, The Netherlands. Visit the ISNAR website at http://www.isnar.cgiar.org or email isnar@cgiar.org.

BIO-EARN SET TO CHANGE ITS PROGRAM

The East African Regional Programme and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development (BIO-EARN), which is East Africa's premier biotech capacity building facility, is set to develop a new program that is in-line with the new initiatives on biotechnology capacity building and policy support that have recently emerged in the region. This decision was arrived at during BIO-EARN's fourth General Assembly in Arusha, Tanzania last March 3-5, 2004.

Thematic workshops focusing on key agricultural biotech issues affecting the region were discussed during the assembly, while progress report presentations were done by the different heads of biotech institutions who also attended the said meeting. The meeting was attended by 150 delegates from different countries, and was jointly organized by the Tanzania Commission of Science and Technology (COSTECH); BIO-EARN Regional Office in Kampala, Uganda; and the Stockholm Environment Institute (SEI).

Prior to the said assembly, the Network commissioned an external review of its activities. The external review was conducted by Dr. Jane Morris, Director, African Centre for Technologies; and Dr. Niels Louwaars of the Netherlands-based Research Programme International Cooperation. The external reviewers recommended that the future BIO-EARN program find a clear niche in the region. They also made recommendations on how a future BIO-EARN program could be developed, how partnerships with other organizations can be formed, how competitive research grants can be conceptualized, and how to branch into other areas of biotechnology.

At present, BIO-EARN has three broad objectives, which includes: building biotechnology, biosafety and biotechnology policy capacity; facilitating regional collaboration; and stimulating dialogues between policy makers and scientists in the East African region./ Kenya Biotechnology Information Center (http://www.isaaa-africenter.org)

ISLAM AND BIOTECHNOLOGY

What is Islam's view on food biotechnology? Tuan Shaikh Mohd Saifuddeen bin Shaikh Mohd Salleh, a fellow with the Institute of Islamic Understanding Malaysia, says any discourse on food is considered important. The general criteria for any food to be consumed by Muslims is known as halalan tayyiban, which means "permissible from the shariah perspective (halal) and of good quality (tayyib)." In the case of genetically modified (GM) food, as long as they meet these two criteria, then it is consumable by Muslims.

Hence, the halal criterion is that food should originate from sources that are slaughtered according to the shariah and are not of prohibited animals. To date there is only one fatwa or religious decree in Malaysia pertaining to GM food. It states that GM food with DNA from pigs are haram (not permissible) for Muslims to consume.

Read more on "Biotechnology and Religion: Are They Compatible?" in the latest issue of the BICNews, a publication of the Malaysian Biotechnology Information Centre. Email info@bic.org.my or visit their website at http://www.bic.org.my.

CHALLENGES OF GENOMICS IN INDIA

“India, being host to a vast bio-reservoir and a pool of competent scientific and technical manpower, can really make a mark in the post-genomics era if there is an organized and directed private/ public partnership. India can contribute immensely with (its) scientific manpower capabilities existing in both life sciences and information technology (IT),” says Kannan Sivaprakasam, a research associate from Cornell University, USA. Sivaprakasam added that India can also benefit immensely by actively encouraging investment in genomics.

However, the field of genomics is information-driven, thus the opportunities and challenges lie with the large databases for new knowledge and having the ability to convert knowledge into useful and commercially significant results. In line with this, Indian IT companies have a niche and can offer complete database solutions to major pharmaceutical and genome-based biotech companies around the world.

Sivaprakasam observed that computational biology and bio-informatics (the integration of biology, computer science and information technology) are the areas where substantial levels of development skills are required to develop custom applications. Bio-informatics is also crucial for the advancement of the genome-based industry since it can cut the timeframe and costs in developing a product. At present, the bio-IT solutions market in India is pegged at $15 million and is envisioned to amount to $120 million by 2006.

Download the full article published at the Asia Times Online at http://www.atimes.com/atimes/South_Asia/FC11Df04.html

2004 IS YEAR OF RICE

The United Nations has declared 2004 as the International Year of Rice with the theme "Rice is life." First proposed by the International Rice Research Institute, and then endorsed and supported by the Food and Agriculture Organization of the United Nations and the government of the Philippines, the International Year of Rice celebrates, “not only the cultural and culinary importance of rice, but also seeks to highlight the major challenges still facing one of the world's most vital industries, an industry that feeds almost three billion daily and employs hundreds of millions more.”

Scientists and researchers with the Consultative Group on International Agricultural Research have been active in creating rice varieties to meet the needs of people around the world. These include:

* Storage and maintenance of varieties by the International Rice Research Institute has saved a treasure-trove of biodiversity from extinction.

* The International Rice Research Institute has developed a high-yielding, tropical rice plant that grows on dry, irrigated land. The new "aerobic rice" may one day reduce water usage for rice planting by 50 percent in the dry areas of developing nations.

* Collaborative research on biofortication of rice for better nutrition hopes to improve the quality of life.

* The Centro Internacional de Agricultura Tropical is engaged in a focused program of research that integrates advanced techniques with conventional plant breeding to broaden the genetic base of rice production, providing genes for useful traits that have not previously been available to the region's rice growers.

To learn more about these efforts visit http://www.futureharvest.org.

BIOTECH PARTNERSHIP BETWEEN INDIA AND PAKISTAN

India and Pakistan have established biotechnology collaboration during the BioAsia 2004 meeting in Hyderabad last week. During the said event, the Pakistani delegation signed five agreements — three with Indian biotechnology companies, and two with the All India Biotech Association (AIBA).

According to Anwar Nasim, chairman, Pakistan's National Commission on Biotechnology, and head of the delegation, Pakistan intends to collaborate with the Indian companies in the areas of industrial products, vaccines, diagnostic kits and transgenic crops. Also, biotechnology companies in India will benefit from the opening of a potential market in Pakistan.

Under the said agreements, AIBA will help Pakistan establish its own biotechnology association, and provide a list of Indian technologies that are available for licensing in Pakistan. Indian technology could also help Pakistan to lessen the price of drugs that are more costly than those produced in India. Further, the relationship between Indian and Pakistani scientists look promising. The Indian National Science Academy (INSA), and the Pakistan Academy of Sciences are due to launch discussions on common interests such as agriculture and malaria.

Read the full article from Nature at http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v428/n6979/full/428110a_fs.html.

VRN2 GENE KEY TO WHEAT GLOBAL ADAPTATION

Jorge Dubcovsky from the University of California Davis and colleagues have isolated and cloned the VRN2 gene in wheat, which controls vernalization. This research gives new ideas on how wheat has been able to adapt to a wide range of climates and provides practical implications for improving wheat varieties through manipulation of flowering times.

The same research team also cloned the first wheat vernalization gene, VRN1.They discovered that VRN1 and VRN2 work together to confer the winter growth habit. Loss-of-function mutations in either of these two genes can result in spring wheat varieties that do not require cold weather to initiate flowering. Hence, these varieties can be planted in spring to grow throughout the warmer months of the year.

Dubcovsky noted that an additional application of their discovery will be the experimental manipulation of cereals’ flowering time.

The paper entitled “The Wheat VRN2 Gene is a Flowering Repressor Down-Regulated by Vernalization” appears in the March 12, 2004 issue of the journal Science. View the journal online at http://ww.sciencemag.org.

CONVENTIONAL PLANT BREEDING

Conventional plant breeding resulting in open pollinated varieties (OP) or hybrid varieties has had a tremendous impact on agricultural productivity over the last decades. Forms of conventional plant breeding are: mutation breeding and hybrid seed technology. Some advantages of conventional plant breeding are: yield improvement, extended growing season, and quality improvement.

While an extremely important tool, conventional plant breeding also has its limitations. First, breeding can only be done between two plants that can sexually mate with each other. This limits the new traits that can be added to those that already exist in a particular species. And second, when plants are crossed, many traits are transferred along with the trait/s of interest - including those traits that have undesirable effects on yield potential.

Read more about conventional plant breeding as discussed in the latest Pocket Knowledge (K) from the Global Knowledge Center on Crop Biotechnology of the International Service for the Acquisition of Agri-biotech Applications (ISAAA-KC). The Conventional Plant Breeding Pocket K is downloadable at http://www.isaaa.org/kc.

TISSUE CULTURE TECHNOLOGY IN AFRICA AND ASIA

Plant tissue culture is a technique that has been around for more than 30 years, and is still seen as an important technology for developing countries for the production of disease-free, high quality planting material and the rapid production of uniform plants. Also, micropropagation, which is a form of tissue culture, increases the amount of planting materials to facilitate distribution and large scale planting. In general, micropropagated plants are observed to establish more quickly, grow more vigorously and taller, have shorter and more uniform production cycles, and produce higher yields as compared to conventional propagules.

To date, the benefits of tissue culture technology is already experienced farmers in Africa and Asia. In Kenya, small-scale banana producers used tissue culture as an option to provide sufficient quality and quantity of planting materials. The same technology was also used by scientists from the West Africa Rice Development Association (WARDA) for combining the ruggedness of the African rice species (Oryza glaberrima) with the productivity of the Asian species (Oryza sativa), which resulted to the ‘New Rice for Africa’ (NERICA).

In Asia, tissue culture technology has been refined to suit the needs of orchid species and hybrids. Judging from the experiences of Thailand, Singapore, and Malaysia, the ornamental and cut-flower trade is a substantial source of foreign exchange, and provides additional income for small growers.

All these issues are extensively discussed in the latest Pocket Knowledge (K) from the Global Knowledge Center on Crop Biotechnology of the International Service for the Acquisition of Agri-biotech Applications (ISAAA-KC). The Tissue Culture Pocket K is downloadable at http://www.isaaa.org/kc.

ANNOUNCEMENTS:

ISAAA CHAIR TO PRESENT GLOBAL STATUS OF GM CROPS

Dr. Clive James, chairman of the International Service for the Acquisition of Agri-biotech Applications will give a presentation on the global status of genetically modified crops and their contribution to sustainability and future prospects at the Cape Milner Hotel, Milner Road Tamboerskloof in South Africa on March 26, 2004. It is being organized by Cape Biotech, a government-funded Biotech Regional Innovation Centre in the Western Cape. Additional information may be obtained from Britt Akermann of Cape Biotech at britt@capebiotech.co.za.

WORLD CONGRESS ON CONSERVATION AGRICULTURE

The 3rd World Congress on Conservation Agriculture, organized by the Africa Conservation Tillage Network (ACT) in collaboration with the Kenya Ministry of Agriculture, Kenya Conservation Tillage Initiative (KCTI), and African Union's New Partnerships for Africa's Development (NEPAD), will be held on October 3 to 7, 2005 in Nairobi, Kenya. For more information, visit their website at www.fao.org/act-network, or email Martin Bwalya at actsecre@africaonline.co.zw.
