



A PERSPECTIVE: NEED OF SECOND GREEN REVOLUTION IN INDIA

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Abstract :

The Green Revolution, also known as the Third Agricultural Revolution, was a period of technology transfer initiatives that resulted in significant increases in crop yields and agricultural production. The term Green Revolution was coined by William Gaud in 1968 (Kumar,2007). India has the second largest agricultural area in the world with 20 agro-climatic regions and 157.35 million hectares of arable land. After the long time that has passed since the first green revolution, a declining Indian economy and growing food insecurity has policy and environmental experts calling for a Second Green Revolution. India needs a second green revolution to bring food security to its population of over a billion, alleviate the plight of the farming community and make its agriculture globally competitive. To achieve these goals, yield rates of grains, legumes, oilseeds, dairy and poultry, horticultural crops and vegetables must be improved; and forward-backward links of agriculture with technology, the food processing industry needs to be strengthened to match soil to seed and product to market. High productivity and better added value through agro-processing are the key parameters.

Key Words: Green revolution, Agriculture production, Population..

Objective

1. To study the basic of the first GreenRevolution in India.
2. Find out the various drawback of first green revolution in India.
3. Find out the need of second GreenRevolution in India.
4. To study the government policy and plans for second green revolution.

Data base and methodology:-

The study is based on secondary data and compiled from the publications of the Department of Agriculture and Farmer Welfare (MOA&FW), the Government of India (GOI), the Department of Food and Public Distribution System, the Department of Consumer Affairs, the Government of India and related organisations sites. A simple tabular analysis is used for data analysis to elaborate and explain the impact of the green revolution on food production as well as food security challenges in India.

Introduction

First Green revolution History:-

During British rule, India's grain economy depended on a one-way exploitative relationship. Consequently, when India became independent, the weakened country quickly became vulnerable to frequent famines, financial instability and low productivity. After independence, India was not self-sufficient in food production. The production of food within India was insufficient in the years from 1947 to 1960 as there was a growing population, during which a famine was also anticipated (Nelson et al., 2019). Food availability was only 417 g per day per person (Ghosh, 2002). Hence, India imported grain from the US under the PL-480 program. But those grains came with conditions that affected India's foreign policy. India's first prime minister, Jawaharlal Nehru said "everything can wait except agriculture". Hence, independent India invested heavily in hydroelectric dams, both to generate electricity and to irrigate large areas. It had a positive effect on food production. But by the 1960s, India faced a serious grain deficit.. So India thought of achieving food grain insufficiency.

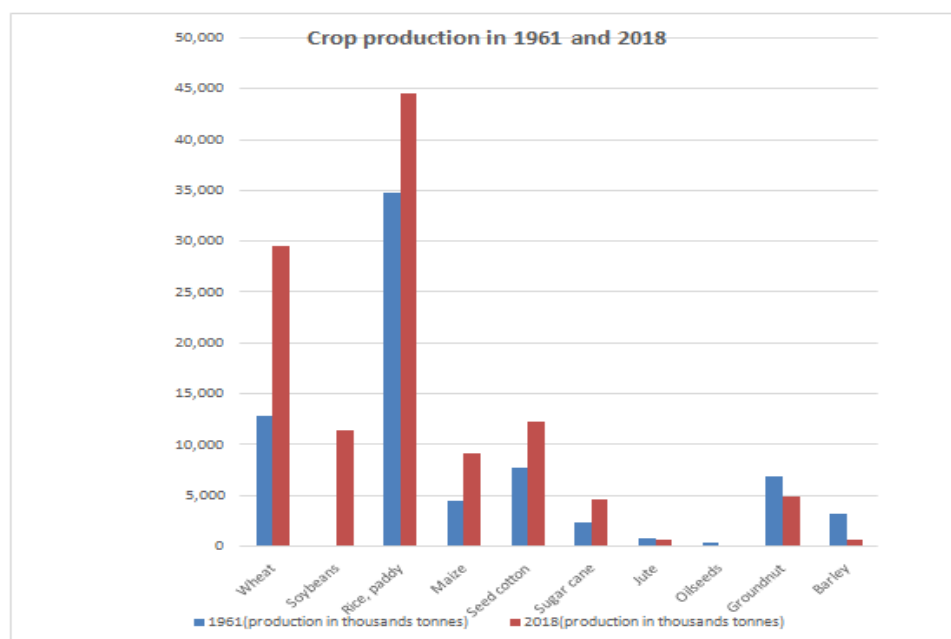
Hence, India opted for the **New Agricultural Strategy (NAS)** to increase grain production. NAS-loaded fertilizers, irrigation, HYV seeds, lending to creditworthy farmers (to buy expensive equipment and seeds). Green Revolution focused on using High Yielding Variety (HYV) seeds developed by US agronomist Norman Borlaug, who was researching a British Rockefeller Foundation grant in Mexico in the late 1950s. The new wheat seeds developed in vivo claimed to increase productivity by more than 200%. Apart from that, **M.S. Swaminathan is the father of the Indian Green Revolution**. The Green Revolution began in 1965. It was the first time High Yield Variety seeds were introduced into Indian agriculture. The main goal of the Green Revolution was to make India self-sufficient in food grains and to provide the growing population with enough food as cheaply as possible. Under the premiership of Congress leaders LalBahadurShastri and Indira Gandhi, the Green Revolution began in India in 1968, leading to an increase in food grain production, particularly in Punjab, Haryana and Uttar Pradesh. Important milestones in this endeavour were the development of high-yielding wheat varieties and rust-resistant wheat varieties.

Green revolution

The results of India's Green Revolution can be categorized into economic, social and political aspects. From an economic point of view, the Green Revolution led to record grain production of 131 million tons in 1978/79. This achievement established India as one of the world's largest agricultural producers. No other country in the world attempting the Green Revolution has had such success. In the late 1970s, India went from being a net importer to a net exporter of food. After the Green Revolution, the acreage increased from 97.32 million hectares in 1950 to 126.04 million hectares in 2014. One of the most notable achievements of the Green Revolution is the significant increase in production of two main crops, namely rice and wheat. Rice production has increased from 34.48 million tonnes in Triennium Endings (TE) in 1962-63 to 112.47 million tonnes in TE in 2018-19. Rice yield per hectare has also improved from 1013 kilograms (kg) in 1960 to 2578 kilograms in 2017-18. At the same time, wheat production also increased significantly from 11.28 million tons in TE 1962-63 to 99.18 million tons in TE 2018-19 (GOI, 2019). Wheat yield per hectare also increased fivefold during this period (663 kg in 1950-51 to 3371 kg per hectare in 2017-18). During the period 1949/50 to 1983/84 the agricultural sector recorded an annual growth rate of 2.7 percent. Apart from that, many other food and non-food crop productions also increased variably. The acreage of coarse grain has drastically decreased from 37.67 million hectares to 25.67 million hectares since the 1950s. Likewise, the area under sorghum fell from 15.57 million hectares to 5.82 million hectares and that of pearl millet from 9.02 million hectares to 7.89 million hectares. But the area under rice, wheat, corn and legumes increased from 30.81 million hectares to 43.95 million hectares, from 9.75 million hectares to 31.19 million hectares, from 3.18 million hectares to 9.43 million hectares and from 19.09 million hectares to 25.23 million hectares. The trends in food grain production influenced the availability and consumption of food grain in rural and urban household.

Changes in area harvested of the crops from the years 1961 to 2018

Sr..No	Crop	1961 (production in thousands tonnes)	2018 (production in thousands tonnes)
1	Wheat	12,927	29,580
2	Soybeans	11	11,400
3	Rice, paddy	34,694	44,500
4	Maize	4,507	9,200
5	Seed cotton	7,719	12,350
6	Sugar cane	2,413	4,730
7	Jute	917	764
8	Oilseeds	477	201
9	Groundnut	6,889	4,940
10	Barley	3,205	661



Source: The Food and Agriculture organisation (FAO) 2020.

From the table above it can be seen that before the Green Revolution, wheat production was 12,927 thousands tons. But after the green revolution, this production increases sharply. The highest increase in production is for rice, while the smallest increase is for oilseeds. There is a negative increase in the production of oilseeds. In order to make food crops available to the growing population, it is necessary to propagate food crops on a large scale.

Components of the Green Revolution

The Green Revolution was based on the timely and appropriate supply of many inputs/outputs.

1. HYV SEEDS:-

They were popularly referred to as dwarf varieties of seeds. Dr. Borlaug was able to develop seeds that directed the large amount of nutrients supplied to wheat plants to the grain and less to the leaves and stems (cause of dwarfism). The HYV plays a very crucial role in the green revolution as the ripening time of such crops is shorter compared to others. Because this enables farmers to cultivate multiple crops. For example, traditional rice and wheat varieties take around 130 to 150 days to harvest, while new seed varieties only take 100 to 110 days to harvest. Aside from that, such seeds also

help in creating a higher employment rate as they require more labour per unit area under optimal conditions.

2. Chemical fertilizers:-

Over time, the natural fertility of the soil continues to decrease and the HYV seed variety requires large amounts of fertilizer to produce a high crop yield. In terms of fertilizer consumption, South India was the leader compared to North India until 1970, but after that, fertilizer consumption increased enormously in northern states, especially in states like: Punjab, Haryana and Uttar Pradesh. The seeds increased productivity provided they received adequate nutrients from the land. Conventional compost could not provide the required nutrients because it had a low concentration of nutrients. For this reason, a highly concentrated fertilizer is required. The only option was the chemical fertilizer with N, P, K.

3. Irrigation:-

There was a need for controlled means of water supply for proper growth of plants and proper dilution of fertilizers. This led to two critical constraints: first, the territory of such plants should be at least free from flooding, and second, an artificial water supply should be developed. Irrigation is considered the second most important component of the green revolution. Because over- and under-watering is harmful to the plants. Since the rainy season is completely irregular, farmers cannot rely on rain for the irrigation process. So in order to achieve a good quality crop, it is important to irrigate regularly and the amount of water supplied. This can increase the yield by 80%.

4. Chemicals & Germicides:-

Since the HYV seeds were new and not acclimated to local pests, germs and diseases, pesticides and germicides became mandatory for result-oriented and secured yields.

5. Chemical Herbicides & Weedicides:-

To prevent the more costly use of fertilizers from not being consumed by herbs and weeds on the farmland, herbicides and weedicides were used when sowing the HYV seeds.

6. Credit, Subsidies, storage, marketing :-

In order for farmers to take advantage of the new and more expensive inputs of the Green Revolution, easy and cheaper credit was needed. In addition, the advance payments had to be made cheaper through subsidies. The arable land suitable for this new type of farming was region specific (Haryana-Punjab & Western UP). Storage took place in these regions, from where it was distributed throughout the country.

Positive Impacts of the Green Revolution

Due to the Green Revolution, India is considered one of the largest agricultural producers in the world. This resulted in a crop yield of 131 million tons in 1978-79. The productivity of the main crops, namely wheat and rice, has increased. India, which was dependent on the US for food crops through PL-480, became independent for food crops. Grain production increased in India as a result of the Green Revolution. Food self-sufficiency helped India take independent positions in foreign policy and save huge foreign exchange reserves. With the help of the Green Revolution, farmers have increased their net income and they have continued to invest their income in more agricultural productivity. This revolution also promoted capitalist agriculture. The Green Revolution had a positive impact on industries that manufactured agricultural equipment such as tractors, engines, threshing machines and pump sets. New dams were built to take advantage of monsoon water. The stored water was used to generate hydroelectric power. It, in turn, fuelled industrial growth and improved people's lives. After the Green Revolution, people started working more in agriculture and industry. It created a rural middle class that later invested in their children's college education.

Negative Impacts of the Green Revolution

The farm subsidy system introduced during the Green Revolution is now hurting public finances. The Green Revolution has distorted farm ecology and led to environmental degradation. Due

to the repetitive cultivation pattern and increased cultivation intensity, soil fertility has decreased. An exponential increase in tube wells has lowered the water table in Punjab and Haryana. The large-scale loss of biodiversity and native crops was lost forever. Increased use of fertilizers, pesticides, and herbicides has resulted in soil chemical contamination and toxicity. It has led to extensive water pollution that has contaminated groundwater. It has increased cases of cancer, kidney failure, stillbirth and congenital disabilities due to overuse of pesticides and herbicides. It has led to an increase in malaria incidence due to water logging. There were also socioeconomic impacts. It has increased income inequality in villages. Because the Green Revolution was input-centric, only rich farmers who could afford the inputs became rich at the expense of small and marginal farmers. Dominant castes such as Jatts, Jats, Yadavs, Kurmis, etc. began to assert themselves in politics due to their numerical superiority and newly acquired wealth. The use of machines such as tillers, tractors, threshers and harvesters led to the displacement of the service caste groups that used to carry out these agricultural activities. Legumes, millet and oilseeds were neglected. As a result, India now has to import oilseeds and legumes.

The need of second Green Revolution in India:

India needs a second green revolution to bring food security to its population of over a billion, alleviate the plight of the farming community and make its agriculture globally competitive. To achieve these goals, yield rates of grains, legumes, oilseeds, dairy and poultry, horticultural crops and vegetables must be improved; and forward-backward links of agriculture with technology, the food processing industry needs to be strengthened to match soil to seed and product to market. High productivity and better added value through agro-processing are the key parameters. In the First Green Revolution, India achieved food security but had some disadvantages that we need the Second Green Revolution for.

1. Regional equality:

In the first phase of green revolution is 1962-65 to 1970-73 when there was a sharp increase in wheat yields in the north western region of Punjab, Haryana and western Uttar Pradesh. In general, we just refer to this phase as the Green Revolution. The second phase lasted from 1970-73 to 1980-83 when rice yields began to respond to HYV seed technology and the Green Revolution spread to other parts of the country, particularly the eastern UP, the Andhra Coast, some Parts of Karnataka, Tamil Nadu, Maharashtra, Gujarat, Madhya Pradesh etc. So in the second green revolution Special focus on the eastern states like Bihar, West Bengal, Jharkhand, Assam, Odisha and Northeast which did not benefit so much from the 1st Green Revolution.

2. Other crop invention:

When the green revolution promoted the monoculture of some lucrative species. In addition to wheat and rice, there should also be legumes, oilseeds and other grains such as corn etc., which would make India self-sufficient in the truest sense of the word.

3. Eco- friendly revolution:

It will be eco-friendly and sustainable. Food security should not come at the expense of soil fertility, water scarcity and farmer health.

Government plans/support for second green revolution

The Green Revolution in India has also been hindered by a lack of government support. While the government has invested in infrastructure and agricultural services, there has been a lack of investment in research and development, which has limited the development of new technologies and improved farming practices. Additionally, the government has been slow to respond to market changes and has failed to provide farmers with access to credit and marketing services.

After the first green revolution, food grain production has been growing slowly as expected, and the population growth rate is stronger in the last year, the government and government policies

support the second green revolution. Government policy to increase the production of farmers through following some government schemes:

Related Schemes

- Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)
- Pradhan Mantri Kisan Maan Dhan Yojana (PM-KMY)
- Per Drop More Crop Initiative
- Paramparagat Krishi Vikas Yojana (PKVY)
- Har Medh Par Ped:
- Pradhan Mantri Annadata Aay Sanrakshan Abhiyan (PM-AASHA)
- Kisan Credit Card (KCC)
- Operation Greens
- PM Kisan Sampada Yojana
- Initiating National Agriculture Market (eNAM)
- National Mission For Sustainable Agriculture (NMSA)
- Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)
- Pradhan Mantri Fasal Bima Yojana (PMFBY).

Conclusion

In the 2022 Global Hunger Index, India is ranked 107th out of 121 countries with enough data to calculate 2022 GHI scores. India needs a second green revolution to bring food security to its population of over a billion and make its agriculture globally competitive. India's population growth, climate change, climate dependent hybrid crop productivity, state indifference to agriculture, declining productivity per hectare in agriculture since the first green revolution and slow growth of crops compared to population growth are reasons why India needs a second revolution.

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