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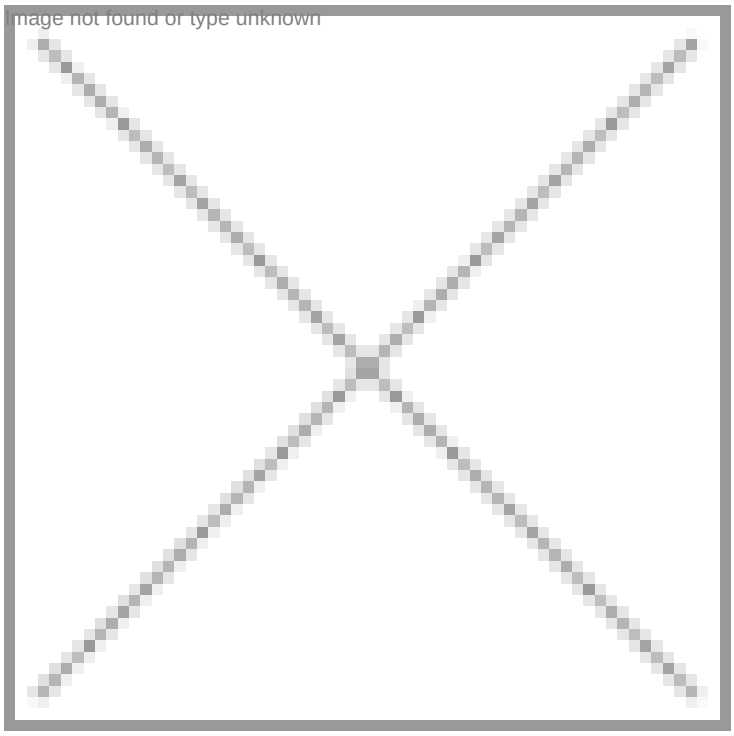


Like it or not, transgenics are the order of the day

Adoption of genetically modified seeds is the solution to feed India's growing population and reduce pressure on land, feel experts.

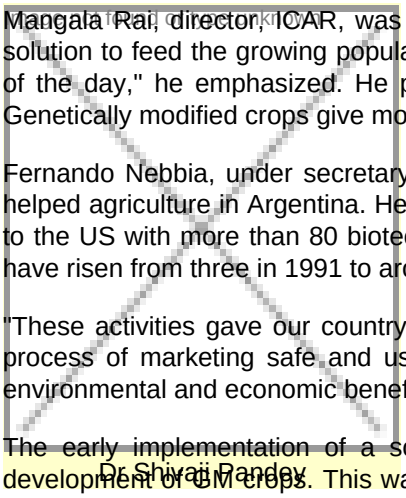
A recent scientific study by the Indian government has confirmed a 34 percent increase in seed yield of genetically modified (GM) Bt cotton hybrids over non-Bt hybrids. The Bt cotton yield was almost 74 percent more than open-pollinated cotton varieties.

The importance of biotechnology in agriculture was outlined at the Agbio 2007 international conference organized jointly by the Federation of Indian Chambers of Commerce and Industry (FICCI), DBT and the Indian Council for Agricultural Research (ICAR) on September 17-18 in Delhi and the recent FBAE symposium in Bangalore. Here are the highlights of the conferences:

Agribio 2007

At the inaugural session of the Agribio 2007 conference, Dr Krishna M Ella, chairman, National Biotech Committee, FICCI and managing director, Bharat Biotech International, said, "The challenge in Indian agriculture is to produce more food in less land with less water, fertilizers, pesticides, labor and other resources. Modern agricultural biotechnology has the potential to offer solutions to some of these and contribute towards sustainable agriculture. Optimistic about India's agribiotech sector, he

added, "India would be the hub for world seed production in the next few years. Agribiotech is growing at 15 percent per annum."


Dr Shivaji Pandey

Mangala Rai, director, ICAR, was in favor of GM crops. "India should accept that genetically modified (GM) seeds are the solution to feed the growing population and reduce the pressure on land. Whether we like it or not, transgenics are the order of the day," he emphasized. He pointed out that normal seeds consume 3,000 liters of water to produce one kg of rice. Genetically modified crops give more yield with less water and hence there should no opposition to GMOs, he added.

Fernando Nebbia, under secretary of Food and Agriculture Policies of Argentina offered an insight into how biotechnology helped agriculture in Argentina. He said that Argentina has 18 million hectares of land planted with GM crops that is next only to the US with more than 80 biotech companies. The country is first among developed nations with regard to field trials that have risen from three in 1991 to around 260 till date.

"These activities gave our country many benefits. It allowed us to gain a great experience on biosafety, it speeded up the process of marketing safe and useful crops and it gave our farmers the opportunity to take advantage very early of the environmental and economic benefits of GM crops," he noted.

The early implementation of a sound and scientifically-based regulatory framework was the key to the promotion and development of GM crops. This was the reason why the first GM crop was commercially released in Argentina soon after its first release in the US, he said adding that the total area under soyabean increased from 3 percent in 1996-97 to 99 percent in 2006-07.

The introduction of agricultural biotechnology allowed seed companies and farmers to take early advantage of the benefits of biotech crops and to develop a competitive advantage in the region. Since the approval of the first GM crop in 1996, acreage has grown at least 5 percent per year, an exceptional rate for a new technology. The use of GM varieties from 1996 to 2005 generated a net income of about $17 billion, according to a few estimations.

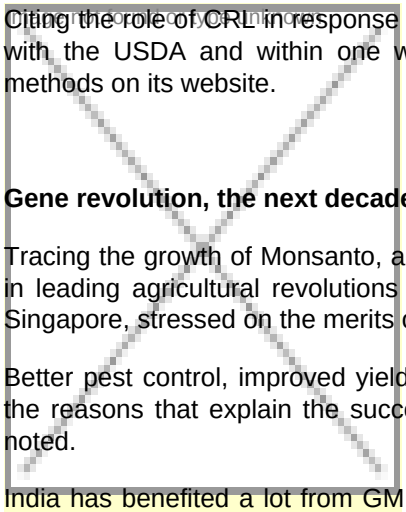
In Argentina, it has been shown that the profit from the use of GM crops was widely distributed among farmers, but small farmers with less than 100 hectares of land were the largest group. This distribution pattern has been found globally: 90 percent of the beneficiary farmers were resource-poor farmers from developing countries. India will benefit from GM crops, Nebbia said, since large numbers of Indian farmers are engaged in subsistence farming.

The conference saw experts from various backgrounds sharing their thoughts on issues related to agri-biotech and brainstorm ideas with an equally receptive audience. Here's a snapshot of the key messages:

Implementation of GMO regulation in EU, role of joint research and community

Dr Guy van Eede, unit head, biotechnology and GMOs, European Commisions's Joint Research Centre, Italy, gave a sneak peek into how GMOs are flourishing in the EU due to a strong consumer involvement, along with strict regulatory norms and absolute traceability from the point of production or import down to the table and vice versa. He also outlined the role of co-existence between organic, traditional and GM plant from the seed throughout the production chain and good post-market monitoring for the success of GM crops there. This is possible due to the Joint Research Centre (JRC) that is committed to providing customer-driven scientific and technical support for the conception, implementation and monitoring of EU policies and functions as a reference centre of science and technology for the Union. He also stressed the need for labeling of GMOs derived food and feed products at all stages along with GMO quantification and detection and to reduce analytical errors during sampling. This can be done through proper validation and using (certified) reference materials. Europe has an extensive network of GMO labs that provide extensive support to the CRL (Central Reference Laboratory), e.g. in method validation and acceptance criteria. The CRL in turn has a crucial role in (dis)approval of methods that are "fit for the purpose of regulatory compliance".

Citing the role of CRL in response to a crisis, namely the case of US GM-rice LLRice601, he added that the JRC collaborated with the USDA and within one week after issuing the EU emergency measures, it tested and published two detection methods on its website.

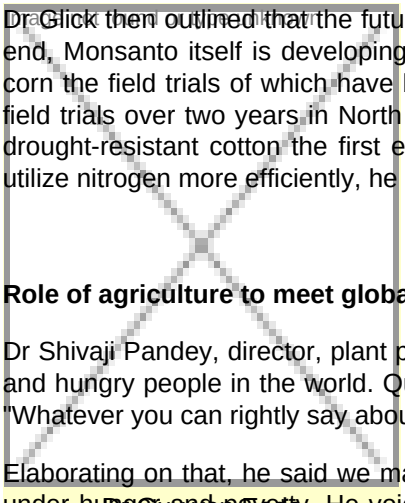

Paul Teng

Gene revolution, the next decade of biotech

Tracing the growth of Monsanto, a 100-year-old company that originally manufactured a sweetener to it being the frontrunner in leading agricultural revolutions in several countries in the world, Dr Harvey Glick, director, scientific affairs, Monsanto, Singapore, stressed on the merits of GM crops.

Better pest control, improved yields, reduced pesticide, lower farm costs, higher profitability and human safety are some of the reasons that explain the success of GM crops that are being grown by 6-10 million farmers in 22 countries today, he noted.

India has benefited a lot from GM crops economically as compared to other countries. In 2005, India planted 16 percent of the total land area with Bt cotton and it fetched a net income of $339 million as compared to the US that had 52 percent of the total area under Bt cotton and had a net income of $306 million only. The environmental impact of GM crops can also not be denied, because in the same year, the pesticide use with Bt cotton reduced by 10 percent both in India and the US.


Dr Guy Van Eede

Dr Glick then outlined that the future generation of biotech revolution will see insect and herbicide tolerance in plants. To this end, Monsanto itself is developing products that are in the pipeline right now. Prominent amongst these is drought tolerant corn the field trials of which have been approved. Hybrids with lead events show yield improvement under drought stress in field trials over two years in North and South America and it is slated for 2012 launch in the US. This would be followed by drought-resistant cotton the first elads of which are showing promise. The company is also working to develop plants that utilize nitrogen more efficiently, he informed.

Role of agriculture to meet global food security

Dr Shivaji Pandey, director, plant production, FAO, Italy, stressed the need for biotechnology to decrease the number of poor and hungry people in the world. Quoting Nobel Laureate Amartya Sen who in turn had quoted Prof. Joan Robinson, he said, "Whatever you can rightly say about India, the opposite is also true".

Elaborating on that, he said we may be the most populous country in the world, but we also have a large population reeling under hunger and poverty. He voiced his skepticism on biotechnology alleviating hunger because as he noted although the US had the largest number of transgenic crops followed by Argentina, yet none of those are food security crops.

Dr Pandey said biotechnology has to play a bigger role more so with 23 countries in the world having access to capacities in the application of biotech tools. It can produce more food and feed by helping to increase yield and reduce losses.

"We might have progressed towards millennium development goals but we are yet to progress towards world food security goals," he concluded.

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Agricultural biotechnology, a global outlook

Paul Teng, dean, graduate programs and research, Nnyang Technlogical University, Singapore, highlighted the need for biotechnology to solve the crisis that the world is going to face years from now. As per data, with the world population reaching 9 billion in 2050, the total cultivable land would decrease to 0.15 ha along with lower yields. Comparing this to 840 million people suffering from malnutrition, we already need to double food production on same land area, (1.5 billion ha) by 2050. In 2006, however, the US increased the cultivable area by 4.8 million ha, the largest for any country followed by lot of countries. It is notable that India tripled Bt cotton area to 3.8 million hectares in the same year. 2006 also saw the first

perennial biotech crop- alfalfa-for forage, planted on 80,000 ha in the US. From 1996 to 2006, the percentage of global area of biotech crops in developing countries increased every year. This figure was 40 percent in 2006 as compared to the previous year. Biotech area in developing countries also grew by 21 percent in 2006, compared with 9 percent in industrial countries. China, India, Argentina, Brazil and South Africa were the five lead biotech crop developing countries with a combined population of 2.6 billion (40 percent of global) that grew 38.2 million hectares of biotech crops in 2006, equivalent to 37 percent of global total. Paul Teng added that developing countries record bigger gains in biotech area than industrial countries in 2006.

Addressing the challenges for the future, he said there is a need for assessment of risks, with and without biotech crops, increase the number of adopters and area and ensure that biotech crops in conjunction with conventional technologies can contribute to a more sustainable agriculture, global food, feed and fiber security, alleviation of poverty, and safer environment.

Shalini Gupta