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Second Green Revolution - the need of the hour

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Abstract

Indian agriculture has been characterized by many revolutions that changed the very face of this sector. They have important milestones in Indian agriculture. One thing common in all these revolutions was the use of technology. The revolutions could not have occurred without relevant technologies. Our food productions which are merely 50 million tones at the time of independence have now reached more than 250 million tones. There are many ills that plague Indian agriculture today. Inadequate water management systems, poor irrigation strategies, lack of crop insurance and very some of them. Adopting new technologies helps vegetable sector in establishing its credentials for improving sector land productivity, employment generation, improving economic condition of farmers and providing nutritional security to the country. Its time that India initiates a new green revolution with a renewed vision to address these issues by boosting its budgetary support to agriculture. This paper mainly discuss about the success of Green Revolution in productivity , production crop and areas covered, need for sustainable agriculture, to analyze negative impact of Green Revolution on environment and to know the ways and means to develop agriculture in the direction of organic farming, environment friendly, export oriented and to enhance the development in other sectors.

Keywords: Green Revolution, Food Security Agricultural Production Trend, HYV, Drudgery Reduction, Post Harvest Technologies

INTRODUCTION

Indian agriculture has been characterized by many revolutions that changed the very face of this sector. The Green, Blue, Yellow and White Revolutions have been the important milestones in Indian agriculture. One thing common in all these revolutions was the use of technology. The revolutions could not have occurred without relevant technologies. The technological led agricultural development saw India emerging as world leader in many important food commodities. Our food production which was merely 50 million tones at the time of Independence has now reached more than 250 million tones. Similarly in case of livestock, we are the leading producers of the milk in world and the largest producers of pulses.

The National Sample Survey Organization (NSSO) report on "Situation Assessment Survey of Agricultural Households" tells us that Indian agriculture is not only in a terrible crisis, but is also fast decaying. Around 42 per cent of farmers want to quit agriculture, if given an opportunity. Indian agriculture is plagued by many ills today. Inadequate water management systems, poor irrigation strategies, lack of crop insurance are some of them. Its time that India initiates a new green revolution with a renewed vision to address these issues by boosting its budgetary support to agriculture. We need to urgently kick start modern water management systems, modern irrigation techniques and rapid increase in farm productivity to revive swiftly in Indian agriculture. However the prerequisite for boosting agricultural development is environment protection. The objectives of the paper as follows

1.To study the success of Green Revolution in productivity, production crop and areas covered.

2.To study need for sustainable agriculture

3.To analyze negative impact of Green Revolution on environment

4.To know the ways and means to develop agriculture in the direction of organic farming, environment friendly, export oriented and to enhance the development in other sectors.

Productivity Trends in Agriculture:

Agricultural productivity can be analyzed in two ways viz, employed in this sector the farmer is known as land productivity while the latter is called labour productivity. However, in most of the discussion, on agricultural productivity, the average yield per hectare or the land productivity is generally taken into accounts.

Agricultural Production

Production of agriculture goods such as wheat, rice, sugarcane, cotton, etc. has shown substantial improvements, while output of pulses has not performed well.

The above table shows the output trends in some major agricultural commodities from an extremely low output level of 51 million tonnes, foodgrains production increased to about 264 million tonnes in 2013-2014. The productivity of food crops, particularly wheat increased

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substantially after 1967-68 with the onset of Green Revolution among the non-food crops sugar cane output incresed sharply from 57 million tonnes in 1950-51 to ariund 348 million tonnes in 2013-2014. Cotton production showed a nearly twelve fold and jute and mesta recorded near four fold increases respectively.Thus, there has been a significant progress in agriculture, through the growth rate has not been very promissing

The above table shows the yield per hectare for some of the major crops in India. The largest increase in productivity has gone up from 655 kgs in 1950-51 to 3140 kgs in 2011-12, a nearly five fold increase over these sixty years. This tremendous increases in yield has been possible due to the widespread use of high yielding varieties of seeds, extension of irrigation facilities, fertilizer etc. wheat productivity however, declined to 3059 kilograms per hectare in 2013-14. Much of the research is continuing in developing the high yielding seeds of rice suitable for cultivation in varying climate conditions of our country to further increases productivity of rice cultivation.

Technologies for agriculture development

In future the technologies that are developed and promoted must result not only in increased productivity level but also ensure that the quality of natural resources base is preserved and enhanced. In short, they have to lead to sustainable improvements in agricultural production

Resource Conserving Technologies: Resource conservation technologies aim to produce more at less cost while at the same time enhancing the neutral resource base and maintenance of soil quality in fairly good conditions. The input use efficiency also gets increased due to the right placement of the seeds and fertilizers at right time and at right depth. Some of the resource conservation practices areas: a) Reduction of tillage and retention of adequate surface crop residues over the soil. b) Similarly by using drip and sprinkler type of irrigation methods the more are can be brought under irrigation than the conventional irrigation methods by canals. C) The use of Farm Yard Manure (FYM), Compost, and Bio fertilizers also reduce over dependence on the chemicals led intensive cultivation

High Yielding Technologies: The Green Revolution of the sixties would not have occurred without the High Yielding Varieties of Wheat and Paddy. These high yielding varieties along with increased area under irrigation fertilizers saw India becoming a bread basket from once being leveled as a begging bowl. Sustainable intensification of agriculture is a good alternative to avoid localized chronic food and nutrition insecurity when between 75 and 90 per cent of staple foods are produced and consumed locally.

Post Harvest Technologies: Post harvest infra structure also plays an important role in Indian agriculture. A considerable proportion or our produce goes wasted in the absence of suitable post harvest infrastructure. A study puts this losses to the tune of rupees 44,000 crore. This can be avoided if suitable post harvest infrastructure is provided to the farmers. Some of the modern post harvest and processing techniques which can be adopted in small scale by rural people especially women are a) Dehydration b) Minimal processing c) Steeping preservation

Climate Resilient Technologies: The effects of climate change are being witnessed all over the globe but the vulnerability of Indian agriculture to this is high. This aims to enhance resilience of Indian agriculture to climate change and climate variability through strategic research and technology demonstrations in most vulnerable districts of India. The basic purpose is to enable the farmers to cope up with the climatic variability through efficient management of their resources.

Technologies for Drudgery Reduction: Agriculture in India is prone to drudgery and women that constitute half of the work force in agriculture are more susceptible to this. Mechanization is also another important aspect for enhancing agricultural production**.** Unfortunately mechanization is very low in India. Farmers still operate with their traditional implements which hamper their performance.

Negative Impact of Green Revolution on Environment

Problems of Present Day Agriculture: The effect of intensive cropping has resulted in deteriorating soil tilth and decreased organic matter content high level of chemical inputs is increasing pollution hazard and result further degradation of soil health, the increased use of agro- chemical is polluting water and atmosphere and thus effect on crop production, and animal and reflect on human health.

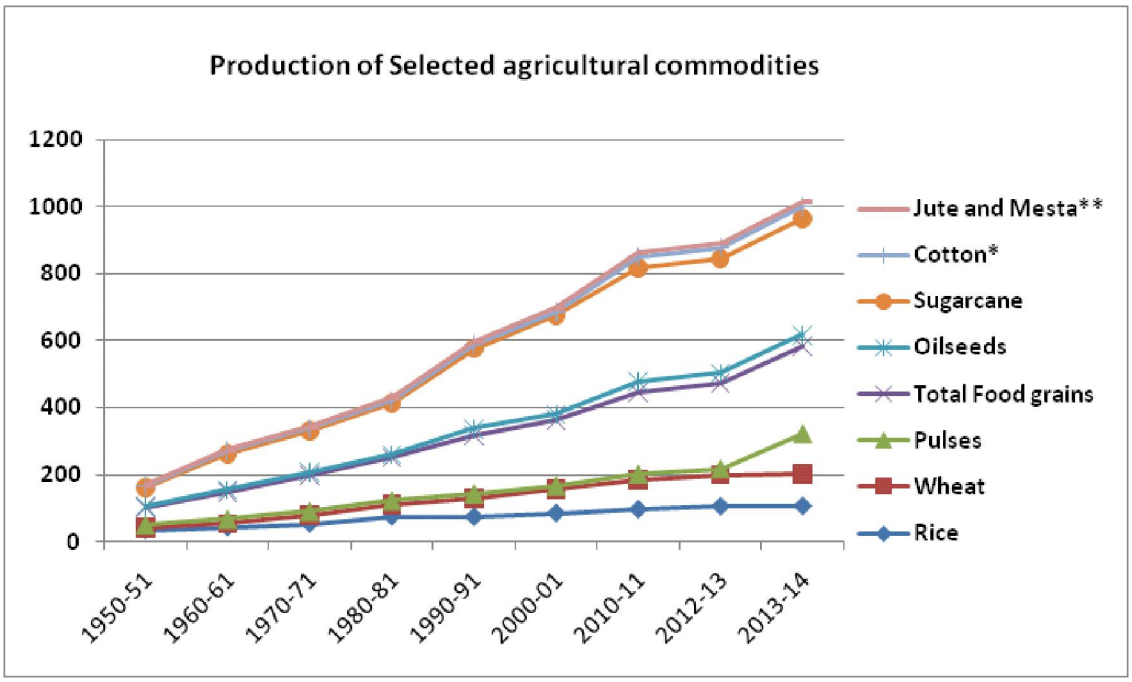
Loss of Genetic Diversity: Under Green Revolution farmers plant fewer crop varieties in favor of those that produce high yields. This type of cultivation causes an undesirable loss in crop genetic diversity. In India, where about 75 percent of their rice fields contain only 10 varieties of plants. This is a significant drop compared to the 30,000 rice varieties that were planted 50 years ago. Traditional crops have the highest gene diversity and as they dwindle, those genes vanish. These genetic diversity losses can be seen all over the world in locations that implemented Green Revolution farming methods.

Pesticides: Many of the pesticides used during the heady days of the green revolution (60s to 90s) are very toxic to humans and other non-target organisms.

Table 1.1 Productions of Selected Agricultural Commodities (In million tones)

Crops	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2012-13	2013-14
Rice	34.6	42.2	53.6	74.3	73.7	85.0	96.0	105.2	106.3
Wheat	6.4	11.0	23.8	36.3	54.1	69.7	86.9	93.5	95.8
Pulses	8.4	12.7	11.8	10.6	14.3	11.0	18.2	18.3	119.6
Total Food grains	50.8	82.0	108.4	129.6	176.4	196.8	244.5	257.0	264.4
Oilseeds	5.2	7.0	9.6	9.4	18.6	18.4	32.5	30.9	32.4
Sugarcane	57.1	110.0	126.4	154.2	241.0	296.0	342.4	341.2	348.4
Cotton*	3.0	5.6	4.8	7.0	9.8	9.5	33.0	34.2	36.3
Jute and Mesta**	3.3	5.3	6.2	8.2	9.2	10.8	10.6	10.9	11.4

*In million bales of 170 kg each ** In million bales of 180 kg Source: Economic Survey 2013-14 and earlier surveys



Inter-Crop Imbalances: The effect of Green Revolution is primarily felt on food-grains. Although all food-grains including wheat, rice, jowar, bajra and maize have gained from the Green Revolution, it is wheat which has benefited the most. It has wrested areas from coarse cereals, pulses and oilseeds. The HYV seeds in latter crops have either not been developed so far at all, or they are not good enough for farmers to risk their adoption. Consequently, their cultivation is fast becoming uneconomic and they are often given up in favour of wheat or even rice. The result is that an excess of production in two main food-grains (wheat and rice) and shortages in most others today prevail side by side. Major commercial crops like cotton, jute, tea and sugarcane are also almost untouched by the Green Revolution. The rate of growth in production of pulses has declined from 1-39 per cent per annum in the pre-Green Revolution period to only 0·79 per cent per annum

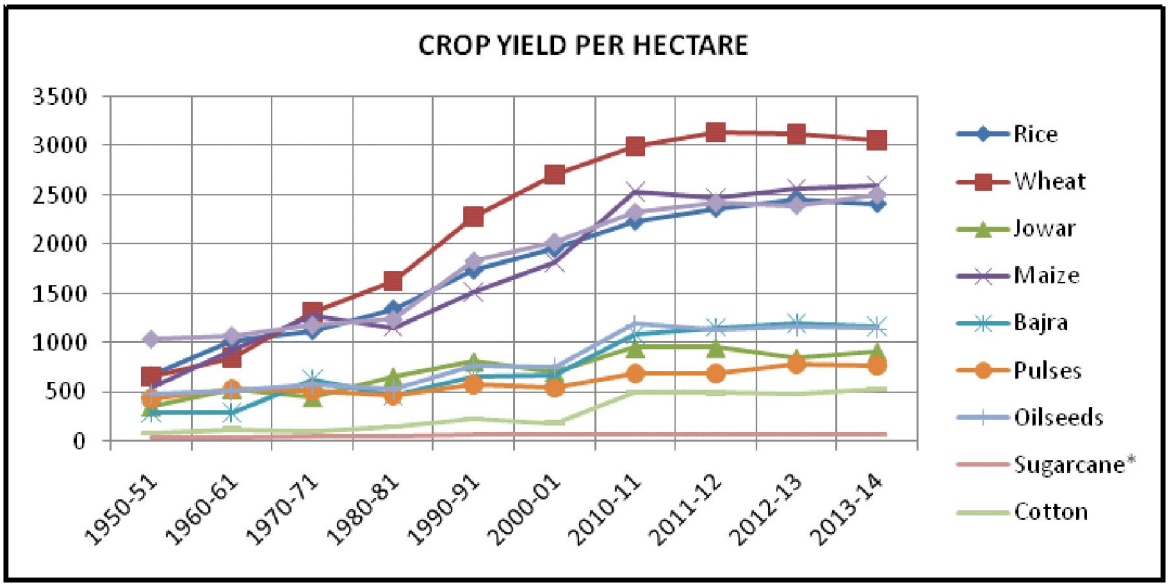
Degradation of land: Due to change in land use pattern and employing two and three crop rotation every year land quality has gone down and yield has suffered. Due to heavy chemical fertilizer inputs land has become hard and carbon material has gone down.

Regional Disparities: Green Revolution technology has given birth to growing disparities in economic development at interred and intra regional levels. It has so far affected only 40 per cent of the total cropped area and 60 per cent is still untouched by it. The most affected areas are Punjab, Haryana and western Uttar Pradesh in the north and Andhra Pradesh and Tamil Nadu in the south. It has hardly touched the Eastern region, including Assam, Bihar, West Bengal and Orissa and arid and semi-arid areas of Western and Southern India. In short, Green Revolution affected only those areas which were already better placed from agricultural point

Table 1.2 CROP YIELD PER HECTARE In Kilograms

Crops	1950-51	1960-61	1970-71	1980-81	1990-91	2000-01	2010-11	2011-12	2012-13	2013-14
Rice	668	1013	1123	1346	1740	1961	2239	2372	2462	2419
Wheat	655	851	1307	1630	2281	2708	2989	3140	3117	3059
Jowar	353	533	446	660	814	704	949	954	850	912
Maize	547	926	1279	1159	1518	1822	2540	2476	2566	2602
Bajra	288	286	622	**458**	658	666	1079	1156	1198	1161
Pulses	441	539	524	473	578	544	691	694	789	770
Oilseeds	481	507	579	532	771	757	1193	1135	1168	1149
Sugarcane*	33	40	48	58	65	70	70	70	70	70
Cotton	88	125	106	152	225	190	499	491	486	529
Jute	1044	1080	1186	1245	1833	2026	2329	2422	2396	2504

Source: Economic Survey 2013-14 and earlier surveys. *Yield per hectare in tones.



of view. Thus the problem of regional disparities has further aggravated as a result of Green Revolution.

Increase in Inter-Personal Inequalities: It has been observed that it is the big farmer having 10 hectares or more land, who is benefited the most from Green Revolution because he has the financial resources to purchase farm implements, better seeds, fertilizers and can arrange for regular supply of irrigation water to the crops. As against this, the small and marginal farmers do not have the financial resources to purchase these farm inputs and are deprived of the benefits of Green Revolution Technology.

Unemployment: Except in Punjab, and to some extent in Haryana, farm mechanization under Green Revolution has created widespread unemployment among agricultural laborers in the rural areas. The worst hits are the poor and the landless people.

Weeds have increased: Due to heavy crop rotation pattern we do not give rest to land nor we have time to employ proper weed removal system which has increased weeds.

Loss of bio diversity: Due to heavy use of chemical pesticides, insecticides and fertilizers we have lost many birds and friendly insects and this is a big loss in long term

Chemicals in water: These chemicals which we have been using in our farms go down and contiminate ground water which affect our and our children health.

Water table has gone down: Water table has gone down due to lack of water harvesting systems and now we

have to pull water from 300 to 400 ft. depth which was 40 to 50 feet earlier

Suggestions have been made to remove the limitations of Green Revolution

1.Organic Farming: Organic agriculture is a holistic production management system which promotes and enhances agro ecosystem health, including biodiversity, biological cycles, and soil biological activity. An organic production system is designed to a) enhance biological diversity within the whole system; b) increase soil biological activity; c) maintain long-term soil fertility; d) recycle wastes of plant and animal origin in order to return nutrients to the land, thus minimizing the use of nonrenewable resources; e) rely on renewable resources in locally organized agricultural systems; f) promote the healthy use of soil, water, and air, as well as minimize all forms of pollution thereto that may result from agricultural practices;…

2. Land reform measures should be adopted on a war footing to maximize agricultural production.

3.New irrigation schemes should be started in arid and semi- arid areas to enable the farmers to reap the benefits of green revolution. Drip irrigation system in the form of sprinkler system should be in vogue, wherever possible. This will save water, electricity and man power.

4.The watershed management approach should be tried on a larger scale for moisture conservation and checking the deterioration of the soil.

5.In place of chemical technologies, emphasis should be laid on biotechnologies and eco-technologies for increasing agricultural productivity

6.In the scheme of green revolution, supreme importance should be attached to the production of both food crops and cash crops.

7.Adequate credit facilities should be provided to the small and marginal farmers to purchase necessary inputs like seeds, fertilizers etc. They should be encouraged to join cooperatives in order to avail the best use of the new farm technology

Need Second Green Revolution.

The second Green Revolution should focus on generation of employment for the small and marginal farmers and the landless, while enhancing agricultural production. As these families mostly own degraded and low fertile lands, deprived of irrigation, the focus should be on efficient use of such lands. As such lands are not suitable for intensive cropping of high yielding food and cash crops, priority should be given to dryland horticulture and agri-silvi pastures. Tree crops have the ability to withstand the vagaries of nature without causing heavy losses. Tree farming can also provide year-round employment while protecting the soil from erosion and runoff of rain water. Promotion of tree farming will also enrich soil fertility and increase the water table. Therefore, such programmes can improve the quality of life and protect the environment.

Conclusion

Adopting new technologies helps vegetable sector in establishing its credentials for improving sector land productivity, employment generation, improving economic condition of farmers and providing nutritional security to the country. Promoting new interventions in handling, grading of vegetables from farm gate to consumer and other marketing interventions in reduce intermediaries in supply chain are highly required to promote vegetables sector in our country. For promoting rural prosperity, the development programme should focus on improving agricultural production while generating gainful self-employment for the small farmers and weaker sections of the society. With year-round employment, the poor can earn enough to meet their basic needs. As the growth in the agricultural sector has been almost stagnant, we need to plan for the Second Green Revolution. The prerequisites for boosting agricultural development are women empowerment and environmental protection.

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