What are the Main Features of the National Agricultural Policy of India?

The main features of the National Agricultural Policy are:

1. Privatization of agriculture and price protection of farmers in the post QR (Quantitative Restrictions) regime would be part of the government's strategy to synergize agricultural growth.

2. Private sector participation would be promoted through contract farming and land leasing arrangements to allow accelerated technology transfer, capital inflow, assured markets for crop production especially of oilseeds, cotton and horticultural crops.

3. The policy envisages evolving a 'National Livestock Breeding Strategy' to meet the requirement of milk, meat, egg and livestock products and to enhance the role of draught animals as a source of energy for farming operations.

4. High priority would be accorded to evolve new location-specific and economically viable improved varieties of farm and horticulture crops, livestock species and aquaculture.

5. The restrictions on the movement of agricultural commodities throughout the country would be progressively dismantled. The structure of taxes on food grains and other commercial crops would be reviewed.

6. The excise duty on materials such as farm machinery and implements and fertilizers used as inputs in agricultural production, post-harvest stage and processing would be reviewed.

7. Rural electrification would be given high priority as a prime mover for agricultural development.

8. The use of new and renewable sources of energy for irrigation and other agricultural purposes would be encouraged.

9. Progressive institutionalization of rural and farm credit would be continued for providing timely and adequate credit to farmers.

10. Endeavour would be made to provide a package insurance policy for the farmers, right from sowing of crops to post-harvest operations including market fluctuations in the prices of agricultural produce.

Important Policy Measures Introduced in the Agricultural Sector in India

Important policy measures introduced in the agricultural sector in India during the period of planning are as follows:

1. Technological Measures:

Initiation of measures to increase agricultural production substantially to meet the growing needs of the population and also to provide a base for industrial development included steps to increase both extensive cultivation and intensive cultivation.

For the former, irrigation facilities were provided to a large area on an increasing basis and area hitherto unfit for cultivation was made fit for cultivation. For the latter, new agricultural strategy was introduced in the form of a package programme in selected regions of the country in 1966.

To sustain and extend this programme to larger and larger areas of the country, steps were initiated to increase the production of high-yielding varieties of seeds, fertilizers and pesticides within the economy and supplement domestic production by imports whenever necessary. This has made the country self-reliant; we have turned from large importer of food grains to net exporter of food grains.

2. Land Reforms:

Land reform measures to abolish intermediary interests in land and transfer of land to actual tiller of the soil were expected to be taken up on a priority basis. Measures taken under this head included:

(i) Abolition of intermediaries.

(ii) Tenancy reforms to –

(a) Regulate rents paid by tenants to landlords;

(b) Provide security of tenure to tenants; and

(c) Confer ownership rights on tenants.

(iii) Imposition of ceilings on holdings in a bid to procure land for distribution among landless labourers and marginal farmers.

3. Institutional Credit:

After nationalization of banks in 1969, nationalized banks have paid increasing attention to the needs of agriculture. Regional Rural Banks were also set up to deal specially with the needs of agricultural credit. A National Bank for Agriculture and Rural Development (NAB ARD) was also set up.

As a result of the expansion of institutional credit facilities to farmers, the importance of moneylenders has declined steeply and so has the exploitation of farmers at the hands of moneylenders.

4. Procurement and Support Prices:

Another policy measure of significant importance is the announcement of procurement and support prices to ensure fair returns to the farmers so that even in years of surplus, the prices do not tumble down and farmers do not suffer losses This is necessary to ensure that farmers are not 'penalized' for producing more.

In fact, the policy of the Commission for Agricultural Costs and Prices has been adopted to announce fairly high prices in a bid to provide incentive to the farmers to expand production.

5. Input Subsidies to Agriculture:

The objective of input subsidization is to increase agricultural production and productivity by encouraging the use of modern inputs in agriculture. Under the government policy, various inputs to the farmers are supplied at prices which are below the level that would have prevailed in the open market.

6. Food Security System:

In a bid to provide food grains and other essential goods to consumers at cheap and subsidized rates, the Government of India has built up an elaborate food security system in the form of Public Distribution System (PDS) during the planning period.

PDS not only ensures availability of food grains at cheap prices to the consumers but also operates as a 'safety net' by maintaining larger stocks of food grains in order to combat any shortages and shortfalls that might occur in some years and/or in certain areas of the country.

7. Targeted Public Distribution System (TPDS):

The Government has streamlined the PDS by issuing special cards to people below poverty line (BPL) and selling essential articles under PDS to them at specially subsidized prices with better monitoring of the delivery system.

Under the new system the states are required to formulate and implement foolproof arrangements for identification of the poor, for delivery of food grains to fair-price shops and for its distribution in a transparent and accountable manner at the FPS level.

Under TPDS each poor family is entitled to 10 kg of food grains per month at specially subsidised prices. With effect from April 2002, the BPL allocation of food grains was increased from 20 kg (in April 2000) to 35 kg per family per month. According to Economic Survey 2007-08, 73% of the poor and very poor families were benefited from TPDS.

8. Rural Employment Programmes:

PDS alone cannot serve as an effective safety net. This is due to the reason that unless the poor have adequate purchasing power they cannot buy their requirements from the PDS. Therefore, large-scale poverty alleviation programmes in the form of rural employment programmes are required to provide purchasing power to the poor.

On account of this reason the government introduced various poverty alleviation programmes particularly from Fourth Plan onwards like Small Farmers Development Agency (SFDA), Marginal Farmers and Agricultural Labour Development Agency (MFAL), National Rural Employment Programme (NREP), Rural Landless Employment Guarantee Programme (RLEGP), Integrated Rural Development Programme (IRDP), Jawahar Rozgar Yojana (JRY), Employment Assurance Scheme (EAS), etc.

Measures Introduced in the Agricultural Sector in India During the Period of Planning

In addition to the measures mentioned above, the Indian agricultural policy contained a number of other elements, some of which are outlined below:

(i) Improving the system of agricultural marketing through the establishment of regulated markets and introducing a variety of measures like standardization of weights and measures, grading and standardisation of farm output, providing information regarding market prices, etc. to farmers. Efforts have also been made to strengthen the cooperative marketing structure.

(ii) Initiation of steps to improve the economic condition of agricultural workers. In this category comes a measure to enforce minimum wages, abolition of bonded labour, grant of agricultural land to landless labourers, schemes for expanding rural employment, etc.

(iii) Promotion of agricultural research and training to discover new high-yielding varieties of seeds, optimum utilisation of soil and water resources, development of techniques for increasing productivity of soil, etc.

(iv) To meet the demand for bringing in more crops into the purview of crop insurance extending its scope to cover all farmers and lowering the unit area of insurance, the government introduced a new scheme titled 'National Agriculture Insurance Scheme' (Rashtriya Krishi Bima Yojana) in the country from 1999-2000. The scheme replaced the earlier Comprehensive Crop Insurance Scheme operative since 1985.

(v) The Small Farmers' Agri-Business Consortium (SFAC) was set up in January 1994 to generate agri-business activities with the theme objective of securing expanding employment opportunities and raising income levels in the rural areas through effective support to various types of agri-business.

(vi) A Rural Infrastructure Development Fund (RIDF) was set up within NABARD in 1996-97 to provide credit for medium and minor irrigation and soil conservation projects.

(vii) Most of the restrictions on agricultural exports have been removed. Export oriented units in the floriculture sector are being set up and import of capital goods, plant and machinery for establishing food processing units has been made more liberal.

(viii) An Accelerated Irrigation Benefit Programme (AIBP) was launched during 1996-97 to give loan assistance to the states to help them complete some incomplete irrigation projects.

The role of modern technological inputs on agricultural development in India!

Over 50 years since its independence, India has made immense progress towards food security. Indian population has tripled, but food-grain production more than quadrupled: there has thus been substantial increase in available food-grain per capita.

Prior to the mid-1960s, India relied on imports and food aid to meet domestic requirements. However, two years of severe drought in 1965 and 1966 convinced India to reform its agricultural policy, and that India could not rely on foreign aid and foreign imports for food security.

India adopted significant policy reforms focused on the goal of food grain self-sufficiency. This ushered in India's Green Revolution. It began with the decision to adopt superior yielding, disease resistant wheat varieties in combination with better farming knowledge to improve productivity. The Indian state of Punjab led India's green revolution and earned itself the distinction of being the country's bread basket.

The initial increase in production was centred on the irrigated areas of the Indian states of Punjab, Haryana and Western Uttar Pradesh. With both the farmers and the government officials focusing on farm productivity and knowledge transfer, India's total food grains production soared.

A hectare of Indian wheat farms that produced an average of 0.8 tons in 1948, produced 4.7 tons of wheat in 1975 from the same land. Such rapid growths in farm productivity enabled India to become self-sufficient by the 1970s. It also empowered the smallholder farmers to seek further means to increase food staples produced per hectare. By 2000, Indian farms were adopting wheat varieties capable of yielding 6 tons of wheat per hectare.

With agricultural policy success in wheat, India's Green Revolution technology spread to rice. However, since irrigation infrastructure was very poor, Indian farmer innovated with tube-wells, to harvest ground water.

When gains from the new technology reached their limits in the states of initial adoption, the technology spread in the 1970s and 1980s to the states of eastern India — Bihar, Orissa and West Bengal. The lasting benefits of the improved seeds and new technology extended principally to the irrigated areas which account for about one-third of the harvested crop area.

In the 1980s, Indian agriculture policy shifted to "evolution of a production pattern in line with the demand pattern" leading to a shift in emphasis to other agricultural commodities like oilseed, fruit and vegetables. Farmers began adopting improved methods and technologies in dairying, fisheries and livestock, and meeting the diversified food needs of India's growing population.

As with Rice, the lasting benefits of improved seeds and improved farming technologies now largely depend on whether India develops infrastructure such as irrigation network, flood control systems, reliable electricity production capacity, all season rural and urban highways, cold storage to prevent food spoilage, modern retail, and competitive buyers of produce from the Indian farmer. This is increasingly the focus of Indian agriculture policy.

Main Features of Green Revolution in India!

Food is the most basic requirement for sustaining every kind of living creatures on this earth. It is the source of energy which is utilized by living organism for their growth, development and doing work.

Man obtains their food from cultivated plants and domesticated animals. Around 95% of the human population's protein demand are met from agricultural crops, animal husbandry and fishing. India is self sufficient in food production this is only because of modern pattern of agriculture. Then Green revolution in 1960's is one of the important era in India history.

The main features of Green Revolution in India are:

1. Introduction of new and high yielding variety of seeds.

2. Increased use of fertilizers, pesticides and weedicides in order to reduce agricultural loses.

3. Increased application of fertilizers in order to enhance agricultural productivity.

4. Use of latest agricultural machinery like tractor, seed drills, threshers and harvester.

5. Use of high disease resistance varieties so that production will enhance.

Some of the important components of the green revolution in India are as follows:

1. High Yielding Varieties (HYV) of seeds.
2. Irrigation (a) surface and (b) underground.
3. Use of fertilizers (chemical).
4. Use of Insecticides and Pesticides.
5. Command Area Development (CAD).
6. Consolidation of holdings.
7. Land reforms.
8. Supply of agricultural credit.
9. Rural electrification.
10. Rural Roads and Marketing.
11. Farm Mechanizations.
12. Agricultural Universities.

It must be noted that majority of the components do not act in isolation, rather they are closely inter-related and heavily dependent upon one another. For example, HYV seeds are highly responsive to use of fertilizers and are equally vulnerable to pest attacks and growth of useless weeds. Their full potential cannot be developed without the requisite supply of water.

The shorter maturing period enables the farmers to obtain more than one crop in a year from the same piece of land. This would require hastening of the harvesting operations so that land is quickly prepared for the second crop.

This will require mechanisation of farming. In order to make optimum use of the farm inputs, the farmer must know the why, where, what, when and how much of each for which there is ample scope.

1. High Yielding Varieties (HYV) of seeds:

According to R.N. Chopra, "The high yielding variety seeds are major input of agricultural production under the Green Revolution technology. Their main characteristic is increased responsiveness to chemical fertilizers, their period of maturing is short, it helps double cropping; their short stems can easily carry fertilizer load, resist wind damage, their large leaf surface helps the process of photosynthesis."

According to Sunil Kumar Munsi, The H[1]* V seeds were perhaps the single most important input in the Indian Green Revolution. All other inputs were linked with HYV." M.S. Swaminathan has remarked that apart from erasing the 'begging bowl' image of our country, the most important gain has been the saving of forests and land, thanks to the productivity improvement associated with high yielding varieties.

The development of HYV seeds of wheat in 1960s and those of rice in 1969-70 laid the foundation for Green Revolution in India. Bandhu Das Sen has rightly remarked that they play the role of modernisers of agriculture like engines of change, capable of transforming a traditional farmer into a commercial producer. They act as part of steam engine (for industrial revolution) to ignite an agrarian revolution in poor countries.

Thus the HYV programme brought about a major change—a transformation affecting almost every aspect of Indian agriculture. In words of Dantwala, "widespread adoption of HYVs has helped to step up cereal production, stimulated investment and substantially increased the use of modem inputs."

The Pearson Commission Report hailed it as one of the authentic marvels of our time. It's most important effect was to be seen in the attainment of self-sufficiency in cereals, which enabled us to have a break from the snip-to-mouth situation and move forward ahead of population.

National Seeds Corporation (NSC) was established in 1963. It undertakes the production of breeder seeds on its own farms and foundation and certified/quality seeds through contract growers, agricultural universities, state seeds corporations and state farms corporation of India.

Certified seed is t e ultimate stage in seed production chain and is the progeny of foundation seed. National Seeds Programme was launched in 1977 in collaboration with World Bank covering 9 states of Punjab, aryana, U.P., Bihar, Orissa, Maharashtra, Karnataka, Andhra Pradesh and Rajasthan. The production' distribution and utilization of quality seeds has been increasing since the beginning of Green Revolution.

2. Irrigation:

Irrigation is the second most important component of Green Revolution technology after HYV seeds. Assured and regular supply of sufficient water to crops not only adds to production it also assures stability

in production. Indian rainfall being unreliable, irregular and seasonal, there is urgent need to expand irrigation potential to meet the requirements of the Green Revolution strategy Irrigation is a precondition for successful introduction of HYV seeds even in areas of heavy rainfall.

The success m use of HYV seeds lies in availability of water at the right time and in the right quantity tor which B.B. Vohra had laid more emphasis on ground water rather than on surface water. The ground water gives the advantage of push-button irrigation, made possible by a pump set or a tube well and is completely under farmer's own control.

Appreciating the role of ground water in the success of Green Revolution, Vohra has preferred to call it the Ground Water Revolution. However, there is serious threat of depletion of ground water due to over-exploitation when the rate of drawl of ground water is higher than the rate at which it is replenished. In many districts of Haryana and Punjab the ground water exploitation is very high.

3. Use of Fertilizers (Chemical):

The use of chemical fertilizers has been the third most important input of Green Revolution after HYV seeds and irrigation; rather the three are tied together. In tact use of HYV seeds needs heavy dose of irrigation and fertilizers to give high yields.

Since the entire culturable land has already been brought under plough and there is practically no scope for ringing any new areas under cultivation, further increase in food-grains production can be achieved only by multiple-cropping which heavily leans on the trio of the basic inputs, viz. HYV seeds irrigation and chemical fertilizers.

Generally the use of chemical fertilizers is made according to the soil properties. Soil testing is very essential to know the nutrient status of the soil. As a normal practice, it is suggested that NPK (Nitrogen, Phosphorus, and Potassium) should be used in the ratio of 4: 2: 1 but it depends upon the quality and requirement of the soil and differs from place to place.

To encourage balanced fertilizer use and make fertilizers available to farmers at affordable prices, t e Central Government determines and notifies the selling price of urea as well as decontrolled P&K fertilizers. The current selling prices of urea and P&K fertilizers are less than the cost of production the difference between the selling price and the cost of production as assessed by the Government is' borne as subsidy.

TABLE 23.2Subsidy on fertilizers (Rs. crore):

Year	Imported Urea	Domestic Urea	Decontrolled P&K Fertilizers	Total
1960-61	—	—	—	—
1970-71	—	—	—	—
1980-81	335	170	—	505
1990-91	659	3,730	—	4,389

2000-01	1	9,480	4,319	13,800
2001-02	47	8,044	4,504	1235
2002-03	0	7,790	3,224	11,014
2003-04	0	8421	3,326	11,847

It is more than three times in Haryana and more than two times in Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and West Bengal. It is worth mentioning that Punjab and Haryana with only 6 per cent of the country's cropped area consumed 18 per cent of the fertilizers used in the country in 1981-82.

The regional variations come in sharp focus when we look at the per hectare consumption of fertilizers. The national average consumption was 89.8 kg per hectare in 2003-04. Majority of the states have consumption much below this average.

But it is very high in north-western states of Punjab (184.1 kg), Haryana (167.1 kg), Andhra Pradesh (136.8 kg), Manipur (130.5 kg), Uttar Pradesh (126.7 kg), West Bengal (122.4 kg) and Tamil Nadu (112.5 kg). It was quite low in Rajasthan, Orissa and Madhya Pradesh, apart from the majority of states in the North-Eastern region (Table 23.3).

In spite of the fact that India is the fourth largest consumer of chemical fertilizers in the world, after the USA, Russia and China, per hectare consumption still remains low compared to the world averages. This means that there is still large scope for using chemical fertilizers, increasing the yields and converting the dreams of Green Revolution into reality.

4. Use of Insecticides and Pesticides:

Though intensive use of irrigation and fertilizers under the Green Revolution technology has increased the farm production, it has also given birth to the problem of pests, insects, weeds, rodents, etc. The monoculture promoted by the Green Revolution technology is more vulnerable to the insects and pests.

These pets, weeds and diseases are to be checked by proper doses of insecticides, pesticides and weedicides surveillance should be an integral crop production. The first of Agriculture (1983-84), over million hectares of cropped area in the country is affected by various pests and diseases, taking an annual toll of 5 to 25 per cent of the agricultural production.

There has been a tremendous increase in the use of different types of biocides and in the area under plant protection. The regional distribution makes it clear that areas with Green Revolution technology are the main consumers of pesticides.

For example, Punjab, Haryana, Andhra Pradesh and Tamil Nadu consumed over 55 per cent of the country's pesticides in 2003-04.

5. Command Area Development (CAD):

Command Area Development Programme is a centrally sponsored scheme which was launched in January 1975. Its aim was to bridge the gap between potential created and utilized in selected major/medium

irrigation projects of the country for optimising agricultural production from the irrigated land. The programme covers the following components:

(i) On-farm development (OFD) works which include soil surveys, land shaping, construction of field channels, field drains, farm roads, realignment of field boundaries (where possible consolidation of holdings should also be combined), introduction of warabandi to ensure equitable and assured supply of water to each and every farm holding, supply of all inputs and services including credit and strengthening of extension services.

(ii) Selection and introduction of suitable cropping pattern

(iii) Development of groundwater to supplement surface water.

(iv) Development and maintenance of the main and intermediate drainage system

(v) Modernisation, maintenance and efficient operation of the irrigation system upon the outlet of one cusec capacity

The restructured programme which started from April 2004 is aimed at bringing about better water management practices and efficient utilisation of irrigation water which, inter-alia includes taking up corrective measures for rectification of deficiencies of delivery systems on the one hand and participation of water users in sharing the cost of works on the other. The Programme would cover 133 project commands with total Culturable Command Area of 1.7 million hectares. The work is already in progress.

6. Consolidation of Holdings:

Small and fragmented land holdings have been one of the main obstacles in the progress of agriculture in India. Consolidation of holdings has been introduced to solve this problem.

7. Land Reforms:

Immediately after the Independence, it was felt that land reforms must be brought in to improve the agricultural situation in the country. Absentee landlordism, tenancy-at-will and share cropping could not help in inculcating interest among the farmers to make investments in farm inputs and adopt new farm technology.

In 1947 half of India was under Zamindari System in which 80 per cent of the land was in the hands of the absentee landlords. The Zamindar used to exploit the farmers who used to till the land. Soon after Independence, the slogan of land to the tiller was raised and steps were taken for the abolition of the Zamindari. Consequently, tenants became owners of land.

They started taking interest and pains to increase the farm production. Raitwari system prevailed in Madras, Bombay, Assam and Punjab. Under this system the peasant was the owner of land and paid rent directly to the Government. The rent was usually half of the net produce.

A fixed amount of rent was to be paid irrespective of the condition of the crops. In the event of crop failure the peasant was obliged to pay rent by incurring debt against mortgage. Ultimately the land passed into the hands of the money lender who had no real interest in cultivation.

Mahotwari was another system in which a chosen peasant (Lambardar) was responsible for depositing the rent varying from 40 to 70 per cent of the produce. These systems were to be abolished in the interest of

better agricultural performance. Another measure taken by the government was the enforcement of land ceiling act.

Under this act a farmer cannot own more land than the ceiling limits. This resulted in the redistribution of surplus land which proved beneficial to lakhs of landless farmers. After obtaining the ownership rights, farmers worked whole-heartedly on their farms and this led to a tremendous increase in agricultural production. Dr. Randhawa has beautifully summed up the benefits of land reforms. According to him, A stable and restructured rural base with an equitable tenurial system paved the way to Green Revolution and can be accredited with its blooming to the present stage."

8. Supply of Agricultural Credit:

In the words of R.N. Chopra Credit is the most crucial input in all agricultural developmental programmes. The other inputs viz., technology, HYV seeds, fertilizers, pesticides, irrigation water and machinery—all depend on the availability of credit.

A large percentage of Indian farming community consists of small and marginal farmers who do not have their own resources to invest in agriculture. They depend upon agricultural credit to carry on most of their agricultural operations.

Earlier they used to get loan from the moneylender who used to charge very high rate of interest. Now Cooperatives, Commercial Banks and Regional Rural Banks extend loans to farmers on easy terms.

9. Rural Electrification:

Rural electrification is one of the essential inputs in modem agricultural system. Studies made in 1970 showed the electricity makes a significant contribution to development of agriculture. It is a cheap source of energy which can be used for lifting water by tubewells/pumpsets, processing and preserving agricultural produce, sprinkler irrigation and so many other farm operations. The development of ground water, so vital for Green Revolution, requires uninterruped supply of electricity at cheaper rates.

Realising the importance of electricity for the proper growth and development of agriculture, a massive programme of rural electrification was taken up immediately after Independence. At the time of Independence only 1,300 villages had been electrified and only 6,400 energised pump sets were working in the entire country.

At the end of the Fourth Five year Plan about 1, 55,297 villages had been electrified and there were 24 lakh pumpsets. Up to the end of the Seventh Five Year Plan 4, 70,836 villages were electrified and 83, 58,363 pump-sets had been energised. As on 31 March, 2004,4,73,892 villages out of a total of 5, 87,556 villages (i.e. 86.25 per cent of the total villages) had been electrified and about 1, 40, 02,634 pump sets had been energised.

Haryana was the first state to electrify all its 6759 villages in 1970. Punjab, Kerala, Andhra Pradesh, Karnataka, Gujarat, Himachal Pradesh, Tamil Nadu, J and K, Maharashtra and Nagaland have 97 to 100 per cent villages electrified.

10. Rural Roads and Marketing:

They constitute an important segment of infrastructure to improve agricultural productivity under the Green Revolution programme.

Rural roads are very essential for connecting the villages to the neighbouring markets and villages. Unfortunately, there is still a big gap between the requirement and availability of village roads. Road network upto town level is fairly satisfactory. The weakest point is that of rural roads.

Marketing is essential for progressive agriculture. Regulated markets enable the farmer to sell his agricultural produce and to purchase farm implements and tools, fertilizers, pesticides and other agricultural inputs as well as goods of everyday use. The farmer can go to the market with his produce, sell it and on his return journey he can bring the goods required for agriculture or in everyday life.

In this way the farmer can save on his return transport and avoid unnecessary waste of time, energy and money. Ideally speaking the market place should be within a distance of 5 km from the village. In the words of Leo E. Holman, "Marketing is the part and parcel of a modern productive process, the part at the end that gives point and purpose to all that had gone before. Benefits from mechanisation can be minimised if corresponding improvements are not made in the marketing system."

11. Farm Mechanisation:

Much success of The Green Revolution depends upon farm mechanisation. Mechanisation saves a lot of human labour and quickens the farm operations, thereby adding to the farm efficiency and productivity.

12. Agricultural Universities:

Agricultural universities and other agricultural institutes are primarily engaged in agricultural research and passing on the research findings to the farmers. A good deal of research and extension work done by these universities has paid rich dividends in the agricultural field. Success of Green Revolution largely depends upon the work done by these universities. Punjab, Haryana and Uttar Pradesh, are the best examples of such a progress.

The Factors Contributing to Green Revolution in India

Several factors have led to the growth of green revolution in the Indian context. They are as follows:

1. Adoption of high-yielding varieties of seeds:

The use of high-yielding varieties of seeds since 1966 has resulted in substantial increase in food grain production. The cause of breakthrough in the production of wheat and rice has been attributed to magic seeds and certified seeds adopted by the agriculturists.

The role of National Seeds Corporation, State Seeds Corporation and Agricultural Universities in distributing these seeds to the farmers, indeed, has been commendable.

2. Supply of chemical fertilizers:

Besides high-yielding varieties of seeds, chemical fertilizer is the other input which is responsible for making the green revolution a signal success. In fact, the latest agricultural technology is referred to as the seed and fertilizer technology.

The demand for fertilizers has been increasing after green revolution. The total amount of fertilizers used in 1960-61 was 292 thousand tonnes (nutrients). In 2001- 02, the total consumption of fertilizers was 17400 thousand tonnes (nutrients).

3. Expansion of irrigation facilities:

The role of irrigation facilities in bringing about the green revolution cannot be gainsaid. Sir Charles Trevelgan rightly observed, "Irrigation is everything in India. Water is more valuable than land, because when water is applied to land it increases its productiveness at least six-fold and renders great extent of land productive, which otherwise, would produce nothing or next to nothing."

According to the Indian Council of Agricultural Research (ICAR), the production of irrigated crops is on an average 50 to 100 per cent higher than that of unirrigated crops in the same locality.

Extension of irrigation facilities in the form of major and medium projects, minor irrigation projects like wells and tube wells has led to the adoption of multiple cropping pattern, introduction of modern farm technology and protection of the crops from drought. All these factors result in spectacular increase in agricultural production. Further, many economists consider irrigation as an important factor for providing employment opportunities to the ruralites."

4. Use of machinery:

Economists like Bergmann hold the view that despite its adverse effect on overall employment, the role of machinery in accelerating the growth of green revolution is, indeed, great. The use of modern agricultural tools and implements like tractors, harvestors, threshers, pump sets sprayers etc. has led to progressive agriculture. As a consequence of the use of machinery, there has been substantial increase in the area under assured irrigation, multiple cropping and increase in agricultural productivity.

5. Provision of agricultural credit:

Credit is another necessary input to increase agricultural productivity. Co-operative credit institutions such as Primary Co-operative Societies, Central Co-operative Banks and State Co-operative Banks for short-term credit and Land Development Banks for long-term credit have been set up throughout the country in quite large numbers. Besides this, Regional Rural Banks, commercial banks like State Bank of India and National Bank for Agriculture and Rural Development have also helped the farmers to grow more output.

6. Soil conservation:

Soil conservation is another significant cause of green revolution. Various soil conservation schemes have led to the conservation of soil fertility and thereby contributed to increased output.

7. Development of infrastructure:

Green revolution in the Indian context has attained considerable success. It is mostly because infrastructural facilities in the form of transport and communication, regulated markets, storage and warehousing, agricultural education and training etc. have enabled the farmers to take recourse to the modern art of cultivation.

8. Multiple cropping programmes:

The multiple cropping programmes aims at increasing the cropping intensity of land. Further, it is instrumental in increasing agricultural production.

9. Incentive prices:

The incentive price policy of the government has induced the agriculturists to grow more. Besides fixing remunerative prices for agricultural crops, the government has also been subsiding the purchase of various agricultural inputs used by the farmers.

10. Land reforms:

The adoption of land reform measures in the form of abolition of intermediaries, security of tenure, consolidation of holdings, ownership right on the tenants, regulation of rent, ceiling on land holdings and co-operative farming goes a long way in increasing agricultural productivity.

11. Development programmes for small and marginal farmers:

So far as District Rural Development Agency is concerned, special attention has been given to the problems of small and marginal farmers. They are being provided with loans at subsidised rates. As a result they can adopt NAT without any difficulty.

Economic, social and political implications of Green Revolution in India !

In recent years agriculture has occupied an important and prestigious place in Indian economy. The Indian farmer is now receptive to new ideas. He resorts to modern methods of cultivation.

He views agriculture with optimism and dignity. He raises the highest yield of wheat and rice on his farm. His income has recorded a sharp increase. The introduction of green revolution has brought in its train several implications. They are as follows:

Economic Implications:

1. Increase in agricultural production:

The seed- fertilizer technology has brought about a phenomenal growth in the production and productivity of many food crops. The productions of wheat, rice, maize and potatoes have increased impressively. Total production of food grains has increased from 50.8 million tonnes in 1950-51 to 209.8 million tonnes in 1999- 2000.

2. Decline in import of food-grains:

Increase in food grain output brought about by green revolution reduces India's dependence on food imports. The decline in the imports of food grains is confirmed by the fact that while, in 1970-71, the import of cereals constituted 54% of the total value of imports, these constituted only 4.5% of the total value of imports.

3. Generation of more employment opportunities in the agricultural and the non-agricultural sector:

In the agricultural sector, changes in biological inputs such as quality seeds and the use of chemical fertilizers and pesticides have created more demand for labour to look after sowing, weeding and harvesting activities. Further, due to the introduction of multiple cropping patterns, there has been increased demand for labour for agricultural operations.

Increase in agricultural production has led to the setting up of agro-based industries. Such industries provide employment opportunities to the ruralites on a large scale.

So far as the manufacturing sector is concerned, factories have been set up to produce chemical fertilizers, insecticides, pesticides and also to manufacture agricultural tools and implements. These have provided employment opportunities to many persons.

The tertiary sector through the marketing and transporting of agricultural produce is also instrumental in mitigating the problem of rural unemployment. The servicing of agricultural machinery has also provided employment to persons with technical know-how.

4. Reduction in employment opportunities:

Some economists are of the view that mechanisation of the farms would lead to labour displacement. The end result would be the growing problems of rural poverty and rural unemployment. Uma K. Srivastava, Robert W. Crown and Earl O. Heady rightly observe, "Since mechanisation may dampen the increase in labour demand, resulting from the expanding factor of seed fertilizers, the policies that encourage premature mechanisation in surplus labour economies, such as India, do not seem conducive to solving the problem of growing unemployment". M.S. Gurupadaswamy rightly cautions that labour displacement may create explosive economic and political situation in the country.

5. Strengthening the forward and backward linkages:

The green revolution strikes a happy balance between the forward and the backward linkages. The new agricultural strategy has made our agriculture more capital intensive. Industries supply tractors, pumpsets, fertilizers and pesticides etc. to the agriculturists. This sort of linkage is known as backward linkage between agriculture and industries.

On the other hand, agriculture also supplies basic raw materials to industries which is called forward linkage. Consequent upon the adoption of green revolution, both forward and backward linkages have become more strengthened. That is certainly a healthy sign of our economic progress.

6. Saving of foreign exchange:

Consequent upon green revolution there is considerable decline in import of food-grains. Foreign exchange has been saved to a remarkable extent. The same foreign exchange has been utilised for the import of capital goods which is very much necessary for bringing about economic development of the country.

7. Raising the standard of living of the farmers:

Green revolution has raised the standard of living of the farmers. Wages of tenant cultivators and landless agricultural workers have increased thereby leading to an improvement in their standard of living.

8. Stimulus to industrialization:

The rapid growth of industries manufacturing agricultural inputs such as fertilizers, insecticides and machinery is the gift of green revolution. Green revolution has also led to the expansion of agro-based industries in the countryside.

9. Rural development:

Green revolution is responsible for bringing about over-all rural development. The reason for this is attributed to the implementation of various programmes on the part of the government like construction activities in the countryside and the role of banks for mopping up the savings of the ruralites for purposes of development.

10. Growing regional disparities:

The negative impact of green revolution is reflected in the growing regional disparities in the country. The revolution has become successful in Punjab, Haryana and Western Uttar Pradesh. Other states of the country have not been benefitted much out of this revolution. Hence there has been a widening gap between the states where the green revolution has become successful and the rest of the country.

11. Wide disparity in the distribution of income:

The green revolution is not resource neutral. Large farmers are immensely benefitted because of their capacity to invest liberally in the new inputs as compared to the small and marginal farmers. Further, the practice of reverse leasing as well as the fall in the area leased out by the large farmers to small farmers has further increased the disparity in the size of operational holdings.

This, in turn, has added to the inter-farm disparity in income. C.H. Hanumantha Rao rightly observes, "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."

12. Emergence of capitalistic farming:

Green revolution necessitates the adoption of HYV seeds, chemical fertilizers, assured water supply and modern farm implements and machines. Needless to state that such a huge investment is not within the reach of small and marginal farmers.

Big farmers because of their sound economic position experience no difficulty in availing the facilities pertaining to NAT. A class of gentlemen farmers comprising ex-service men, retired civil servants, urban-based businessmen and rich industrialists has adopted capitalistic farming. The interests of subsistence farmers have been vitally affected.

13. Storage problem:

Consequent upon green revolution, there is a significant increase in the stock of food grains. But the expansion of storage facilities is not in comensurate with the increase in food grains. The open storage of food grains and other crops has resulted in colossal wastage.

14. Acceptability:

NAT has not received universal acceptance. Several factors such as caste-dominated traditional village structure, illiteracy, ignorance, ineffective extension service, financial handicaps, experienced by the small and marginal farmers, indifferent and lukewarm attitude of the officials in charge of rural development programmes stand in the way of the adoption of green revolution on a universal scale.

Social Implications:

1. Green revolution has led to several by-products. Substantial agricultural production has improved transport system, expanded educational network. It has also introduced electricity in the countryside on a large scale. As a result of the operation of all these factors, there has been a substantial progress in the condition of the villages.

2. Some sociologists and economists hold the view that the villages undergoing through the process of green revolution have all the facilities of urbanized setting such as electricity, tap water, cooking gas, roads, education, supply of newspapers, radio, television, telephone facilities etc.

Hence most of the ruralites are not in favour of migration to towns/ cities. Non-migration to urban centres has significant implications so far as congestion and problem of accommodation are concerned.

3. It is normally believed that the green revolution would bring the "trickle-down effect". It means that if the higher segments of rural life develop, its impact would also reach the lower segments. But unfortunately this has not happened.

The growth in the economy has not necessarily brought about an improvement in the quality of life of all the people. On the other hand, the trickle-down theory has only widened and reinforced the gap between the rich and the rural poor.

4. The new agricultural technology has created two groups of farmers – rich farmers and poor peasants. Governmental incentives have stimulated the poor peasants to strike their claims on land they have been tilling for unknown times. But the rich farmers adopt all manoeuvring practices to prevent them from achieving their objectives. This has created social tension in rural areas.

5. New agricultural technology has brought about a significant change in the attitude of the rich peasants towards the small and marginal farmers and landless labourers. This has been made possible through urban contact, mass media and education. So far as social relations are concerned, of late, there are greater social contacts among the ruralites, inter-dining, inter-caste marriage, group activities and the like.

6. Consequent upon the adoption of green revolution there is a significant increase in the income of the large farmers. It is generally observed that they spend lavishly on occasions like marriages, births, celebration of festivals etc.

This unproductive expenditure forces them to borrow from banks to purchase agricultural inputs. The end result is that the additional credit needs of the small and marginal farmers are not met. They fail to adopt the new agricultural technology for increasing agricultural production.

Political Implications:

The adoption of new agricultural technology is conditioned by several factors such as adoption of high-yielding varieties of seeds, supply of chemical fertilizers, expansion of irrigation facilities etc. These factors are not identical in all regions. Some regions have developed faster than others. Steep variations in local prosperity are a threat to the unity and integrity of the nation.

Problems of Green Revolution in India:

Green Revolution is a unique event in the agricultural history of Independent India. This has saved us from the disasters of hunger and starvation and made our peasants more confident than ever before. But it has its own inherent deficiency segments.

Ever since its inception, the income gap between large, marginal and small farmers has increased, gap between irrigated and rainfed areas has widened and some crops have benefited more than the others, sometimes even at the cost of other crops.

It is neither product-neutral nor region-neutral and leaves uneven effects of growth on products, regions and classes of people. This has given birth to a plethora of socio-economic problems. According to Radha Krishna Rao, "The spiraling prices of fertilizers, the tendency to use them frequently and the stagnant wheat and rice yields in Punjab and Haryana have combined to confirm, that Green Revolution has reached ripened old age".

The fatigue of the Green Revolution is already visible. Still the main lacuna in the Green Revolution is that up till now it is an unfinished task. Some of the demerits or problems of Green Revolution are briefly discussed as under:

1. 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 during the period from 1967-68 to 1994-95. This is not good for a balanced growth of Indian agriculture. Central Government has taken some steps to remove these imbalances.

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

The ratio between the lowest and highest yield- rates among the states for the 1975-78 period amounted to 1: 3.2 in paddy, 1 : 3.7 in wheat, 1 : 3.4 in cereals, 1 : 3.2 in pulses, 1 : 3.2 in food grains, 1 : 3.0 in oilseeds, 1: 3.2 in sugarcane, 1 : 4.9 in cotton and 1 : 1.6 in jute. Study of some sample surveys recently conducted by the Indian Agricultural Statistics Research Institute (IASRI) revealed that the single most important factor is the 'input differential which alone can explain extreme yield variations even under similar physical and cultural conditions.

According to a study by Bhalla and Alagh, 69 districts with a relatively high productivity levels account for 20 per cent of the cultivated area and 36 per cent of output, consume 44 per cent of fertilizers, employ

50 per cent of tractors and 45 per cent of irrigation pumps and have 38 per cent of India's gross irrigated area.

Regional disparities in crop yields can be reduced by evolving suitable disease resistant high-yield strains of paddy for most eastern parts and by developing irrigation facilities and a suitable dry farming technology for the arid and semi-arid western and southern regions.

3. 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. There were about 1,053 lakh holdings in India in 1990-91 out of which only 1.6 per cent exceeded 10 hectares in size.

Francine R. Rankel has concluded from his study of Ludhiana (Punjab), West Godavari (Andhra Pradesh), Thanjavur (Tamil Nadu), Palghat (Kerala) and Bardhaman (West Bengal) that the greater beneficiaries are those farmers who own 10 to 12 hectares of land. Similar conclusion was drawn by G.R. Saini from his study of Ferozepur (Punjab) and Muzaffamagar (U.P.). G.S. Bhalla and G.K. Chadha have found out that Green Revolution has benefited the farmers in general but one-third of them are small farmers with 2.5 acres of land and are living below poverty line. (Poverty line is measured at Rs. 15.90 per capita monthly expenditure at 1960-61 prices and is inflated with consumer price index for agricultural labourers).

Another 24.0 per cent of the farmers own 2.5 to 5.0 acres of land and they are also living below poverty line. The land holdings are generally small in rice producing areas and the economic position of the farmers living in those areas is extremely miserable. In short, Green Revolution has made the rich richer and rendered the poor poorer resulting in wide-spread social and economic tensions.

4. Unemployment:

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

5. Other Problems:

Agriculture under Green Revolution has not grown at a rate which was expected in the beginning. The differential rates of growth of different crops and their regional variations have already been discussed. Some scholars have expressed serious doubts about the capability of HYV seeds itself.

Analyzing the role played by miracle seeds in the Green Revolution, Vandana Shiva says that the term HYV is a misnomer. In actuality, these seeds are highly responsive to certain key inputs such as fertilizer and irrigation and as such they should have been called highly responsive varieties. Shiva says that there is increasing evidence that the indigenous varieties could also be high yielding given the required doses of inputs.

According to Shiva, "the inevitability of the Green Revolution option was built on neglecting the other avenues for increasing production that is more ecological such as improving mixed cropping systems, improving indigenous seeds and improving the efficiency of use of local resources." Vandana Shiva further comments that having destroyed nature's mechanisms for controlling pests through the destruction

of diversity, the miracle seeds' of the Green Revolution became mechanisms for breeding new pests and creating new diseases".

In a case study of Punjab, M.K. Sekhon and Manjeet Kaur of P.A.U. Ludhiana have warned against the excessive use of groundwater, chemical fertilizers and pesticides. This will lead to large scale depletion of groundwater and will adversely affect the health of soil.

Major Economical Impact of Green Revolution in India

Like other developing countries, Green Revolution has influenced the economy and way of life in India to a great extent as is evident from the following points:

1. Increase in Agricultural Production:

The introduction of Green Revolution in 1967-68 has resulted in phenomenal increase in the production of agricultural crops especially in food-grains. From 1967 onwards, the Green Revolution aimed at bringing about a Grain Revolution.

Among the food grains too, it is the wheat crop which drew maximum benefit from Green Revolution. The production of wheat increased by more than three times between 1967-68 and 2003-04 while the overall increase in the production of cereals was only two times. On account of this reason, it is said that the Green Revolution in India is largely the Wheat Revolution.

2. Prosperity of Farmers:

With the increase in farm production the earnings of the farmers also increased and they became prosperous. This has, especially, been the case with big farmers having more than 10 hectares of land.

3. Reduction in import of food-grains:

The main benefit of Green Revolution was the increase in the production of food-grains, as a result of which there was a drastic reduction in their imports. We are now self sufficient in food-grains and have sufficient stock in the central pool. Sometimes we are in a position to export food-grains also.

The per capita net availability of food-grains has also increased from 395 grams per day in early 1950s to the level of 436 grams in 2003, this in spite of the rapid increase in population. In the words of Dantwala, Green Revolution has given a breathing time. As a result, there will be relief from anxiety of food shortage and the planners will concentrate more on Indian planning.

4. Capitalistic Farming:

Big farmers having more than 10 hectares of land have tended to get the maximum benefit from Green Revolution technology by investing large amount of money in various inputs like HYV seeds, fertilizers, machines, etc. This has encouraged capitalistic farming.

5. Ploughing back of profit:

The introduction of Green Revolution helped the farmers in raising their level of income. Wiser farmers ploughed back their surplus income for improving agricultural productivity. This led to further improvement in agriculture. According to a study conducted by Punjab Agriculture University, Ludhiana farmers plough back about 55 per cent of their income for agricultural progress.

6. Industrial Growth:

Green Revolution brought about large scale farm mechanisation which created demand for different types of machines like tractors, harvestors, threshers, combines, diesel engines, electric motors, pumping sets, etc. Besides, demand for chemical fertilizers, pesticides, insecticides, weedicides, etc. also increased considerably.

Consequently, industries producing these items progressed by leaps and bounds. Moreover, several agricultural products are used as raw materials in various industries. These industries are known as agro based industries. Textile, sugar, vanaspati, etc. are some outstanding examples of agro based industries.

7. Rural Employment:

While on one hand, large scale unemployment was feared due to mechanization of farming with the introduction of Green Revolution technology in India, there was an appreciable increase in the demand for labour force due to multiple cropping and use of fertilizers.

According to Gobind Thukral, "Green Revolution has generated lakhs of new jobs in Punjab. Almost 15 lakh poor people from the impoverished regions of Bihar, eastern Uttar Pradesh and Orissa work here. They not only earn their bread and butter, but take back home new ideas and technology".

As per findings of Bhalla and Chadha in respect of Punjab, "The drive towards mechanization was caused mainly by the scarcity of labour and relatively high wage rate especially during peak agricultural operations." During the last few years, a large number of farm labours have migrated from Bihar and eastern Uttar Pradesh to Punjab where they find better opportunities of earning a livelihood.

8. Change in the Attitude of Farmers:

The Indian farmer had remained illiterate, backward and traditional and had been using conventional methods of cultivation since the early times. But Green Revolution has brought about a basic change in his attitude towards farming. The way he has readily adopted the Green Revolution technology has exploded the myth that the Indian farmer is basically tradition bound and does not use new methods and techniques.

Wolf Ladejinsky has rightly concluded that, "Where the ingredients for new technology are available, no farmer denies their effectiveness. The desire for better farming methods and a better standard of living is growing not only among the relatively small number of affluent farmers using the new technology, but also among countless farmers still from outside looking in."

Suggestions to Overcome the Limitations of Green Revolution in India

Several suggestions have been made to remove the limitations of green revolution. They are as follows:

1. The range of green revolution should be extended to all the regions where it has not taken place so far.

2. Green revolution should continue for a longer period so that its beneficial effects reach the poorest of the poor in the countryside.

3. Land reform measures should be adopted on a war footing to maximise agricultural production.

4. 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.

5. Provision should be made to provide better marketing facilities to the farmers.

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

7. Multiple cropping programme should be undertaken on the same piece of land during one agricultural year. Further, price parity should be maintained among different crops in order to provide balanced incentives for the production of all principal crops.

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

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

10. Emphasis should be laid on evolving and multiplying short duration high-yielding and drought – resistant varieties of crops. In consequence, the farmers belonging to such areas may avail the benefits of green revolution.

11. Efforts should be made to develop an integrated post- harvest technology. Production, processing, marketing and distribution should receive concurrent attention.

12. Crop insurance schemes should be implemented in all the states and union territories of the country to meet the adverse impact of eventualities caused by short supply of inputs, unfavourable weather conditions etc.

13. 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.

14. Research work should be activated in the sphere of agricultural production. The fruits of research activity should reach the farmers for the purpose of agricultural development.

15. Agricultural education programmes should be conducted on a large scale to inspire the ruralities about the utility of green revolution.

16. Extension services should be strengthened. Apart from agricultural crops, their area of operation should be extended to cover activities allied to agriculture like floriculture, bee keeping, pisciculture and horticulture.

17. Last but not least, institutional framework should be strengthened and broad-based so as to provide adequate and timely support to the millions of farmers in the country.

In fine, the implementation of the above mentioned measures goes a long way in not only making India self-reliant in agricultural production but also enabling her to occupy an enviable position among the exporters of agricultural commodities.