



GREEN REVOLUTION IN AGRICULTURE- PRE AND POST REFORM SCENARIO

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Abstract: The sudden jump in agricultural production as a result of the application of high yielding varieties of seeds, increased use of chemical fertilizers and irrigation is collectively known as the “Green Revolution” which made India self-sufficient in the field of food grains. It can be termed as the First Green Revolution and was enunciated in the pre-reform period of 1967- 68. Accordingly, India became the world’s biggest agricultural producer, and produced record grain output of 131 million tons in 1978-79. But it was a failure as its fruits were not achieved by small and marginal farmers. It provided an unbalanced growth among agricultural workers and did not provide an inclusive growth in the agricultural field. So it cannot be considered as a 100 percent success. So there arose a need for a Second Green Revolution in order to eradicate the inequality among farmers and also to provide food security to its billion plus population, to remove distress of farming community and to make agriculture globally competitive. It was during the post reform period of April 2013, there came a coordinated effort to double agricultural output over the next few years by providing new technologies and better farming practices. In this endeavor, the problems of marginal and small farmers will be taken care off. Special attention will also be made to raise agricultural productivity in dry areas without compromising on preserving soil and water resources.

As a result of Second Green Revolution the food grains production which was about 51 million tons in 1950-51, achieved an all-time record harvest of more than 250 million tons in 2012-13. It has also helped the evolution of a low cost technology which can be adopted by small farmers and which can use and exploit the local resources. Thus agricultural production has increased along with balanced growth and through Second Green Revolution India is aiming to attain inclusive growth along with agricultural growth.

Against this backdrop, this paper attempts to compare and analyse the impact of agricultural reforms in the area of Green Revolution introduced during the pre and post reform period for providing agricultural growth along with inclusive growth in agricultural field.

Index Terms - Green Revolution, HYVS, Multiple Cropping, Inclusive Growth etc

Status and Importance of Indian Agriculture

Agriculture is an important sector of Indian economy as it contributes about 17% of the total GDP and provides employment to over 60% of the population. The Agriculture sector of India has occupied almost 4% of India's geographical area. Indian Agriculture has registered impressive growth over last few decades. The food grain production has increased from 51 million tonnes in 1950-51 to 250 million tonnes during 2011-12 highest ever since independence

Need For Economic Reforms in Agricultural Sector.

Economic Reforms aim to achieve rapid economic development to improve the standards of our people and to eliminate poverty. With over 70% of population in rural areas, and most of them dependent on Agriculture, it follows that the strategy for economic reforms must address the constraints on efficiency and production in the agricultural sector. Much of what needs to be done in this area consists of effective implementation of the basic strategy for agricultural development that has worked well in many parts of the country and needs to be extended to other parts. This calls for substantial investments in land and water management, supply of improved seeds, an effective system for delivery of rural credit and of course security of tenure. The resources saved should be devoted to increased investment in agriculture and related rural infrastructure.

Green Revolution

“Green Revolution” was introduced during the pre-reform period of 1967 to 1978. The introduction of high yielding varieties of seeds especially rice and wheat and the application of modern agricultural techniques, increased use of chemical fertilizers and irrigation are known collectively as the Green revolution, which provided the increase in production needed to make India self - sufficient in food grains, thus improving agriculture in India. Norman Borlaug has been hailed as the “Father of the Green revolution” but M.S. Swaminathan is known as the “Father of the Green Revolution in India”

Objectives of the study

The main objective of this paper is to compare and analyse the impact of agricultural reforms in the area of Green Revolution introduced during the pre and post reform period for providing agricultural growth along with inclusive growth in agricultural field.

Basic Elements of Green Revolution

Green Revolution is the combined result of various measures taken by the Government. Some of these are

- (1) Supply of New inputs. These includes the following:
 - (a) Adoption of high-yielding varieties of seeds
 - (b) Supply of chemical fertilizes
 - (c) Expansion of irrigation facilities
 - (d) Plant protection and pest control
 - (e) Development of infrastructure
 - (f) Use of Machinery
- (2) Multiple cropping programme
- (3) Provision of Agricultural credit

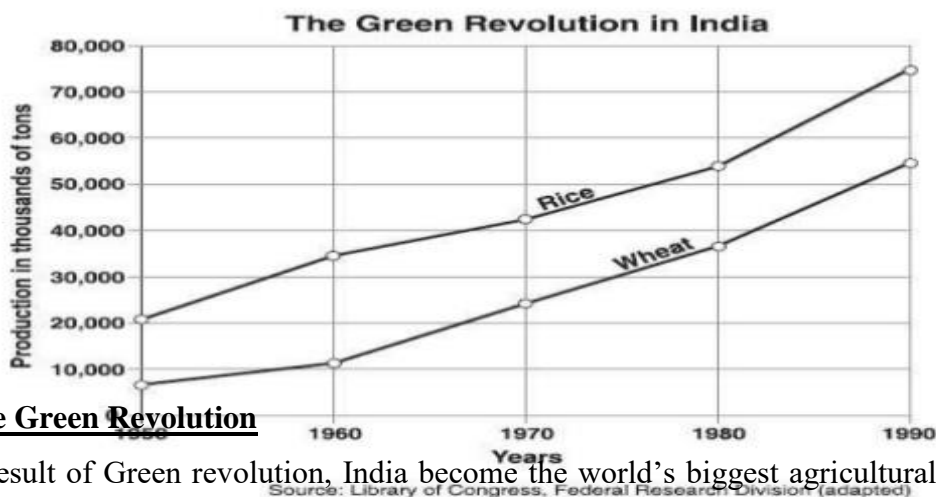
- (4) Incentive prices
- (5) Development programmes for small and Marginal Farmers.

Using Seeds with Superior Techniques

This was the Scientific Aspect of the Green Revolution. The Indian Council for Agricultural Research was re-organized in 1965 and then again in 1973. It developed new strains of High Yield Value (HYV) Seeds, mainly Wheat and Rice but also Millet and Corn. The most noteworthy HYV seed was the K68 Variety of Wheat. The credit for developing this strain goes to Dr. M.P. Singh who is also regarded as the Hero of India's Green Revolution.

Result/Evaluation of Green Revolution:

1. Statistical Result:



Success of the Green Revolution

1. As a result of Green revolution, India become the world's biggest agricultural producer ie, a record grain output of 131 millions tons in 1978 -79.
2. The major achievement of the new strategy is to boost the production of major cereals, wheat and rice.
3. The crop area under HYV varieties grow from 7 percentages to 22 percent of the total cultivated area during the 10 years of the Green Revolution.
4. Green Revolution results increase in irrigation and the water stored was used to create hydro-electric power. This in turn boosted industrial growth, created jobs and improved the quality of life of the people in villages.
5. Green Revolution helped India to pay back all loans and this improved India's credited worthiness in the eyes of the lending agencies.
6. Green Revolution has resulted in the over-all rural development ie, growing income of people in rural areas has encouraged various types of construction activities.
7. Green Revolution has saved the foreign exchange which was paid for the import of food grains
8. The new technology and modernization of agriculture as a result of Green revolution have strengthened the linkages between agriculture and industry.

Does the First Green Revolution provide Agricultural and Inclusive Growth

Although the first Green revolution provide Agricultural Growth, it does not provide Inclusive Growth because its benefits prevail only in certain selected areas and the rest of the country is not yet suitable for advanced technology. What is, therefore, wanted is the evolution of a low-cost technology which can be adopted small farmers and which can use and exploit the local resources.

The following are some of the Defects of First Green Revolution:

- (1) The spectacular rise in food grain production has taken place since the 1960s in Punjab, Haryana, Western U.P and in some selected districts of Andhra Pradesh, Maharashtra and Tamilnadu. In other words, the already better off areas have made their economic position still better. This has initiated a process of unbalanced growth in India.
- (2) It has been observed that in the present rural set-up of co-operative societies and rural banks, it is the big farmer who is able to secure a loan at low rate of interest. The small farmer who wields very little intensive in the village has to borrow from the village money-lender at exorbitant rates of interest. This introduces a difference in the real price of inputs to the large and the small farmers, obviously to the disadvantage of the latter.
- (3) The New Agricultural Strategy necessitated heavy investment and thus they are beyond the capacity of small and medium farmers. Consequently, the New Agricultural Strategy has helped the growth of capitalist farming in India and has led to concentration of wealth in the hand of the top 6 percent of the rural population. The poor and Marginal peasants have not directly benefited from Green Revolution.
- (4) The Green Revolution caused by the new strategy was initially limited to wheat, Maize and bajra only. The major crop of India ie, rice, responded to the impact of the high - yielding varieties much latter. Progress in major commercial crops viz, oilseeds, cotton and jute is very slow.
- (5) Technological changes have contributed to widening the disparities in income between different regions, between small and large farms and between landowners on the one hand and landless labourers and tenants on the other.
- (6) The Green Revolution, however impressive, has thus not succeeded in making India totally and permanently self -sufficient in food. 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.
- (7) The new strategy has created three kinds of conflicts, namely, between large and small farmers, between owners and tenant farmers and between employers and employees on agricultural farms.

In short, the first Green Revolution was a failure as its fruits are not achieved by small and marginal farmers. It provides an unbalanced growth among agricultural workers and not provided an Inclusive Growth in Agricultural field. So it could not considered to be a 100 percent success

Second Green Revolution

India needs Second Green Revolution to bring food security to its billion plus population, to remove distress of farming community and to make its Agriculture globally competitive. It is possible in India, but it must be

based on integrated approaches considering entire farming system. It should be a Co-ordinated effort and mainly deals with increase in production for the next generation. M.S. Swaminathan is known as the Father of Second Green Revolution. The year 2004 is somewhat termed as Second Green Revolution in India, it is also known as Rainbow Revolution. Its developmental framework must guarantee Inclusive Growth (considering those who neither have land or assets) along with Agricultural Growth.

Aims and Strategy of Second Green Revolution

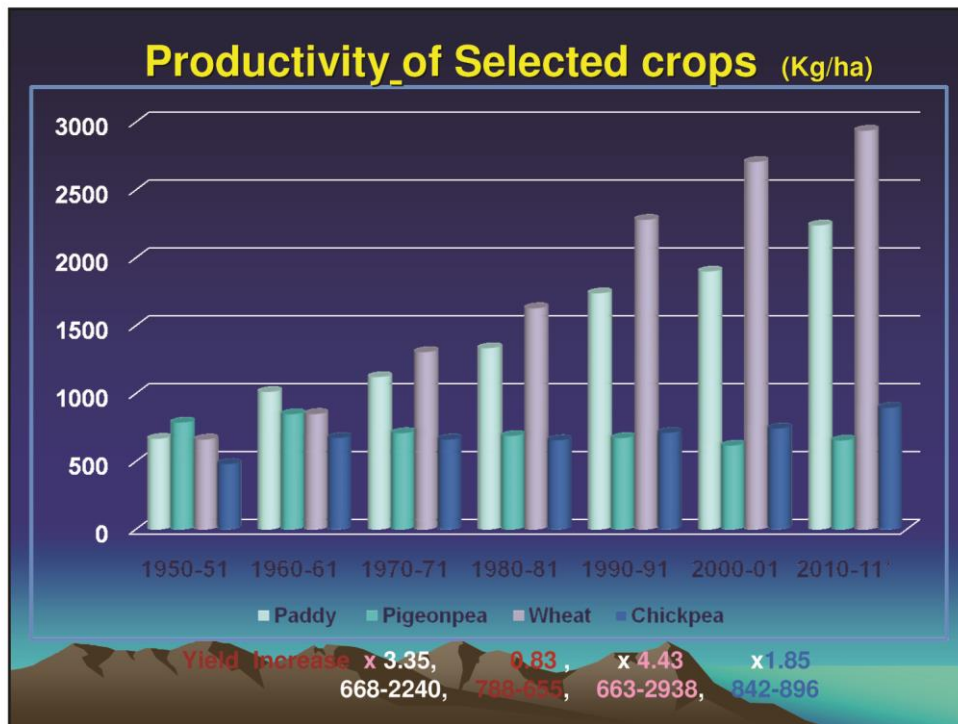
1. Double the Food grain production
2. Sustainable use of natural resources
3. Increase the nutritional quality of conventional food grains
4. Proper and improved crop Management practices
5. Enhanced use of irrigation water
6. Spread the benefits of Green Revolution across the spectrum of farmers
7. Above all provide Inclusive Growth in the field of Agriculture

Strategy to Improve the Economic Condition of Farmers

Outlining the basic philosophy of the National Commission on Farmers, the recommendations emphasize the need to increase farm productivity and profitability in perpetuity without ecological harm. For this purpose, it would be essential to bridge the gap between potential and actual yields in agriculture. This will require the intensive introduction of mutually reinforcing packages of technology, services and public policies. This AGRICULTURE RENEWAL ACTION plan has five components which include the following.

- (1) Soil Health Enhancement
- (2) Employment of Water Harvesting
- (3) Enlarging Credit at lower rates
- (4) Widening and Dissemination of New Technology
- (5) Improving Infrastructure through Marketing.

The following graph shows the Productivity of some Selected Crops during the period of Second Green Revolution.



Issues needs to be Considered during Second Green Revolution

The Second Green Revolution will enable India to further increase its productivity in the agricultural sector. This revolution focuses on matching soil to seed, and product to market. The key parameters required in this endeavor are high productivity and better value addition by agro-processing.

Some of the Important Issues that India needs to Consider during the Second Green Revolution are:

Better use of resources: Since productivity of land needs to be increased to feed the rising population it is suggested that poorer land be utilized for building roads, agro-processing industries and storage facilities, all of which are needed for processing and selling farming produce. Further a lot of present day farming techniques result in wastage of water. India needs to adopt water conserving technologies, as many developed countries have done. This will also aid farming in areas with less water, and be environmentally more sustainable.

Changing mindsets: Farmers typically believe that their role is limited to growing of crops. Nearly 60 percent of India's population depends on agriculture for a living. This should be reduced to 40 percent or less, and the people formerly employed in agriculture should ideally move to agro-processing and services, where earnings are higher. This will enable both the farmers as well as the people shifting to the new areas to become prosperous.

Diversifying products: Farmers need to be encouraged to move to producing crops where they have a natural advantage, and for which there is good demand. Animal husbandry and growing cash crops are two of the many new areas which are emerging.

Strategies to be adopted for the Success of Second Green Revolution

As mentioned before, there are certain Important Technologies that are required for the Second Green Revolution to be Successful. These include:

1. Soil matching: Using modern sensors, it is now possible to examine the soil and find out its characteristic deficiencies and excesses. As a result soil matching is becomes possible to say which crop would grow best on that soil, and farmers can devote themselves to growing that crop, provided of course that there is a demand in the market for it.

2. Water technologies: The amount of water used should be minimized. Technologies like drip irrigation, at its most sophisticated, using microelectronic circuits to control irrigation, should be increased.

3. Crop rotation and better seeds: Farmers must use the multiple cropping technique, which gives greater yield from the same land, and judicious crop rotation, which helps in protecting the soil. High-yielding and hybrid seeds are now available, which give new and varied types of genetically improved crops.

4. Fertilizers and pesticides: Whilst fertilizers and pesticides are considered necessary for improving crop output, they can be reduced to a minimum if soil tests are conducted properly and irrigation is controlled. As chemical fertilizers are often expensive and polluting, farmers could consider using organic fertilizers. Biotechnology can help in creating these. Similarly, pesticide usage can be minimized through biological control of pests.

5. Phytosanitary conditions: In order to reach export markets, it is important that all agricultural produce-whether poultry, animal or plants-meet certain international cleanliness levels in chemical, bacterial and other residues. To achieve such phytosanitary conditions, the technologies involved are not complex, but farmers have to be made aware of these and provided with the tools necessary to achieve these.

6. Cash crops: Crops like tea, cotton and spices have the potential to be high earners. It is essential that these are given the technological attention they require. New cash crops also need to be explored. There are many specialists at different agricultural universities who have been working on these areas.

Agriculture and Inclusive Growth through Second Green Revolution

The Eleventh Five Year Plan emphasizes the need for promoting “Inclusive Growth”. If the dream has to be translated into reality, then as indicated by the National Commission on Farmers, the Second Green Revolution should specifically address the problem of marginal and small farmers so as to provide them income security. This can happen only if small and Marginal farmers are treated as partners in development in the Second Green Revolution, rather than as mere beneficiaries of some government programmes. For this

purpose, the process of implementation of the policies enunciated by National Commission on Farmers should by special focus on improving the lot of small and marginal farmers.

By encouraging Co-operative Joint Farming, the lot of the small and marginal farmers can be improved. Since 93 percent of agriculture holdings belong to small and Marginal Farmers, the strategy of Co-operative Joint Farming, if followed sincerely, can make an effective contribution to improve the economic condition of the small and marginal farmers.

Due to Second Green Revolution, the rate of Capital Formation in agriculture has increased from 10.2 percent in 2003-04 to 12.5 percent in 2006-07. Wheat production in 2007-08 rose by 3.4 percent to a record 78.4 million tonnes, Rice production was at 96.4 million tonnes, up from the previous fiscal's 93.4 million tonnes. Oilseeds production soared by 18.7 percent to touch a record 28.8 million tonnes. The production of Pulses was also at a record of 15.1 million tonnes, growth of 6.4 percent. Cotton production in fiscal 2008 expounded by 14 percent to a record 25.8 million bales (one bale equals to 170kg). Coarse Cereals production grew to 40.7 million tonnes (from 33.9 million tonnes in 2007) and Maize was up at 19.3 million (from 15.1 million tonnes). In short, starting with food grains production of about 51 million tonnes in 1950-51, today we have achieved an all time record harvest of more than 250 million tonnes.

M.S Swaminathan, also known as the Father of the Green revolution, advocates an "Ever Green Revolution" in agriculture to ensure sustainability in the availability of food and to maintain sufficient buffer stock at all times. Increasingly, there are calls for a Second Green Revolution in India, to boost productivity and to meet the growing needs of an economy expanding at between eight and nine percent per annum. With the sharp decline in poverty, eating habits of the formerly poor change dramatically; they begin consuming grains. Naturally agricultural production increased along with balanced growth in the Second Green Revolution.

Conclusion

The First Green Revolution makes India become the Worlds biggest agricultural producer ie, a record grain output of 131 million tonnes in 1978-79. The Second Green Revolution to boost food- grain output in India to 400 million tonnes in the next 15 years is the need of the hour. It also helped the evolution of a low cost technology which can be adopted by small farmers and which can use and exploit the local resources. Agriculture growth would also depend upon technological inputs relating to water management systems, better seeds and farming practices. The continuing investments being made in the sector will indeed help to usher a new era in agriculture.

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