

# Biotechnology and GM crops

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In many countries, the debate surrounding the use of biotechnology in agriculture is often associated with genetically modified (GM) crops. Hence there is a wide misconception that the only application of biotechnology is in the development of such transgenic crops. However the scope of biotechnology is widespread: in *Industrial Biotechnology* (microbial fermentation, metabolite production etc.); in *Environmental Biotechnology* (to reduce contaminations, to alleviate pollution, to recover habitats from oil spillage etc.); in *Medical Biotechnology* (pharmaceutical industries, gene therapies, etc.); and finally in *Agricultural Biotechnology* (conventional breeding, tissue culture, micropropagation, molecular breeding or marker assisted selection, GM crops, plant disease diagnostics, etc).

### What is GM?

The genetic makeup of an organism has been continuously altered throughout history through careful breeding and selective pressure applied by traditional farmers. Genetic Modification or GM uses the modern day recombinant DNA technology in doing the same.

### Why make GM crops?

However, this cross breeding is limited to same or very closely related species. It also takes a long time to achieve desired results and frequently undesired characteristics get transferred -- such as lower yields, poorer taste, etc. Further difficulties arise when the characteristics of

interest do not exist in related species, e.g. flood tolerant gene does not exist in jute species, but is present in Arabidopsis, a distant plant type. However modern biotechnology, through genetic modification, may allow us to develop flood tolerant variety of jute by transferring to it only the specific flood tolerant gene from Arabidopsis. Similar examples can be given for other crops.

The benefits of GM plants have been clearly seen in many countries. These include -- Higher crop yields: As a result of which GM crop area has grown 35 fold

Improvement in health and environment: Higher yield GM crops would mean using less land and hence less conversion of natural habitats into farmland. GM crops also require less pesticides and insecticides causing less damage to the environment. Also low-till farming is most beneficial for birds and wildlife, which is made possible by cultivating GM crops.

Increase in the nutritional value of food: GM crops can help fight diseases such as night blindness and kwashiorkor; improve food quality by increasing its shelf life; help to

enormous benefit Bangladesh, for instance by help fight drought in its northern districts or help grow rice along its coastal regions.

Undergoes strict quality assurance test and hence a safer choice: Crops improved through biotechnology have undergone more safety and environmental testing than any crop varieties in history, and have been produced and consumed by humans and animals in millions of tons around the world for years. There is, to date, not a single solitary confirmed case of human or animal illness or disease

**GM crops should not be considered under one blanket, but should be regarded on a case to case basis. Only those which suit our national interest should be developed. Developing countries are making real progress in genetic engineering, and our neighboring countries India, Pakistan, and China have already started developing their own GM crops.**

between 1996 and 2002, adopted by 6 million farmers, of whom 5 million were small resource-poor farmers.

Reduction in farm costs: BT cotton (a popular transgenic crop) has reduced the use of insecticide in India by 70 per cent and has saved farmers about \$45 per hectare in every crop cycle. Increase in farm profit (for both farmers and industries): It is estimated over half of the land in the Indian subcontinent periodically loses crops to drought because farmers cannot afford to pay for irrigation. Introduction of drought-resistant rice developed through GM technology would greatly reduce crop losses, increasing both farmers' profits and the value of the country's rice trade.

enhance the immune system; and significantly reduce the residual insecticide and pesticide in comparison to crops from traditional practices. Recently cooking oil from genetically modified Canola has become popular in many countries including Bangladesh for its low level of saturated fat, and hence lower risk of cardio vascular diseases.

Decrease in the use of insecticides and pesticides: Annually, approximately \$32 billion is spent on traditional pesticides. In 1997, farmers who planted BT cotton used 300,000 fewer gallons of insecticides.

Produce crops resistant to salinity, drought, cold, flood, etc: Needless to mention that these would bring

associated with a biotech crop.

To feed the future population: At present, we face an increasing shortage of water and good agricultural land. While there may be food surpluses in some areas, we need to treble food production in the next 50 years to feed 3 billion extra people.

### Are GM crops appropriate for developing countries?

In 2003 GM crops have been planted in over 70 million hectares in 18 countries. Nearly five million small farmers in China, India, South Africa, Brazil and Morocco grew genetically modified cotton to protect against boll weevil. In China, this saved farmers as much as \$500 per hectare, mainly through a 60-80 per cent reduction in the use of pesticides. In KwaZulu, 92 per cent of cotton farmers, mainly women, now grow GM cotton, many of whom have seen their becoming income nearly double, primarily because savings on pesticides greatly exceed the extra cost of the seeds. In India, due to the absence of legalisation, a black market for GM cotton seed came into existence pursuant to the popular demand from the farmers.

The story of cotton shows actual financial benefit, here and now, mainly to small farmers in the developing world, contrary to the allegation frequently made that agricultural biotechnology only promotes industrial farming. But the greatest contribution of GM technology is yet to come. China spends over \$100 million a year on plant science and has developed 141 different types of GM crops, 65 of which are already in field trials. In India, too, biotechnology flourishes. Most research is on staple crops grown by ordinary farmers. Salt-resistant and drought-resistant crops are also being developed, which can be cultivated in large tracts of land currently considered infertile.

Research on GM plants will bring particular benefits to health. Some have already been achieved through the reduced use of pesticides. In South Africa, cases of burns and sickness from agricultural chemicals have fallen from 150 a year to a dozen, chiefly because GM cotton, which is currently being used, is sprayed only twice a season instead of more than eight times, which was required by the conventional variety.

Yet some of those dedicated to helping people in the developing world ignore these potential benefits. They even oppose the development of "golden rice" containing pro-vitamin A as part of a staple diet, which can help redress the vitamin A deficiency associated with the deaths of more than a million children every year, according to the World Health Organisation. This deficiency is also the single most important cause of blindness in about half a million children annually.

I would like to stress that GM crops should not be considered under one blanket, but should be regarded on a case to case basis. Only those which suit our national interest should be developed, especially where traditional breeding has not been successful.

Developing countries are making real progress in genetic engineering, and our neighboring countries India, Pakistan, and China have already started developing their own GM crops. In agriculture based countries like Bangladesh, where food prices directly affect the incomes of majority of the population, the potential benefits of GM crops cannot be ignored.

The population of Bangladesh is growing, but its arable land is decreasing. To ensure the food security in future, now is the time for the government and the scientists to develop its technology using the available modern tools. We should now be united in formulating a strategy on how to reap maximum benefits from this novel technology. Let our prejudice or our political interest not hinder in appreciating and developing our own GM technology.

No one argues that all problems can be solved by the magic GM wand. But the question is: Can GM crops help? No one is insisting to jump to the GM technology blindly. There are pitfalls as with any other technology. But in this era of fast paced technological progress we cannot afford to deprive ourselves and fall behind in innovations. Blind opposition to GM crops will only be a triumph of dogma over reason.

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# Chinese Lessons

COMMENTARY BY PHILIP BOWRING

**DHAKA, Bangladesh** The current 10-day, four-nation tour of South Asia by China's prime minister, Wen Jiabao, is at one level a triumphal affair. Here is the outwardly modest Wen basking in China's success, spreading the gospel of good will to these neighbors whose combined populations equals that of China. Here is a China that will give aid, help them escape from poverty, make Asians proud and speak up for multilateralism and the United Nations system - articles of faith throughout the subcontinent. But Wen's tour is also a reminder that China's global economic influence is now a factor in relations between the states of South Asia in a way that China's ideology never was. It thus presents India, anxious both to develop its strategic relationship with the United States and be the leader of South Asian economic integration, with awkward balancing acts. Wen will visit India last but not longest, flattering Indian egos with a trip to high-tech Bangalore and hearing eloquent Indian rhetoric about a new era of Asian cooperation driven by mutual economic interests. Trade has indeed been increasing rapidly as China sells manufactured goods and buys iron ore from India. Commerce may keep border disputes and Beijing's ambiguous attitude to enlargement of the UN Security Council - which India hopes to join - in the background. But Wen's visits to Pakistan and Bangladesh may be at least as significant in suggesting to India that a new attitude to its immediate neighbors is needed if the subcontinent is to get back on a par with China. Wen reaffirmed the strength of relations with Pakistan despite its improved relationship with Washington and past support for the Taliban. He was keen, too, to emphasize that South Asian countries should "treat each other as equals," a jab at India that went down well in Pakistan and in Bangladesh - which feels that it is treated by India as the United States used to treat Mexico. Bangladesh is particularly in need of China's moral support. There is an impression among diplomats here that India's recent rapprochement with Pakistan has caused New Delhi's propaganda and intelligence machines to turn more attention to the alleged misdeeds of its eastern neighbor.

On scant evidence, Bangladesh is accused of harboring insurgents in India's long-troubled northeastern states and of flooding these states with illegal migrants. India has endeavored - without success - to persuade the United States that Bangladesh is on the way to becoming a failed state of Muslim fundamentalists and assorted gunmen. There is a belief here, not confined to nationalist Bangladeshis, that India does not want Bangladesh to be successful as it would demonstrate the potential for relatively small homogenous states on the subcontinent and would show up the failures of Bihar and other adjoining Indian states. Bangladesh cannot escape dependence on India, which almost entirely surrounds it. It needs more Indian investment and cross-border trade to integrate markets. Links to Myanmar, Thailand and China will grow but are no substitute. Many Indo-Bangladeshi disputes are petty or over matters that neither government fully controls, such as smuggling of goods and people. But one big issue could drive Bangladesh to seek much closer links with China - the rivers that are its lifeblood. India's plans to link river systems include diverting water from the Brahmaputra, Bangladesh's single largest water source, into the Ganges. Although India is being urged - most recently in a World Bank report - to cooperate with its neighbors in sharing waters and developing hydroelectric potential, it has a tendency to treat Bangladesh as at best a little brother and at worst a vassal state. That's where the Chinese come in. The headwaters of the Brahmaputra are in Tibet. Should China thus not also be party to water-sharing talks? That is not on New Delhi's cooperation agenda. It is clearly not in China's interest to be drawn deeply into South Asian disputes. But its prestige and its appearance of benevolence, magnanimity and success suggest that the newly confident, outward-looking India needs new approaches to its neighbors. Can India learn from Wen's triumphant progress through the region that it claims to lead?

The author is former editor of the Far Eastern Economic Review. Courtesy: *The International Herald Tribune*.

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