

## 1. Details of Module and its structure

Module Detail	
Subject Name	Geography
Course Name	Geography 04 (Class XII, Semester - 2)
Module Name/Title	Land resources and Agriculture – Part 3
Module Id	legy_20503
Pre-requisites	Problems of farmers during the british time period, Techno-institutional reforms, Green revolution.
Objectives	<p>After reading this lesson, learners will be able to:</p> <ul style="list-style-type: none"><li>• Know about agricultural development in India.</li><li>• Understand the techno-institutional reforms in agriculture.</li><li>• Critically analyse the package technology- Green revolution.</li><li>• Analyse the contribution of agriculture to the national economy, employment and output</li><li>• Notice the effects of globalisation on agriculture.</li><li>• Understand the problems of the Indian farmers.</li><li>• Know the need for organic farming and sustainable agriculture.</li></ul>
Keywords	Agricultural Development, Food security, IADP, IAAP, Green revolution, HYV seeds, package technology, techno-institutional reforms, globalisation, land reforms, organic farming, sustainable agriculture.

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In the previous modules of this chapter you have learnt about the importance of land, land use and its changing pattern in India, cropping seasons and major crops in India. You must have noticed the Indian farmers using the modern tools and machines and on the other hand news of farmers committing suicide. Here in this last module of this chapter we will discuss about the role of Green revolution in agricultural development and the problems of Indian agriculture. Now let us begin this module with the technological advancements that were brought to Indian agriculture.

### **Agricultural Development in India**

Agricultural Development refers to efforts made to increase farm production in order to meet the growing demand of increasing population. This can be achieved in many ways such as:

- a) Increasing the cropped area
- b) The number of crops grown
- c) Improving irrigation facilities
- d) Use of fertilisers and high yielding variety of seeds
- e) Mechanization of agriculture

The ultimate aim of agricultural development is to increase food security. Food security exists when all people, at all times, have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Agriculture has developed at different places in different parts of the world. Developing countries with large populations usually practise intensive agriculture where crops are grown on small holdings mostly for subsistence. Larger holdings are more suitable for commercial agriculture as in USA, Canada and Australia.



Image: Modern Inputs

Source: <https://www.pxfuel.com/en/search?q=Agricultural+Tractor&page=19>

Indian agricultural economy was largely subsistence in nature before Independence. It had dismal performance in the first half of twentieth century. This period witnessed severe droughts

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and famines. During partition about one-third of the irrigated land in undivided India went to Pakistan. This reduced the proportion of irrigated area in Independent India.

After Independence, the immediate goal of the Government was to increase food grains production by

- (i) Switching over from cash crops to food crops
- (ii) Intensification of cropping over already cultivated land; and
- (iii) Increasing cultivated area by bringing cultivable and fallow land under plough.

Initially, this strategy helped in increasing food grain production. But agricultural production stagnated during late 1950s. To overcome this problem, Intensive Agricultural District Programme (IADP) and Intensive Agricultural Area Programme (IAAP) were launched. But two consecutive droughts during mid-1960s resulted in food crisis in the country. Consequently, food grains were imported from other countries.

New seed varieties of wheat (Mexico) and rice (Philippines) known as high yielding varieties (HYVs) were available for cultivation by mid-1960s. India took advantage of this and introduced package technology comprising HYVs, along with chemical fertilisers in irrigated areas of Punjab, Haryana, Western Uttar Pradesh, Andhra Pradesh and Gujarat. Assured supply of soil moisture through irrigation was a basic pre-requisite for the success of this new agricultural technology.



Image: HYV seeds

Source: [https://commons.wikimedia.org/wiki/File:Rice\\_diversity.jpg](https://commons.wikimedia.org/wiki/File:Rice_diversity.jpg)

This strategy of agricultural development paid dividends instantly and increased the foodgrains production at very fast rate. This spurt of agricultural growth came to be known as ‘Green

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Revolution'. This also gave fillip to the development of a large number of agro-inputs, agro-processing industries and small-scale industries.

This strategy of agricultural development made the country self-reliant in foodgrain production. But Green Revolution was initially confined to irrigated areas only. This led to regional disparities in agricultural development in the country till 1970s, after which the technology spread to the Eastern and Central parts of the country.

The Planning Commission of India focused its attention on the problems of agriculture in rainfed areas in 1980s. It initiated agro-climatic planning in 1988 to induce regionally balanced agricultural development in the country. It also emphasised on the need for diversification of agriculture and harnessing of resources for the development of dairy farming, poultry, horticulture, livestock rearing and aquaculture.

Initiation of the policy of liberalisation and free market economy in 1990s influenced the course of development of Indian agriculture. Lack of development of rural infrastructure, withdrawal of subsidies and price support, and impediments in availing of the rural credits may lead to inter -regional and inter-personal disparities in rural areas.

### **Technological and Institutional Reforms**

Agriculture has been practised in India for thousands of years. Sustained uses of land without compatible techno-institutional changes have hindered the pace of agricultural development. In spite of development of sources of irrigation most of the farmers in large parts of the country still depend upon monsoon and natural fertility in order to carry on their agriculture. For a growing population, this poses a serious challenge.

Agriculture which provides livelihood for more than 60 per cent of its population, needs some serious technical and institutional reforms. Thus, collectivisation, consolidation of holdings, cooperation and abolition of zamindari, etc. were given priority to bring about institutional reforms in the country after Independence.

'Land reform' was the main focus of our First Five Year Plan. The right of inheritance had already lead to fragmentation of land holdings necessitating consolidation of holdings. The laws of land reforms were enacted but the implementation was lacking or lukewarm. The Government of India embarked upon introducing agricultural reforms to improve Indian agriculture in the 1960s and 1970s.

The Green Revolution based on the use of package technology and the White Revolution (Operation Flood) were some of the strategies initiated to improve the lot of Indian agriculture. But, this too led to the concentration of development in few selected areas. Therefore, in the 1980s and 1990s, a comprehensive land development programme was initiated, which included both institutional and technical reforms.



Image: Impact of Green revolution

Source: <https://www.pikist.com/free-photo-sjjwv>

Provision for crop insurance against drought, flood, cyclone, fire and disease, establishment of Grameen banks, cooperative societies and banks for providing loan facilities to the farmers at lower rates of interest were some important steps in this direction. Kissan Credit Card (KCC), Personal Accident Insurance Scheme (PAIS) are some other schemes introduced by the Government of India for the benefit of the farmers. Moreover, special weather bulletins and agricultural programmes for farmers were introduced on the radio and television. The government also announces minimum support price, remunerative and procurement prices for important crops to check the exploitation of farmers by speculators and middlemen.

### **Merits and demerits of Green revolution**

When you critically analyse the Green revolution in India you will observe that one hand it has been highly beneficial for the people and the country but on the other hand it has posed some serious repercussions. Let us discuss the merits and demerits of green revolution in the country.

#### **Merits:**

1. The HYV seeds promised to produce much greater amounts of grain on a single plant. Due to the use of the high yielding variety of seeds the yield per hectare has increased.
2. Use of the modern tools and machines made the production process very efficient.
3. Now the farmers have surplus production which increased their earnings.
4. The crops in the fields are highly protected with the use of pesticides and insecticides.
5. The modern means of irrigation techniques helped in raising more crops.
6. The modern inputs in agriculture has raise the yield per hectare and therefore there is reduction in increasing the farm area by degrading the forest areas.

#### **Demerits:**

1. In many areas, Green Revolution is associated with the loss of soil fertility due to increased use of chemical fertilisers. Chemical fertilizers can also kill bacteria and other

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microorganisms in the soil. This means some time after their use, the soil will be less fertile than ever before.

2. HYV seeds needed plenty of water. The farmers in these regions set up tubewells for irrigation. Continuous use of groundwater for tubewell irrigation has led to the depletion of the water-table.
3. Chemical fertilisers provide minerals which dissolve in water and are immediately available to plants. But these may not be retained in the soil for long. They may escape from the soil and pollute groundwater, rivers and lakes.
4. The continuous use of chemical fertilizers has led to degradation of soil health. Punjab farmers are now forced to use more and more chemical fertilizers and other inputs to achieve the same production level. This means cost of cultivation is rising very fast.
5. Green Revolution was initially confined to irrigated areas only. This led to regional disparities in agricultural development in the country till 1970s.
6. Human beings are now more exposed to the use of foodgrains grown with the help of high doses of chemical fertilisers. This has led to number of health related issues.
7. Change in cropping pattern for example from cereals to high-value crops will mean that India will have to import food. During 1960's this would have been seen as a disaster. But if India imports cereals while exporting high-value commodities, it will be following successful economies like Italy, Israel and Chile. These countries exports farm products (fruits, olives, speciality seeds and wine) and import cereals. Are we ready to take this risk?

### **Contribution of agriculture to the national economy, employment and output**

Agriculture has been the backbone of the Indian economy though its share in the Gross Domestic Product (GDP) has registered a declining trend from 1951 onwards; in 2010-11 about 52 per cent of the total work force was employed by the farm sector which makes more than half of the Indian Population dependent on agriculture for sustenance. The declining share of agriculture in the GDP is a matter of serious concern because any decline and stagnation in agriculture will lead to a decline in other spheres of the economy having wider implications for society.

Considering the importance of agriculture in India, the Government of India made concerted efforts to modernize agriculture. Establishment of Indian Council of Agricultural Research (ICAR), agricultural universities, veterinary services and animal breeding centres, horticulture development, research and development in the field of meteorology and weather forecast, etc. were given priority for improving Indian agriculture. Apart from this, improving the rural infrastructure was also considered essential for the same.



Image: CAZRI

Source: [https://commons.wikimedia.org/wiki/File:ICAR-Central Arid Zone Research Institute, Jodhpur.jpg](https://commons.wikimedia.org/wiki/File:ICAR-Central_Arid_Zone_Research_Institute,_Jodhpur.jpg)

From the following Table, it is clear that though the GDP growth rate is increasing over the years, it is not generating sufficient employment opportunities in the country. The growth rate in agriculture has been decelerating which is an alarming situation. Today, Indian farmers are facing a big challenge from international competition and reduction in the public investment in agriculture sector. Subsidy on fertilisers is decreased leading to increase in the cost of production. Moreover, reduction in import duties on agricultural products have proved detrimental to agriculture in the country. Farmers are withdrawing their investment from agriculture causing a downfall in the employment in agriculture.

Sector	2013–14	2014–15	2015–16
Agriculture	4.2	-0.2	1.1
Industry	5.0	5.9	7.3
Services	7.8	10.3	9.2
GDP	6.6	7.2	7.6

### **Impact of Globalisation on Agriculture**

Globalisation is not a new phenomenon. It was there at the time of colonisation. In the nineteenth century when European traders came to India, at that time too, Indian spices were

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exported to different countries of the world and farmers of south India were encouraged to grow these crops. Till today it is one of the important items of export from India.

During the British period cotton belts of India attracted the British and ultimately cotton was exported to Britain as a raw material for their textile industries. Cotton textile industry in Manchester and Liverpool flourished due to the availability of good quality cotton from India. You have read about the Champaran movement which started in 1917 in Bihar. This was started because farmers of that region were forced to grow indigo on their land because it was necessary for the textile industries which were located in Britain. They were unable to grow foodgrains to sustain their families.

Under globalisation, particularly after 1990, the farmers in India have been exposed to new challenges. Despite being an important producer of rice, cotton, rubber, tea, coffee, jute and spices our agricultural products are not able to compete with the developed countries because of the highly subsidized agriculture in those countries.

Today, Indian agriculture finds itself at the crossroads. To make agriculture successful and profitable, proper thrust should be given to the improvement of the condition of marginal and small farmers. The green revolution promised much. But today it's under controversies. It is being alleged that it has caused land degradation due to overuse of chemicals, drying aquifers and vanishing biodiversity.

The keyword today is "gene revolution", which includes genetic engineering. Genetic engineering is recognised as a powerful supplement in inventing new hybrid varieties of seeds. In fact, organic farming is much in vogue today because it is practised without factory made chemicals such as fertilisers and pesticides. Hence, it does not affect environment in a negative manner. A few economists think that Indian farmers have a bleak future if they continue growing foodgrains on the holdings that grow smaller and smaller as the population rises. India's rural population is about 833 million (2011) which depends upon 250 million (approximate) hectares of agricultural land, an average of less than half a hectare per person. Indian farmers should diversify their cropping pattern from cereals to high-value crops. This will increase incomes and reduce environmental degradation simultaneously. Because fruits, medicinal herbs, flowers, vegetables, bio-diesel crops like jatropha and jojoba need much less irrigation than rice or sugarcane. India's diverse climate can be harnessed to grow a wide range of high-value crops.





Image: Organic farming

Source: <https://www.pxfuel.com/en/free-photo-eudch>

### **Growth of Agricultural Output and Technology**

There has been a significant increase in agricultural output and improvement in technology during the last 50 years.

- Production and yield of many crops such as rice and wheat has increased at an impressive rate. Among the other crops, the production of sugarcane, oilseeds and cotton has also increased appreciably.
- Expansion of irrigation has played a crucial role in enhancing agricultural output in the country. It provided basis for introduction of modern agricultural technology, such as high yielding varieties of seeds, chemical fertilisers, pesticides and farm machinery. The net irrigated area in the country has also increased.
- Modern agricultural technology has diffused very fast in various areas of the country. Consumption of chemical fertilizers has increased by 15 times since mid-sixties. Since the high yielding varieties are highly susceptible to pests and diseases, the use of pesticides has increased significantly since 1960s.

### **Problems of Indian Agriculture**

The nature of problems faced by Indian agriculture varies according to agro-ecological and historical experiences of its different regions. Hence, most of the agricultural problems in the country are region specific. Yet, there are some problems which are common and range from physical constraints to institutional hindrances. A detailed discussion on these problems follows:

#### **1. Dependence on Erratic Monsoon**

Irrigation covers only about 33 per cent of the cultivated area in India. The crop production in rest of the cultivated land directly depends on rain. Poor performance of south-west monsoon also adversely affects the supply of canal water for irrigation. On the other hand, the rainfall in

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Rajasthan and other drought-prone areas is too meagre and highly unreliable. Even the areas receiving high annual rainfall experience considerable fluctuations. This makes them vulnerable to both droughts and floods. Drought is a common phenomenon in the low rainfall areas, which may also experience occasional floods. The flash floods in drylands of Maharashtra, Gujarat and Rajasthan in 2006 and 2017 are examples of this phenomenon. Droughts and floods continue to be the twin menace in Indian agriculture.



Image: Monsoon rain

Source: <https://pixabay.com/photos/ratangad-monsoon-rain-nature-244138/>

## 2. Low productivity

The yield of the crops in the country is low in comparison to the international level. Per hectare output of most of the crops such as rice, wheat, cotton and oilseeds in India is much lower than that of the U.S.A., Russia and Japan. Because of the very high pressure on the land resources, the labour productivity in Indian agriculture is also very low in comparison to international level. The vast rainfed areas of the country, particularly drylands which mostly grow coarse cereals, pulses and oilseeds have low yields. Do you know why agricultural productivity is low in dry regions? It is because most of the farmers in the dry regions are poor, they are dependent on monsoon rain and also there is lack of affordable means of irrigation for them.



Image: Dryland farming

Source: <https://commons.wikimedia.org/wiki/File:Camposcala.JPG>

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### 3. Constraints of Financial Resources and Indebtedness

The inputs of modern agriculture are very expensive. This resource intensive approach has become unmanageable for marginal and small farmers as they have very meagre or no saving to invest in agriculture. To tide over these difficulties, most of such farmers have resorted to availing credit from various institutions and moneylenders. Crop failures and low returns from agriculture have forced them to fall in the trap of indebtedness. A vicious cycle may be created by disadvantaged farmers, there are incidents of farmers committing suicide in different states of the country as a result of indebtedness.



Image: Indebtness

Source: <https://thenounproject.com/term/borrowed/2218084/>

### 4. Lack of Land Reforms

Indian peasantry had been exploited for a long time as there had been unequal distribution of land. Among the three revenue systems operational during British period, i.e., Mahalwari, Ryotwari and Zamindari, the last one was most exploitative for the peasants. After Independence, land reforms were accorded priority, but these reforms were not implemented effectively due to lack of strong political will. Most of the state governments avoided taking politically tough decisions which went against strong political lobbies of landlords. Lack of implementation of land reforms has resulted in continuation of iniquitous distribution of cultivable land which is detrimental to agricultural development.

### 5. Small Farm Size and Fragmentation of Landholdings

There are a large number of marginal and small farmers in the country. The average size of land holding is shrinking under increasing population pressure. Furthermore, in India, the land holdings are mostly fragmented. There are some states where consolidation of holding has not been carried out even once. Even the states where it has been carried out once, second consolidation is required as land holdings have fragmented again in the process of division of

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land among the owners of next generations. The small size fragmented landholdings are uneconomic.



Image: fragmented landholdings

Source: [https://commons.wikimedia.org/wiki/File:Green\\_Beds,\\_farmlands\\_India.jpg](https://commons.wikimedia.org/wiki/File:Green_Beds,_farmlands_India.jpg)

## **6. Lack of Commercialisation**

A large number of farmers produce crops for self-consumption. These farmers do not have enough land resources to produce more than their requirement. Most of the small and marginal farmers grow foodgrains, which are meant for their own family consumption. Modernisation and Commercialisation of agriculture have, however, taken place in the irrigated areas.

## **7. Vast Underemployment**

There is a massive underemployment in the agricultural sector in India, particularly in the unirrigated tracts. In these areas, there is a seasonal unemployment ranging from 4 to 8 months. Even in the cropping season, work is not available throughout as agricultural operations are not labour intensive. Hence, the people engaged in agriculture do not have the opportunity to work round the year.

## **8. Degradation of Cultivable Land**

One of the serious problems that arises out of faulty strategy of irrigation and agricultural development is degradation of land resources. This is serious because it may lead to depletion of soil fertility. The situation is particularly alarming in irrigated areas. A large tract of agricultural land has lost its fertility due to alkalinisation and salinisation of soils and waterlogging. Excessive use of chemicals such as insecticides and pesticides has led to their concentration in toxic amounts in the soil profile. Leguminous crops have been displaced from the cropping pattern in the irrigated areas and duration of fallow has substantially reduced owing to multiple cropping. This has obliterated the process of natural fertilization such as

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nitrogen fixation. Rainfed areas in humid and semi-arid tropics also experience degradation of several types like soil erosion by water and wind erosion which are often induced by human activities.

### **Organic Farming**

In this type of farming, organic manure and natural pesticides are used instead of chemicals. No genetic modification is done to increase the yield of the crop. One of the main objectives of the organic farming is to enhance the fertility of the soil and maintain biological diversity. It began in the 20<sup>th</sup> century in response to the rapidly changing farming practices. There is a rapid increase in the market of organic food since the 1990. In this type of farming farmers use fertilisers of organic origin like compost manure, green manure etc. Techniques like crop rotation, mixed cropping, biological pest control and fostering of insects predators are used. International federation of organic agriculture movements (IFOAM), established in the year 1972, set the standard for organic agricultural methods internationally.



Image: Organic Farming

Source: <https://www.pikist.com/free-photo-sfima>

### **Sustainable agriculture**

It means practice of agriculture in such a way that people can meet the growing demands of the agricultural products without compromising with the needs of the future generations. The term “sustainable agriculture” was coined by an Australian agronomist Gordon McClymont and became popular in the 1980s. There are two different viewpoints of this concept – ecocentric approach and technocentric approach. The ecocentric approach of this concept focusses on organic farming with the objective of changing consumption pattern whereas the technocentric approach states that sustainability can be achieved and the increasing demand for food can be met with the use of biotechnology.



Image: sustainable agriculture

Source: <https://www.flickr.com/photos/ugacommunications/19170123832>

### **Conclusion**

You are well aware about the condition of the Indian farmers during the British time and at the time of independence. Population was growing rapidly and there was increasing demand for the agricultural products. To meet this demand and bring food security, India adopted the techno-institutional reforms in agriculture and started the use of modern applications in agriculture. Undoubtedly, this change helped in increasing the agricultural production but left us to ponder upon the question that will the land sustain. So it is the need of the hour to bring back to find the solution of this with the concepts like organic farming and sustainable agriculture.