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Bt crops: India ranks fourth

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India has come a long way since its adoption of Bt cotton in 2002. It is ranked fourth in the world among Bt crops growing countries, in terms of hectares. With a number of other Bt crops under research, the country is heading for a bigger share of the pie in the next few years.

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The year 2008 had been a year of robust growth for biotech crops according to the latest report released by the International Service for the acquisition of agri-biotech applications (ISAAA). Being in the 13th year of the commercialization of GM crops globally, the report outlines that the year saw millions of small and resource poor farmers worldwide plant more hectares of biotech crops owing to the substantial economic, environmental and welfare benefits offered by biotech crops.

Last year also saw an increase in the hectarage of biotech crops; the number of countries and farmers planting them; substantial progress in Africa, increased adoption of stacked traits and the introduction of new biotech crops. These are very important developments given that biotech crops can contribute to some of the major challenges facing global society, including food security, high price of food, sustainability, alleviation of poverty and hunger, and also help mitigate some of the challenges associated with climate change.

Three new countries join the biotech bandwagon

With only six countries growing biotech crops in 1996, 25 countries today are following the league with Burkina Faso, Egypt and Bolivia being the three new countries to adopt biotech crops in 2008. Of these, two (Burkina Faso and Egypt) are in Africa, thus making it the continent with significant progress from one country in 2007(South Africa) to three countries in 2008. While Burkina Faso took the decision to grow 8,500 hectares of Bt cotton for seed multiplication and initial commercialization, Egypt decided to commercialize 700 hectares of Bt maize in 2008. This is of strategic importance for the African continent given the fact that Africa is home to over 900 million people representing 14 percent of the world population

and is the only continent in the world where food production per capita is decreasing and where hunger and malnutrition afflicts at least one in three people.

In December 2008, Kenya, a pivotal biotech crop country in East Africa, enacted a biosafety law, which will facilitate the adoption of biotech crops. Another trend noticed was that there were a higher number of developing countries (15) as opposed to industrial countries (10) in 2008. Each of the top eight countries grew more than one million hectares of Bt crops: US (62.5 million hectares (mn ha)), Argentina (21.0 mn ha), Brazil (15.8 mn ha), India (7.6 mn ha), Canada (7.6 mn ha), China (3.8 mn ha), Paraguay (2.7 mn ha), and South Africa (1.8 mn ha). India with a high 23 percent growth rate between 2007 and 2008 narrowly displaced Canada for the fourth ranking position globally in 2008.

Five countries adopt new biotech crops

Not only did the year see a new biotech crop being cultivated, but also saw more countries growing biotech crops that have already been commercialized in other countries. RR herbicide tolerant sugar beet was introduced for the first time globally in the USA(2.6 lakh hectares) and on a small hectarage in Canada. The percentage of adoption in 2009 is expected to be close to 90 percent as opposed to 2008, where it was a substantial 59 percent. Five countries including Egypt, Burkina Faso, Bolivia, Brazil and Australia introduced, for the first time, biotech crops that have already been commercialized in other countries. Bolivia planted 6 lakh hectares of RR soybean, Brazil and Egypt planted Bt maize, Burkina Faso planted Bt cotton and Australia planted Bt canola. Bolivia is the eighth largest grower of soybean in the world and is today the ninth country in Latin America to benefit from the extensive adoption of biotech crops.

Global hectarage of biotech crops reaches 125 million hectares

In 2008, the global hectarage of biotech crops continued to grow strongly reaching 125 million hectares, up from 114.3million hectares in 2007. This translates to an “apparent growth” of 10.7 million hectares (the sixth largest increase in 13 years) or 9.4 percent when measured in hectares. The year also saw the planting of the second-billionth acre (800 millionth hectare) of a biotech crop – only three years after the first one-billionth acre of a biotech crop was planted in 2005 which took 10 years.

Bt crops with stacked traits on a high

The stacked double and triple traits occupied a larger area (26.9 million hectares, or 22 percent of global biotech crop area) than insect resistant varieties (19.1 million hectares) at 15 percent. Stacked traits (as opposed to single traits in one variety or hybrid) in cotton and maize were deployed by 10 countries – US, Canada, Philippines, Australia, Mexico, South Africa, Honduras, Chile, Colombia, and Argentina, with more countries expected to adopt stacked traits in the future. A total of 26.9 million hectares of stacked biotech crops were planted in 2008 compared with 21.8 million hectares in 2007. In 2008, USA led the way with 41 percent of its total 62.5 million hectares of biotech crops stacked, including 75 percent of cotton, and 78 percent of maize. The fastest growing component of stacked maize in the US was the triple stacks conferring resistance to two insect pests plus herbicide tolerance. Double stacks with pest resistance and herbicide tolerance in maize were also the fastest growing component in 2008 in the Philippines doubling from 25 percent of biotech maize in 2007 to 57 percent in 2008. In 2008, herbicide tolerance deployed in soybean, maize, canola, cotton and alfalfa occupied 63 percent or 79 million hectares of the global biotech area of 125 million hectares.

Biotech maize, most planted crop

In 2008, 17, or two-thirds of the 25-biotech countries planted biotech maize (same as in 2007), 10 countries planted biotech soybean (up from nine), 10 countries planted biotech cotton (up from nine) and three countries planted biotech canola (up from two in 2007). In addition, two countries the US and China grew virus resistant papaya, two countries Australia and Colombia grew biotech carnation, a small hectarage of Bt poplar grown in China, and Bt squash and alfalfa in the US.

About 13.3 million farmers benefit from Bt crops worldwide

Of the global total of 13.3 million beneficiary biotech farmers in 2008, (up from 12 million in 2007), remarkably over 90 percent or 12.3 million (up from 11 million in 2007) were small and resource-poor farmers from developing countries; the balance of one million were large farmers from both industrial countries such as the US and Canada and developing countries such as Argentina and Brazil. Of the 12.3 million, most were Bt cotton farmers with the highest, 7.1 million in China followed by 5.0 million in India. The largest increase in the number of beneficiary farmers in 2008 was in India where an additional 1.2 million more small farmers planted Bt cotton which now occupies 82 percent of total cotton cultivation, up from 66 percent in 2007.

Biotech crops have improved the income and quality of life of poor farmers

In 2008, five million small farmers, (up from 3.8 million farmers in 2007) in India benefited from planting 7.6 million hectaresof Bt cotton. Benefits will vary according to varying pest infestation levels in different years and locations. A conservative estimate for small farmers indicates that yields increased by 31 percent, insecticide decreased by 39 percent, and profitability increased by 88 percent equivalent to $250 per hectare. About 7.1 million small and resource-poor farmers benefited from Bt cotton in China in 2008, based on studies conducted by the Center for Chinese Agricultural Policy (CCAP), it was concluded that, on an average, small farmers adopting Bt cotton increased yield by 9.6 percent, reduced insecticide use by 60 percent, with positive implications for both the environment and the farmers’ health, and generated a substantial $220 per hectare

increase in income.

The global value of biotech crop market was at $7.5 billion in 2008

In 2008, the global market value of biotech crops, estimated by Cropnosis, was $7.5 billion, (up from $6.9 billion in 2007) representing 14 percent of the $52.72 billion global crop protection market in 2008, and 22 percent of the approximately $34 billion global commercial seed market in 2009. The value of the global biotech crop market is based on the sale price of biotech seed plus any technology fees that apply. The global value of the biotech crop market is projected at approximately $8.3 billion in 2009.

Status of field trials of biotech/GM crops in India, 2008

Crop	Organization	Transgene/Event
Brinjal	IARI, New Delhi; Sungro Seeds, New Delhi; Mahyco, Jalna TNAU, Coimbatore; UAS, Dharwad; and Bejo Sheetal, Jalna.	cry1Aabc cry1Ac cry1Ac cry1Ac cry1Ac cry1Fa1
Cabbage	Nunhems, Gurgaon; Sungro Seeds, New Delhi; and Mahyco, Jalna.	cry1Ba and cry1Ca cry1Ac cry1Ac
Castor	Directorate of Oilseeds Research (DOR), ICAR, Hyderabad.	cry1Aa and cry1Ec
Cauliflower	Mahyco, Jalna; Sungro Seeds, New Delhi; and Nunhems, Gurgaon.	cry1Ac cry1Ac, cry1Ba and cry1Ca cry1Ac, cry1Ba and cry1Ca
Corn	Monsanto, Mumbai.	Mon89034
Groundnut	ICRISAT, Hyderabad.	Rchit and DREB
Okra	Mahyco, Mumbai; Sungro Seeds, Delhi; Bejo Sheetal, Jalna; and Arya Seeds, Gurgaon.	cry1Ac cry1Ac cry1Ac CP-AV1
Potato	CPRI, Shimla; and NCPGR, Delhi.	RB Ama1
Rice	IARI, New Delhi; TNAU, Coimbatore; MSSRF, Chennai; DRR, Hyderabad; Mahyco, Mumbai; Bayer CropScience, Hyderabad; and Avesthagen, Bangalore.	cry1Aabc, DREB, GR-1 & GR-2 (Golden Rice) chi11 MnSOD cry1Ac cry1Ac, cry2Ab cry1Ac, cry1Ab, bar NAD9

The next decade of Bt Crops (2009-2015)

According to the report, the future surely belongs to Bt crops with more than 40 countries expected to adopt biotech crops. About 15 or more countries are projected to plant biotech crops for the first time during 2009-2015 including 3-4 each in Asia, eastern and southern Africa and West Africa, 1-2 in North Africa and the Middle East, 2-3 countries in Latin/Central America and the Caribbean and six in eastern Europe including Russia, which has a biotech potato at an advanced stage of development. While the first decade (1996-2006) was dominated by America; the second decade, will witness more growth in Asia and Africa with growth in stacked traits, particularly in North America and Brazil.

Biotech maize, named Smartstax, is expected to be released in the US in 2010 with eight different genes coding for several pest resistant and herbicide tolerant traits. Future stacked crop products will comprise both agronomic input traits for pest resistance, tolerance to herbicides and drought plus output traits such as high omega-3 oil in soybean or enhanced pro-vitamin A in golden rice. Drought tolerance conferred through biotech crops is viewed as the most important trait that will become available by 2015, because it is by far the single most important constraint to increased productivity of crops worldwide. Drought tolerant Bt maize, is the most advanced of the drought tolerant crops under development, and is expected to be launched commercially in the USA in 2012, or earlier. A private or public sector partnership hopes to release the first biotech drought tolerant maize by 2017 in Sub-Saharan Africa.

The future adoption of biotech crops in developing countries will be dependent on a host of factors like establishment and effective operation of appropriate, responsible and cost/time-effective regulatory systems and strong political will and support for the adoption of biotech crops that can contribute to a more affordable and secure supply of food, feed, and fiber. While the first generation biotech crops realized a significant increase in yield and production by protecting crops from losses caused by

pests, weeds, and diseases, the second generation biotech crops will offer farmers additional new incentives for further increasing yield. RR2 soybean, to be launched in 2009, is the first of many such second-generation products that will further enhance the yield from 7 to 11 percent.

Deployment of biotech rice is also seen as a crop seminal for catalyzing the further adoption of biotech crops globally. Bt rice is almost ready for adoption, principally the pest/disease resistant biotech rice extensively field tested in China and awaiting approval by the Chinese regulatory authorities; and Golden Rice expected to be available in 2012. Several medium hectarage crops are expected to be approved before 2015 including potatoes with pest and/or disease resistance and modified quality for industrial use; sugarcane with quality and agronomic traits; and disease resistant bananas. Some biotech orphan crops are also expected to become available. For example, Bt eggplant may become available as the first biotech food crop in India within the next 12 months and has the potential to benefit up to 1.4 million small and resource-poor farmers.

Vegetable crops such as biotech tomato, broccoli, cabbage and okra which require heavy applications of insecticides (which can be reduced substantially by a biotech product) are also under development. Pro-poor biotech crops such as biotech cassava, sweet potato, pulses and groundnut are also included in the list. It is noteworthy that several of these products are being developed by public sector national or international institutions in the developing countries. The development of this broad portfolio of new biotech crops augurs well for the continued global growth of biotech crops, which ISAAA projected to reach 200 million hectares by 2015, grown by 20 million farmers, or more. However, by far, the most important potential role of biotech crops will be their contribution to the humanitarian Millennium Development Goals (MDG) to ensure a secure supply of affordable food and the reduction of poverty and hunger by 50 percent by 2015, the report notes.

Increasing political will

The 2008 World Bank Development Report emphasized that, agriculture is a vital development tool for achieving the Millennium Dev

The G8 leaders'at a meeting in Hokkaido Japan in July 2008 gave a statement on biotech crops that reads as follows, "We have to

While the European Commission stated that "GM crops can play an important role in mitigating the effects of the food crisis." China c

All seven European Union (EU) countries increased their Bt maize hectarage in 2008, resulting in an overall increase of 21 percent to

Source:ISAAA report, Brief 39