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Indo-US Agricultural Cooperation: From 'Green' to 'Evergreen' Revolution?

'Everything can wait, but not agriculture.'

Jawaharlal Nehru

In the last two decades, India and the US have come closer to each other as never before since Independence. Though commentators have contributed this new amity in ties to strategic reasons, such as dealing with the rise of China and facing perceived common threats, trade has played no less a role in bringing the world's two greatest democracies together. Trade between India and the US has grown exponentially since India adopted economic reforms in the 1990/91 period. There still remains a huge potential for increasing the bilateral trade. Defence-related trade, high-tech trade, agriculture, investment in infrastructure and insurance, seem to be the foci of the US in India. India's burgeoning consumer-driven middle class and the market prospects they offer to US businesses is another motive that has driven US investment in India. India has one of the highest rates of GDP growth in the world and was not affected much by the global financial crisis, making it an important market for US goods and services. Indeed, India too has benefited from US businesses. The outsourcing, IT (Information Technology) and ITES (Information Technology Enabled Services) industries, which have provided jobs to many young Indians, largely owes itself to US businesses. Thus, India-US economic relations have moved into a new phase of “intensive interaction”¹ since 2000 in areas as diverse as nuclear trade to defence-related trade to cooperation in trade and agriculture. Improving agricultural productivity is vital for India; while two-thirds of its population is engaged in agriculture, the country is burdened with the largest number of malnourished people in the world. Agriculture

will always play the key role in India's prosperity and growth. Moreover, as a recent World Bank report says, increased agricultural growth and productivity is the best way to reduce poverty².

While trade in nuclear technology and material may take some time to fructify, agriculture is already high on the agenda of Indo-US cooperation. Former President George Bush and Prime Minister Manmohan Singh took the first step towards expanding agricultural cooperation in July 2005 when they announced the US-India Knowledge Initiative on Agriculture. Furthermore, in their March 2006 joint statement, they agreed to expand agricultural cooperation by:³

1. Launching the Knowledge Initiative on Agriculture (KIA) with a three-year financial commitment to link India's universities, technical institutions and businesses to support agriculture education, joint research, and capacity building projects including in the area of biotechnology.
2. Endorsing an agreed work plan to promote bilateral trade in agriculture through agreements that would lay out a path to open the US market to Indian mangoes, and to recognize India's authority to certify that shipments of Indian products meet USDA organic standards, as also to provide for discussions on current regulations affecting trade in fresh fruits, vegetables, poultry and dairy items and almonds.

Following this announcement, Washington and New Delhi launched a three-year programme on agriculture (2006–2008), with both committing about US \$ 24 million each to the project. However, much of the US money came within the ambit of the existing USAID agricultural programmes⁴.

The importance given to cooperation in this field was also evident during President Obama's visit to India; in the Indo-US joint statement signed during his visit as well as his address to the Indian Parliament, where he stated:⁵

... India is a leader in using technology to empower farmers, like those I met yesterday who get free updates on market and weather conditions on their cell phones. And the United States is a leader in agricultural productivity and research. Now, as farmers and rural areas face the effects of climate change and drought, we'll work together to spark a second, more sustainable Evergreen Revolution. Together, we're going to improve Indian weather forecasting systems before the next monsoon season. We aim to help millions of Indian farming households save water and increase productivity; improve food processing so crops don't spoil on the way to market; and enhance climate and crop forecasting to avoid losses that cripple communities and drive up food prices.

Similarly, in his address to a joint session of the US Congress in July 2005, Prime Minister Manmohan Singh had stated:⁶

The Green Revolution lifted countless millions above poverty.... I am very happy to say that US President George Bush and I have decided to launch second generation of India-US collaboration in agriculture. The new initiative will focus on basic and strategic research for sustainable development of agriculture to meet the challenge of raising productivity in conditions of water stress. It seeks to take information and know-how directly to the farming community and promote technologies that minimise post harvest wastage and improve food storage. It will also help Indian farmers to meet phytosanitary conditions and enable them to participate more fully in global agricultural trade.

Clearly, both the countries attach the highest importance to further agricultural cooperation between them. US Secretary of State Hillary Clinton, during a visit to the Indian Agricultural Research Institute in 2009, said that agriculture would be the “strongest and most important pillar of cooperation” between the United States and India⁷. Hunger and food security is a signature issue in the Obama Administration's foreign policy. President Obama has launched a 'Feed the Future Initiative' and his statements as well as those of other top officials clearly show that the US sees a key role for India in this. India, in fact, is one of the 'strategic partnership countries' in the initiative along with Brazil and South Africa, countries that can provide South-South technical advice and act as regional growth hubs⁸.

The Food Security Situation in India

The need for agricultural cooperation with the US arises out of India's rather dismal food security situation and the poor state of its agricultural sector. Agriculture, therefore, is a key item on the agenda of the Indo-US strategic dialogue. India needs an 'Evergreen Revolution' and comprehensive cooperation with the US to achieve it.

The two countries are all set to revitalize and expand the agricultural cooperation begun during the Green Revolution of the 1960s and 1970s to move towards what has variously been called 'Second Green Revolution' (SGR), the 'Evergreen Revolution' and the 'Green Revolution 2.0'. While the Green Revolution depended on fertilizers, chemicals, electricity and hybrid seeds for success, the Second Green Revolution will focus on food biotechnology, water harvesting techniques, weather forecasting, prevention of wastage of agricultural produce and improving farmer-market connectivity to raise agricultural growth to 4 percent from the

present average of around 2 percent per annum. The Second Green Revolution (SGR) seeks to make India's agricultural sector environmentally sustainable, 'market-oriented', driven by 'need' and technology oriented—making it knowledge-intensive rather than chemical-intensive⁹. Also, unlike the Green Revolution (GR), the SGR will focus more on dry land agriculture and on small and marginal farmers¹⁰. Another difference between the GR and SGR is that, while the former was powered by public sector research, the latter lays emphasis on the private sector and will depend on privately-funded research.

In the SGR, emphasis would be given to approaches that move from: (i) piecemeal to holistic solutions, (ii) commodity to production systems, (iii) applied to basic and strategic research, (iv) mono-disciplinary to interdisciplinary research, (v) single institution to cross-organisation and trans-country working and (vi) home-based consumer to market-driven agriculture¹¹. In this scenario, it would be useful to look at the history of Indo-US agricultural cooperation.

PHASE I

One of India's biggest challenges shortly after independence was how to feed its people. India's task was made doubly difficult by the fact that farmers in India used traditional methods of farming; production was low, there were famines and, with increasingly improved health services, its population was expanding at a rapid pace. Soon after independence, India asked the US for technical assistance in agriculture. The request fell on deaf ears, as there was no framework in place for Washington to accede to the request. However, soon after the Point Four Programme was passed by the Congress, Washington began to provide technical assistance to India's agriculture¹². Point Four proposed a partnership between private capital,

private philanthropy and government policy to create security, prosperity and extend American influence across the world¹³. The Rockefeller and Ford Foundations also provided support for the Green Revolution.

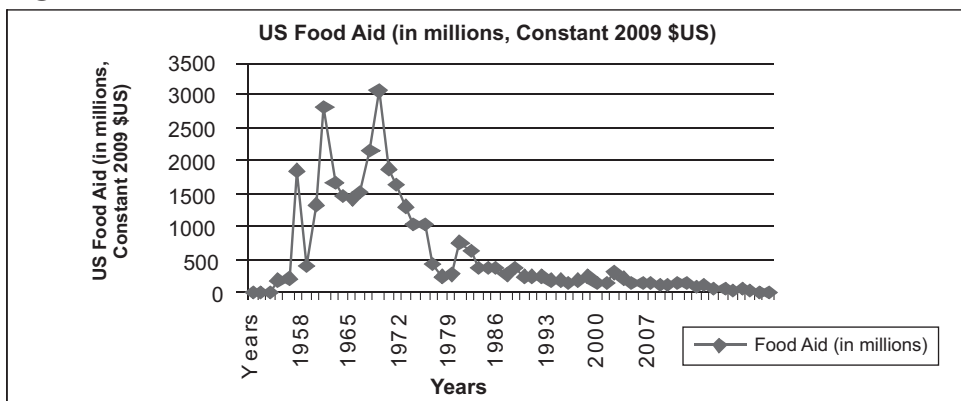
US Food Aid to India

Before the Green Revolution in India, the US provided substantial quantities of food aid to India. While the food aid was not entirely based on philanthropic motives—it also had the underlying objective of ensuring that India did not tilt towards Communism; besides disposing off farm surpluses—it helped India to tide over food shortages.

Food aid soon became the major tool for economic engagement between India and the US and, by 1965, India had become the single largest recipient of PL 480 food¹⁴. Food aid and help for agricultural development to India was prompted by the prevailing theory in the US during the Cold War called the Population-National Security Theory (PNST) that linked causally overpopulation, resource exhaustion, hunger, political instability, communist insurrection, and danger to vital American interests.¹⁵ From 1955–1971, India got the highest amount of food aid under PL 480, amounting to about 40 per cent of all food grains and 25 per cent of all commodities given under this programme.¹⁶ However, shipping costs were high due to the conditionality in US law that 75% of the food aid had to be transported on American ships.¹⁷ In 1965 and 1966, following droughts, India needed food aid from the US to avoid famines and requested more food from the US under PL 480. But President Johnson said that he would personally decide on the terms of assistance to India.¹⁸ He felt that foreign aid to India was becoming unpopular in Congress, as it believed that India was taking US aid for granted, was not using it effectively for economic

development and was doing nothing to increase agricultural production.¹⁹ Therefore, Johnson approved only just enough food grains (under PL 480) to tide over the famine—a tactic that has been termed a 'ship to mouth' policy; food aid was allocated on a month-to-month basis and that too, after India had submitted an estimate of its food requirements for the month to the US.²⁰ The clearance of food shipments were linked to reforms in India's agricultural policy, such as: giving price incentives to producers; increasing fertilizer production under private enterprises and; bringing more land under irrigation.²¹ Another reason for Johnson's tactics was believed to be his annoyance with India for its strident criticism of US policy in Vietnam. Johnson's tactics soured relations between India and the US. The 'short tether' policy continued till 1967, by which time India had begun to reduce its dependence on US wheat and had reformed its agricultural policy that climaxed with the 'Green Revolution'²². India finally unilaterally ended the PL 480 agreement with the US in December 1971. However, other US food aid programmes to India continued and, till as recently as 2009, India received some amounts of US food aid by way of humanitarian assistance and for USAID activities in India. This is shown in Figure 1.

Figure 1: US Food Aid to India from 1952–2009



Source: calculated from the USAID Greenbook, available at <http://gbk.eadsusaidallnet.gov/data/>. (Based on latest data available)

The US and India's Green Revolution

Despite the disagreements over food aid, India's Green Revolution was possible due to the assistance from the Rockefeller and the Ford Foundations, as also funds from the US Government. Though the Foundations got more acclaim for the success of the Green Revolution, Washington's support and role cannot be forgotten. In fact, the US Government, through the USAID and USDA, partnered by the Ford and Rockefeller Foundations, helped set up five agricultural universities in India. Education in agriculture in India was modelled on the Land Grants Colleges of the US and the faculty in agricultural universities and institutes were also trained in the US universities through a joint Indo-US programme. This initial critical mass of faculty/scientists played an important role in further preparing technically qualified manpower, which designed the direction and course of events that first led to the Green Revolution and the White, Blue and Yellow Revolutions later²³. The United States also donated fertilizers, gave loans for importing fertilizers, gave money for building fertilizer factories, sent advisors and experts to India, helped develop electrical infrastructure and established irrigation systems in rural areas.²⁴

The Green Revolution revolutionized plant-breeding practices and agriculture in India. Traditional varieties of plants were replaced with hybrid varieties, traditional fertilizers gave way to chemical fertilizers and pesticides, intensive irrigation was adopted and agriculture in India became more scientific. Land reforms were also initiated in many parts of the country. Subsequently, yields increased to such an extent that the country not only became self sufficient, but had surplus food grains for buffer stocks. However, many decades after the Green Revolution, it has now become evident that the Green Revolution had negative effects on the environment: soil has become less fertile due to excessive use of chemicals, pests have

become resistant to pesticides, resulting in higher expenditures on fertilizers and pesticides, and carcinogens in these chemicals have resulted in a palpable increase in the number of cancer patients amongst farmers, particularly in Punjab. Another problem with the Green Revolution was that it failed to increase the production of pulses and other cereals like millet, barley and sorghum which form an essential part of the diet in many states. The Green Revolution also had profoundly negative effects on biodiversity, as green revolution varieties have made local varieties of crops extinct in many places²⁵. It led to regional and interstate disparities as it benefitted farmers mainly in those states which had more access to inputs like water and fertilizers. The small farmers were hit the hardest; they could not afford to buy the pesticides and fertilizers required by the High Yielding Varieties and often produced less than they used to with local varieties. Those who did use fertilizers and pesticides fell into a debt trap. Also, despite the Green Revolution, agriculture in India continues to be mostly at a subsistence level, which is again overly dependent on the monsoon. Only about 40% of cultivated land in India has adequate irrigation. Lack of institutional credit and the absence of farmer-industry partnership that would develop technology to ensure optimal use of agricultural produce are other factors which make farming an unprofitable enterprise in today's India. In short, our agricultural sector is in a crisis and the large number of farmer suicides in recent years bears testimony to this.

Forty years after the Green Revolution, India continues to be haunted by the spectre of hunger and food insecurity in vast tracts of the country. Also, a large amount of produce in India gets wasted after the harvest. More food needs to be produced keeping in mind the fact that large tracts of agricultural land is becoming infertile, and water and other natural resources are depleting, global warming and climate change are causing unprecedented changes in weather patterns and farmers are turning more

and more towards profitable cash crops as farming of grains and pulses is becoming less profitable. About 60 percent or more of India's population is engaged in agriculture and agriculture contributes 18 percent of the country's GDP today. Therefore, in this era of globalization, such an important sector of the economy also needs to be made more market-friendly and profitable so as to bring the farmers into the economic mainstream of Indian society. It is in this context that Indo-US agricultural cooperation becomes important.

INDO-US AGRICULTURAL COOPERATION: PHASE II

The Institutional Mechanisms

Agriculture has been determined by both the US and India as a key area of cooperation in their strategic partnership. President Obama, in his National Security Strategy released in May 2010, identifies promoting 'sustainable agriculture' as one of the key areas where India—which he calls one of the 21st century 'centres of influence'—and the US can work together.²⁶ The two nations seek to build on the cooperation efforts of the 1960s and 1970s to address the challenges and opportunities of modern agriculture. The challenges of climate change, soil infertility, increasing population, urbanization and industrialization make it imperative that India plans for future food security in terms of production too. This is where the need for a Second Green Revolution comes in. The US is a country in which only around 2 percent of the population is directly employed in agriculture. Yet, it not only feeds itself, but also exports food and this has been possible because its technology and knowledge-intensive agricultural methods have enhanced production. In the case of India, with just three percent of the world's land, it has to feed 17 percent of the world's population. Therefore, this is an area where India can learn much from the US. This is the basis of

the Indo-US Agricultural Knowledge Initiative on Agricultural Education, Research and Service and Commercial linkages (AKI) that was signed in 2005.

The joint declaration signed by the Ministry of Agriculture and the US Department of Agriculture (USDA) states that the aim of the AKI is to 're-energize our partnership by promoting teaching, research, service and commercial linkages to address contemporary challenges'²⁷. Emphasis is to be given to a 'public-private partnership where the private sector can help identify research areas that have the potential for rapid commercialization, with a view to developing new and commercially viable technologies for agricultural advancement in both countries'²⁸. The AKI aims to facilitate technology transfer, trade, and investment and bolster agricultural research, education, and extension through public-private partnerships. The USDA also mentions that a vital component in securing these aims is 'cooperation on development of effective policy, regulatory, and institutional frameworks'²⁹. Thus, the AKI specifies the role of the private sector in agricultural research, while pointing out the vital need for regulatory frameworks.

The initiative as mentioned in the joint declaration focuses on: teaching; collaborative research; information, education and communication technologies; compliance with international standards; commercialization; SPS and related areas, and funding. The initiative's aims are coordinated by a Knowledge Initiative Board comprising experts from both countries, including those from the private sector. The board members from the private sector include representatives from Archer Daniels Midlands (AKM), Monsanto and Wal-Mart from the US and ITC, Masani farms and Venkateshwara Hatcheries from the Indian side. The cooperation process

under the AKI functions at several levels—government-to-government, University-to-University, enterprise-to-enterprise as also as a blend of two or all three of these levels³⁰.

This cooperation is not a one-way process as India has greater knowledge about and insights into tropical crops that it can offer to the US. There are other benefits for the US, as is evident from a Foreign Agricultural Service report of the US Department of Agriculture (USDA), which clearly spells out 'increased market access' to India as one of the main goals of Indo-US agricultural cooperation³¹. According to the USDA, the AKI has the 'potential to raise agricultural productivity, strengthen food security, increase technology transfer, expand US-India trade and investment through policy and regulatory capacity building, ensure key roles for the Indian and US private sectors and reinvigorate the US-India university partnerships'.³²

India and the US have also started a dialogue to build on the AKI. In the Indo-US Agriculture Dialogue meeting held on September 13–14, 2010, three Working Groups were set up: Strategic Cooperation in Agriculture and Food Security; Food-Processing, Agriculture Extension, Farm-to-Market linkages and; Weather and Crop-forecasting. This builds on the MOU on agricultural cooperation and food security signed in March 2010 as well as the Focus Group on Agriculture of the Trade Policy Forum and the AKI announced in 2005. During President Obama's November 2010 visit, a partnership based on these frameworks was agreed upon to launch an 'evergreen revolution' to 'extend' food security in India, Africa and in other parts of the world³³. The partnership aims at using both countries' expertise in a number of agreed-upon activities, such as:³⁴

Enhanced Weather and Climate Forecasting: Through this, the two

countries will work together to increase agricultural production by reducing the loss of crops due to climate change and weather-related problems. The two nations will enter into a broad interagency partnership to: (1) Enhance forecast systems in India in advance of the 2011 monsoon season; (2) Advance crop forecasting and strengthen agricultural market outlooks and; (3) Improve water resource modelling and flood forecasting for agricultural management.

Improved Food Processing and Farm-to-Market Links: This aims at building an improved food chain and building an Indian food processing industry as well as reducing losses by focussing on: (1) marketing, cold chain logistics, and sharing of market knowledge by introducing Indian private entrepreneurs and public sector officials to American best practices, standards and technologies in cold chain infrastructure; (2) technology transfer, like packaging or water recycling and; (3) programmes to improve quality, safety and professional certification.

Partnering for Global Food Security in Africa: This will be achieved by: (1) harnessing frontier technologies for food security and climate-resistant agriculture; (2) promoting conservation agriculture and natural resource management and; (3) linking US, Indian, and African universities to improve the knowledge base for agricultural extension and innovation.

Promoting Improved Agricultural Trade: The two countries also aim to collaborate on policies to reduce or remove barriers to trade and investment in agriculture. They further agreed to continue the ongoing bilateral dialogue on agricultural trade issues in the Trade Policy Forum Agricultural Focus Group.

The AKI, the main framework for agricultural cooperation between the two countries, also aims at expansion of agricultural trade and investment and cooperation in four broad areas: education, learning resources, curriculum development and training; food processing and use of by-products and bio-fuels; water management and; biotechnology.³⁵ It is important for farmers to be up to date about the latest technologies and also to get trained in using them. Reducing post-harvest losses through food processing and food preservation is of great importance to India as, according to Monojit Chintey (executive officer in the CII's department of food processing), 40 per cent of agricultural produce is wasted every year in India.³⁶ Bio-fuels are becoming increasingly important due to depleting oil reserves and India has the potential to produce more biofuels through *Jatropha* and other plants. Market development and farmer-market linkages would help farmers get better prices for their products. Improving research-farmer links assumes importance as it has been a traditionally weak link that has caused delays in transfer of technology to Indian farmers. According to the World Bank, at present only 40% of cultivated land in India is adequately irrigated.³⁷ So there is a need to use irrigation potential more effectively and to have better water management practices in rain-fed areas. Biotechnology would play a significant role in increasing farm yield and productivity.

Improving the cold chain infrastructure³⁸ through building pack houses and cold storages, would prevent decay and improve the quality of products; but this could be at the cost of the consumer having to pay more for food. Water management would help ensure sustainable use of ground water. After the signing of the AKI, the cooperation between the two countries has moved forward. The salient measures taken are: the institution of several fellowships, such as the Borlaugh and Cochran fellowships; several seminars and workshops on various aspects have been held and; several joint projects

in areas like water management, agro-processing, biofuels, biotechnology and Information and Communications Technologies (ICT) for Capacity Building Model in Water Management have been started. However, there is not much information on how much progress there has been on these projects at the ground level. USAID continues to be active in India, helping to improve Indian agriculture by developing and distributing productivity-enhancing technologies (including biotechnology) and supporting research on new high-yield crop varieties.³⁹ The thrust of Indo-US agricultural cooperation today is on private sector cooperation. For instance, Pepsico has entered into contracts with farmers in Punjab, West Bengal and Maharashtra, whereby the farmers sell their produce to the company as a trade-off for all the inputs except land and labour.⁴⁰ Other companies like ADM have launched joint ventures with Indian companies. India and the US are also working together in agricultural training programmes in Afghanistan and African countries.

However, while on the one hand, the bilateral cooperation is being reinvigorated, on the other hand, the two countries continue to have trade disputes, particularly on agricultural issues at the Doha Round. These are related to India's objections to the US' domestic support programmes or subsidies to farmers and the US' objections to India's high tariffs on agricultural imports, which inhibit market access for agricultural products from the US.

Other differences pertain to the 'Special Safeguard Mechanism' (SSM), 'Special Products' (SP) and food aid. SPs are the agricultural products on which a developing country can ask for tariff relaxation on grounds of development, food security and livelihood concerns. India has problems with the advance disclosure demand and the restrictions on the number of products to which SP can be applied. The US wants a limit on the number of

SPs. In the case of SSMs (which refers to tariffs that countries can impose in the case of an import surge of agricultural products), India wants unrestricted rights to increase duties to protect its farmers. The US and other developed countries want to limit the extent of tariffs that can be imposed. India sees food aid as a form of export subsidy and prefers that food aid be given as cash and not in kind. India is also against the US policy of monetization⁴¹ of food aid, as it causes distortions in the market, both local and global⁴².

There are several phyto-sanitary disputes between the two countries. For instance, India has long complained about foreign weeds infesting India's land through weed seeds in US grains. In response to complaints from farmers, India's Ministry of Agriculture issued a directive 'Plant Quarantine (Regulation of Import into India) Order' in 2003, which set strict requirements for allowable weed seeds in grain imports⁴³. This affected American farmers adversely when India had to import wheat in 2006. Despite requests from the US, India only relaxed the restrictions temporarily. The issue remains unresolved and has resulted in excluding American wheat from the Indian market. Another dispute was about the presence of mango stone weevil in mangoes exported to the US. But this issue has since been solved with India setting up an irradiation facility at BARC for mangoes meant for the US markets.

These differences inhibit agricultural cooperation and need to be resolved if the Doha process is to move forward.

Criticism against US-India Agricultural Cooperation

There has been much criticism in India of the bilateral agricultural cooperation. A good deal of it has focused on the AKI. The presence of

American MNCs, namely Archer Daniels Midland Company (ADM), Monsanto and Wal-Mart on the board of the AKI is seen by many in India as a means by which these MNCs could dictate the terms and direction of India's future agricultural research, change regulatory regimes related to agriculture, give them access to India's gene banks and to open up India's huge market for their genetically modified (GM) food products⁴⁴. There is a perception that since the US is the leading developer and consumer of GM food, joint research in agriculture would focus on this and the Indian market would be thrown open for GM foods from the US.

The GM Foods Controversy

It is in the area of cooperation in biotechnology that the most concerns have arisen. Environmentalists are concerned about the thrust on biotechnology and GM food, whose effects on the environment and the human body are as yet unknown and some Indian scholars argue that evidence points towards GM food having harmful effects on humans and animals⁴⁵. GM seeds and technology could destroy our biodiversity, make our soils less fertile due to mono-cropping, lead to the spawning of secondary pests and uncontrollable super weeds and super bugs that would make the human body resistant to antibiotics and medicines. It is in view of this that the EU countries and Japan, arguably the US' longest-standing allies, have banned the entry of GM crops, and some African countries have rejected US food aid due to the presence of genetically modified organisms (GMOs) in it. In fact, India has imposed a moratorium on growing GM brinjal developed by Mosanto on the grounds that it might have an adverse effect on health and on the ecosystem. Also, GM seeds are patented and expensive and would push farmers towards further poverty.

Rejecting such criticism, the US holds that GM is the technology of the future and is needed to boost production. Further, it says that it is impossible to now separate GM food from non-GM food in the US. Moreover, they claim that Americans have been consuming GM food for the last 15 years or more without facing any side effects. Also, GM crops would be drought-resistant, yield more, mature earlier and would consume less water. They also need less fertilizer and pesticides, as they are programmed to fight commonly-occurring pests and diseases. The importance of GM crops and the influence that agricultural biotechnology firms have in the US is evident from the recent Wikileaks cables where the US Ambassador to France apparently called on Washington to launch a trade war against EU countries for not allowing US-grown GM crops into their countries.⁴⁶ Wikileaks cables also show that the US was lobbying the Vatican to speak in favour of GM foods. Thus, finding new markets for US-grown GM crops is an important driver of US agricultural policy.

Some Indian scholars have alleged that the presence of US agri-business firms in the AKI board would enable them to change India's regulatory regimes like: (1) regulation of genetically modified organisms (GMOs); (2) contract farming; (3) seeds regulation and; (4) Intellectual Property Rights (IPRs) in agriculture.⁴⁷ The fact that the US is not a party to the UN biodiversity convention makes it doubly important for India to ensure that its biodiversity and traditional knowledge are protected. India has so far only approved Bt cotton, but its economic benefits have not been great. In fact, it has been accused of causing a large number of suicides by farmers in the cotton-growing states of Maharashtra and Andhra Pradesh, all because they could not afford to buy the exorbitantly-priced seeds and fell into debt traps for buying these seeds.

The AKI has come under criticism for other reasons too. There is concern that the focus on technology will force many small farmers to give up their

small land holdings, paving the way for contract farming and corporate farming that would focus only on a few selected profitable crops. There is fear that the AKI would increase farmers' dependence on corporates and US agribusiness because, if GM crops are allowed, farmers would have to depend on them to buy GM seeds patented by these companies.

Exporting the Green Revolution to Africa

India and the US have the potential to together boost agriculture and help ensure food security in Africa, where there is a need to promote self sufficiency in food by using the techniques of the Green Revolution and other new technologies. In fact, both countries have announced that they would like to export Green Revolution technologies to African countries. For instance, President Obama touched on this aspect of Indo-US agricultural cooperation in his remarks to the joint session of Indian Parliament on November 8, 2010.⁴⁸

.... as part of our food security initiative, we're going to share India's expertise with farmers in Africa. And this is an indication of India's rise—that we can now export hard-earned expertise to countries that see India as a model for agricultural development.

Indeed, the food security situation in Africa has worsened since 1970 and the proportion of the malnourished population has continued to be as high as 33 to 35 per cent in Sub-Saharan Africa.⁴⁹ Underinvestment in agriculture, loss of soil fertility, frequent droughts, globalization—which has led to developed countries dumping their heavily subsidized foods in African markets—civil wars and poor governance are the factors that have contributed to this critical situation on the continent. Any effort to get out of this quagmire would be welcomed by African countries. In fact, for the first time in history, the US and India have agreed on a triangular

cooperation programme to build agricultural capacity and promote food security in Kenya, Malawi and Liberia. Thus, India has become an important part of the 'President's Feed the Future' initiative, which has become important in the context of rising food prices across the globe. However, India enjoys tremendous goodwill in the African continent and it is important not to lose this goodwill by using enhanced US-India agricultural cooperation as a vehicle for the sale and propagation of GM crops in Africa.

Conclusion

Agricultural productivity in India can be increased through alternative means like the integrated pest management and organic farming that are safe for the environment and produce safe food for the consumer. Moreover, the problem of food security in India today is more about lack of purchasing power and access to food than scarcity. Merely investing in technology-driven agriculture to increase productivity is not going to help in providing access to food. More social security measures need to be put in place for this purpose.

The Government should invest more in agriculture and e-agriculture and use IT to aid farmer-market communication and sales, so as to build a sustainable business model in agriculture too. IT could help small and marginal farmers in marketing, pricing, water management, irrigation and managing the logistics of the supply chain, including storage and post-harvest preservation techniques.⁵⁰ Rural infrastructure needs to be developed through public-private partnerships so that products reach consumers faster and fresher. Losses in agricultural produce can be attributed to the lack of post-harvest technology, infrastructure and storage facilities. Therefore, India needs to invest in new technologies for scientific and methodical post-harvest operations, creating proper storage facilities

and building food processing units near farms lands. More agro-based industries would also increase employment opportunities. Thus, agriculture needs to be seen as an instrument of growth in addition to serving as a means of food security.

US-India agricultural cooperation has a long and rich history. It is a relationship that is necessary for solving Indian and global challenges in this vital sector. But the two countries should focus on reducing post-harvest losses, food processing and food preservation, improving research-farmer and farmer-market linkages and capacity building, developing biofuels—given the precarious state of global oil resources⁵¹—improving agricultural education and research in India, increasing private investment in agribusiness, sustainable use of groundwater to improve the quality of our products and ensuring that farmers get good prices and meet export standards. Other areas of cooperation could be agricultural business, finance, marketing engineering, food technology, product agriculture, animal husbandry and aquaculture. The cooperation need not extend to opening up the Indian market for GM food from the US. In US-India bilateral and multilateral cooperation in agriculture, the provisions of the Codex Alimentarius⁵², SPS, Agreement on Technical Barriers to Trade (TBT), Cartagena Protocol on Biosafety and International Plant Protection Convention (IPPC), should be borne in mind.

GM foods may well have the potential to contribute to food security by increasing productivity, but their environmental and health hazards, as can be seen from the discussion above, are still matters of debate and doubt. Therefore, the government would be best advised to stick to a wait-and-watch policy and take decisions on a case-by-case basis, keeping in mind India's experience with Bt Cotton. It should wait for conclusive GM studies and not take any decision in a hurry. Joint research between the US and India

on this subject should continue, as there is no denying the fact that India will need to produce more food in the future for its growing population. If GM plants are to be planted commercially, there must be long-term monitoring of the environmental and health impacts. Even if the government does permit the entry and sale of GM foods, labelling of foods containing GMOs must be made mandatory, so that consumers can make informed choices—though this would be a tough task, considering the facts of cross-pollination and the age-old practice among Indian farmers of sharing of seeds⁵³ among themselves instead of buying seeds. The Government should ensure that Indo-US agricultural cooperation promotes sustainable agriculture and protects the interests of India's farmers and its people in general and the country's environment through a holistic approach for a truly 'Evergreen Revolution'.

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