



SOUTH ASIA
BIOSAFETY PROGRAM



NEWSLETTER

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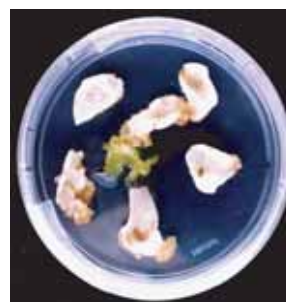
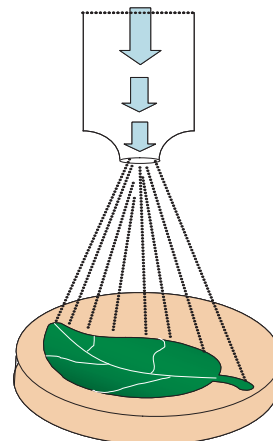
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SABP

The South Asia Biosafety Program (SABP) is an international developmental program initiated with support from the United States Agency for International Development (USAID). The program is implemented in India and Bangladesh and aims to work with the local governments to facilitate implementation of transparent, efficient and responsive regulatory frameworks that ensure the safety of new foods and feeds, and protect the environment.

SABP is working with its in-country partners to:

- Identify and respond to technical training needs for food, feed and environmental safety assessment.
- Develop a sustainable network of trained, authoritative local experts to communicate both the benefits and the concerns associated with new agricultural biotechnologies to farmers and other stakeholder groups.
- Raise the profile of biotechnology and biosafety on the policy agenda within India and address policy issues within the overall context of economic development, international trade, environmental safety and sustainability.



CHLOROPLAST TRANSFORMATION TECHNOLOGY – A WAY FORWARD FOR DEVELOPING ENVIRONMENTALLY SAFE TRANSGENIC PLANTS

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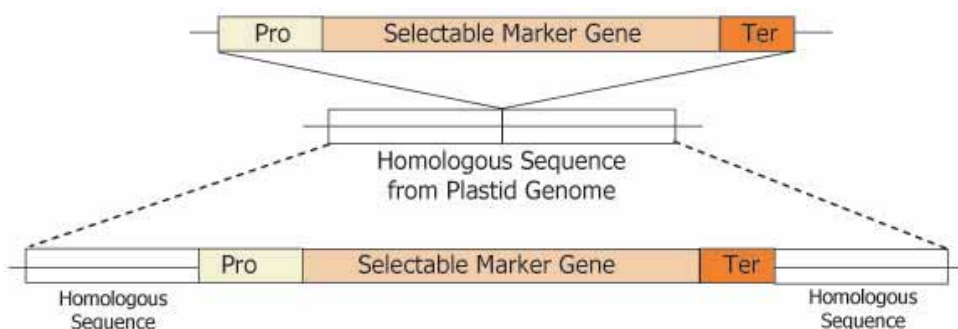
In recent times, chloroplast transformation technology (CTT) has gained importance for the purpose of developing transgenic plants with improved traits. This technology scores over the classical nuclear method of genetic transformation in that it has several distinct advantages; the most notable advantage being the prevention of transgene flow from the transformed plant species via pollen to the neighbouring weedy or wild relatives. This property of CTT renders it as a method of choice for developing second generation transgenic plants. To begin with, this technology was perfected in tobacco in the early 1990s by Pal Maliga and his associates at Rutgers University, New Jersey, USA. It generated a lot of interest in many other labs around the world and as

Bombardment of leaf with chloroplast expression vector and regeneration of chloroplast transgenic tobacco (transplastomic tobacco).

Source: Bansal KC, 2006, Pusa AgriScience 29: 1-6

a result, new information started pouring into the area of basic chloroplast biology. The technology also caught the attention of several other researchers for transferring genes, particularly of bacterial origin to chloroplasts. Native bacterial genes were preferred owing to the prokaryotic nature of chloroplasts. The first example of such a gene transfer was the expression of unmodified *Bacillus thuringiensis* (*Bt*) gene to tobacco chloroplasts for introducing resistance to insect-pests. Another significance that can be attached to this technology is the amount of the transgene product, *i.e.* the level of proteins produced in the chloroplasts which can reach up to 40 per cent of the total soluble proteins. Such high abundance of proteins, particularly that of the *Bt* toxin can equip plants to ward off the insects easily and not allow

them to develop resistance against the toxin. The potential of CTT could be best realized if native *Bt* genes (or *Bt* operon) are stacked in cotton chloroplasts to make the plants resistant to the American boll worm complex. To achieve this goal, the system of chloroplast transformation was optimized in cotton recently. Efforts are in progress globally to develop a method of chloroplast transformation in several other crops of agricultural importance. To date, the technology has been developed in tomato, potato, rice, soybean, lettuce, carrot and oil seed *Brassic*as including



Chloroplast expression vector.

Source: Bansal KC, 2006, Pusa AgriScience 29: 1-6

(continued on page 2 - see Chloroplast)

CALENDAR OF EVENTS

INDIA			
Event	Organization	Date	Place
Awareness workshop on GM crops with a focus on post release monitoring	Ministry of Agriculture (MoA) and Biotechnology Consortium India Limited (BCIL)	April 18, 2007	Hotel Ambassador Ajanta, Aurangabad
Training workshop on biosafety issues for the members of SBCC, DLC and IBSC	Ministry of Environment & Forests (MoEF) and BCIL	April 30, 2007	Hotel Mountview, Chandigarh

Chloroplast - continued from page 1

Indian mustard *Brassica juncea* by our group at National Research Centre on Plant Biotechnology, Indian Agricultural Research Institute, New Delhi. More recently, this technology has been extended to liverwort *Marchantia* and poplar tree.

The technology has already given several leads for introducing useful traits in crop plants. Some of the examples of these traits include: resistance to insect-pests (see above), resistance to herbicides, tolerance to drought and salinity stresses, resistance to bacterial and fungal diseases, production of cytoplasmic male sterile lines, engineering nutritionally important biochemical pathways in non-green plastids, increased rate and duration of leaf photosynthesis, and engineering a novel form of Rubisco - the key carbon dioxide-fixing enzyme. Delayed leaf senescence resulting subsequently in increased seed yield has also been reported through this technology. There have also been several reports of creating transplastomes (plants with transformed chloroplasts are called transplastomic plants) as a source for recombinant therapeutics and vaccines. Phytoremediation of toxic compounds is another novel feasibility with this technology.

In conclusion, it can be safely said that chloroplast transformation technology has a bright future as it offers numerous advantages over nuclear transformation, particularly for generating transgenic crop plants ensuring environmental bio-safety.

CONFERENCE PROCEEDINGS NOW AVAILABLE

The Proceedings of the joint International Food Policy Research Institute, South Asia Biosafety Program, Research and Information System for Developing Countries conference on regulations, which was held in New Delhi on August 24 and 25, 2006, are now available on the SABP website at <http://www.agbios.com/docroot/articles/07-093-001.pdf>

'ADOPT BIOTECHNOLOGY IN AGRICULTURE'

Chennai Online - April 16, 2007

Coimbatore -- With production of foodgrains and oilseeds remaining either stagnant or facing a shortfall, India, which stands at the crossroads, needed a breakthrough technology to increase productivity in the available land, a senior official in Agricultural Science Recruitment Board, Delhi, said today.

The yield of oilseeds was short by 24 million tonnes, pulses 15 million tonnes, wheat remaining at 70 million tonnes and rice at 85 to 90 million tonnes. Biotechnology could be an

improved tool to introduce a second green revolution in India, Dr. C.D. Mayee, Chairman of the Board, said.

Addressing a two-day media workshop on 'Agricultural Biotechnology' here, Mayee, however, said there were a lot of misconceptions and misunderstanding about the technology, which has created a fear among the farming community.

With basic need of food sufficiency in the long run, in the wake of foodgrains production remaining stagnant at 210 to 215 million tonnes in the last one decade, India has already started importing wheat now, he said.

Cotton production, after introduction of *Bt*, a small fraction of the technology, in 2002 in India, has witnessed tremendous growth from 140 lakh bales to 270 lakh bales now. Media has a vital role to play to provide right kind of information on the advantages of *Bt* to the maximum benefit of farmers, he said.

When biotechnology was adopted in human and veterinary care, why was it not adopted in agriculture, Mayee asked.

In his address, G. Balachandran, Joint Secretary, Ministry of Environment and Forests, said, "More than 38 lakh hectares of cotton cultivation in the country are an indication that the farmers have accepted biotechnology."

India was one of the early movers in the matter of biosafety laws and policies and adopted biosafety rules in 1989. Balachandran said *Bt* cotton was approved in India in 2002, after rigorous risk assessment studies conducted by different committees.

To strengthen India's capacity as also to implement the Cartagena Protocol on Biosafety, the country is implementing a GEF-World Bank Capacity Building Project on Biosafety. This project carries out training workshop for all stakeholders and is an incremental factor for India's national capacity in order to implement the Cartagena Protocol, Balachandran said.

Apart from cotton, there are many more GM crop under development and field trials in India, he said.

The workshop is being jointly organised by Tamil Nadu Agricultural University, Ministry of Environment and Forests, Delhi, and International Service for the Acquisition of Agri-biotech Applications, Delhi.

BT COTTON NOT CAUSED ANY NEGATIVE IMPACT ON SAFETY

The Hindu - April 15, 2007

Bt cotton has neither caused any negative impact related to safety of human or animal or environment nor has there been any crop contamination or pest resistance anywhere in the world for the last 11 years, an expert in the field and a key member of Mahyco-Monsanto team has claimed.

In fact, safety had been accorded the highest priority in biotechnology and in the last five years of its commercial cultivation in the country and for 11 years in on thousands of hectares in several other countries, it has an impeccable global safety record as are the other *Bt* crops, T.M. Manjunath in his just released book *+Q and A on Bt-Cotton India: Answers to more than 70 questions on all aspects*, maintained.

The detractors of biotechnology did not seem to take cognizance of the facts that a number of experts drawn from various reputed institutions of India, used their collective wisdom in scrutinising the scientific data from various perspectives before approving any product as safe, Manjunath, a former Director of Central Institute for Cotton Research, Nagpur, and a key member of the Mahyco-Monsanto team that was responsible for the introduction of *Bt* cotton in India, said.

Despite the continued opposition by "a small section", Indian farmers, who have been haunted by bollworms for more than three decades, had accepted this technology, he claimed.

This was reflected by the fact that area under *Bt*-cotton, which was about 29,000 hectares in 2002, the first year of approval, has steadily increased from year to year to reach about 3.8 million hectare grown by more than 2.3 million farmers in nine states by 2006, Manjunath said.

Presently, with the approval of more than 60 *Bt* cotton hybrids developed by various Indian seed companies and also newer and improved versions of *Bt* cotton, there would be an increasing demand for these transgenic seeds, Manjunath claimed.

Making an attempt to clear a lot of doubts and enable people to develop more confidence in crop biotechnology, Manjunath in his book said that coincidental with its steep increased adoption, the average yield of cotton in India increased from 308 kg per hectare in 2001-02 to 450 kg per hectare in 2005-06 with most of the increase in yield of up to 50 per cent or more, attributed to *Bt* cotton.

The book, which described as very cruel the allegation that *Bt* cotton was responsible for farmers' suicides, said it had no empirical basis. On the contrary, *Bt* cotton has come as a big relief to farmers and has saved their crops and enabled them to reap a better harvest and profit, Manjunath said.

In fact, an International Market Research Bureau survey in 2004 indicated that for every rupee spent by the farmers, they received Rs.5.80 in value for reduced insecticide cost and increased yield over conventional cotton, he said.

Further, *Bt* cotton cultivation has started in India only since 2002, whereas the farmers' suicide had been an issue since decades, Manjunath claimed.

"Healthy criticism is welcome, but blind opposition and creating suspicion and fear through unsubstantiated allegation have no place in science." With vast resources, India has the potential to emerge as a supreme power in agriculture if modern technologies were appropriately reviewed and adopted and the farmers would be the greatest beneficiaries of agricultural biotechnology, Manjunath said.

INSECT-TOLERANT BRINJAL, RICE CROPS IN INDIA SOON

India eNews - April 10, 2007

India will soon start cultivating crops of insect-tolerant brinjals and rice as a group of scientists with a seed firm are close to developing a genetic technology.

The new technology for developing insect-tolerant food and vegetables would help in making qualitative and nutritious food available to India's fast growing population at cheaper rate, Maharashtra Hybrid Seeds Company Ltd. (Mahyco) said in a statement Sunday.

'China has developed many insect-tolerant crops to reduce the environmental burden of pesticides that will be commercialised shortly. Now India too is not far behind as Mahyco scientists are close to achieving success,' Usha Barwale Zehr, joint director (research), said in the statement.

See the full article at: http://www.agbios.com/sabp_main.php?action=ShowNewsItem&id=8388

GM TRIALS TO CONTINUE AFTER SETTLEMENT OF CASE IN SC

The Times of India - March 27, 2007

COIMBATORE -- Trials of genetically modified (GM) food or non-food crops would be carried out only after settlement of a case pending before the Supreme Court, a senior official with Department of Biotechnology (DoB) said today.

Though the DoB had decided to release GM brinjal, followed by cauliflower and cabbage, the apex court stayed fresh trials in its order in October last year. The case would come up for its next hearing on April 16, said K. K. Tripathi, Advisor, DoB.

Almost all trials, including toxicity, have been carried out with regards to brinjal and only environmental safety and agro-climatic condition trials have to be conducted. The department would release GM crops after carrying out all the safety trials, said Tripathi.

Similarly, research and trials were going on in many food and non-food crops in "greenhouse", added Tripathi. The department has carried out trials in rice and started with maize for weed and stem-borer resistance, said Tripathi.

Tripathi was in Coimbatore to participate in a meeting called 'Consultation on Safety Assessment of GM Food Crops.' He said farmers should have no cause for apprehension in adopting BT seeds which, in real terms, were beneficial in terms of income.

However, "certain vested interests" were driving away innocent farmers from utilising the technology to increase production, said Tripathi.

ANTI-HAY FEVER GMO RICE MAY WIN OVER JAPANESE DOUBTS

Zeenews.com - March 23, 2007

TOKYO -- Something as simple as eating a bowl of rice could bring relief to millions of Japanese hay fever sufferers each year -- if that rice is ever allowed to hit the market.

The rice, now under development in Japan, is genetically modified, but GM technology is still viewed with deep suspicion by many consumers here, where no GMO crops are commercially grown despite increasing growth in global acreage.

Still, some industry officials say a biotech crop with health-enhancing characteristics may offer one of the best chances for acceptance of GMO crops in a country that boasts one of the world's longest average life spans.

"Those are the kind of products that may find greater acceptance, at least in the context of the Japanese consumers,"

(continued on page 4 - see Japanese)

Japanese - continued from page 3

said Randy A. Hautea, director at the South East Asia Center of the pro-biotech International Service for the Acquisition of Agri-biotech Applications.

Hay fever, which by some estimates afflicts one in five Japanese, has ballooned into a major health problem.

"Japan has a high premium on things like improving the quality of life," said Hautea, who is based in the Philippines.

Japanese researchers have successfully cultivated a genetically modified rice that contains some of the allergy-related proteins found in Japanese cedar pollen, the most common cause of hay fever in Japan.

Eating the rice helps the body's immune system develop a tolerance to the allergy-causing pollen, much in the same way as allergy shots, experts say.

Experiments on mice have shown that those fed with the rice sneezed much less often than mice that had also been showered with pollen but had not eaten the rice.

Japanese researchers have been working on the project since about 2000, and the next major step would be to test on humans the effectiveness of eating the transgenic rice.

But Japan's Agriculture Ministry, which is supervising the project, says it does not have a timetable for beginning testing on humans, much less one for when the rice might reach consumers.

Nevertheless, the developers hope to bring a product to market at some point, said Shinichi Ui of the ministry's Innovative Technology Division.

Ui said the project had reached a sensitive phase in many ways, including defining whether the crop should be described as "food" or "medicine," in which case the farm ministry must work closely with the Health Ministry.

See the full article at: http://www.agbios.com/sabp_main.php?action=ShowNewsItem&id=8347

NO TIMEFRAME YET FOR BT COTTON VARIETY IN PAKISTAN

The International News - March 19, 2007

ISLAMABAD - Technical officials of the Ministry of Food, Agriculture and Livestock and its attached departments have failed to give a timeframe for making available *Bacillus Thuringiensis* (*Bt*) cotton variety for its plantation in the coming Kharif season.

The stunning disclosure was made before the Standing Committee on Food, Agriculture and Livestock in a meeting with Makhdoom Ahmed Alam Anwar in the chair on Saturday. "No variety of *Bt* cotton will be allowed to dodge the criterion laid down for regular release of Genetically Modified (GM) plant varieties," said an official of Punjab Seed Council.

Expressing dissatisfaction over slow process of approval of *Bt* variety, Chairman Standing Committee Makhdoom Ahmed Alam Anwar said all the departments did nothing. "We should introduce this technology for the benefit of farming community and should also disclose the hazards of it," he added.

Influential lobbies of pesticide and seed corporations backed by some institutions and legislators were behind the delay in the approval of *Bt* cotton, said agriculture development commissioner in the meeting. The first *Bt* variety of National Institute for Biotechnology and Genetic Engineering (NIBGE) is facing stiff resistance from various quarters, he added.

A representative of NIBGE, during the meeting, said they would again send the cotton variety next week to the Environment Protection Agency for evaluation. The variety would then be sent to the provincial Seed Council for approval.

"If *Bt* varieties of NIBGE or CEMB are not approved by the agencies and provincial governments, it will promote sale of illegal varieties, which are already being sold without any approval," warned an official of the Ministry of Food, Agriculture and Livestock. However, the committee urged the officials and departments concerned to formulate other procedures and standards which would be needed once the variety was approved.

CHINA TO INCREASE SPENDING ON AGRICULTURAL BIOTECHNOLOGY

All Headline News - March 16, 2007

Beijing, China -- China is expected to increase its spending on agricultural biotechnology almost five fold by 2010 in an attempt to improve food security for its rapidly increasing population the Financial Times reported on Thursday.

China's population, currently 1.3 billion or 20 percent of the world's total, is expected to rise to 1.5 billion by 2020. Yet with only seven percent of the world's arable land, China needs to address the problem of feeding its people.

By increasing its research in genetically modified food products, China hopes to lessen its dependency on other countries for food products such as soy beans.

"The government takes the issue of food security seriously," said Zhang Liang Chen, president of the Agricultural University of China. "Last year we imported 17m tonnes of soybean from the US, Brazil and Argentina. This dependency could lead to trouble in the future."

See the full article at: http://www.agbios.com/sabp_main.php?action=ShowNewsItem&id=8318

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