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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IMPLICATIONS OF GMF TECH FOR SUB-SAHARAN AFRICA

The economic gains from using genetically modified (GM) crop technology in Sub-Saharan Africa (SSA) are potentially large, say Kym Anderson and Lee Ann Jackson in a working paper released by the World Bank Group. The gains are felt most from using nutritionally enhanced GM wheat while the estimated benefits are diminished slightly by European Union's current barriers to GM foods.

The authors used the global economy-wide computable general equilibrium model known as GTAP. They specifically noted that if SSA countries impose bans on GM crop imports in deference to EU market demand for non-GM products, the domestic consumer loss net of that protectionism boost to SSA farmers would be more than the small gain derived from greater market access to the EU.

Anderson and Jackson conclude that African countries need to assess whether they share the food safety and environmental concerns of Europeans regarding GM organisms. Otherwise, they have much to gain from adopting GM crop varieties especially second generation ones.

The paper is a product of the Trade Team, Development Research Group, which aims to better understand the contributions of new technologies and trade policies to economic welfare of the developing world. The full paper is available at http://econ.worldbank.org/files/38750_wps3411.pdf

ENVIRONMENTAL BIOSAFETY AND GM POTATO

There is no basis for invoking the precautionary principle to bar genetically modified nematode-resistant (GMNR)-cystin potato trials for their impact on non-target soil microbes and fauna or associates of the crop's foliage. This was the view forwarded by Carolina Celis of Wageningen University in the Netherlands and colleagues in a November 11, 2004 article in Nature.

The researchers demonstrated that there is no harm to many non-target organisms but gene flow occurs to wild relatives growing near potato crops. Initially, a barrier to outcrossing can be provided by the male sterile cultivar Revolucion which provides a basis to underpin the development of GM field trial regulations for potato in the Andes.

With this in mind, Celis and colleagues suggest that "transgenic planting should be limited to male sterile cultivars while concerns over possible introgression of any given trait are evaluated over several generations of random mating among individuals of a wild species by defined methods."

Nature articles can be viewed online by subscribers at http://www.nature.com/nature

EVOLVING ROLE OF GENEBANKS

Genebanks as repositories of plant genetic resources need to adapt to the changing demands of different clients and the fast developing field of molecular genetics. Hence, it is necessary to readjust the value assigned to genetic resources and find new ways of better exploiting them. This is the main raised by paper on "The Evolving Role of Genebanks in the Fast Developing Field of Molecular Genetics" released by the International Plant Genetics Resources Institute and edited by M. Carmen de Vicente.

Clients are now seeking expertise from traditional breeding to molecular biology and genomics. This requires a broader range of services and staff that can transcend various disciplines. Several issues should therefore be addressed, such as the attributes that a genebank should maintain, the convenience of networking to outsource certain types of expertise and procedures, the gap this situation may create among genebanks, and the benefits genebanks offer in countries with varying levels of development.

The paper suggests that regional networks be established with the aim of characterizing the germplasm of specific crops through molecular markers. Such

networks would facilitate the use of the most appropriate tools, reduce costs for individual parties and improve strategies for conservation and use.

See the full paper at
http://www.ipgri.cgiar.org/publications/pdf/986.pdf

INDIA GETS READY FOR RELEASE OF NEW PATENT BILL

A World Trade Organization (WTO)-compliant patent regime is scheduled to start on January 1, 2005, in India, and experts around the country have both scrutinized the bill and offered points to improve it.

For instance, some sectors have said that many issues, including data protection and quality of patents, would need to be attended to even after the Third Patent (Amendment) Bill is passed by Parliament. Mr C.D. Mayee, Agriculture Commissioner, called for "immediate attention to data protection, particularly in the area of agrochemicals and agricultural biotechnology".

The proposed third amendment to the Patent Act, 1970 will cover food, drugs, and chemicals, including agro-chemicals and transgenic seeds and products. As the new law will cover basic sectors like food, health and agriculture, the rise in cost will have a bearing on the overall economy.

Read the original articles at
http://www.financialexpress.com/fe_full_story.php?content_id=74157 and
http://www.thehindubusinessline.com/2004/11/17/stories/2004111702780300.htm

POTATOES GET A BRIGHT NEW LOOK

Scientists at the Scottish Crop Research Institute at Invergowrie, near Dundee, Scotland, have recently developed transgenic versions of two potato varieties, Desiree and Mayan Gold, which have much higher levels of carotenoids. Their findings are reported in the Journal of Experimental Botany.

The red, orange and yellow colors of fruit and vegetables, such as carrots, citrus fruits, peppers, and tomatoes are mainly due to pigments called carotenoids. These pigments are believed to protect against cancer, heart disease and deterioration of eyesight in the aged.

For example, lycopene, present in tomatoes, appears to have a protective effect against prostate cancer, while lutein and zeaxanthin (both of which are found in dark green leafy vegetables, fruit, corn and egg yolks) appear to provide protection against age-related macular degeneration.

Researchers used the phytoene synthase gene (crtB) from Erwinia uredovora, a species of bacteria obtained from a brewery in Japan, and introduced it into potato plants through Agrobacterium transfer, along with a gene that would direct it for

expression in tubers. Tests on RNA and protein levels of various carotenoids showed that the tubers had successfully expressed violaxanthin, lutein, antheraxanthin, and beta-carotene, with the carotenoid levels lower in mature tubers, and with the levels of beta-carotene greater by as much as six times as those in their natural counterparts.

With news from The Glasgow Herald and CheckBiotech.

Visit the Scottish Crop Research Institute at http://www.scri.sari.ac.uk/. Download the full article at http://jxb.oupjournals.org/cgi/reprint/eri016v1?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=potatoes+carotenoids&andorexactfulltext=and&searchid=1100771355217_290&stored_search=&FIRSTINDEX=0&sortspec=relevance&resourcetype=1&journalcode=jexbot.

BAD BLOOM TURNS GOOD

While normal opium poppies are the source of opiate drugs, such as morphine and codeine, the Commonwealth Scientific and Industrial Research Organization (CSIRO) Plant Industry researchers have turned the bloom around to produce higher amounts of a useful pharmaceutical product. Their findings are reported in the December issue of Nature Biotechnology.

The research team, headed by Dr. Alan Larkin, identified the gene that produces an important enzyme in the synthesis of morphine. The gene, which codes for codeinone reductase (COR), was silenced through RNA interference (RNAi) technology. This involved making a synthetic version of the gene that would cause a hairpin structure to form in the RNA transcript involved in the enzyme's production – thus halting the production of the opiates morphine, codeine, oripavine, and thebaine.

What resulted, however, was accumulation of reticuline - a non-narcotic alkaloid that is useful in developing antimalarial and anticancer drugs. Further research may one day allow the poppy to produce even more of the precursor, leading to better therapies and better drugs.

Download the complete article at http://www.nature.com/cgi-taf/DynaPage.taf?file=/nbt/journal/vaop/ncurrent/abs/nbt1033.html

CARROTS COME IN PURPLE, TOO

Colors can mean nutrition, too, as researchers with the Agricultural Research Service (ARS) Vegetable Crops Research Unit in Madison, Wisconsin proved recently, with their new line of conventionally-bred rainbow carrots. The bright vegetables now come in yellow, dark orange, bright red, and even purple.

Yellow carrots owe their color to xanthophylls, compounds that have been linked to good eye health. Lycopene, a carotene found in tomato, has been shown to prevent certain types of cancer, and gives the carrots their bright red blush. Purple carrots carry anthocyanins, powerful antioxidants that can guard the body's cells from the destructive effects of free radicals.

Read the full article at
http://www.ars.usda.gov/is/AR/archive/nov04/carrot1104.htm

AN APPLE A DAY MAY KEEP ALZHEIMER'S AT BAY

Not only the apple, but other fruits and vegetables rich in antioxidants may delay or even prevent Alzheimer's disease, Cornell University scientists report in the Dec. 1 issue of the Journal of Agricultural and Food Chemistry.
Quercetin, a potent antioxidant, appears to protect brain cells against oxidative stress, a tissue-damaging process associated with Alzheimer's and other neurodegenerative disorders. It is concentrated in the skin of red apples, and is also present in onions, blueberries, and cranberries

In the latest experiments, scientists treated rat brain cells with varying concentrations of either quercetin or vitamin C. The cells were then exposed to hydrogen peroxide to simulate the type of oxidative cell damage that is believed to occur with Alzheimer's. These results were then compared to brain cells that were similarly exposed to hydrogen peroxide but were not pre-treated with antioxidants.

Brain cells that were treated with quercetin had significantly less damage to both cellular proteins and DNA than the cells treated with vitamin C and the cells that were not exposed to antioxidants. This demonstrates quercetin's stronger protective effect against neurotoxicity, according to the researchers.
Studies on the influence of diet on brain cell health have already been conducted since 2002. In one experiment, mice with genetic defects similar to Alzheimer's disease were fed apple juice, then put in a maze to test their memory. Mice that had the Alzheimer's-like defect were forgetful and explored the same corridors repeatedly. After drinking apple juice, their memories improved so much that they performed nearly as well as normal mice. Normal mice who drank apple juice improved even more. Mice who drank too much apple juice did not benefit in the experiment, and actually had trouble in the maze.

Read the original press release at
http://center.acs.org/applications/ccs/application/index.cfm?PressReleaseID=2414&categoryid=2

DOCUMENT REMINDER: ITALY RELEASES CONSENSUS DOCUMENT ON FOOD SAFETY, GMO'S

The first ever consensus document on "Food Safety and GMOs," signed by 18 respected Italian associations, and representing over 10,000 researchers, was

launched in Milan, Italy on November 3, 2004 on the initiative of the Società Italiana di Tossicologia (SITOX).

The consensus was drafted after thorough evaluation of international literature, the opinions of various Learned Societies, and the recommendations of several international organizations regarding biotechnology and genetically modified organisms (GMOs). It addresses several topics, including the relationship between GMOs and nature, safety evaluation procedures, the principle of substantial equivalence, toxicity analysis, allergenicity, gene transfer, antibiotic resistance, long-term effects, and GMOs in animal feed.

Download the document from (ISAAA site link)

ANNOUNCEMENTS

FAO WORKSHOP ON BIOTECH

The Food and Agriculture Organization will hold a workshop on "The role of biotechnology for the characterization and conservation of crop, forestry, animal and fishery genetic resources" in Turin, Italy on 5-7 March 2005. Co-organized with the Fondazione per le Biotecnologie, the ECONOGENE project and the Società Italiana di Genetica Agraria, the workshop includes three sessions on the status of the world's agro-biodiversity; the use of biotechnology for conservation of genetic resources; and genetic characterisation of populations and its use in conservation decision-making. See http://www.fobiotech.org/FAO_2005.htm or contact mail@fobiotech.org for more information.

BIOTECH CHALLENGES TO BE EXPLORED IN 2005 FORUM

Harnessing the benefits of biotechnology, as well as producing results, present a challenge to the Asian Scientific community. These challenges, as well as the political, economic, social, technological, environmental, and legal aspects of the biotechnology industry will be discussed in the Asia Biotech Forum, to be held on the 3rd & 4th of February, 2005, at the JW Marriott in Kuala Lumpur, Malaysia.

Biotech professionals and those associated with the industry are invited to attend. For more information, contact
http://www.marcusevans.com/vents/CFEventinfo.asp?EventID=9129

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