
THE IMPLICATIONS OF GREEN REVOLUTION ON PUNJAB IN CONTEXT TO AGRICULTURE

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Abstract

The Green Revolution was a period of technological advancement in agriculture between 1943 and the late 1970s. Many developing countries like India were exposed to the ideologies of the Green Revolution and it was having a great success in many nations for the increased production of grains due to new irrigation techniques, fertilizers and seed technology. The Green Revolution, beginning in India around the mid-sixties and involving the use of high yielding variety of seeds, chemical inputs and irrigation has also aroused a lot of academic interest in terms of its social, economic and political implications. The Green Revolution in Haryana has achieved much progress in agricultural productivity but on the other side it had also impact the society, economy and polity of the state. The increase in the cost of cultivation due to rising expenditure on irrigation, fertilizers, land reclamation and pesticides made the farmers feel victimized due to erosion in profits. The depleted water resources due to tube well irrigation created refusal to share river waters caused political problems in Punjab. So, the main emphasis of this research study is to delineate the past and present situation of the impact of Green Revolution on the socio-economic and political aspects of Punjab.

Keywords: *Socio-Economic, Political, Green Revolution*

INTRODUCTION

Punjab is bestowed with diverse Agro-climatic resources which have massive potential for rich harvest of agricultural produce. However, at the time of independence, we were facing acute shortage of cereals and other agricultural products due to legacy of bad agricultural policies of British Government. In the backdrop of the food crisis that gripped India in the 1960s, the Government of India initiated the 'Green Revolution' program. This was an attempt to become self-sufficient in production of food grains. Traditional farming methods gave way to farming with high-yield seeds, fertilizers, and pesticides. The Green Revolution nearly quadrupled the production of rice and wheat, transforming Punjab fertile areas into 'granaries'. Now, our state is not only self sufficient in production of food grain and to meet food requirement need of the people but agriculture is also contributing towards foreign earning.

Since the beginning of the industrial revolution, starting in the mid-eighteenth century, the development process has been rapid and concentrated in time. The event was associated with three marked features: technological advancement, fast population growth and intensifying pressure on natural resources. This gradually led to aggravating problems of ozone layer depletion, deforestation, global warming and loss of biodiversity. The Green Revolution, beginning around the mid-sixties and involving the use of high-yielding variety of seeds, chemical inputs and irrigation, has also aroused a lot of academic interest in terms

of its social, economic and political implications. The impact of the Green Revolution on the Society, economy and polity of the state is the result of the increase of the area, production indicators has been shown in the table below:

Punjab: Causes of agricultural development over time						
Indicators		1970-71	1980-81	2000-01	2008-09	2010-11
Fertilizers Consumption						
(Kilograms per hectares of						
total Cropped area)		37.5	112.5	168.33	223	243
Net irrigated area						
to net area sown						
in %		71	81	93	97.4	97.9
Cropping Intensity						
(Total cropped area/Net area						
sown*100)		140.09	161.37	186.07	187.96	190
Marketed surplus of						
food grains and non food grains						
handled(lakh tonnes)		NA	132.4	270.56	325.93	326.96
Tube well						
(per 1000 hectares of net		47.37	143.06	252.47	305.92	332.37
irrigated area)						
Green Revolution						
Intensity						
(Total food grains in %)		69.18	68.82	79.05	81.58	82.52
Source: Statistical abstract, Punjab						

The green revolution almost affected each and every aspect of households concerned with agriculture sector. It is generally held that production and productivity of Punjab agriculture increased manifold. The developments in agriculture and particularly cropping pattern are the combined result of increase in the use of fertilizers, intensity of the irrigation, tractorisation and increase in the tube-well sets. All this has resulted in increase of cropping intensity. The consumption of fertilizers per hectares of total cropped area increased from 2.88 kg in 1966 to 208.51 kg/ of total cropped area in 2012;an increase more than hundred times in 45 years. The intensity of irrigation increased from 134 per cent in 1966 to 185 per cent in 2012. Irrigation intensity is calculated by dividing gross irrigated area to net irrigated area. The irrigation intensity increased 51 per cent from 1966 to 2012. There is also increase in the intensity of cropping in Haryana. In 1966, the cropping intensity was 135 per cent and

it increased to 185 in 2012. The uses of heavy machinery like tractors were also increased. In 1966, there were only 2 tractors per 1000 hectares of total cropped area but the number increased 21 times in 2012. There were 42 tractors per 1000 hectares of total cropped area in 2012. With the increasing of fertilizers and machineries, tube wells had also increased from 20 per 1000 hectares of net irrigated area to 245 tube wells per 1000 hectares of net irrigated area in Haryana. There is 12 times increase of tube wells in between 1966 to 2012 that played a crucial role for the development of agriculture in Haryana. There were only 7 diesel pumping sets and electric tubewells per 1000 hectares of net area sown increased to 214 diesel pumping sets and electric tube wells per 1000 hectares of net area sown. It shows the 30 times increase of the diesel pumping sets and electric tube wells from 1966 to 2012. There were 2 mandis per lakh hectares of net area sown in 1966 and in 2012 there are 3 mandis in per lakh hectares of net area sown. All these improvements in mechanization and use of inputs reveal the intensity of green revolution. The green revolution intensity of Haryana was increased from .20 in 1966 to .58 in 2012. The index of green revolution intensity is calculated by dividing the total area of paddy and wheat to the total cropped area. So, there is a three-fold increase in the intensity of the green revolution in Punjab.

Objectives

Accordingly, the main objectives of the study may be listed as follows:

1. To identify the pattern of regional variations in intensity of the Green Revolution in Punjab
2. To discern the social, economic and political impacts of the Green Revolution.
3. To identify the social, economic and political impacts on Punjab related to the Green revolution
4. To draw the suggestions and conclusions

Data and Methodology:

The Green Revolution in Punjab started around 1966; it climaxed about 1976 and gradually attained a plateau stage thereafter. The year 1966 also coincides with the time when Punjab was reorganized to its present form. The year 1991 and 2012 brings us to a time for which the latest requisite data are available. The study, thus, covers the impact of the green revolution on the society, economy and polity since the Green Revolution started in Punjab 1966 and particularly the district wise authentic data of Statistical Abstracts of Punjab 1991 and 2012. This research paper was based on the secondary data, collected from the statistical abstract of published by is Self-sufficiency in food, general upliftment of agricultural classes, including their acquiring political clout, rapid transformation of the countryside and stimulus to agro-based trade and industry are listed among the positive outcomes of the Green Revolution. It is stressed that these benefits were pervasive and penetrated all sections of society (Sen, 1970; Randhawa, 1974; Fernando and Thomas, 1978; Chadha, 1979, Swaminathan, 1985).

The other group of scholars argues on different lines. They point out that the Green Revolution has caused structural distortions. The uneven distribution of the benefits of the Green Revolution, wherein the bigger farmers emerged as the main beneficiaries, is cited as an illustration. The increased dependence of farmers on uncertain sources for their inputs is

another point which is highlighted in association with the problems of unemployment, poverty and inequality. At one point, it was feared that the Green Revolution may even turn red due to these issues (Ladejinsky, 1969; Frankel, 1971; Parthasarthy, 1971; Oommen, 1971 and 1989; Griffin, 1974; Morgan, 1978; Rahman, 1979; Dasgupta, 1983; Aggarwal, Arora and Gupta, 1989; Gangrade and Chaturvedi, 1989).

Implications

(1) Social implications

After independence the social, political and economic forces acted in a way which gave no other option to adopt new package in country. The package increased the production and agriculture became market oriented though it was the manifestation of the new package. It provided mobility to the farmers. The package had manifold affects and it was studied by many scholars. T.K Oommen (1971) asserted that the agrarian unrest and the economic disparity believed to have resulted from the Green Revolution Similarly Wolf Ladejinsky (1969) pointed that the greater the impact of the Green Revolution in an area, the more the disparity between the rich and poor, and the greater the prevalence of agrarian tension. Thus the agrarian problems dwelled on the new ground after the Green revolution. Hence the package was biased toward small and landless farmers. It was shown by many studies that Green Revolution has widened the gap and increased the social and economic problems (Brown 1970). the old fabric of Punjab got transformed. The barter system, jajmani system and the traditional culture were shaped. It indicated that the pattern of social intercourse and interdependent is different in commercialized agriculture production. At one side Punjab has experienced a situation where it achieved the status of 'food bowl of India' with the rapid transformation but on other side it directly bearing on the social relations in agrarian society. Jodhka pointed that "Green Revolution was first introduced in Punjab, it also matured here before it did in other places in the country. The new technology raised productivity of land by several folds. It also changed the rural social structure and had a direct bearing on the nature of local and regional politics" (Jodhka 2006, p. 1530). Interdependent is different in commercialized agriculture production. At one side Punjab has experienced a situation where it achieved the status of 'food bowl of India' with the rapid transformation but on other side it directly bearing on the social relations in agrarian society. Jodhka pointed that "Green Revolution was first introduced in Punjab, it also matured here before it did in other places in the country. The new technology raised productivity of land by several folds. It also changed the rural social structure and had a direct bearing on the nature of local and regional politics" (Jodhka 2006, p. 1530). It is generally believed that new package has brought changes in social relation of production and in the nature of occupation Its negative consequences far exceeded its benefits. The Green Revolution introduced commercial culture in rural Punjab and destroyed the community. It changed social relations, from those based on mutual obligation to those based purely on the market principle As a consequence of new technology "Atomised and fragmented cultivators related directly to the state and the market. This generated on the one hand, an erosion of cultural norms and practices and on the other hand, it sowed the seeds of violence and conflict" (Shiva 1991, p. 171) It have risen significantly and virtually stagnated after the mid-seventies (Rao 1989).

Similarly a case study on the impact of the Green Revolution on rural Punjab by Abbi and Singh prepared in 1997 also concluded that the social gap between the higher and the lower

castes became negligible in this period. A major change in the caste hierarchy was visible in both public ceremonial functions and interpersonal relations, strengthening the cross-caste alliance. The cross-caste similarity of lifestyles, helped to promote egalitarian social interaction. Green Revolution has transformed economy, society and culture too “but at the same time it has become the reason for ethical and moral crisis. Circulation of new cash in a society [disturbed] the old forms of life and dislocated to an epidemic of social diseases like alcoholism, smoking, drug addiction” (Shiva 1992, p.45).

The traditional culture and fabric of Punjab lost in new infrastructure of Green revolution. The capitalistic mode of production made land a commodity which was used to generate profit. In profit all the social relations were lost. Green Revolution followed by mechanization. Combination of both increased the food grain production and shifted agriculture. Mechanization not only affected agriculture but it also affected the labour and status of women. It opened a new channel for them.

Agriculture needs labour so it provided an opportunity to the women to work in family agriculture work. Their active participation in the fields at the time of irrigation and other important time affected their status. This upward trend in the production affected the social life of the farmers. “The increase in the incomes of farmers raises their investment surplus as well as their credit-worthiness for the purchase of machines...with the rise in the income of farmers, the desire to lessen the drudgery and hard work asserts itself” (Sharma 1993, p.23). Dependency on market for buying inputs and for selling outputs (produce) of farmers increased. The uncertain production and costly inputs forced farmers to get into the trap of credit. During ancient period, farmers were dependent on moneylenders, who were taking advantage of misery and ignorance and thus exploit the farmers. Government provided solution to this problem and created banks and societies that much of their credit went to the expensive informal sources (Thorner 1964; Oommen 1984).

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Women started actively participating in the agriculture. The use of new technology may have improved the bargaining power of female labour for operations such as transplanting and inter-culturing on account of the rise in seasonal demand for such labour (Rao 1989). Post Green Revolution also attracted migrant labour.

(ii) Economic implications

The changes produced by Green Revolution generated interesting debate among the scholars. The economic implications of the new package on the three main social categories: maliks(landlord), kisans(the working peasants) and mazdoors(the labourers) is focus of this section. Initially it was viewed that the benefits of the package was cornered by the large landholders. It is made out that owners of land are more likely to adopt HYV's of seeds than tenants because of the risk factors. So it is said that the fruits of Green Revolution are pocketed mainly by the rich and prosperous farmers, and the disparities between them and the have-nots particularly landless agricultural labourers has increased. The increased

disparity leads to a sense of deprivation among the weaker and poorer agrarian classes and their frustrations are manifest in agrarian tensions, occasionally leading to the eruption of violence. The large landlord is after modern inputs for cultivating the land. The main tractorisation may have helped large farmers in increasing the possibility of multiple cropping and provided the substitute of labour. However, it seems that the adoption of tractors by small and marginal farmers was not always economically justifiable because of its economic constrain. The larger farmers experienced an absolute increase in their output, the gap between large and medium farmers widened. Changed agriculture after Green Revolution has manifold effects on the different strata of the farmers. The primitive subsistent and traditional mode of production became capitalistic, where production was basically produced for the market. In the market economy, farmers have turned managers of the production process of agriculture because the manual operations have been almost eliminated and the remaining tasks are being done by the migratory available at the low level of wages (Gill and Singh 2006).

Production gains were mostly enjoyed by large farmers. Tenants and small farmers were not the beneficiary. They spent most of their gains

in adopting new inputs or returning the credit which they had taken in adopting new technology.

This new technology of Green Revolution involved working capital for the purchase of new inputs. In that situation marginal and small farmers had started struggling to manage these new inputs. Scholars like Hira (2008) stated that the declining of groundwater has started after inception of Green Revolution. Such alarming situation has jeopardized the initial benefits of Green Revolution. HYV Seeds thus introduced were water thirsty which pushed the farmers to own individual pumps. In 1990-91 tube-wells irrigate 57 percent of the areas and in 2006-7 it rose to 71 percent. Punjab has a network of about 11 lakh tube-wells. Its net cultivable area is 43,00,000 hectares and net irrigated area 40,60,000 hectares. And if we notice irrigation through canal it was in 1949-50, 3.6 million acres. In 2001-02 the area irrigated by canals came down to 9,62,000 hectares and through tube-wells it went to 30,74,000 (The Tribune, 24 January, 2008). For managing water for their production farmers installed pumps. In a way it gave way to private pumps. It became a major reason for groundwater exploitation. After the Green Revolution, agricultural activities have become cash-based individual enterprises requiring high investment in modern inputs and wage labour as is evident from the list of states with high incidence of farmers' suicides, which are not necessarily backward or predominantly agrarian or with low income, according to the NCEUS report (Financial Express 22 Dec, 2008). Dasgupta (1980) observed that the gains are inequitably distributed between the rural population within a given region. But the cost of the new technology to a large extent is borne by all the regions and by all the sections. Per acre yield of major crops has been rising in the wake of the new technology. Aggregate agriculture income has also gone up. Yet the proportion of rural families under the poverty line is higher today than before. In fact efforts to improve the situation with the package have its constrain too. Rao (1975) inferred that Green Revolution had led to an increase in regional disparities of productivity per acre of major crops. It displaced other crops because farmers found cultivation of rice more beneficial.

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Some scholars even suggested that the Green Revolution technology even lead to a Red Revolution (Ladejinsky 1969 and 1973). That means that it has resulted into violence, discontentment and conflict because small and marginal landholders and labourers did not benefit from the Green Revolution. In managing new implements, inputs for agriculture, farmers evolved in credit system. After such step the whole life and income of the farmers were spent to get rid from the debt, some time indebtedness became so distressing that farmers committed suicide.

Other main effect of Green Revolution is that it increased instability in food grain production. Only rice and wheat cultivation start dominating among the crops and these two crops displaced other crops, cereals etc. All this happened because Green Revolution pushed agriculture toward mechanization.

It introduced new technology for irrigation, and farmers full utilized those technologies and it resulted in depletion of aquifers. Technological innovation increased the production and changed the pattern of production. All the HYV seeds are water intensive which directly affected the water table. Farmers installed advance technology pumps for irrigating water thrust crops and its long term consequence is falling of water table Brown noted that " the drastic gains in income being realized by farmers who are able to use the new seeds, abruptly widens the gaps in living standards and the consequence conflict between them and those who are still tied to traditional husbandry practices" (Brown 1970, p.11).

POLITICS Implications:

With the advent of the Green Revolution, the political structure of Punjab underwent tremendous change. Rural population of Punjab had already started participating in political activities of the state after independence when the adult franchise was introduced in the country. Spread of education among the peasantry was another contributory factor. It created social awareness and enhanced greater participation in the political process. But a major change in the political structure of Punjab came after the coming of the Green Revolution. Farmers started dominating in the political scene. The politics of farmers no longer remained limited to village Panchayat elections. They were the dominate factor both at state and at all India level. With the changed political conditions, the numerical strength of agricultural labour was a great attraction for the political parties. They were the major vote banks of the political groups who gave them soaps to win their votes. Some of the political parties have taken interest in organizing the small farmers and landless agricultural labourers. The existence of various organizations such as Punjab Khetibari Zamindar Union, Khet Mazdoor Sabha, Kisan Sabha, Dehati Mazdoor Sabha and Zimindara Union is the proof of increasing political consciousness among the farmers and landless labour. These Kisan organizations have been continuing struggles on behalf of landless on various issues in different areas of the state. The youth and students wings of the CPS-SFI, AISE, PSU, DYFI are also trying to increase their hold among the landless and the marginal and poor peasants. The farmers and agricultural labourers jointly participated in anti price rising movements from 1972 – 1975.

Conclusion

Technology is an important constituent of the mode of production that alters the social relations. The structure of agricultural production has changed after the introduction of new technology. Agriculture got modernized and commercialized since then. But the gains from this revolution were short lived as the above discussion shows. At present, when growth rates of agricultural production are decelerating and where about 65 percent farmers' households are under debt, large scale unemployment (approximately 20 lakhs, out of which 15 lakhs are in rural areas), ecosystem is fragile, the state seems to be heading for a serious crisis. So at present stage, rather than blaming the cause, one has to find the solution.

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