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AGRICULTURE AND FOOD SECURITY

In the previous lessons, you studied climate, soils, various types of resources and human activities. In this lesson, you will study agriculture. Agriculture is the milestone in the history of human civilization, due to agriculture man settled at a particular place. India is a unique country from an agricultural point of view. Its vast area, rich soils, high percentage of cultivable land, wide climatic range and long growing season provides a solid base to agriculture. Agriculture is predominant economic activity in India, engaging nearly three-fifths of its working population. Though the share of the agricultural sector in gross domestic product has considerably declined to about one-fourth yet the importance of agriculture as an employment provider to the workforce especially in the countryside is very high. Obviously, agriculture forms the hub of the Indian economy as a large number of industries are also heavily dependent on agriculture for supply of raw materials. Agriculture involves not only crops raising but also animal ranching and fishing.



OUTCOMES

After studying this lesson, learner:

- analyses spatial and temporal variations in agricultural production since independence;
- describes production of cereal and non-cereal crops;
- identifies environmental and socio-economic implications of agriculture development and
- explains the concepts of food security and safety.

17.1 SIGNIFICANCE OF AGRICULTURE

Agriculture is an important part of India's economy and at present it is among the top two farm producers in the world. This sector provides approximately 52 percent of the total number of

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jobs available in India and contributes around 18.1 percent to the GDP. Agriculture is the only means of living for almost two-thirds of the employed class in India. As stated by the economic data of financial year 2006-07, agriculture has acquired 18 percent of India's GDP. The agriculture sector of India has occupied almost 43 percent of India's geographical area. Agriculture plays a vital role in the Indian economy. Over 70 per cent of the rural households depend on agriculture. Agriculture is an important sector of the Indian economy as it contributes about 17% to the total GDP and provides employment to over 60% of the population. Indian agriculture has registered impressive growth over the last few decades. The food grain production has increased from 51 million tonnes (MT) in 1950-51 to 250MT during 2011-12 highest ever since independence. It is significant due to various reasons such as:

- **Agriculture plays a vital role in generating employment:** In India at least two-thirds of the working population earn their living through agricultural works. In India other sectors have failed to generate much employment opportunity for the growing working populations.
- **Agriculture makes provision for food for the ever increasing population:** Due to the excessive pressure of population labour surplus economies like India face rapid increase in the demand for food. It resulted in the increase in food production at a fast rate.
- **Contribution to capital formation:** There is general agreement on the necessity of capital formation. Since agriculture happens to be the largest industry in a developing country like India, it can and must play an important role in pushing up the rate of capital formation. If it fails to do so, the whole economic development will suffer a setback.
- **Supply of raw material to agro-based industries:** Agriculture supplies raw materials to various agro-based industries like sugar, jute, cotton textile and Vanaspati industries. Food processing industries are similarly dependent on agriculture. Therefore, the development of these industries entirely is dependent on agriculture.
- **Market for industrial products:** Increase in rural purchasing power is very necessary for industrial development as two-thirds of the Indian population live in villages. After the green revolution the purchasing power of the large farmers increased due to their enhanced income and negligible tax burden.

Let's Do Can you name some industries based on agricultural raw material?



INTEXT QUESTIONS 17.1

1. In which percentage, agriculture contributes to the GDP of India?
2. Name any two types of raw materials used by agro-based industries.



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17.2 MAJOR PRACTICES IN AGRICULTURE

India has a long agricultural history, which dates back approximately ten thousand years. Today, India has the second-highest crop output in the world and agriculture-related jobs employ nearly 60% of the total workforce. However, as India's population grows, the country is having difficulties meeting the demand for food products like wheat and rice. There are different types of farming activities performed in India which are as follows:

- a. **Subsistence farming:** This is one of the most popular farming techniques that can be seen in various parts of India. The farmer along with his family cultivates grains for themselves or for sale at the local market. The entire family works on the farm and most of the agricultural work is done manually here. Traditional methods of farming are followed by the farmers in their small farms. Since facilities like electricity and irrigation are generally not available to the poor farmers, they do not use fertilisers and high yielding varieties of seeds in their fields to the extent they should.
- b. **Shifting Agriculture:** This way of farming is widely used by the tribal groups to grow crops. Firstly, the land is obtained by clearing a forested area and then crops are planted. While the land loses its fertility, another area of land is cleared and the crops are shifted there. The commonly grown crops in this type of farming are dry paddy, maize, millets and vegetables.

This practice is known by different names in different regions of India. For example, it is called Jhum in Assam, Ponam in Kerala, Podu in Odisha, Bewar, masha, penda, and bera in Madhya Pradesh. But since it causes extensive soil erosion, the government has tried to discourage this practice of cultivation by tribal population.

- c. **Intensive agriculture:** This farming practice can be seen in densely populated areas in India. It is an attempt to maximise the output of the land, through the use of every possible effort. It requires a huge amount of capital and human labour, more than one crop can be raised per year.
- d. **Extensive agriculture:** This is the modern type of farming that can be seen largely in the developed world and in some parts of India. It relies largely on machinery as opposed to a human labour force and raises one crop per year.
- e. **Commercial Agriculture:** The goal of commercial agriculture is high yield, so that produce can be exported to other countries for profit making. Wheat, cotton, sugarcane and corn are some commercial crops. They are grown in states of Gujarat, Punjab, Haryana, and Maharashtra.
- f. **Plantation agriculture:** This style is often used for crops which require a lot of space and a long growing period, such as rubber, tea, coconut, coffee, cocoa, spices, and

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fruits. Plantations are only capable of producing a single crop. Plantation agriculture is practised in Kerala, Assam, Karnataka, and Maharashtra.

- g. **Dry land farming:** As the name suggests, dry land farming is practised in the more arid and desert-like areas of the country, including northwest and central India. Crops such as gram, jowar, bajra and peas have lower water requirements and can therefore be grown in these conditions.
- h. **Wetland farming:** Many areas of India are affected by heavy monsoon rains and subsequent flooding. Well-irrigated areas, such as those in northeast India and the western ghats are suitable for rice, jute, and sugarcane farming.
- i. **Terrace Agriculture:** The hill and mountain slopes are cut to form terraces and the land is used in the same way as in permanent agriculture. Due to scarcity of the availability of flat land, terraces are made to provide a small patch of level land. Soil erosion is also checked due to terrace formation on hill slopes.
- j. **Mixed and Multiple Farming:** It refers to a system of growing agricultural crops as well as the raising of livestock. Whereas multiple farming refers to growing more than one crop in the same field. Usually, two different crops with varying periods of maturity are shown so that they compete with growth period and nutrients. For e.g. wheat and gram, wheat and mustard etc. This type of farming system is followed in regions where abundant rainfall is expected and good irrigation facilities are available. This farming system controls total loss from pests, diseases and drought. It also helps in maintaining the fertility of soil by nitrogen fixation.
- k. **Dairy Farming:** Dairy farming involves the rearing of cattle for milk. The dairy farming is highly developed in Sweden and Denmark. However, it has spread to other parts of the world and is practised in areas near markets. It thrives in regions that enjoy temperate climate. It plays a vital part of the global food system and plays a prime role in the sustainability of rural areas.



INTEXT QUESTIONS 17.2

1. Write any two types of crops grown in wet farming?
2. Give any two examples of crops which may be commercial in one region and may provide subsistence in another region?
3. Name any two states where commercial agriculture is popular.
4. Write any two characteristics of subsistence farming.



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17.3 CROPPING PATTERN IN INDIA

Cropping Pattern means the proportion of area under different crops at a point of time, changes in this distribution overtime and factors determining these changes. Cropping pattern in India is determined mainly by soil type and climatic factors i.e. rainfall and temperature. They are reflected in agricultural practices and cropping patterns of the country. India is geographically a vast country so it has various food and non-food crops which are cultivated in three main cropping seasons which are Rabi, Kharif and Zaid.

- **Rabi Crops:** The Rabi crops in the spring harvest or winter crop in India. It is sown every year in October and harvested every year in March. Wheat, Barley, Mustard, Sesame, Peas etc. are the major rabi crops in India.
- **Kharif Crops:** The crop from Kharif is India's summer crop or monsoon crop. Kharif crops are usually seeded at the beginning of July's first rain. India's major Kharif crops include Millets (Bajra and Jowar), Cotton, Soja, Sugarcane, Turmeric, Paddy (Rice), Maize, Moong (Pulses), Groundnut, Red Chillies etc.
- **Zaid Crops:** This crop is grown from March to June in some parts of the country. Prominent examples are Muskmelon, Watermelon, Cucurbitaceous family vegetables such as bitter gourd, pumpkin, ridged gourd and other crops.

17.4 MAJOR CROPS IN INDIA

A variety of food and non-food crops are grown in different parts of the country depending upon the variations in soil, climate and cultivation practices. Major crops grown in India can be classified into four categories:

- **Food Grains-** (Wheat, Rice, Maize, Millets and Pulses)
- **Cash Crops-** (Cotton, Jute, Sugarcane, Tobacco and Oilseeds)
- **Plantation Crops-** (Tea, Coffee, Coconut and Rubber)
- **Horticulture crops-** (Fruits and Vegetables)

A. Food Grains

The crops that are grown to feed the human population are known as food crops. There are a number of food crops grown in the country. Let's know some of the major food grains.

- Paddy :** India is an important centre of paddy cultivation. It is the staple food crop in a majority of regions in the country. paddy is a Kharif crop that requires high

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temperature, heavy rainfall and high humidity for proper growth. The areas with less rainfall use irrigation for rice cultivation. The paddy is cultivated on the largest areas in India. paddy cultivation in India extends from 8° to 35°N latitude and from sea level to as high as 3000 metres. Paddy crops need a hot and humid climate. The average temperature required throughout the life period of the crop ranges from 21° to 37° C. Deep fertile loamy or clayey soils are considered ideal for this crop. It requires considerable manual labour for sowing and transplantation. Total production of paddy during 2019-20 is estimated at record 117.94 million tons. It is higher by 8.17 million Tons than the five years' average production of 109.77 million tons. Major paddy producing states are shown in the given Map.

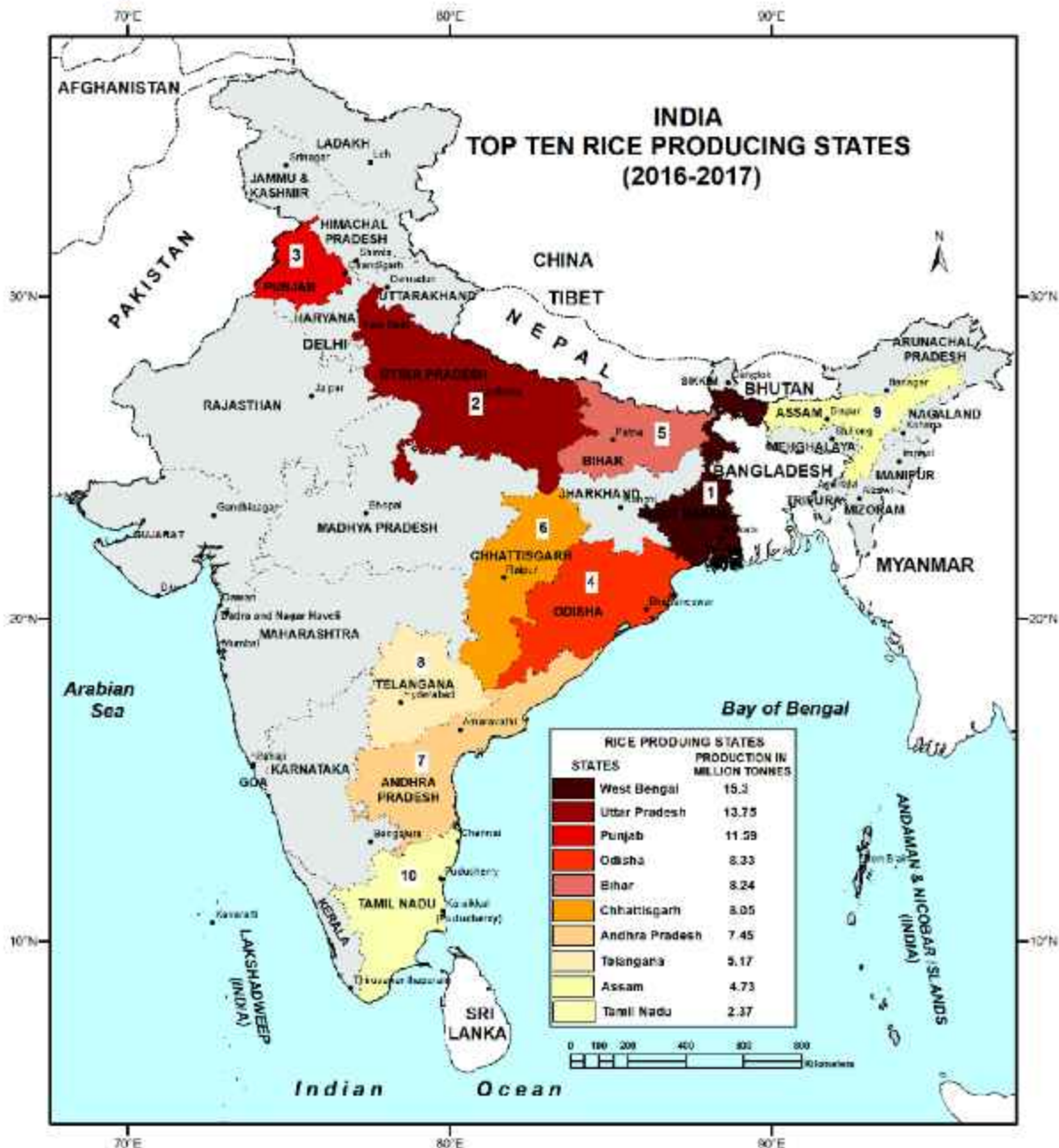


Fig 17.1 Major Rice Producing States of India



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- b. **Wheat:** Wheat is the main cereal crop of India. The total area under the crop is about 29.8 million hectares in the country. It can be grown not only in the tropical and sub-tropical zones, but also in the temperate zone and the cold tracts of the far north, even beyond the 60° N latitude. The best wheat is produced in areas favoured with cool, moist weather during the major portion of the growing period followed by dry, warm weather to enable the grain to ripen properly. The ideal temperature for the cultivation is about 15° - 20° C and requires moderate amounts of rainfall of 25-75 cms. The regions with a warm and damp climate are not suited for wheat growing. Production of wheat during 2019-20 was estimated at 107.18 million tons. It has increased by 3.58 million tons as compared to wheat production during 2018-19. The top four major wheat producing states of India are Uttar Pradesh, Punjab, Madhya Pradesh and Haryana.

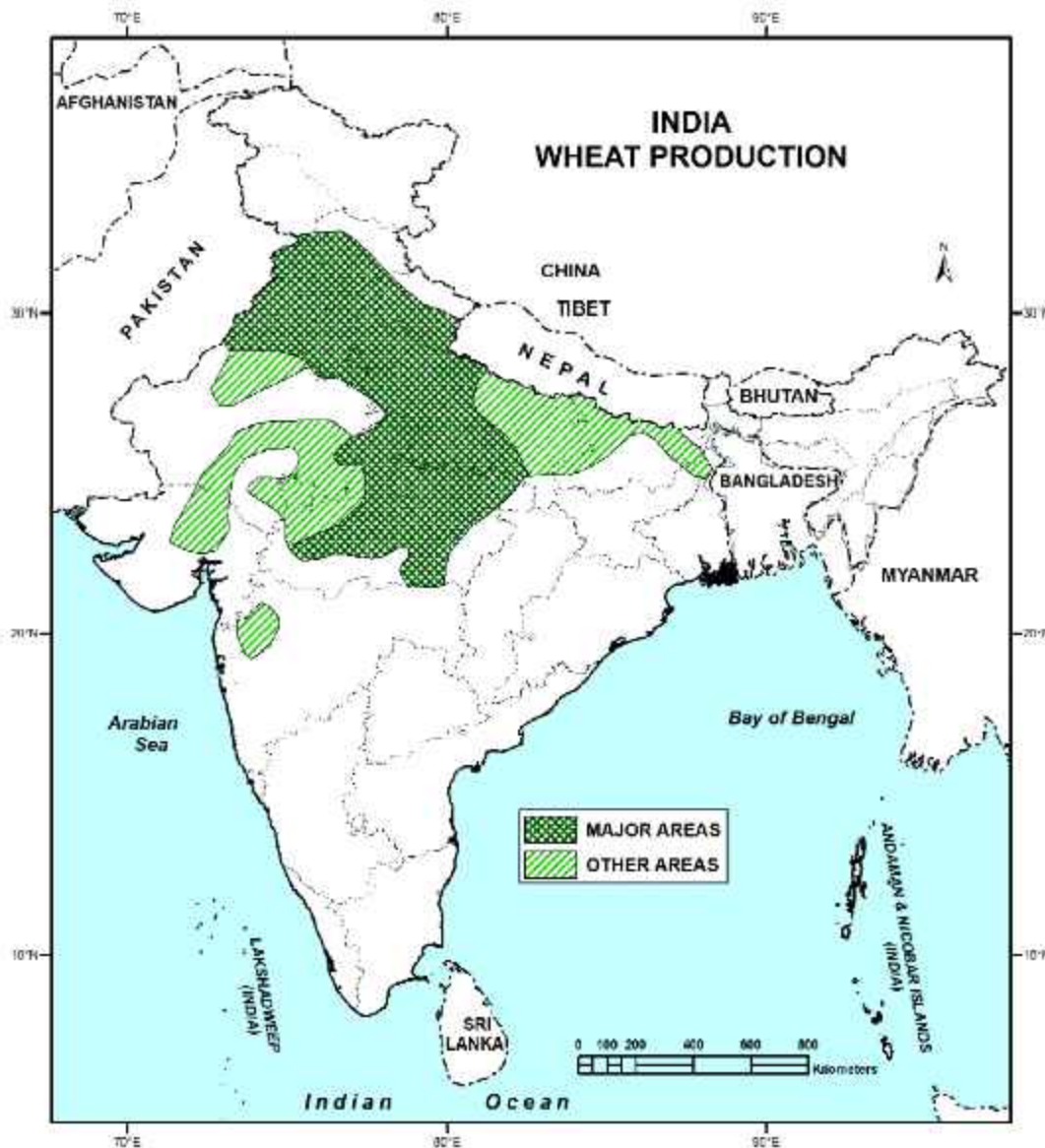


Fig. 17.2: Wheat Producing Areas

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B. Cash Crops

- a. **Sugarcane:** Sugarcane is a crop of tropical regions. Under rain fed conditions, it is cultivated in sub-humid and humid climates. Its cultivation is largely concentrated in Uttar Pradesh, Maharashtra and Gujarat. In southern India, it is cultivated in irrigated tracts of Tamil Nadu, Karnataka, Andhra Pradesh and Telangana. Uttar Pradesh produces about two-fifths of sugarcane of the country. India is the second largest producer of sugarcane after Brazil in 2015. It accounts for about 19 percent of the world production of sugarcane. But it occupies only 2.4% of the total cropped area in the country.

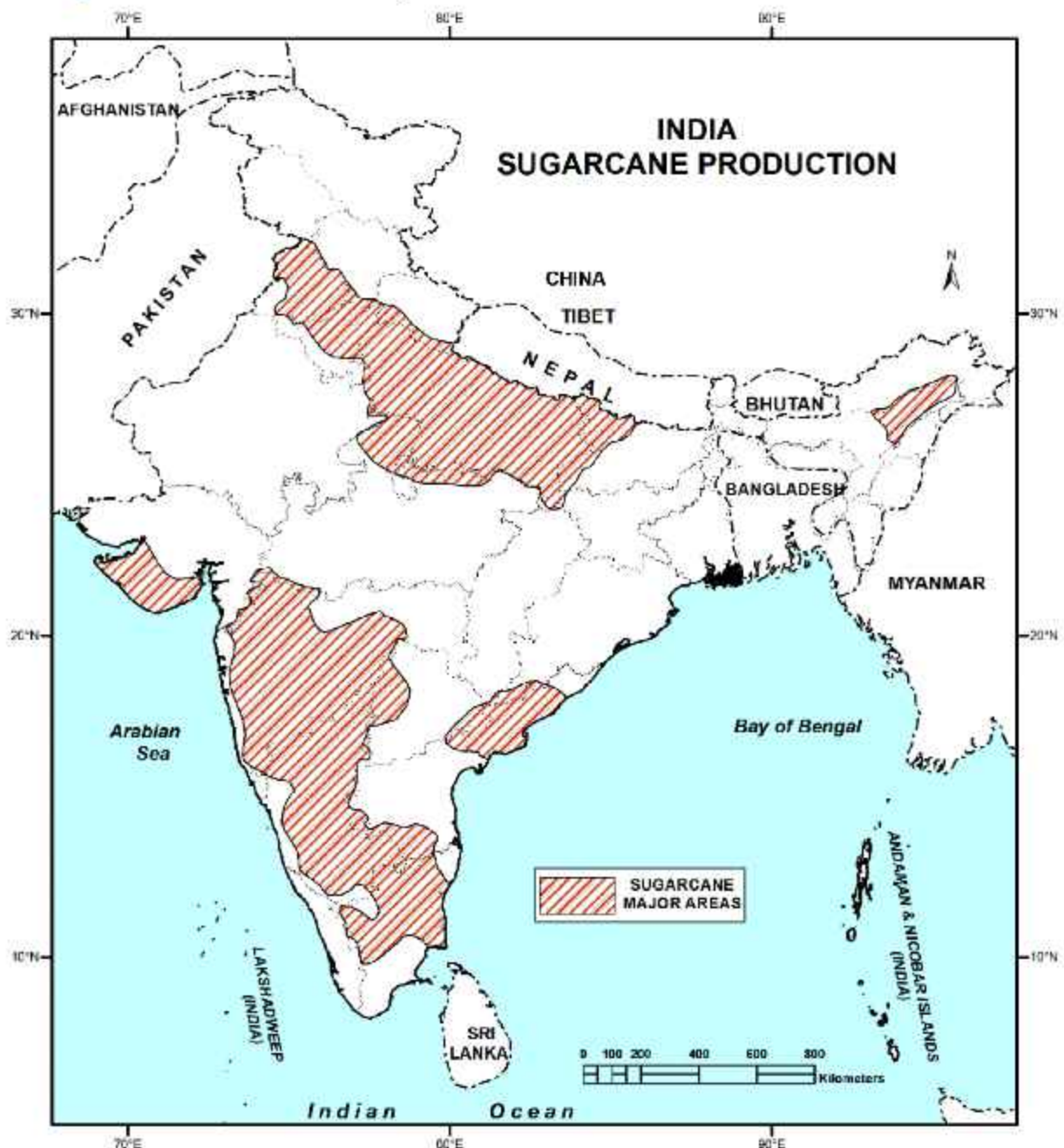


Fig. 17.3: Sugarcane Producing Areas



- b. **Cotton:** Cotton is a Kharif Crop that grows in tropical and subtropical regions. India supports the growth of both short staple (Indian) and long staple (American) cotton called Narma in the north-western regions of the country. It grows in areas with a minimum of 210 frost free days in a year. It grows well in black soils of Deccan and Malwa plateau and also in Satluj-Ganga plain having red and laterite soils of the peninsular region. Leading producers of this crop are Gujarat, Maharashtra and Telangana.

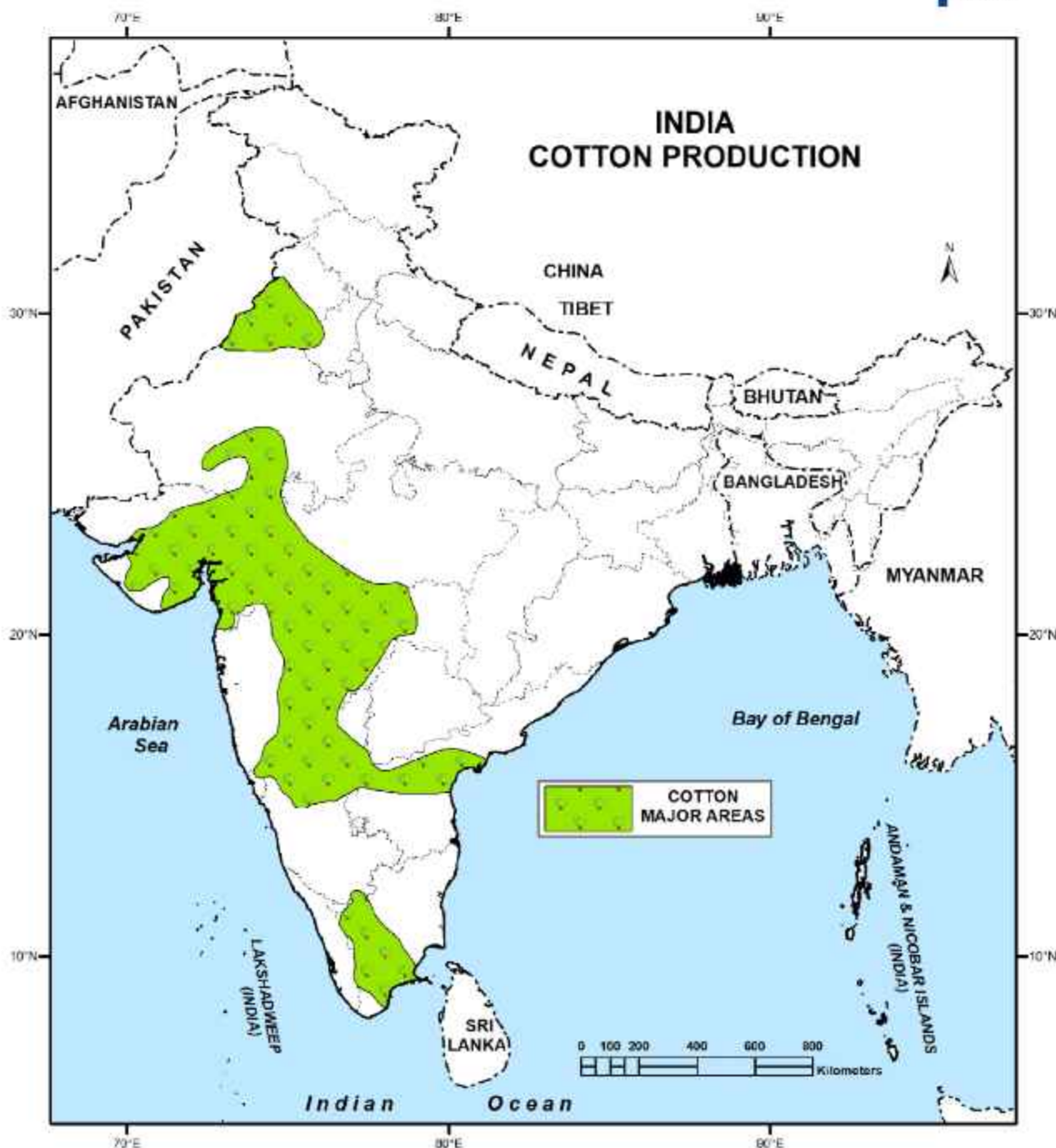


Fig. 17.4 : INDIA: Cotton Producing Areas

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C. Plantation Crops

- a. **Tea:** Tea is a plantation crop which is used as a beverage. Tea leaves are rich in caffeine and tannin. Tea is mostly grown in hilly areas and well drained soils in humid and subtropical areas. India is the world's largest black tea producer and consumer. Tea is grown in India in 16 states. Assam, West Bengal, Tamil Nadu, and Kerala make up around 95% of total tea production.
- b. **Coffee:** Coffee is a tropical plantation crop. The seeds of coffee are roasted, ground and are used for preparing a beverage. Coffee needs a hot and humid climate ranging from 15°C to 28°C. Well-drained, rich loamy soil with humus and minerals is ideal for growing coffee. Coffee is cultivated in the highlands of Western Ghats in Karnataka, Kerala and Tamil Nadu which are the major coffee producing states in India.

D. Horticulture

- a. **Fruits:** India accounts for about 10 percent of the production of fruits in the world. It leads the world in the production of mango, banana, sapota and lemons. A large variety of fruits are grown in India. Mango, bananas, citrus fruits, pineapple, papaya, guava, sapota, jackfruit, lichi and grapes are tropical and subtropical fruits. The fruits of temperate areas are apple, pear, peach, plum, apricot, almond and walnut which are grown mostly in the mountainous areas of the country. The important fruits of the arid zone of India are Amla, ber, pomegranate and figs.
- b. **Vegetables:** India is the second largest producer of vegetables in the world next only to China. It contributes about 13 per cent to the world vegetable production. It occupies first position in the production of cauliflowers, second in onion, and third in cabbage in the world. Other major vegetable crops are potato, peas, tomato and brinjal. More than fifty varieties of vegetables are grown in India.
- c. **Floriculture:** With breaking of trade barriers in the post-globalisation phase, international trade in vegetables, fruits and flowers has become lucrative. India can earn a sizable amount of foreign exchange by exporting flowers. Flowers such as rose, jasmine, marigold, chrysanthemum, tuberose, and aster are grown over large areas in Karnataka, Tamil Nadu, Andhra Pradesh, Rajasthan, West Bengal, Maharashtra, Delhi, Uttarakhand, Assam and Manipur.

Let's Do

- Collect different food grains and classify them according to seasons.



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**INTEXT QUESTIONS 17.3**

1. Name two important fibre crops of India.
2. Which state is the largest producer of Rice in India?
3. Name two important sugarcane producing states in the country.
4. Name a major coffee producing state of India.

17.4 AGRICULTURAL DEVELOPMENT IN INDIA

Agricultural development is a must for the economic development of a country. "Agricultural progress is essential to provide food for growing non-agricultural labour force, raw materials for industrial production and saving and tax revenue to support development of the rest of the economy, to earn foreign exchange and to provide a growing market for domestic manufactures." Agriculture development implies giving assistance to farmers or crop producers by providing them various agricultural supports. Providing security, helping in the research area, employing advanced techniques, checking pests and facilitating diversity all fall under the category of agriculture development. In the colonial dominion, there was neither equity nor growth in the agricultural division. The strategy and rule makers of independent India addressed these problems through land reforms and advancing the use of High Yielding Variety (HYV) seeds which guided in a revolution in Indian agriculture.

A. Land Reforms

Land reform means equity in agriculture, which also means the shift in the ownership of landholdings. Land reform normally relates to the redistribution of land from rich to the poor. More deeply, it involves control of operation, ownership, sales, leasing, and inheritance of land. In recent years the theory of land reforms has expanded in the identification of the strategic role of land and agriculture in development. Therefore, Land reform has become similar to agrarian change or rapid development of the agrarian structure. This structure includes the land tenure system, farm organisation, the pattern of cultivation, the scale of the farm operation, the terms of tenancy, and the system of rural credit, marketing, and education. It also deals with advanced technology.

B. Green Revolution

After independence India had to rebuild its economy. Over three-quarters of the population depended on agriculture in some way. But agriculture in India was faced with several problems. Firstly, the productivity of grains was very low and Indian agriculture was dependent on the monsoon due to lack of irrigation and other

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infrastructural facilities. India had previously faced severe famines during the British rule, who had only promoted cash crops instead of food crops. The idea was to never depend on any other country for food sufficiency. So in 1965, the government with the help of Indian geneticists M.S. Swaminathan, known as the father of Green Revolution, launched the Green Revolution. The movement lasted from 1967 to 1978 and was a great success.

Agriculture production was very less because of the practice of old technology. The Green Revolution started in 1965 with the introduction of High Yielding Variety (HYV) seeds in Indian agriculture. This was coupled with better and efficient irrigation and the correct use of fertiliser to boost the growth of the crops. This strategy of agriculture development increased the production of food grains in India. This also supported development of a large number of agro-inputs, agro-processing industries and small-scale industries. This method of agricultural development made India self-reliant in terms of food grain production.

Impact of the Green Revolution

- a. **Increase in Agricultural Production:** Food grains in India saw a great rise in output. It was a remarkable increase. The biggest beneficiary of the plan was the Wheat crop. The production of wheat increased from 11 million tons in 1960 to 55 million tons in 1990.
- b. **Increase in Per Acre Yield:** Green Revolution not only resulted in increased agricultural output, but has also caused increase in per hectare yield. In the case of wheat, the per hectare yield increased from 850 kg/hectare in 1960 to 2281 kg/hectare by 1990.
- c. **Less Dependence on Imports:** After the green revolution, India was finally on its way to self-sufficiency. There was enough food production for the population and food stock for emergencies. We did not need to import grains or depend on other countries for our food supply. In fact, India was able to start exporting its agricultural produce.
- d. **Employment:** It was feared that commercial farming would leave a lot of the labour force jobless. But on the other hand, we saw a rise in rural employment. This is because the supporting industries created employment opportunities. Irrigation, transportation, food processing, marketing all created new jobs for the workforce.
- e. **A Benefit to the Farmers:** The Green Revolution majorly benefited the farmers. Their income saw a significant raise. Not only were they surviving, they were prospering. It enabled them to shift to commercial farming from only sustenance farming.

**Notes****C. White Revolution**

The revolution associated with a sharp increase in milk production in the country is called the White Revolution in India also known as 'Operation Flood'. White revolution period intended to make India a self-dependent nation in milk production. Today, India is the world's largest producer of milk and Dr. Verghese Kurien is known as the father of the White Revolution in India. During the year 1964-1965, the Intensive Cattle Development Programme was introduced in India in which the cattle owners were provided with a package of improved animal husbandry for promoting the white revolution in the country. Later on, the National Dairy Development Board introduced a new programme named "operation flood" to increase the speed of the white revolution in the country. Operation Flood started in the year 1970 and was aimed to create a nationwide milk grid. It was a rural development programme initiated by NDDB - National Dairy Development Board of India. Village milk producer's cooperatives laid the foundation of the operation flood. With the optimum use of modern technology and management, they procured milk and provided the services. White Revolution had the objectives as stated below:

- Creating a flood of Milk by Increase production
- Increase the incomes of the rural population
- Provide milk to consumers at fair prices

Significance of Operation Flood

- a. The White Revolution in India helped in reducing malpractice by traders and merchants. It also helped in eradicating poverty and made India the largest producer of milk and milk products.
- b. Operation Flood empowered the dairy farmers with control of the resource created by them. It helped them in directing their own development.
- c. To connect milk producers with the consumers of more than 700 cities and towns and throughout the country, a 'National Milk Grid' was formed.
- d. The revolution also reduced regional and seasonal price variations ensuring customer satisfaction and at the same time. Also, it ensured that the producers get a major share of the price that customers pay.
- e. Improved the living standards of the rural people and led to the progress of the rural economy.

Let's Do

- Collect some dairy farming products with farm photographs.

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D. Blue Revolution

The Blue Revolution was launched in India during the 7th Five Year Plan (1985-1990) during the sponsorship of the Fish Farmers Development Agency (FFDA) by the Central Government of India. Later, during the 8th Five Year Plan (1992-97), the Intensive Marine Fisheries Programme was launched, and eventually, the fishing harbours in Visakhapatnam, Kochi, Tuticorin, Porbandar, and Port Blair were also established over the time. The Nili Kranti Mission aimed to enhance the economic condition of India through the augmentation of fisheries and thus contributing towards food and nutritional security. The utilisation of the water resources for the development of fisheries was done by the Neel Kranti Mission in a sustainable manner.

The Blue Revolution in India along with the Fish Farmers Development Agency (FFDA) brought an improvement in the aquaculture and fisheries sector with the introduction of new techniques of rearing, marketing, exporting, and fish breeding. Some of the major outcomes of the Blue Revolution in India are mentioned below:

- Currently, the Indian Fisheries Sector reached a production of 4.7 million Tons of fish from a limit of 60,000 tons including 1.6 million tons of fish from freshwater aquaculture.
- India is recorded to achieve an average annual growth of 14.8% as compared to the global average percentage of 7.5% in the production of fish and fish products.
- The fishery has become India's largest agricultural export over the last five years with a growth rate of 6% - 10%.
- India has become the world's second-largest producer of fish with exports worth more than 47,000 crore rupees.
- The fisheries and aquaculture production contributes 1% and 5% to India's GDP and Agricultural GDP respectively.

E. Yellow Revolution

The term yellow revolution has been adopted to express the remarkable increase in oilseed production in India which started in 1986. The objective of the yellow revolution is to achieve self-reliance in the production of oilseeds. Oilseed's technological mission was launched to ensure optimum utilisation of production, processing, management and technology in oilseed crops. The impact of the yellow revolution and its success had a dramatic increase from 10.83 million tons in 1985-86 to 24.75 million tons in 1998-99. However, after that, we have not been able to achieve self-sufficiency in oilseeds. A second yellow revolution is the crying need of the hour. Also, a technical



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invention in dry land farming is required to maximise yield, productivity, and farm income. Achieving the aim of making the nation self-sufficient in oilseeds would have a significant impact on agriculture and the economy and would serve to reduce dependence on foreign markets.

17.5 ENVIRONMENTAL AND SOCIO-ECONOMIC IMPLICATION

The Green revolution was highly successful as agricultural production in most countries increased. India which was once dependent on import of food grains for satisfying the needs of its population gradually became an exporter of food grains. The green revolution has both positive and negative impacts on environments and socio-economic conditions.

A. Environmental Implication

- a. **Loss of Biodiversity:** The spread of Green Revolution agriculture affected both agricultural biodiversity and wild biodiversity. There is a little disagreement that the Green Revolution acted to reduce agricultural biodiversity, as it relied on just a few high-yield varieties of each crop. For example, before the revolution, it is speculated that there were over 3000 variants of rice. Now it is estimated that only ten modified varieties of rice are used. This has led to concerns about the susceptibility of a food supply to pathogens that cannot be controlled by agrochemicals, as well as the permanent loss of many valuable genetic traits bred into traditional varieties over thousands of years.
- b. **Dependence on non-renewable resources:** Most high intensity agricultural production is highly reliant on non-renewable resources. Agricultural machinery and transport, as well as the production of pesticides and nitrates all depend on fossil fuels. Moreover, the essential mineral nutrient phosphorus is often a limiting factor in crop cultivation, while phosphorus mines are rapidly being depleted worldwide. The failure to depart from these non-sustainable agricultural production methods could potentially lead to a large-scale collapse of the current system of intensive food production within this century.
- c. **Salinization:** The continuous supply of moisture through irrigation during the summer and winter seasons have changed the soil chemistry. In the arid and semi-arid areas, owing to capillary action, the soils are becoming either acidic or alkaline. The saline and alkaline affected tracts, locally known as kallar or thur in Punjab and kallar or reh in Uttar Pradesh have expanded and increased in area. According to one estimate, about 50 percent of the total arable land of Punjab and Haryana has been harmed by soluble salts.

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d. Soil Erosion: Soil erosion is a universal phenomena. It may be observed to some extent in all parts of the country; its intensity, however, is more in the arid, semi-arid, and mountainous areas. The presence of forests reduces the danger of soil erosion significantly. In recent years, the agricultural area has been expanded by indiscriminate felling of trees. The increase in the rate of soil erosion is not only damaging the agricultural lands, it is also adversely affecting the areas where the eroded soil is deposited.

e. Decline in soil fertility: The High Yielding Varieties perform better if heavy doses of chemical fertiliser, insecticides, and pesticides are applied. Application of heavy doses of these inputs destroy the micro-organisms which are so necessary to maintain the fertility of the soil.

f. Lowering of the Underground Water-Table: The High Yielding Varieties of rice and wheat are water-relishing crops. The continuous lifting of water through tube-wells and pumping sets has lowered the water Table in the eastern districts of Haryana. Many farmers have to lower their tube-wells in the years of inadequate monsoon rainfall. If the cropping pattern is not changed, and irrigation of rice and wheat continues at the present level, the underground water-table may not be sufficiently recharged and may get substantially depleted.

In opposition to this, the underground water-table in western Haryana is rising as there is a gypsum layer in that part of the state which does not permit the percolation of water through this layer; the water-table in the Jhajjar District of Haryana has risen significantly. The crops of millets, bajra, arhar are damaged. Consequently, there are waterlogged conditions in several tracts in the western parts of Haryana. This rise in the water-table is resulting in capillary action, leading to the occurrence of saline and alkaline formations.

g. Deforestation: There had been heavy felling of trees to bring the forest area under cultivation. In Punjab and Haryana, less than 5 percent of their area is under forest. This is affecting the environment and ecology adversely.

B. Socio-economic implications

a. Higher productivity and self-sufficiency in food grains production: Agricultural productivity increased sharply and India became self-sufficient in food grain production in a decade.

b. Increases inequality in rural society: The larger and medium farmers only afforded the high input cost, small and marginal farmers could not afford this high input cost and were left unbenefitted. Farmers benefited most of those who were able to access land, capital, technology, and knowledge. Those who do not have

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- much land are only able to produce for family consumption; those who were able to produce much are able to sell in the market and get benefitted most. Rich farmers become richer and poor farmers do not benefit much.
- c. **Displacement of tenant cultivators:** Prior to the green revolution, the tenant cultivators got land as a lease from the landlord as landlords had too big land to do cropping by using the traditional agricultural tools. After the induction of new agriculture technology and modern agriculture tools, landlords get back their own land from the tenant which leads to tenant displacement.
 - d. **Displacement of Rural-Urban Migration:** Service cast groups such as tractors, threshers, and harvesters increase leads to rural-urban migration. Labour worker migration increased from drought-prone areas to irrigated areas as the demand for labour increased when the green revolution was introduced.
 - e. **The wage of rural workers does not increase despite high productivity:** The mode of payment also shifted from food grains to cash. The above two worsened the economic condition of most of the workers.
 - f. **Commercialization and dependency on market:** The second phase of the green revolution was introduced in the semi-arid region in India. Cropping pattern changes and cash crops such as cotton are grown for the market. Market-oriented single crops such as cotton and bananas are grown. Commercialization and dependency on the market increase livelihood insecurity; a fall in price or bad crops increases the insecurity. Mono crop culture also increases the chance of crop failure and leads to nutrient depletion in the soils.
 - g. **Increase regional inequality:** The first phase of the green revolution was implemented in the limited part of the country where assured irrigation was available as the result Punjab, Haryana, Western UP, and part of Tamil Nadu become more developed as compared to eastern UP, Bihar, Odisha, West Bengal, and other parts of the country. It leads to regional inequality.

**INTEXT QUESTIONS 17.4**

1. Who is called the father of the green revolution?
2. Write two key features of the green revolution.
3. In which five year plan the Intensive Marine Fisheries Programme?
4. Write any two environmental implications of the green revolution.

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17.6 FOOD SECURITY IN INDIA

Ensuring food security ought to be an issue of great importance for a country like India. There have been many emerging issues in the context of food security in India in the last two decades. According to the Food and Agriculture Organization (FAO), food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life. Food security is the combination of the following three elements:

- Food availability-** food must be available in sufficient quantities and on a consistent basis. It considers stock and production in a given area and the capacity to bring in food from elsewhere, through trade or aid.
- Food access-** people must be able to regularly acquire adequate quantities of food, through purchase, home production, barter, gifts, borrowing or food aid.
- Food utilisation-** Consumed food must have a positive nutritional impact on people. It entails cooking, storage and hygiene practices, individual's health, water and sanitation, feeding and sharing practices within the household.

Food security is closely related to household resources, disposable income and socio-economic status. It is also strongly interlinked with other issues, such as food prices, global environment change, water, energy and agriculture growth. India's food security policy has a primary objective to ensure availability of food grains to the common people at an affordable price. It has enabled the poor to have access to food. The focus of the policy is on growth in agriculture production and on fixing the support price for procurement of wheat and rice, to maintain their stocks. Food Corporation of India (FCI) is responsible for procuring and stocking food grains, whereas distribution is ensured by public distribution system (PDS).

We already know that the consumers are divided into two categories: below poverty line (BPL) and above poverty line (APL), with the issue price being different for each category. However, this categorization is not perfect and a number of deserving poor have been excluded from the BPL category. Moreover, some of the so-called APL slips back to BPL, because of the failure of even one crop and it is administratively difficult to accommodate such shifts. Each district and block can be made self-sufficient in food grain production with the help of government by providing proper agricultural infrastructure, credit linkages and also encourages the use of latest techniques. Instead of concentrating only on rice or wheat, the food crop with a better growth potential in that particular area must be encouraged. Creation of necessary infrastructure like irrigation facilities, availability of electricity etc. may also attract private investments in agriculture.



There has been a gradual shift from cultivation of food crops to cultivation of fruits, vegetables, oil-seeds and industrial crops. This has led to the reduction in net sown area under cereals and pulses. With the growing population of India, the declining food production puts a big question mark over the country's future food security. The competition for land between non-agricultural uses such as housing etc. and agriculture has resulted in reduction in the net sown area. The productivity of land has started showing a declining trend. Fertilisers, pesticides and insecticides which once showed dramatic results, are now being held responsible for degrading the soils. Periodic scarcity of water has led to reduction in area under irrigation. Inefficient water management has led to water logging and salinity.

Role of Cooperatives in Food Security

The cooperatives are also playing an important role in food security in India especially in the southern and western parts of the country. The cooperative societies set up shops to sell low priced goods to poor people. For example, out of all fair price shops running in Tamil Nadu, around 94% are being run by the cooperatives. In Delhi, Mother Dairy is making strides in provision of milk and vegetables to the consumers at a controlled rate. Amul is another success story of cooperatives in milk and milk products from Gujarat. It has brought about the White Revolution in the country. These are a few examples of many more cooperatives running in different parts of the country ensuring food security of different sections of society.

Impact of Globalization on Agriculture

Globalisation is not a new phenomenon. It was there at the time of colonisation. In the 19th century when European traders came to India, at that time too, Indian spices were 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.

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 subsidised 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 controversy. It is being alleged that it has caused land degradation at some places due to overuse of chemicals, drying aquifers and vanishing biodiversity. The keyword today is "gene revolution". This includes genetic engineering. 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 the environment in a negative manner.

Economic
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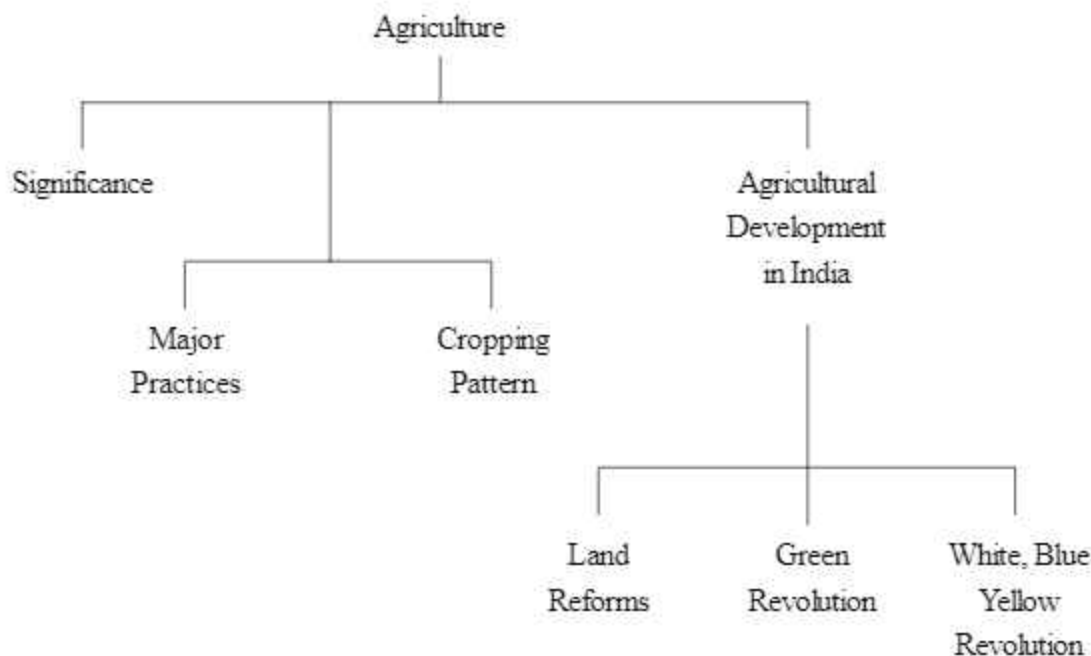


Notes

India's rural population is about 600 million 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, biodiesel 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.

**INTEXT QUESTIONS 17.5**

1. Name the organisation responsible for procuring and stocking food grains in India.
2. Give any one example of cooperative organisation.

**WHAT YOU HAVE LEARNT**

*Notes***TERMINAL QUESTIONS**

1. What are the sustainability principles in food and agriculture?
2. How to achieve sustainable agricultural productivity?
3. What is the minimum support price?
4. Explain the major dimensions of food security with suitable examples.
5. How is food security ensured in India?
6. What do you mean by 'Operation Flood'?
7. Describe the geographical conditions required for the growth of rice and wheat.
8. Describe the impact of globalisation on Indian agriculture.

**ANSWERS TO INTEXT QUESTIONS****17.1**

1. 18.1
2. Sugar, Jute, Cotton

17.2

1. Rice, Jute, Sugarcane
2. Wheat, Corn
3. Gujrat, Punjab, Haryana etc.
4. i) Farmer works with family
ii) Traditional methods are used

17.3

1. Cotton, Jute
2. West bengal
3. U.P., Maharashtra, Tamilnadu
4. Karnataka, Kerala

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Notes

17.4

1. M.S. Swaminathan
2. i) Increase in Agriculture Production
ii) Increase in per Acre Yield
3. Five year plan
4. i) Loss of Biodiversity
ii) Salization.

17.5

1. Food Corporation of India
2. Amul