

CROP BIOTECH UPDATE

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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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CIMMYT SOWS FIRST TRANSGENIC WHEAT FIELD TRIALS IN MEXICO

On 12 March 2004, a small trial plot was sown to genetically modified (transgenic) drought tolerant wheat in a greenhouse at the International Maize and Wheat Improvement Centre's (CIMMYT) headquarters in Texcoco, Mexico. This is the first time that transgenic wheat has been planted under field-like conditions in Mexico, and rigorous biosafety procedures are being followed, according to a press release from Centro

Developing drought-tolerant wheat and maize varieties that perform well under diverse conditions is a top priority for the center, where innovative research—conventional as well as transgenic—is pursued to meet this complex and difficult challenge.

CIMMYT researchers are hopeful that the wheat they are testing will withstand serious droughts. This wheat carries the DREB1A gene from the plant *Arabidopsis thaliana*. The gene has been shown to confer tolerance to drought, low temperatures, and salinity in *Arabidopsis*, a plant species related to wild mustard (see *Nature Biotechnology* 17:287-291).

This trial is the first time that a food crop carrying the DREB gene has advanced to this level of testing. Approval for the trials was granted in December 2003 by Mexican authorities under strict biosafety provisions to ensure that the plants do not inadvertently cross with conventional wheat plants; Access to the enclosed greenhouse trial is tightly restricted; No wheat plants are grown within 10 meters of the greenhouse trial; The spikes (flowers) of the

plants are covered and isolated from the environment by glassine bags; Plant materials are destroyed in an autoclave at the end of the trial; The trial is monitored by Mexican authorities and the CIMMYT Biosafety Officer.

But the greatest biosafety measures are provided by the wheat plant itself. Wheat is a "perfectly self-pollinated crop," with 99% of fertilization occurring within the sheathed spike of the plant, where male and female plant components share the same floret. Even in conventional breeding, researchers have to resort to a series of carefully executed, laborious procedures to cross one wheat plant with another. This makes wheat very different from maize, which freely pollinates and thus exchanges genes with other maize plants. Cross-pollination is further limited because wheat pollen is heavy and does not travel far, and because the pollen remains viable for only 20-30 minutes.

For the full press release, visit  
<http://www.cimmyt.org/english/webp/support/news/dreb.htm>.

#### TESTING METHODS FOR GM FOOD

The Pew Initiative on Food and Biotechnology recently posted the proceedings of the roundtable discussion held last February 2003 in collaboration with the Center for Food and Nutrition Policy at the Virginia Polytechnic Institute and State University. This roundtable discussion entitled "Testing Methodologies in Tracing, Segregating, and Labeling Foods Derived from Modern Biotechnology" examined the role testing methodologies play in the application of biotechnology to agriculture.

The major highlights of the proceedings are as follows:

- \* There are two types of tests currently being used to detect genetically modified organisms (GMOs), both of which have their own strengths and weaknesses. One tests for the presence of proteins produced as a result of the genetic modification (protein testing); the other seeks out the specific DNA sequence associated with a particular GM variety (DNA testing).

- \* Neither protein testing nor DNA testing are sufficient to reach conclusions about the amount of GMOs present in food products. Assessing quantity requires that the tests be accompanied by carefully designed sampling procedures or methodologies.

- \* Those on the front lines of product segregation are keenly aware of the shortcomings of GMO testing. But market demands leave them no choice but to reach for whatever tools are available, however flawed they may be. Thus, there is a need for the establishment of international standards that can resolve the confusion surrounding the marketing of "GMO-free" commodities and processed goods.

Read more about the proceedings at <http://pewagbiotech.org/events/0225>

#### BIOSAFETY: KEY TO GM CROPS IN INDIA

Attempting to clear apprehensions about genetically modified (GM) crops, the Indian Council of Agricultural Research (ICAR) stated that all domesticated crops and animals have generally been subjected to varying degrees of genetic modifications in the past. While the potential dangers associated with GM crops are remote, valid biosafety concerns must still be properly addressed.

With regards to this, Mangla Rai, ICAR director-general, assured that GM crops developed and cleared in the country will be safe if the appropriate biosafety measures are put in place. He further stated that "despite the parallels between selective breeding and transgenic research, we cannot afford to ignore the importance of proper risk assessment and environmental and biosafety regulations with respect to transgenic crops. The fast-paced and ever-changing nature of research and product development presents a moving target for biosafety regulators, research managers, scientists and the public. Therefore, there is a definite need for a dynamic and well-balanced regulatory system."

ICAR has recently launched a national network for the research and development of transgenics. This involves 20 public sector research institutes for developing 14 transgenic crops, which are now in different stages of development. "The transgenic programme in India has so far been heavily dependant on borrowed genes, promoters and gene constructs. We are aiming to develop these products indigenously and also develop marker-free transgenics." He also stressed the need for public-private sector collaboration in developing transgenics as a range of 18 transgenics are being developed by private sector in the country.

The news article from the Financial Times can be downloaded at [http://www.financialexpress.com/fe\\_full\\_story.php?content\\_id=55297](http://www.financialexpress.com/fe_full_story.php?content_id=55297).

#### MAURITIUS ADOPTS GMO BILL WHILE ANGOLA SEEKS BIOSAFETY REGULATIONS

The Mauritian Parliament has approved the production and sale of genetically modified organism (GMOs). Panafrican News Agency quotes Mauritian Prime Minister Paul Berenger as saying that the new legislative order was not aimed at promoting GMOs but at ensuring that their import, sale, and production are properly authorized. Berenger added that GMO production has been increasing by 10 per cent annually and there has been "no evidence of adverse effects on people's health."

Meanwhile, Panafrican News Agency also reported that Angola's National Codex Alimentarius Committee has called for the development of new biosafety regulations on the sale and transport of genetically modified (GM) products. The proposal follows the Angolan government's issuance last week of a ban on the import of GM seed and grain. Codex Committee Chairman Gomes Cardoso said that Angolan biosafety rules should adhere strictly to the precautionary principle as "provided for" by the Cartagena Protocol on Biosafety and should conform with Southern African Development Community (SADC) recommendations on biotechnology and biodiversity.

Cardoso called for all grain received as food aid to be ground before distribution and for a ban on the establishment of GM laboratories in Angola. He added that GM products should be controlled using scientific criteria. In promoting the development of biosafety regulations, the Codex Committee says that it will cooperate with Angolan institutions, including Angola's

Phytogenetic Resources Centre, the customs department, and scientific laboratories. The committee, which is run by Angola's ministries of trade, industry, health, agriculture, and defense, was established in 2003 to develop food standards and update Angola's legislation on food products.

#### RICE BIOTECH MUST SUPPORT FARMERS, SAYS INDIAN REPORT

"The bottom line in the use of recombinant DNA technologies should be the economic well-being of farm women and men, the safety of the environment and the health security of the consumers." This is one of the conclusions of the report of the Indian national colloquium "Molecular Breeding and Shaping the Future of Rice" organized at M. S. Swaminathan Research Foundation, Chennai, India.

Other report recommendations were:

- \* The development of databases on molecular markers and functional genomics, and a National Bioinformatics Centre devoted to the rice genome.

- \* Farmer participatory knowledge delivery and extension systems in the case of GM varieties.

- \* A proactive response on gene development and deployment for facing the impact of global warming and climate change. An anticipatory gene deployment strategy will have to be developed to enable farm families to face potential adverse changes in sea level and precipitation.

- \* An endorsement of bio-fortification efforts. There is an urgent need for an integrated strategy for the elimination of micronutrient deficiencies in the diet, since hidden hunger caused by such deficiencies is widespread.

- \* More research on improving the nutritive quality and digestibility of rice biomass comprising straw, bran and husk for farm animals.

The M.S. Swaminathan Research Foundation (MSSRF) organized in Chennai a National Colloquium on "Molecular Breeding and Shaping the Future of Rice" on 12-13 March 2004, in association with the Food and Agriculture Organization, Department of Biotechnology, Genetic Congress Trust and the Mahyco Research Foundation to discuss the potential impact of molecular breeding in enhancing the productivity, quality, profitability and sustainability of rice farming systems.

For more information on the M.S. Swaminathan Foundation visit <http://www.mssrf.org>.

#### QUALITY PROTEIN MAIZE FROM GHANA

With assistance from the Atlanta-based Carter Center, a new type of corn seed has taken root in Ghana - an altered form of corn known as obatanpa, or "good nursing mother." Scientists, on the other hand, call it "quality protein maize." This corn yields more corn per acre and contains better protein.

The Carter Center worked in partnership with the Sasakawa Africa Association, led by agronomist Norman Borlaug. Scientists began developing this quality

protein maize from a strain of Andean corn in the 1960s to have higher-than-normal levels of lysine and tryptophan. But it was difficult to get a variety that tasted as good as normal corn, resisted disease as well, offered as high a yield, or had the same appealing color and consistency.

The project was then revived in the 1980s, particularly in Ghana, where local experts developed a quality protein strain that matched traditional corn in taste, texture and color.

At present, corn seeds have been taken from Ghana to be introduced in other countries in Africa.

Download the full story at

[http://www.ajc.com/news/content/news/atlanta\\_world/0304/03ghana.html](http://www.ajc.com/news/content/news/atlanta_world/0304/03ghana.html).

#### IMPROVING BIOSAFETY FRAMEWORKS

In a paper entitled "Status of Regulation of Genetically Engineered Products in Selected Countries—An Analysis," S. Rao, Director of Biotechnology, Ministry of Science and Technology, Government of India, conducted a comparative analysis of regulatory mechanisms among selected countries. The study, published in the November 2003 issue of the Asian Biotechnology and Development Review, analyzed the regulatory frameworks of: Australia, Argentina, China, Egypt, India, Japan, Philippines, Russia, Thailand, United Kingdom, and the United States of America.

The study revealed that revisions and modifications of the guidelines and procedures based on feedback from stakeholders and science-based developments in risk assessment are quite common in all countries. It was also found that regulatory mechanisms are continuously updated and evolved to meet current needs and technologies. The paper also underscored the need for amenable regulatory systems in order to address different cross cutting issues affecting specific stakeholder groups. These include the single window system, involvement of stakeholders, cost effectiveness, and the harmonization of regulatory procedures.

The author concluded that building capacity (infrastructure and expertise) through biosafety experiments, addressing public concerns, maintaining databases, monitoring commercialized GMOs, and updating the knowledge of regulatory committee members are immediate needs for improving frameworks for biosafety implementation.

For more details, please email: [srrao@dbt.nic.in](mailto:srrao@dbt.nic.in). For the full article, please visit [www.ris.org.in/abdr\\_nov032.pdf](http://www.ris.org.in/abdr_nov032.pdf)

#### GM TOBACCO FOR CERVICAL CANCER

Scientists at the University of Cape Town are currently using genetically modified (GM) tobacco plants to create vaccines to cure cervical cancer. Ed Rybicki, Department of Molecular and Cell Biology, University of Cape Town in South Africa, and his colleagues are trying to produce an affordable vaccine against the human papilloma virus which causes cancer in the cervix. Cervical cancer is said to be the biggest cancer killer of women in South Africa.

Using the leaves of the tobacco plants as vaccine factories, Rybicki explains "So what you do is make a portion of the virus - that is, the protein coat - which is what the immune system recognizes. You can make this in a number of systems. And the nice thing about it is however you make it, it usually self-assembles - that is, it makes something that looks like the real virus. We can make it in animal cell cultures, we can make it in insect cell cultures, we can make it in plants. And we are trying to make plant production a reality." Adds Rybicki, "We are still in the development phase. We have got candidates, we know that we can make them. We need to make them on a bigger scale, prove that we can make them economically and then stick them in a bottle. Only then will we begin animal testing, let alone human testing."

For more information about this ongoing research, email Ed Rybicki at [ed@science.uct.ac.za](mailto:ed@science.uct.ac.za). The news article was also featured at <http://www.scienceinafrica.co.za/2004/march/vaccine.htm>

#### ANNOUNCEMENTS:

##### BIO-SCIENCE WEEK

May 16-20, Saskatoon, Saskatchewan, Canada

Bio-Science Week, a unique opportunity to discover the latest advances in not one, but three bio-based sectors, namely the agricultural biotechnology industry, bioproducts and bioprocessing industry, and the natural health products industry. For more information, visit [www.bio-science.sk.ca](http://www.bio-science.sk.ca)

##### NEW K-SHEET

The British Medical Association's (BMA) position statement on GM foods is featured as the latest Knowledge (K) Sheet from the Global Knowledge Center on Crop Biotechnology of the International Service for the Acquisition of Agri-biotech Applications (ISAAA-KC). This material is downloadable at <http://www.isaaa.org/kc>.

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