



GREEN REVOLUTION IN INDIA

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Right Time to Go For Second Revolution:

The Green Revolution is the increase in food production stemming from the improved strains of wheat, rice maize and other cereals in the 1960s developed by Dr. Norman Borlang in Mexico, and others, under the sponsorship of the Rockefeller Foundation. This increased the crop yield in India, Pakistan, Philippines, Mexico, Sri Lanka and other under developed countries.

However, in India, the term Green Revolution is applied to the period from 1957 to 1978 between 1947 and 1967, efforts at achieving food self- sufficiency were not entirely successful. Efforts unit 1967 largely concentrated on expanding the farming areas. But, starvation deaths were still being reported in the newspapers. In a perfect case of Malthusian Economics, population was growing at a much faster rate than food production. This called for drastic action to increase yield. The action came in the form of the Green Revolution. The term "Green Revolution is a genus one that is -applied to successful agricultural experiments in many Third world countries. It is not specific to India, but it was most successful in India.

The Green Revolution technologies broadly fall into two major categories: the first is the breeding of new plant varieties and the second is the application of modern agricultural techniques in the new areas.

The development of Hybrid strains was motivated by a desire to, first, increase crop yield, and also to increase durability in transport and longevity for storage. A hybrid strain in what is an example of such a strain that helped developing countries, such as India and Pakistan to increase the productivity of their crops. Since then, strains have been bred for better appearance, e.g. plumper tomatoes, or straighter, more evenly colored cobs of corn. Since improved crop yield was produced mostly through the use of heavy fossil fuel inputs, the 'increased efficiency of Green Revolution strains is geared towards these inputs; that is, the strains are more efficient at exploiting the chemical fertilizers used, and also are designed to be harvested earlier, mechanically.

Agricultural techniques, the techniques introduced in India by the Green Revolution are the extensive *use* of chemical fertilizers, maximizing the irrigation potential, use of heavy machines, application of pesticides and herbicides, etc.

Results of the Green Revolution:

1. The Green Revolution resulted in a record grain output of 131 million tons in 1978-79. This established India as one of the world's biggest agricultural producers.



2. Yield per unit of farmland improved by more than 30 percent between 1947 and 1979 when the Green Revolution was considered to have delivered its goods.
3. The crop area under HYV varieties grew from 7 percent to 22 percent of the total cultivated area during the 10 years of the Green Revolution.
4. Crop areas under high yield varieties needed more water, more fertilizer, more pesticides, fungicides and certain other chemicals. This spurred the growth of the local manufacturing sector. Such Industrial growth created new jobs and contributed to the country's G.D.P.
5. The increase in irrigation created the need for new dams to harness monsoon water. The water stored was used to create hydro-electric power.
6. India transformed itself from a starving nation to an exporter of food. This earned admiration for India in the comity of nations, especially in the Third World.

Limitations of Green Revolution:

Even today, Indian's agricultural output sometimes falls short of demand. The Green Revolution, howsoever impressive, has thus not succeeded in making India totally and permanently self-sufficient in food. Both in 1979 and 1987, India faced severe drought conditions due to poor monsoon; this raised questions about whether the Green Revolution was really a long-term achievement. In 1998, India had to import onions. Last year, India imported sugar. However, in today's globalized economic scenario, 100 percent self-sufficiency's is not considered as vital target as it was when the world political climate was more dangerous due to the Cold War.

India has failed to extend the concept of high yield value seeds to all crops or all regions-. In terms of crops, it remains largely confined to food grains only, not to all kinds of agricultural produce. IN regional terms, only the States of Punjab and Haryana have shown the best results of the Green Revolution. The eastern plains of the river Ganges in West Bengal also showed reasonably good results. But, results were less impressive in other parts of India.

Nothing like the Bengal famine can happen in India again. But, it is disturbing to note that even today; there are places like Kalahindi where famine-like conditions have been existing for many years and .where some starvation deaths have also been reported. Of course, this is due to reasons other "than availability of food in India, but the very fact that some people are still starving in India brings into question whether the Green Revolution has failed in its overall social objectives, though it has been a resounding success in terms of agricultural production. The Green Revolution cannot, therefore, be considered to be a 100 percent success.

A final set of criticisms focus on, whether the agricultural practices of the Green Revolution are sustainable. Green Revolution techniques also heavily rely on chemical fertilizers, pesticides and herbicides, some of which must be developed from



fossil fuels, making agriculture increasingly reliant on petroleum products. This has raised concerns that significant decrease in world oil and gas production and the corresponding price increase, could plunge billions into hunger.

Another criticism is that fertilizer, pesticide and herbicide runoff continue to be a significant source of pollution and a major source of water pollution. Critics further charge that the Green Revolution destroyed soil quality over the long term. This is a result of a variety of factors, including increased soil salinity that results from heavy irrigation, erosion of the soil, a decreased flux of organic material to the soil because of lesser allocation of photosynthetic production to stems and roots, and the loss of valuable trace elements.

The Green Revolution has thrown up its own set of problems. There has been a toll on soil fertility. The HYVs call for heavy dosages of chemical-fertilizers and pesticides, prolonged use of these has depleted our soils and poisoned our environment. The once-thrifty farmer has become a profligate user of power and water. Also, because this form of agriculture is capital intensive, it is the farmer of means who most benefits from it. Therefore, while India's food problem may have been solved, not so the hunger problem of its poor. The profits of the Revolution have not spread evenly in society and the poor have little means to buy the huge stocks with Government. Worst of all, yields are beginning to fall. We may have basked for too long in the glow of the Revolution.

So, India is at the cross-roads once again. A tempting sign points to transgenic crops, also known as genetically modified (GM) crops. These are promoted as being the spearhead of the next Green Revolution. They are said to need few inputs, display greater immunity to pests and lead to higher yield. But there are many sober voices that dispute these claims. Their views too are justified because in the past, multinational companies have hastily jumped in to reap their profits with dubious products, leaving the farmer to harvest sorrow. Objective scientific assessment of the claims made for GM crops is not yet complete. So the time may not be ripe yet to induct these promising technologies.

The more sensible road to take is the one to eco-sensitive farming. India needs to reevaluate proven, ancient ways of harmoniously maintaining soil fertility. Dependence on chemicals has to be minimized. Esteem for carefully selected native strains has to be encouraged if the small farmer is to be freed from malevolent seed companies. Conservation and optimal use of water is an important issue. Most of all, agricultural pricing and market policies need to be reviewed to favor the small farmer. There are signs of an emerging awareness all around, many farmers in Karalla and Karnataka are turning to organic farming on a large scale. Most significantly, Swaminathan, that star of the Green Revolution, is today an advocate of sustainable agriculture.

So let us put the Green Revolution in context again. It is, undoubtedly, a great Indian success story. But its unspoken mission may have been to give us a fresh breath



with which to codify Indian farmer's traditional wisdom. Today, technologies and Indian technologists are available, as was not the case in the sixties, to compile best practices and disseminate them widely. It is in the nature of revolutions that ~ they are never final solution but place-holders till the next one come along.

Target:

It is the right time for India to embark upon the second Green Revolution, which will enable it to increase its productivity in the agricultural sector. The production of cereals needs to increase from the present 200 million tones to over 300 million tons by 2020 in view of population growth. But the requirement of land for the increasing population, as well as for greater afforestation and environmental preservation activities, would demand that the present 170 million hectares of arable land would have to be brought down to 100 million hectares by 2020.

All our agricultural scientists and technologists have to work for doubling the productivity of the available land with lesser area being available for cultivation. The type of technology, proper training to the farmers, additional modern equipment for preservation and storage, etc. The second Green Revolution is indeed graduation from grain production to food processing and marketing as visualized by the late Shri C. Subramanian. While doing so, utmost care should be taken for various environmental and people-related aspects leading to sustainable development.

The bulk of our population still depends upon agriculture for a living. The United States was nearly partner in this area, helping to establish agricultural universities and research institutions in India in the 1960s. It was an American, Nobel laureate Norman Borlaug supported by a grant from the Rockefeller Foundation, who developed high yielding varieties of wheat in Mexico, which were then adapted to Indian conditions in the agricultural universities they helped establish.

This was the start of the Green Revolution in India that lifted countless millions above poverty. It seeks to take information and know-how directly to the farming community. And promote technologies that minimize post-harvest wastage and improve food storage. It will also help Indian farmers to meet the phytosanitary conditions & enable them to participate more fully in global agricultural trade.

Finally:

The technologies we develop must be economically affordable and relevant to small and marginal farmers, especially in drought prone regions. Two criticisms of the first have been, one, that it did not benefit dry land agriculture, and two, that it was not scale neutral and had benefited large farms and big farmers. While evidence shows that this was not always the case, we must ensure that the second Green Revolution technologies have a special focus on dry land agriculture and do benefit small and marginal farmers.

The second Green Revolution will not be possible without a rejuvenation of our agricultural universities, and research institutions. We have to revitalize these



institutions. We have to improve their academic standing and their relevance to agrarian society and the economy. All advanced agricultural economies are knowledge-based economies. We must broaden the knowledge base of our farmersto enable them to make the best use of new technologies. Our farmer's needs for information are multi-faceted and these are not limited to technology alone. They need information about agriculture as a business, about faring practices, about policy initiatives, about best practices of other farmers and about market intelligence. Therefore, timely availability of information is a critical component in the development of our agriculture.

Our extensions services need to gear up to meet these and emerging demands of farmers. Extension services have languished in the past two decades. We have to find innovative ways in which the skills of agricultural graduates can be harnessed for effective extension work. New communications tools can be used to overcome physical barriers between farmers and researches. The Indian Council for Agricultural Research is seeking to provide electronic connectivity to about 200 KrishiVignanKendras to make them hubs for accessing information by our farmers. KrishiVignanKendras should function as knowledge banks in each district. They must bring scientist, extensions workers, and farmers together and bridge the gap between potential and actual farm yields.

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