



## Green Revolution And Protection Of Environment

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**Introduction:** The programme of high-yielding varieties of seeds and the use of fertilizers and irrigation are known as the Green Revolution. This resulted in the increase in production of food grains needed to make India self-sufficient. Genetically modified high-yielding wheat was first introduced to India in 1963 by Dr. Norman Borlaug. Borlaug has been hailed as the Father of the Green Revolution. The Green Revolution refers to the increase in food production and in production of non-food items that has significantly and steadily taken place in India since 1966. Along with high yielding seeds and irrigation facilities, the enthusiasm of farmers mobilized the idea of agricultural revolution. This credit goes to Dr. M. S. Swaminathan and his team which had contributed towards the success of green revolution. Due to the use of chemical pesticides and fertilizers there were so many environmental problems like land degradation, degradation of water levels, health problems to farmers and other environmental related problems. Green Revolution agriculture forced to the use of pesticides, to limit the high levels of pest damage that inevitably occur in mono cropping. The Green Revolution agriculture affected both agricultural biodiversity and wild biodiversity. The consumption of the pesticides used to kill pests by humans in some cases may be increasing the likelihood of cancer in some of the rural villages using them. Poor farming practices including non-compliance to usage of masks and over-usage of the chemicals compound this situation. In 1989, WHO and UNEP estimated that there were around 1 million human pesticide poisonings annually. Some 20,000 majority in developing countries ended in death, as a result of poor labeling, loose safety standards etc. Long term exposure to pesticides such as organ chlorines, creosote, and sulfate have been correlated with higher cancer rates and organochlorines DDT, chlordane, and lindane as tumor promoters in animals. So there should be priority to the protection of environment while taking decision on green revolution.

**History of Green Revolution:** The beginning of Green Revolution attributed to Norman Borlaug, an American scientist interested in agriculture. In the 1940s, he conducted research in Mexico and developed new disease resistance high-yield varieties of wheat. By combining Borlaug's wheat varieties with new mechanized agricultural technologies, Mexico was able to produce more wheat than was needed by its own citizens, leading to its becoming an exporter of wheat by the 1960s. Prior to the use of these varieties, the country was importing almost half of its wheat supply. The success of the Green Revolution in Mexico was spread over worldwide in the 1950s and 1960s. The United States imported about half of its wheat in the 1940s but after using Green Revolution technologies, it became self-sufficient in the 1950s and became an exporter by the 1960s. Countries all over the world in turn benefited from the Green Revolution work conducted by Borlaug and Ford Foundation research institution. In India the Green revolution began in 1966- 67 with the introduction of new fertilizers and pesticides with high yielding varieties. At first a group of agricultural scientists belonging to Ford Foundation was invited in 1959 which submitted its report in April 1959 to improve the conditions of the Indian agriculture. Consequently the Intensive Agricultural District Programme (IADP) was initiated in seven selected districts of the country (West Godavari in Andhra Pradesh, Shahabad in Bihar, and Raipur in Madhya Pradesh.

Thanjavur in Tamilnadu, Ludhiana in Punjab, Pali in Rajasthan and Aligarh in Uttar Pradesh) in 1960-61. India was on the brink of mass famine in the early 1960s because of its rapidly growing population. In 1960 India's rice production was 2 tones per hectare only. Borlaug and the Ford Foundation then implemented research there and they developed a new variety of rice, IR8 that produced more grain per plant when grown with irrigation and fertilizers. During 2009-10 India produced 90 million tones of rice. Today, India is one of the world's leading rice producers and IR8 rice usage spread throughout Asia in the decades following the rice's development in India.

**Impact of green revolution on India:** As fertilizers are largely used for the Green Revolution, they forever changed agricultural practices because the high yield varieties developed during this time cannot grow successfully without the help of fertilizers. Regarding irrigation Green Revolution influenced more land. For example before the Green Revolution, agriculture was severely limited to areas with a significant amount of rainfall, but by using irrigation, water can be stored and sent to drier areas, putting more land into agricultural production which led to increasing nationwide crop yields. Besides this, the development of high yield varieties limited to a few crops like rice and wheat. In India for example there were about 30,000 rice varieties prior to the Green Revolution, today there are around ten - all the most productive types.

In India the green revolution began in Punjab, Haryana and western Uttar Pradesh with the use of HYV seeds in wheat cultivation. But by 1983 it also included rice cultivation and extended its domain to Bihar, Andhra Pradesh and Tamil Nadu. Under the impact of green revolution the production of wheat increased from 123 lakh tonnes (1964-65) to 470.5 lakh tones (1985-86) and then to 551.3 lakh tones (1990-91); the current (1999-2000) production being 675.6 lakh tones. The country has achieved a record food grain production of 241 million tonnes (MT) in 2010-11 crop year. As per latest second advance estimates of Agriculture Ministry, India's food grain production will reach to 232.07 million tonnes from 218.20 million tonnes of the last year, up 6.4%. India's wheat production is estimated at 81.47 million tonnes in 2010-11 crop year, up almost 1% from the last year. The rice output is also estimated to reach 94.01 million tonnes against 89.09 million tonnes during last year. The total production of pulses and cotton are also likely at all-time high of 16.51 million tonnes and 33.9 million bales, respectively in the current year.

**In addition to this the impact of Green Revolution on the Indian agriculture can be summarized as follows.**

- i) Intensive agriculture was developed and food production increased
- ii) Green Revolution enabled Indian agriculture to change from food crops to commercial and market-oriented crops.
- iii) The adoption of new technology created more employment opportunity in the Indian agriculture.
- iv) In India Green Revolution strengthened the relationship between agriculture and industry.
- v) The Green Revolution has enabled farmers to obtain increasing returns from agriculture by greater utilization of agricultural inputs.

vi) In IndiaGreen Revolution has increased rural prosperity.

**Disadvantages of Green Revolution: Green Revolution has the following negative aspects.**

- i) Green Revolution is capitalistic farming in the country, because it needs higher investment in agriculture which is beyond the reach of the small and marginal farmers.
- ii) Green Revolution caused for the economic disparity amongst the farmers.
- iii) The new strategy is not implemented by the farmers where illiteracy is more.
- iv) It has created three kinds of flaws in rural areas, namely: between large and small farmers, between owners and tenant farmers and between employers and employees on agricultural farms.

- v) The mechanization displacement of labor and led to the problem of unemployment in rural areas.
- vi) The impact of Green Revolution is limited to a few food crops like wheat, rice, maize, and bajra only leaving out pulses, oil seeds, cash crops.

Need for second green revolution: India produced record levels of food grain by 2011 but would still need a second green revolution to feed its growing population. As per NSSO report for every 1000 people employed, over 750 persons are employed in the agriculture sector. With the enhance of Food Security Bill which confers legal right to a prescribed quantity of food grains, attention to increasing the productivity, profitability and sustainability of small farm agriculture has become even more urgent. India, can not implement a food security bill based on imported food grains. There fore, steps will have to taken to create interest among educated youth in rural areas for taking agriculture as a profession for second green revolution. The Prime Minister of India has expressed his view on green revolution as follows. "We all look back proudly to our green revolution, which helped us overcome food shortages and banish the specter of starvation. But, many regions which witnessed the green revolution were suffering from environmental degradation and farm productivity had since plateaued. "We clearly need a second green revolution that is broader based, more inclusive and more sustainable; we need to produce more without depleting our natural resources." India had produced a record 241 million tonnes of food grain in the season July 2010 to June 2011, 23 million tonnes more than the previous year. With a population of 1.2 billion that has grown at the rate of 17.64 per cent over the last decade, the demand for food grain was projected to touch 280 million tonnes by 2020—2021. India had cut absolute poverty by half over a quarter century, but 440 million people still lived on less than a dollar a day, the country's top economic policy—making body, the Planning Commission estimated in 2010.

The compound annual growth rate basis shows that in 10 years to 2009-10, the area under rice shrank 0.03 per cent and production and productivity of the cereal grew 1.59 per cent and 1.61 per cent, respectively. As for wheat, the area gain was 1.21 per cent, while progress in production and productivity was 1.89 per cent and 0.68 per cent, respectively. Productivity gains have plateaued raising concerns about food security. All this goes to show that the country now urgently needs a follow up green revolution to the one of the 1960s which led to major breakthroughs in wheat and rice production. The next green revolution has to happen to chase the twin goals of food security and nutritional diet. Without the second revolution, which can be postponed at the nation's peril, the supply side's response to growing demand for food will be weak leading to disturbing price spikes. For boosting productivity of farm

items, the reliance has to be on biotechnology. Our farmers need smart seeds which will make crops withstand diseases and weeds and not allow them to wilt easily in difficult weather condition. How can we have healthy productivity growth when four-fifths of farmers use farm-saved seeds leading to low seed replacement rate. The government has got to go beyond talking and instead create condition for the revolution to start. Food inflation is unnerving for any government anywhere. This must have reminded our policymakers that hunger could ignite another kind of revolution.

Importance of environment protection in agriculture: Agriculture sector which is primary sector in India has experienced significant growth from mid-twentieth century. The growth is caused by Green Revolution technology. Later agriculture faces a severe problems and challenge in terms of sustainability. These problems have led to increasing awareness and a felt need for moving away from the input intensive agriculture perused during the Green revolution phase, to sustainable farming in different parts of the world. Notwithstanding these limitations, policies in both the north as well as the south have led increased emphasis on promoting sustainable agriculture. Agriculture much more depend on monsoon and needs little from outside the farm, i.e., lesser dependence on chemical fertilizers and water. The green revolution has results that it has given rise to new set of problems like overuse of water and fertilizers. Excessive use of water results in water logging and salinization whereas excess of fertilizers and pesticide cause pollution of water bodies contamination of ground water as well as surface water. India has the largest area of irrigated land of which about one-third land is already degraded and 7 million hectare have been abandoned. In such a situation there is need for sustainable agriculture has been emphasized. Hence Policies for sustainable agriculture and organic farming and possible actions in India are to be discussed.

**Policy measures for sustainable environment with green revolution: The following are measures to be followed for protection of environment.**

1. To give incentive for the farmers to follow advanced management practices at farm with environmentally friendly.
2. To provide local designs for local participatory farmers to reduce agriculture pollution.
3. To give support to local environment research for agriculture activities.
4. To conduct effective information and effective education programmes.
5. To provide advance technology to the farmers.
6. Propose strategies for a better inter-agency co-operation like, the relationship between environmental protection agencies, agricultural consultancy agencies, agricultural directorates, farmers associations, local authorities, local NGOs.
7. Reform agricultural policies in ways that contribute to reduce distortions in the use and quality of water resources, and enhance environmental benefits associated with water use in agriculture.
8. For ecological sustainability during the period of green revolution strict measures to be taken by using different laws to protect soil, water, bio-diversity, landscape etc.

Conclusion: As population increases in India there is need for second green revolution. By keeping the defects of first green revolution, the initiation of second green revolution has to be undertaken. For the formulation of second green revolution there should be priority to protection of environment. When protection of environment is possible the entire agriculture will be sustainable for ever.

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