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AGRICULTURAL DEVELOPMENT IN INDIA

22.1 INTRODUCTION

In the previous lessons you have studied the climate, soil types and water resources of India. They are all important components of the physical environment. Depending upon the prevailing physical environment and the availability of various resources, people of India are engaged in varied occupations. Agriculture is perhaps the most important occupation of the people in our country. In this lesson, you will be studying importance of agriculture in India, major characteristics of Indian agriculture, various types of farming practices, modernisation and diversification of Indian agriculture and the cattle wealth in India in detail.

22.2 OBJECTIVES

After studying this lesson you will be able to:

- infer importance of agriculture in India;
- describe the major characteristics of Indian agriculture;
- explain various types of farming practices followed in India;
- state the methods adopted to increase farm production in India;
- highlight the progress made in agriculture after Independence;
- relate the impact of Green Revolution on traditional farming; and
- explain the causes of low quality of Indian livestock and suggest measures to improve it.

22.3 IMPORTANCE OF AGRICULTURE IN INDIA

Agriculture is the practice of cultivation of crops and rearing of animals. It is one of the most important occupations of the people in India employing nearly 65 per cent of the total workforce.

Due to its great importance, agriculture forms the backbone of Indian economy. In spite of various efforts towards industrialisation after the Independence, even today about two-third of the population in the country depends directly or indirectly on agriculture for a livelihood. Share of this activity in our Gross Domestic Product is about 29 per cent. Agricultural products account for about 30 per cent of the export earnings of India. This activity provides us with not only food but also fodder for cattle, and raw materials like cotton, jute, sugarcane and oil seeds for agro-based industries. Thus agriculture is the most important source of livelihood for the people in India and it plays an important role in providing bulk of employment.

22.4 MAJOR CHARACTERISTICS OF INDIAN AGRICULTURE

Though India is primarily an agricultural country, agriculture suffers from a number of drawbacks. Employing as much as 65 per cent of the manpower, this sector contributes less than 30 per cent to the national income. Indian agriculture is traditional and it is practised by the people not so much as an occupation as a means to obtain sustenance. Agricultural productivity in the country is low in comparison to that in many of the developed countries of the world. The major characteristics of Indian agriculture are enumerated here.

1. Low Per Capita Availability of Land : The per capita availability of land in India is 0.29 hectares while it is 0.89 hectares in USA, 0.92 hectares in Russia, 1.25 hectares in Argentina, 2.00 hectares in Canada and 3.40 hectares in Australia. The per capita land in India is lower than the world average also, which is 0.36 hectares. The low per capita availability of land is an indicator of high pressure of population on this resource.

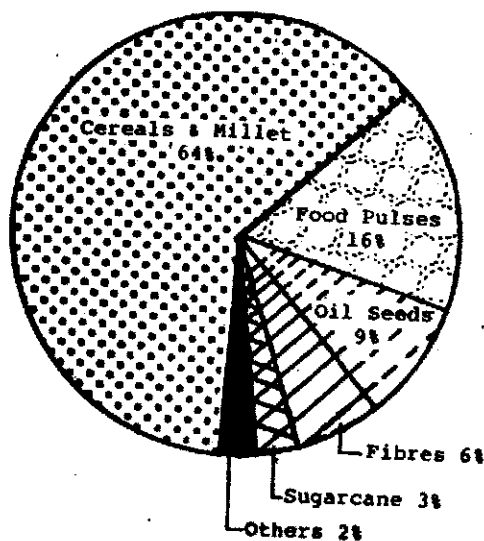


Fig 22.1 Cropping Pattern in India

2. Dominance of Food-grains : The agriculture on small farms in India is done mainly at a subsistence level. About 67 per cent of the cultivable land is under food grains. Development of plantation and commercial agriculture has not been much so far, as is evident from Fig. 22.1

3. High Dependence on Nature: Indian agriculture suffers from vagaries of weather. Success of agriculture in our country depends upon the behaviour of monsoon, which is highly variable and uncertain. Irrigation facilities are available on about 28 per cent of the net sown area. Irrigation facilities have been extended considerably over a large area after the Independence. However, it must be remembered that not more than 45 to 50 percent of our land can be brought under irrigation in near future.

4. Low Yield: The per hectare yield in India is much lower in comparison to that in some of the developed countries. In fact it is lower than even in some of the developing countries like China. This is mainly a result of the poor quality of seeds and traditional methods of farming. The situation, however, has improved to a great extent with the introduction of high yielding varieties of seeds and chemical fertilisers. Today nearly 20 per cent of the total cultivated area of the country is under high yielding varieties of seeds.

5. Low Level of Mechanization in Agriculture: Majority of the farmers in India use traditional methods of farming. The size of the land holdings is very small which does not allow use of large machines. Lack of machines suitable for small farms is also responsible for a low level of mechanisation. Indian farmers even today use old and traditional methods and agricultural implements. The agriculture is labour intensive. This is one of the reasons of low per hectare yields. During the last few decades, the level of farm mechanisation has risen but it is still rather low.

6. Emphasis on Subsistence Farming: Indian agriculture is still largely of subsistence type. The farmers generally grow only those crops which they need for their own consumption. Consequently, the profitability of farming is generally low.

7. A Large Variety of Crops: Indian agriculture is also characterised by a multiplicity of crops. This is partly due to the subsistence nature of farming and partly due to the variations in the prevailing natural, economic and social conditions in different parts of the country. There is thus a lack of specialisation. It often leads to cultivation of crops for which the physical environment is not favourable. However, on the other hand the soil and climatic conditions empower us to raise almost every kind of quality crop be it fine or coarse cereal or millets, pulses, oilseeds, spices, vegetables, fruits, fibre crops (derived both from plants and animals), beverages besides industrial crops like sugarcane, rubber and tobacco. Furthermore, despite very small area under pastures we are the world's second largest producers of milk and milk products.

* Characteristics of Indian Agriculture are high pressure of population on land, dominance of food grains in agriculture, over dependence on nature, low per hectare production, slow progress of mechanization, labour intensive nature of agriculture, variety of crops.

22.6 MAJOR TYPES OF FARMING IN INDIA

A vast size of India along with a great variety of geographical conditions and cultural and technological factors have led to the evolution of various types of farming practices in our country. In some parts of the country rainfall is adequate for farming without any support of irrigation, while in some regions irrigation is necessary. Likewise in some of the regions agriculture is done to produce various crops mainly for local consumption, while in other parts they are grown mainly for sale in the market. On the basis of factors such as use of irrigation facilities, purpose of production, variety of crops and the practices of land utilisation, a number of farming types can be identified in India. The major farming types adopted in the country are described below.

1. **Wet Farming** : This type of farming is practised in those areas of alluvial plains, where the average amount of rainfall is more than 200 cm. Central and eastern parts of Himalayan region, West Bengal, Malabar coast, Assam, Nagaland, Meghalaya, Tripura and Manipur are the regions where more than one crop is grown per year. Rice, jute and sugarcane etc are grown here without irrigation.
 2. **Dry Farming**: This type of farming is practised in areas where the amount of rainfall is generally less than 80 cm. In such regions the farmers grow crops generally without the support of irrigation. As the rainfall is limited in amount, the soil moisture is adequate for growing only one crop a year. The farmers grow the crops requiring a small amount of moisture. Millets are the important crops grown under this system. Large parts in Madhya Pradesh, Gujarat and Rajasthan come under this type of farming.
 3. **Irrigated Farming** : This type of farming is practised in those areas where the rainfall is either seasonal or insufficient for certain crops. Largest part of agricultural area of India comes under this type of cultivation. The major sources of irrigation in such regions are the wells, canals and tanks. Irrigated cultivation can be practised only in those areas where the availability of water from rivers and tanks or some underground sources is sufficient throughout the year and the land is level. Such regions in India are in Punjab, Haryana, Uttar Pradesh, north-western Tamil Nadu and the deltas of peninsular rivers. In these region the crops of wheat, rice and sugarcane etc. are grown with the help of irrigation. There are important pockets of irrigated farming in the states of Maharashtra, Karnataka and Andhra Pradesh in the Deccan Plateau region where sugarcane is by far the most dominant crop. In some regions one crop a year and in others two crops a year are grown under this type of farming.
 4. **Subsistence Farming** : This type of agriculture is practised primarily to meet the local requirements of the people. The main objective of this is to provide subsistence to the largest number of people from a given area of land. Shifting cultivation, sedentary cultivation and intensive cultivation are types of subsistence farming. The size of holding is small. A greater emphasis is laid on use of human labour and some simple farm implements.
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All kinds of manures and fertilisers are used for maintaining fertility of soils. Subsistence cultivation in India is practised in Madhya Pradesh, eastern Uttar Pradesh and parts of southern Bihar, besides several hilly regions in most parts of the country.

5. Commercial Farming: Although most of agriculture in India is of subsistence type where bulk of the production is consumed locally, in some of the regions commercial farming is also practised. Under this system, the farmer grows crops mainly for sale in the market. Under this type of farming generally the crops used as industrial raw materials are grown. Cultivation of sugarcane in Uttar Pradesh, Maharashtra and the other states, cotton in Maharashtra, Gujarat and Punjab etc., jute in West Bengal and neighbouring areas are examples of this type of farming. In some regions, especially where the size of holdings is large, even the crops grown under subsistence type of farming are also grown on a commercial basis. Rice and wheat cultivation in Punjab and Haryana and cultivation of vegetables and a number of other crops in Terai region are examples of this

6. Plantation Agriculture: Cultivation of a single crop on large scale, managed like industries, is called plantation agriculture. This type of farming is done on large holdings and a lot of capital is required in it. Modern scientific techniques are applied in production and trade of the product. Tea gardens or estates in India are a typical example of plantation agriculture where the holdings are large, management is centralised and farming is done on most scientific and commercial line. On the other hand the plantation of coffee, rubber and coconut are characterised by small holding owned largely by small or medium farmers.

7. Shifting Cultivation: This is the system of cultivation in which land is cleared of forests for raising crops. The crops are grown for a few years till the soil is fertile. As the fertility of soils declines, new areas are cleared and the farmers move on to the newly cleared areas. In India, this type of cultivation is done in Meghalaya, Manipur, Tripura, Nagaland and Mizoram. It is practised generally by the tribal people in areas where the population is sparse. Locally, it is called *jhum* cultivation.

8. Terrace Cultivation: This type of agriculture is done on the slopes of the Himalayas and the hills of the peninsular region. The people in these regions carve out terraces on the hill slopes in order to conserve soil and water to grow crops. This involves hard manual labour. Terrace cultivation is being adopted in the northeastern states of India by the farmers who practised shifting agriculture. This trend indicates an increasing pressure of population on land and the reduced area available for shifting cultivation in these states

9. Intensive and Extensive Farming: Farming system under which an effort is made to obtain the maximum yield from the limited amount of land by applying maximum labour, is called intensive farming. This practice is adopted in areas of high density of population where the land available is limited and there is a great pressure of population on land. This type of farming is labour intensive and an effort is made to maximize the yield by applying manures and fertilisers. Farming in eastern part of Ganga plains is of intensive type. In contrast, the farming done on large holdings using machines and employing fewer workers is called extensive farming. This type of farming is typical of areas having a low density of

population. Due to lack of man-power, machinery is extensively used under this system. This is capital intensive also. An effort under this system is made to increase production by bringing a large area under cultivation. Although in India there are no areas of typical type of extensive farming, agriculture in areas of limited rainfall such as Rajasthan and parts of Gujarat and Madhya Pradesh resembles this system. The Terai region of the Himalayas with a relatively low density of population also has a large size of holdings. Here also the farming system resembles extensive farming.

* Due to variations in the distribution of rainfall, size of holdings, technological developments and other factors, different types of farming systems have evolved. Some of the important systems of farming adopted by Indian farmers are wet farming, dry farming, irrigated farming, subsistence farming, commercial farming, terrace farming, intensive farming and extensive farming.

INTEXT QUESTIONS 22.2

1. Complete the table by selecting appropriate characteristics and areas practised of farming systems in India given below.

Characteristics : Large production for market; Factory like management. Practised in areas of low rainfall. Most of the production consumed locally. Practised in areas of high rainfall.

Areas : Terai region. Rice cultivation in West Bengal; Tea cultivation in Assam. Malabar coast. Rajasthan and Gujarat.

Types of Farming	Chief Characteristics	Major Areas
(i) Subsistence Farming	_____	_____
(ii) Plantation Farming	_____	_____
(iii) Wet Farming	_____	_____
(iv) Commercial Farming	_____	_____
(v) Dry Farming	_____	_____

2. Give the opposites of
 - (a) dry farming _____
 - (b) subsistence farming and _____
 - (c) extensive farming _____

22.7 CROPPING SEASONS AND CROPPING PRACTICES

Due to variations in the natural environment and varying pressure of population on land, a variety of cropping systems are adopted by the farmers in different parts of the country. A long growing season enables growing of crops all the year round if the other conditions are

favourable. Therefore, Indian agriculture is characterised by a variety of cropping seasons and cropping systems.

(A) Major Cropping Seasons in India

There are three main cropping seasons in India : (i) Kharif season, (ii) Rabi season and (iii) Zaid season.

The Kharif season corresponds to the rainy season. The crops grown during this season are sown before the onset of the rains and they are harvested before the winter sets in. Major crops of Kharif season are rice, cotton, maize, jute, various types of pulses and sugarcane particularly in northern India.

Rabi crops are sown in the beginning of the winter season and they are harvested before the beginning of the summer. Wheat, barley, gram, peas and potatoes etc. are grown during Rabi season.

The short period in between the harvest of the rabi crops and sowing of the kharif crops is called the Zaid season. A variety of short maturing crops of vegetables, watermelons etc. are grown during this season. Boro rice in West Bengal and moong in Maharashtra are also crops of Zaid season.

(B) Rotation of Crops

There are a number of methods of maintaining soil fertility, including application of manures and fertilisers and leaving the land fallow for some time. Crop rotation is also a method of maintaining soil fertility. Under this system, a number of crops are grown successively in the same field in such a manner that different crops draw plant nutrients from the soil in different proportion and from different strata of the soil. Also some of the crops replenish the nutrients in the soil which have been taken by the other crops grown before them. A crop uses certain vital minerals and organic matter from the soil if it is grown in the same field year after year. But different crops planted in the same field on a regular schedule will replace lost minerals and organic matter. Thus a number of crops can be grown successively in a year or over a number of years keeping the fertility of the soils intact without the use of chemical fertilisers. In crop rotation, the leguminous crops like peas, pulses etc. play an important role. These crops add to the nitrogenous content of the soil. They are usually grown after crops like cotton and cereals which take up nitrogen from the soil. Selection of crops for rotation in a region depends upon the soils and the farming practices adopted in the region.

(C) Multiple Cropping

Growing of two or more than two crops on the same land in a year is called multiple cropping. This is practised in those areas where there is sufficient moisture in the soil all the year round or where irrigation facilities are available to meet the water requirements of the crops during the dry period. It is practised in most of the Ganga Plains, the deltaic regions and irrigation pockets of the Peninsular plateau.

(D) Inter Cropping

Growing of more than one crop simultaneously on the same piece of land is called inter-

cropping. Under this system the crops are mixed in such a manner that one of the crops replenishes those nutrients in the soil which are consumed by other crops. Growing period of different crops varies. Therefore a number of crops are sown simultaneously but they are harvested at different times. For example, quick maturing crops like jowar, bajra, maize and certain pulses are grown simultaneously with late maturing crops like cotton, pulses and sugarcane. When the farmer finishes harvesting one crop, the other crop is ready. In this system, there are fewer chances of total economic losses to the farmers because if the farmer gets lower returns from one crop, the other crop makes up this loss. The system thus helps farmer to safeguard against the unpredictability of weather and the prices of his product.

* Growing of different crops on the same field in some definite order so that the fertility of the soil is preserved, is called crop rotation. Growing of two or more crops on the same land in a year is called multiple cropping. Growing of more than one crop simultaneously on the same land is called inter-cropping.

22.8 CROP COMBINATIONS

In most parts of the India, major portion of the land is used for cultivation. In some parts of the country, only a single crop is grown in the entire region. But the general trend is to grow more than one crop in a region. These crops are selected on the basis of the natural, economic and social conditions prevailing in a region. Some of the crops are grown over large areas while some are grown in limited areas only. The combination of various crops grown in a region in one year is called the crop combination of that region. The agricultural regions identified on the basis of such crop combinations are called the crop-combination regions. Because the crops in most of the areas are not grown individually, but they are grown in combination with various other crops, identification of a region with a particular crop is not correct. For example, division of India into wheat and rice regions is not correct and it conceals one of the chief characteristics of Indian agriculture, namely the characteristic of a large variety of crops grown in most parts of the country. Although wheat is the dominant crop in Punjab, the crops of rice, pulses and sugarcane etc. are also grown there. In the same manner crops like wheat, oilseeds and pulses etc. are grown in areas where rice is the dominant crop. For a detailed study of agriculture in a region, the agricultural maps are prepared now-a-days on the basis of the crop combinations in that region. Agricultural scientists have developed a number of techniques for identifying crop combination regions. With the help of these techniques the crop combination region can be studied easily. According to the simplest of such techniques, the leading crops in a region from the point of view of total area under each crop are selected. They are ranked as first, second, third etc. On the basis of these dominant crops, one can identify and delimit crop combination regions. Each of the regions is identified by the name of the dominant crop and such regions are further subdivided and differentiated on the basis of the second and third ranking crops.

* The combination of various crops grown in a region in one year is called crop combination and regions identified on the basis of the major crops grown there are called crop-combination regions.

22.9 INTENSITY OF CROPPING

Intensity of cropping is measured with respect to the number of crops grown in a year on an agricultural land. If only one crop is grown in one year, the intensity of cropping is low and if two or more crops are grown in a year, the intensity of cropping will be high. A low intensity of cropping indicates a low level of land utilisation in that region. Thus the intensity of cropping indicates the degree of utilisation of land for cropping. Intensity of cropping depends upon the size of holdings or the per capita land availability, physical environment, social customs, means of irrigation and agricultural methods adopted in an area. In India a large part of the area has low rainfall and limited means of irrigation. Some other areas remain flooded for a few months every year. In such regions, one can not raise more than one crop per year. Therefore, the intensity of cropping in such regions is low. The areas of high density of population, fertile soils and having irrigation facilities or large amount of rainfall, generally have a higher intensity of cropping.

Intensity of cropping varies from one part to the other in our country. It is mainly a result of the variations in the fertility of soil, amount of rainfall and the density of population. Areas receiving a higher amount of rainfall, having fertile soils and a high density of population, such as West Bengal and the coastal plains have a high intensity of cropping. On the other hand the dry regions such as parts of Rajasthan and Gujarat and the areas of poor soils in parts of Madhya Pradesh have a low intensity of cropping. Most parts of Punjab and Haryana, Karnataka and Tamil Nadu have a moderate intensity of cropping.

Through expansion of irrigation facilities and introduction of cropping in the dry season in some regions since 1950, an increase has been registered in the intensity of cropping. Per hectare production has also increased due to an increase in the area sown more than once per year. Intensity of cropping is higher due to sufficient amount of rainfall, fertile soils and developed means of irrigation in northern plains, western Assam and plain regions of Tripura. On the other hand it is lower in the mountainous and dry regions of the country.

* Intensity of cropping refers to the number of crops grown per year on the same piece of land. Larger the number of crops grown per year on the same land, higher the intensity of cropping.

22.10. MEASURES BEING ADOPTED TO INCREASE AGRICULTURAL PRODUCTION

Per hectare production of different crops in India is lower than that in many other countries due to traditional methods of farming, low investment of capital, absence of land reforms and lack of education among the farmers. Keeping in view the increasing population and the growing demand for various agricultural products, it is necessary to increase the agricultural production. As the area available for cultivation is limited, it can be done through raising per hectare yield or the productivity of crops. As agriculture employs a very large proportion of the manpower in the country and contributes a significant proportion of the national income,

development of this sector of our economy is imperative for the overall economic development in India. In order to achieve the target of a high productivity in Indian agriculture, the following measures have been adopted

- (i) **Use of Good Quality Seeds, Fertilizers and Irrigation Facilities:** Indian farmers have been traditionally using poor quality seeds and there is high reliance on rainfall. In order to increase the productivity of farming, the farmers in the country are being provided with high yielding varieties of seeds, chemical fertilisers and irrigation facilities. The country does not have sufficient area for extensive farming. Therefore, more attention is being paid to make farming more intensive. Keeping this in view, irrigation facilities have been extended over a large area and provision of irrigation facilities is still one of the highest priorities of agricultural planning in the country. Controlling periodic floods in flood prone areas is being taken care of through long term planning and multipurpose river valley projects.
- (ii) **Mechanisation of Farming:** Mechanization of agriculture is also necessary for its modernisation. The use of improved tools and machines such as iron ploughs, tractors, trolleys, harvesters, threshers, water pumps and sprinklers on Indian farms has resulted in saving manual labour, animal power and above all time. It has increased consumption of diesel and electricity in the farm sector. Indian farmers are generally poor. Modern machines are being made available to them on installments through co-operative societies and other financial institutions.
- (iii) **Insect and Pest Control:** Insects and pests cause damage to crops thereby reducing the per hectare yield of crops. Use of insecticides and pesticides has been encouraged in order to prevent such losses. Besides the various types of chemical insecticides, the farmers are now encouraged to adopt the technique of biological pest control. Under this system, the insect pest populations are controlled by introducing some other insects etc. which feed on the insect pests but they themselves do not harm the crops. Thus the crops can be saved from the pests without using chemical insecticides.
- (iv) **Educating the Farmers:** Most of the Indian farmers have been uneducated and they were not aware of scientific methods of farming. Keeping in view the need to educate the farmers about the new developments in agriculture, demonstration farms and agricultural extension centres have been established in various parts of the country. Suratgarh State Farm in Ganganagar District in Rajasthan is one of the important demonstration centres. These farms help in popularising the use of agricultural machinery, good quality seeds and modern techniques of farming. In addition to these, the Indian Agricultural Research Institute, New Delhi and other institutions produce good quality seeds and make them available to farmers in all parts of the country. Use of these seeds has helped in increasing agricultural production. Use of these high yielding varieties of seeds has resulted in great increase in wheat production in Punjab and Uttar Pradesh. It has been the basis of the Green Revolution in the country. In addition the use of radio and television programmes specially addressed to farmers have gone a long way in this regard.

(v) **Consolidation of Holdings:** Small and scattered holdings of land are one of the reasons of low productivity of agriculture. They are an obstruction in the way of scientific cultivation of land and the use of improved implements and machines, seeds, chemical fertilisers etc. This problem of small and scattered holdings is being solved through consolidation of holdings.

(vi) **Improved Marketing:** Prices of various crops are fixed by the government well before each agricultural season to make them remunerative and the problems relating to marketing have been solved through establishments of co-operative societies and regulated markets. Fixation of the minimum price of various crops helps the farmer in getting a suitable price even if the prices of the crops in the market fall considerably during the harvesting season.

(vii) **Intensive Farming and Crop Rotation:** In addition to the above measures, intensive farming, dry land farming and crop rotation are also being taken up to increase agricultural production in the country.

(viii) **Abolition of Zamindari System and Ceiling on Holdings:** Before Independence the zamindars rented or leased their land to the tenants and collected most of the produce as revenue or rent from the farmers. While the economic condition of the farmers remained poor, the zamindars lived in maximum comfort. Due to lack of economic resources and the ownership of the land, the farmers could not take steps to develop or improve the agricultural land. After Independence the government abolished this system and the farmers have been made the owners of the land they cultivated.

The size of holdings in India is not uniform. It had been felt that the very large holdings are not being used efficiently while many farmers did not have any land to cultivate. Therefore, the government has fixed the ceiling of agricultural land holdings through legislation. According to this law no farmer can own land in excess of the ceiling fixed by the government. The surplus land thus obtained is distributed among the landless farmers.

(ix) **Other Schemes:** In addition to the schemes mentioned above, the Government took up rural electrification at a very rapid pace. This provides the farmers with facilities to install tube-wells for irrigation. Most of the villages have been connected with the towns through pucca roads so that the farmers can carry their produce to the market. The scheme of crop insurance has also been introduced. A number of schemes to protect crops from pests, insects and locusts etc. were also formulated and implemented. Special agricultural programmes are relayed through radio and television for the benefit of the farmers. A number of agricultural fairs are organised in agricultural universities and many districts in the country through which the farmers are informed about various new developments in the field of agriculture. A number of magazines which provide the latest information about agriculture are published by the agricultural universities and the Ministry of Agriculture. Through these schemes and programmes the Indian farmer will now be able to improve his economic status by increasing the productivity of his land. Radio and television are used for announcing weather conditions and weather forecasts every morning and evening for the benefit of a farmer in each part of the country.

* Various steps have been taken to raise agricultural production. These are: Good quality seeds, increased use of fertilisers and extension of irrigation facilities, mechanisation of farming and insect and pest control, use of modern machinery in agriculture, improved marketing and transport system and fixing of minimum support prices, control of floods, intensive farming and crop rotation system, consolidation of holdings, education of farmers, establishment of research institutes and demonstration farms, abolition of Zamindari system and ceiling on holdings.

22.11 GREEN REVOLUTION

Before Independence, Indian agriculture, though self-sufficient, was relying exclusively on its traditional ways of farming. The partition of undivided India proved a great blow to Indian agriculture as she lost the world's best rice and jute bowls to East Pakistan – now Bangladesh. Likewise world's best irrigation network sustaining cotton and wheat baskets went to West Pakistan. India was thus all of a sudden found a deficit country in major food grains and fibre crops. The developmental activities of Independent India resulted in a sharp fall in death rates leading to rapid growth in population. Agriculture which was neglected under the foreign rule had to face tremendous challenges. For nearly two decades, the country had to depend heavily on food imports. Periodic failures of monsoons, particularly in 1967 made the situation worst. However, this adverse situation was turned into an opportunity by the hard working Indian farmers backed by agriculture scientists and engineers. Soon India became nearly self-sufficient in food. This saga of Indian farmers' achievement is popularly known as Green Revolution.

Green Revolution does not stand so much for all increase in farm production as it implies a marked increase in production per unit area i.e. per hectare. This was realised mainly through a three-pronged strategy of (i) popularisation of improved varieties of high yielding hybrid seeds, (ii) application of chemical fertilisers and (iii) extension of adequate and assured irrigation. The chief characteristics of Green Revolution are discussed below.

1. Use of High Yielding Varieties of Seeds: In the beginning, the high yielding varieties of seeds of wheat and rice were imported from Mexico and Philippines respectively. When introduced in the country they gave very good results and came to be known as revolutionary seeds. Later, the agricultural research institutes in India developed their own high yielding varieties of seeds. As a result of these developments in the sphere of agriculture, the production of wheat in Ludhiana District in Punjab increased from 13 to 33 quintal per hectare. Likewise, per hectare production of rice in Godavari and Kaveri Deltas also almost doubled. At present 22 agricultural universities and a number of agricultural research institutes are engaged in the development of new high yielding varieties of seeds. High yielding varieties of seeds of jowar, bajra, maize, groundnut, cotton, mustard and soybean have also been developed in addition to those of wheat and rice. The development of high yielding hybrid varieties is a continuous process as these are developed through the cross breeding of two different varieties and are effective for a short duration only.

2. Use of Chemical Fertilisers: According to agricultural scientists, agricultural production can be increased upto three times by maximum use of chemical fertilisers. It has been found that consumption of one tonne of chemical fertilisers generally results in additional production of food grains under suitable conditions. The total consumption of fertilisers in India in 1950-51 was 69,000 tonnes which increased to more than 13 million tonnes in 1994-95. Over and unbalanced utilisation of chemical fertilisers can be harmful also. It can adversely affect the land and make it barren and unproductive. Therefore, the chemical fertilisers should be used carefully so that the chances of over use and disproportionate use are minimized.

3. Quick Maturing Crops: Quick maturing varieties of crops were developed. These crops take less time in maturing than the traditional crops. For example if the crop of wheat matured in five months earlier, now it takes only four months to mature. It helps in growing more crops per year on the same land.

4. Increase in Irrigated Area: It is difficult to increase the production of agriculture only with seeds and fertilisers. The high yielding varieties of seeds and fertilisers require sufficiently large quantity of water also. Therefore, adequate and timely supply of water is necessary for the crops. Provision of irrigation facilities through canals, tube-wells and wells is necessary for it. It enables farmers of all categories to take advantage of these modern inputs in agriculture. However, supply from privately owned wells and tube wells is more assured than from the public canal system.

5. Use of Agricultural Machinery: Due to the use of quick maturing varieties of seeds, the time between the sowing and harvesting of crops has reduced, necessitating use of agricultural machines like tractors, cultivators, harrows, threshers and harvesters etc. With the help of these machines, more work can be done in shorter time and it has made double and triple cropping possible.

6. Agricultural Education and Research: Agricultural research is necessary to evolve new methods and technology for increasing the agriculture production. Twenty-two agriculture universities in the country are working at new methods of increasing agricultural production through continual development of better seeds and agricultural implements to suit local requirements.

7. Multiple Cropping: Experiments to raise more than one quick maturing crops and raising of more than one crop simultaneously by using new varieties of seeds and chemical fertilisers were undertaken in 1967-68. Presently two or more than two crops are raised annually on more than 20 per cent of the total irrigated area in the country.

8. Use of Insecticides and Pesticides: Use of insecticides and pesticides was introduced to protect crops from various insects and pests. The information about the insecticides and about their procurement is provided to the farmers at the local block level.

Green revolution has been able to influence the rural economy in limited areas only. The major areas of this revolution so far have been Punjab, Haryana and Western Uttar Pradesh,

because big farmers in these region can invest more amounts of money on fertilisers, seeds and irrigation and can therefore use high yielding varieties of seeds, agricultural machiner and modern technology. The majority of farmers in the country who are dependent upon rainfall have been neglected and this has resulted in ever-increasing regional differences income of the farmers.

Generally Green Revolution has been found more successful with regions of moderate rainfall, well supplemented with surface and ground water irrigation facilities. In the regions of heavy rainfall very often chemical fertilisers are washed away by heavy rains discouraging their widespread use by farmers. In the regions of coarse grass, the use of fertilisers is discouraged by low and uncertain rainfall and general lack of irrigation waters

Green Revolution generally stands for increased farm productivity per unit area through the application of triple technology providing (i) high yielding seeds, (ii) more chemical fertilisers and (iii) assured irrigation waters simultaneously.

INTEXT QUESTIONS 22.3

1. Define the following in one or two sentences each :
 - (a) Crop rotation _____
 - (b) Intensity of cropping _____
 - (c) Green revolution _____
2. Name any two factors affecting intensity of cropping .
 - (a) _____
 - (b) _____
3. Name any two important measures to increase agricultural production in India
 - (a) _____
 - (b) _____
4. In which two states of India has green revolution been most successful ?
 - (a) _____
 - (b) _____

22.12 DISTRIBUTION OF MAJOR CROPS

India is a vast country with a variety of geographical conditions, hence, almost every crop can be grown in one part of the country or the other. The crops grown in various parts of India can be classified into the following categories.

(i) **Cereals:** This group includes the grain crops like rice, wheat, jowar, bajra, maize and ragi

(ii) **Pulses:** They include tur or arhar, urad (blac gram), mung, gram and peas etc. making India the largest producers and consumer of pulses. They are the major source of protein for the common man.

- (iii) **Oilseeds:** The seeds from which oil is expelled are called the oilseeds. They include groundnut, mustard, rai, cotton seed, soyabeans, coconuts, castor seed and linseed etc.
- (iv) **Beverages:** This category includes the crops which are used for making soft drinks. Tea and coffee and cocoa are included in this group.
- (v) **Fibre Crops:** The crops providing fibres are included in this category and the cotton and jute are the important plant fibre crops produced in India. Wool and Silk are animal fibre.
- (vi) **Other Crops:** The other important crops grown in India include sugarcane, rubber and tobacco etc.

Rice

Rice is the leading food crop of India and it feeds a larger section of the population of the country. India ranks second after China in the production of rice in the world. With an annual production of more than 80 million tonnes, India accounts for about 21 per cent of the total world production of rice. About 25 per cent of the total cultivated area in the country comes under this crop.

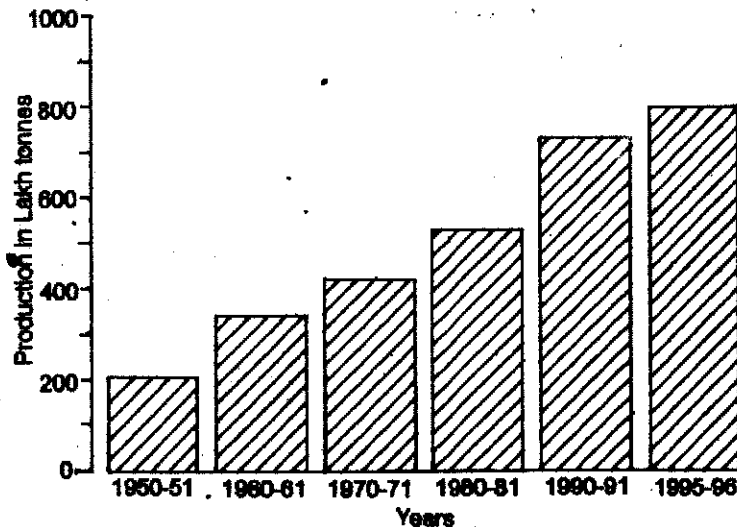


Fig. 22.2 Rice Production in India

Rice is a plant of warm and humid climate. It grows best in areas of more than 100 cm rainfall and irrigation is required if it is grown in areas of lesser rainfall. The fertile alluvial or clayey soils with a high water holding capacity are ideal. Being a labour intensive crop, rice is generally grown in areas of high density of population. The leading producers of rice in India are the states of West Bengal, Bihar, Andhra Pradesh, Orissa, Tamilnadu, Uttar Pradesh,

Punjab and Haryana. Besides these states rice is grown in Karnataka, Kerala, Maharashtra, Assam and Jammu and Kashmir. In the Himalayan region, especially in Jammu and Kashmir Himachal Pradesh and Uttar Pradesh hills, rice is grown on terraced fields. Punjab and Haryana are producers of surplus rice. Availability of good irrigation facilities form the basis of large production of rice in these states. As rice is the staple food of the largest number of people in the country, efforts are being made to increase the per hectare yield by adopting new techniques of farming and using the high yielding varieties of rice. Extension of irrigation facilities is another important measure being adopted to increase rice production in the country. By and large rice is a kharif crop, but it can be grown in rabi and zaid seasons too in deltaic regions of peninsular India.

Wheat

Wheat is a rabi crop and ranks second to rice in both area and production in India. It is cultivated on more than 10 per cent of the net sown area in the country. India is an important producer of wheat in the world following China and USA. However, the average per hectare yield of wheat in India is lower than in many of the developed countries. The average per hectare yield of wheat in our country is only about 2553 kg. Wheat is cultivated in all parts of India except for the southern parts of the peninsular region. From the point of view of production, wheat is the leading crop of North India. The major producers of wheat in the country are Uttar Pradesh, Punjab and Haryana. Wheat is grown in Madhya Pradesh, Maharashtra, Bihar, Gujarat, Rajasthan and Deccan Plateau region also.

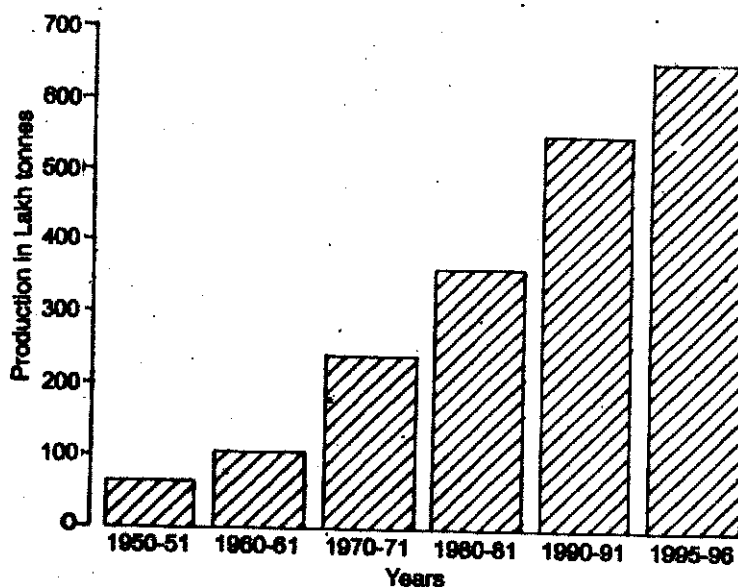


Fig. 22.3 Wheat Production in India

Wheat has been the crop which has witnessed the maximum increase in its production under the Green Revolution. The Indian Council of Agricultural Research has developed a number of high yielding varieties of wheat for increasing its per hectare yield. It is due to such efforts that the per hectare yield of wheat has increased in the country and we have been able to overcome the shortage of food grains in our country.

Millets

Millets are the coarse grains like jowar, bajra, ragi which are used as food grains in many parts of peninsular plateau. Most of the millets require low rainfall of less than 50 cm and they can be grown on less fertile soils also. Gujarat and Rajasthan are the leading producers of bajra and the largest production of jowar comes from Madhya Pradesh and Maharashtra. Ragi is grown mainly in the drier parts of Andhra Pradesh and Karnataka. Although the production of millets is much lesser than that of rice and wheat, these crops serve as food crops for a large section of the poor people in the areas where they are grown. While ragi requires more rain than jowar, the bajra is grown in the region of scanty rainfall.

Oilseeds

India has the largest area under oilseeds in the world and also is the largest producer of oilseeds accounting for about 10 per cent of the total world production of vegetable oil and fats. The major oilseeds grown in India are groundnut, mustard, sunflower, soyabean, linseed and castorseed. The oilseeds provide edible and non-edible oils. Among the above mentioned oilseeds, the linseed and castorseed provide non-edible oils and the remaining ones provide

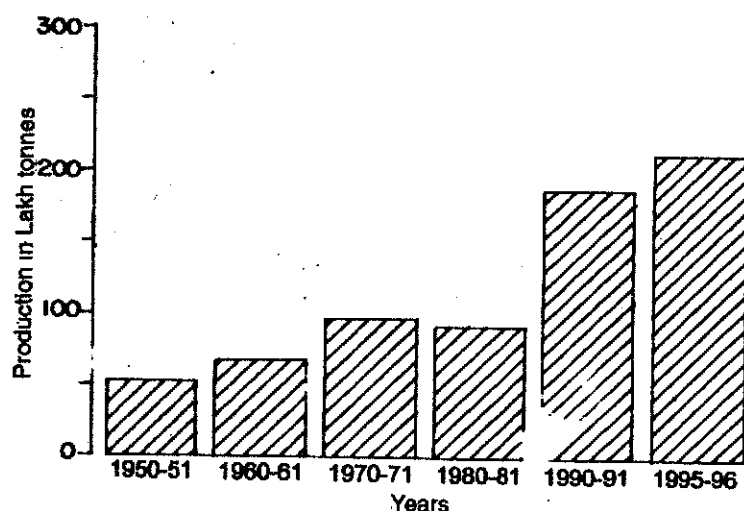


Fig. 22.4 Production of Oilseeds in India

edible oils. Most of the oilseeds are grown as dry crops. Rajasthan, Gujarat, Madhya Pradesh and Andhra Pradesh are the important producers of oilseeds in India. One of the adverse impacts of the Green Revolution in India had been a decline in the area under the oilseeds. However, as a result of the government efforts in the form of development of high yielding varieties of oilseeds, the area under the oilseeds has increased. The production of oilseeds in the country is shown in the figure 22.4. While groundnut is primarily a kharif crop mustard and rai is a rabi crop. Coconut is the major source of edible oil in Kerala, the land of coconuts

Sugarcane

Sugarcane is an important cash crop of India and we have the largest area under this crop in the world. India is also the leading producer of sugarcane in the world. This crop requires a high temperature, good irrigation facilities and fertile soils. Although it is grown in many states in India, Uttar Pradesh, Maharashtra, Bihar, Karnataka, Tamilnadu and Andhra Pradesh are the leading producers of sugarcane.

Sugarcane Research Institute in Coimbatore has developed a number of new varieties of sugarcane. It is used for making sugar and gur. Out of the total production of the sugarcane in the country, considerable proportion is used for making gur. Fig. 22.5 shows the production of sugarcane in India.

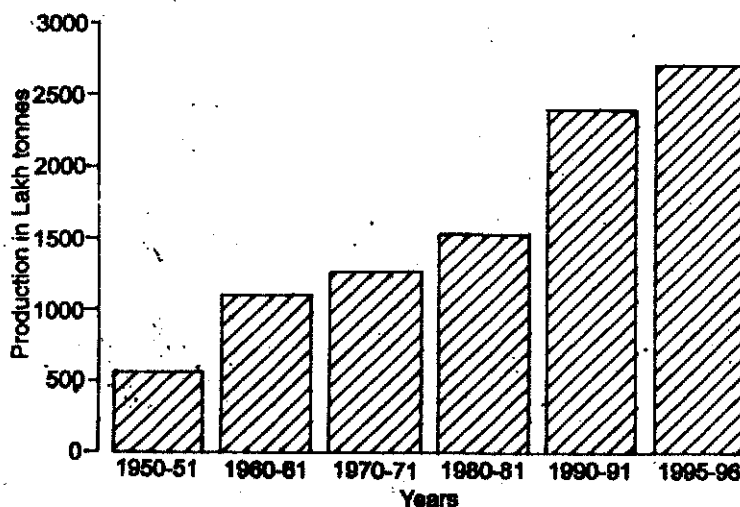


Fig. 22.5 Sugarcane Production in India

Tea

Tea is a major export crop of India and the country earns a sizable amount of foreign exchange through export of tea. Tea grows best on the mountain slopes receiving a large

amount of rainfall and having warm temperatures. Tea plantations in India occupy an area of more than 3 lakh hectares. Most of these plantations are situated in the Surma and Brahmaputra Valleys in Assam. Most of these plantations are laid on the hill slopes. Tea is grown in the northern parts of West Bengal (Darjeeling and Jalpaiguri), on the hill slopes of Nilgiris in South India and in Kangra and Kumaon regions of western and central Himalayas also. India is not only the largest producer but also the leading exporter of tea in the world not withstanding a rapidly growing home market.

Coffee

Coffee plant was introduced in India by the East India Company in the seventeenth century. We produce about 2 per cent of the total coffee produced in the world. The quality of Indian coffee being good, it fetches good price in the international market and we earn a large amount of foreign exchange through coffee exports. Coffee requires a warm and humid climate and it requires a high temperature in shade. Like tea, coffee is also grown on mountain slopes, but in the shade of large trees. Karnataka is the leading coffee producer state in India followed by Kerala and Tamilnadu. About half of the coffee produced in India is exported. Coffee plantations have recently been started in Mizoram also.

Cotton

Cotton requires a moderate rainfall of about 80 cm and a cloud free weather for about 150 days. Deep soils with high moisture holding capacity are ideal for it. Although the black soil of the peninsular plateau is ideal for its cultivation, it can be successfully grown in alluvial soils also with the help of irrigation.

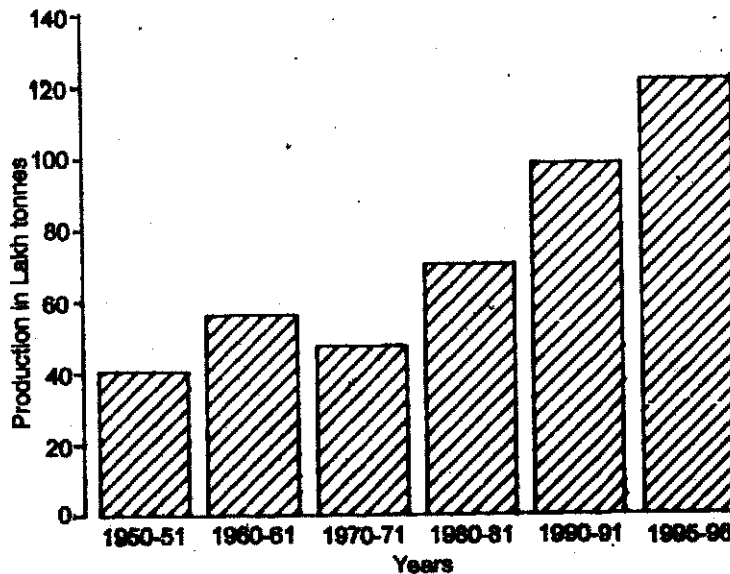


Fig. 22.6 Cotton Production in India

Cotton is the leading cash crop of India and it provides raw material to one of the most important industries of India, the cotton textile industry. Although the cotton production in India is satisfactory, its quality is rather poor. Most of the cotton grown in the country is of short and medium staple quality. The poor quality cotton from the country is exported as it is used for mixing with wool and therefore, fetches good price in the international market. However, the long staple cotton to make good quality fabrics is imported. The long staple cotton these days is grown in Punjab and Haryana. The leading producers of cotton in India are the states of Maharashtra, Gujarat, Punjab and Haryana. Karnataka, Tamil Nadu and Madhya Pradesh also grow cotton. Study the statistics of production of cotton in Fig. 22.6.

Jute

Jute is also a fibre crop and it is called the golden fibre of India. This crop still earns a sizeable amount of foreign exchange. Jute is grown in West Bengal, Assam, Bihar and Orissa only, as the geographical conditions suitable for its cultivation are found only in these areas. These conditions include a high temperature, heavy rainfall and well drained fertile alluvial soils. Jute reduces the soil fertility very rapidly and due to this fact it is generally grown in those regions which are flooded regularly and a new layer of silt is freshly deposited. Due to the declining demand of jute in the world market, the area under jute cultivation has started declining. The jute fibre faces a stiff competition from the synthetic fibres which are cheaper and often more durable also. The trends in jute production are shown in Fig. 22.7. Soon after Independence we were found highly deficient in jute in terms of acreage and production. However, very quickly we not only become self-sufficient in jute production but also overtook Bangladesh in total production.

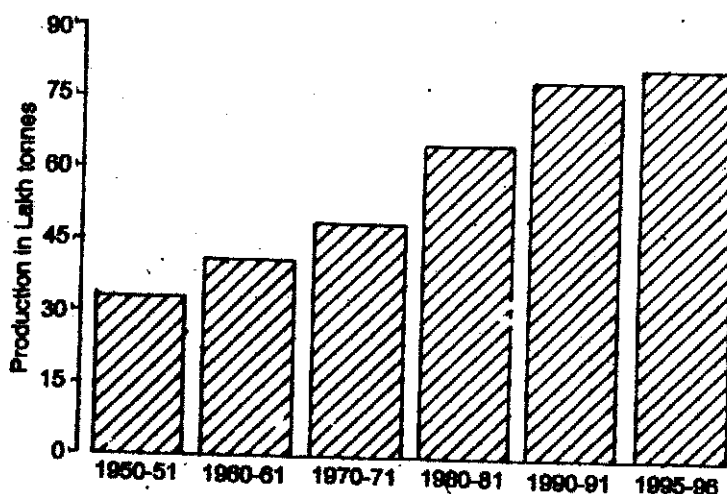


Fig. 22.7 Jute Production in India

Tobacco

India is the third largest producer of tobacco after China and the USA. Tobacco thrives best in areas of warm frost free climate and soils which are rich in potash content. This crop is grown in many parts of India. The leading producer states in the country are Andhra Pradesh, Gujarat and Madhya Pradesh. Tobacco produced in India is used for manufacture of cigarettes and bidis.

Some Other Crops

In addition to the crops described above, India holds an important position in the world in respect of a number of other crops also. The country has been famous for the production of spices for a long time. India produces large quantities of pepper, cloves, cardamom etc. among the spices. Kerala and Karnataka are the leading producers of spices in the country.

India is also the leading producer of fruits in the world. India grows a large variety of fruits including both the tropical and the temperate fruits. Banana, mango and pineapples are the important tropical fruits grown in India. Largest producer of banana is Maharashtra. There are a large number of varieties of mango and they are grown in various parts. Uttar Pradesh, Tamilnadu, Maharashtra and West Bengal are important producers. Pineapple is grown mostly in the northeastern states. Among temperate fruits, apples, peaches etc. are grown in the Himalayan region and oranges are grown in Maharashtra and Sikkim. Maharashtra, Karnataka and Andhra Pradesh grow grapes in large quantities. A number of dry fruits are also produced. Among the dry fruits of the temperate zone, almonds and apricots are grown in the western Himalayan region and the cashewnuts in Kerala and Goa.

Sericulture and Apiculture

Sericulture is the activity of rearing of silk worms and obtaining silk from them. It has been an important activity in some parts of India. The important raw silk producing states in the country are Assam, Karnataka, Jammu and Kashmir, Himachal Pradesh, Madhya Pradesh and Bihar.

Rearing of honey bees and production of honey is called **apiculture**. This activity has been introduced in various parts of India to help the small farmers and the landless people in getting more income. It can be done at small scale without much investment. This activity has become popular in Himachal Pradesh, Jammu and Kashmir and Uttar Pradesh hills.

INTEXT QUESTION 22.4

- (a) Name two important cereal crops of India
(i) _____ (ii) _____
 - (b) Name one state each from the north and south which produces tea
(i) _____ (ii) _____
 - (c) What is India's rank in tea production in the world ? _____
 - (d) How much of the total cultivated area in India is under wheat ? _____
 - (e) Which state in India is the leading producer of sugarcane ?

-

2. Mention two geographical conditions necessary for production of jute
- (i) _____
- (ii) _____

22.13 ANIMAL RESOURCES

Animal resources play an important role in solving the food problem. They provide various kinds of food products and raw materials for industries. Milk, ghee, butter, meat, eggs, leather, wool and silk are all obtained from animals. They provide a large proportion of the energy requirements of the farm sector in India. Although the Government of India has been encouraging use of machinery for increasing agricultural production, the farmers in the country even today depend for much of their agricultural work on the draught animals. About 26 per cent of the total agricultural output is contributed by the livestock sector. A number of products are obtained from the animals. The cattle and buffaloe provide milk which is a nutritive food. The production of milk in 1994-95 was about 63.5 million tonnes. Animals are used in agricultural activities like ploughing of fields, drawing of water from wells and for carrying loads. They provide hides and skins which form the raw material of the leather industry. Animal products such as hides and skins are exported in large quantities from our country. Sheep, goats and camels provide wool. About 25 per cent of the total wool produced in India is exported. Last, but not in the least, the animal refuse serves as valuable manure which helps in maintaining soil fertility besides providing cooking gas

* Economic importance of animals in India are supply of power to agriculture sector, source of manure compost, provide hides and skins provide wool, milk and meat etc.

Although India has the largest cattle population in the world we do not rank among the leading producers of the animal products. The major cause of this backward state of India in respect of animal products is the poor quality of Indian animals. The average milk production per cow in India is extremely low in comparison to that in the countries like New Zealand, Australia, Denmark and Israel. While the average milk yield per cow in India is less than 2 litres per day, it is as high as 30 to 40 litre in Australia and New Zealand. India has a total cattle population of nearly 196 million. The country accounts for about 21 per cent of the cattle population of the world. In addition we have about 18 per cent of the goats, 4 per cent of the sheep and 57 per cent of the total buffaloes of the world.

As mentioned above, the quality of animal resources of India, especially the cows, is rather poor. A lot of attention has been given to the development of the animal resources of the country since independence and cows of good breeds which yield more milk have been introduced in the country. In order to increase the production of milk, the government started a very ambitious project called 'Operation Flood'. As a result of these efforts the dairy activity has witnessed phenomenal growth during the post-independence period and today India is one of the leading producers of milk in the world.

The ideal climate for rearing animals is generally a dry climate. The major areas of India

with a large population of the animals are the states of Punjab, Haryana, Rajasthan, Madhya Pradesh and Gujarat and the western part of Uttar Pradesh. These areas receive low rainfall and therefore they do not have good pasture areas. The farmers grow fodder crops to feed their cattle. The density of animals on land in India is the highest in the world. It is about 130 heads of livestock per 100 hectares of land. The area under pastures is very low in comparison to the density of animal population. Over centuries Indian farmer has developed mutually beneficial partnership with farm animals both of whom contribute to as well as benefit from farm produce.

INTEXT QUESTION 22.5

1. Select the most appropriate answer from those given in the brackets in each case.
 - (a) What per cent of the total value of agricultural products is contributed by livestock in India? (15\20\26\35)
 - (b) About how much of the total wool produced in India is exported? (10 per cent \ 25 per cent \ 35 per cent \ 45 per cent)
 - (c) About what per cent of the total cattle population of the world is found in India? (16 \ 21 \ 26 \ 35)

22.14 DISTRIBUTION OF ANIMAL RESOURCE IN INDIA

Cattle

Most important among the animal resources of India are the cattle and the buffaloes. The cows provide milk and they also produce the bullocks. In Indian agriculture the bullocks are used in large numbers as draught animals. The largest number of cattle in India is in Uttar Pradesh. This state accounts for about 15 per cent of the total population of these animals. Madhya Pradesh (14%), Bihar (9%), Maharashtra (8.8%), Rajasthan (7.3%), Andhra Pradesh, West Bengal and Tamilnadu are the other states in the country having large cattle populations. Although the number of cows in India is very large, the yield of milk per animal is rather low. The average annual yield of milk from Indian cows is only about 188 litres in comparison to that of 4200 litres in Netherlands. The yield of milk from Indian cows is among the lowest in the world. Under the dairy development programmes the cows of Jersey, Holstein and Friesian breeds have been imported from Australia and New Zealand and they have been introduced in the country. Simultaneously efforts are being made to improve the quality of the local breeds through careful cross breeding. Some of the good local breeds such as Gir, Kankrej, Sindhi, Devani, Malvi and Sahiwal now yield upto 2000 litre of milk per milching season.

Buffaloes

Buffaloes are reared in large numbers in India and they are kept mainly for milk. In fact the importance of buffaloes as milch animals is more than that of cows. The milk of buffaloes contains more fat than that of cow. Buffaloes account for about 53 per cent of the total milk produced in the country. A number of breeds of buffaloes such as Jaffarabadi, Murrah, Bhadavari, Surti, Mehsana and Ravi etc. are famous for high milk yields. Buffaloes of good

breeds yield about 1500 litres of milk per milching season. The largest number of buffaloes in India is in the states of Uttar Pradesh, Haryana, Delhi, Madhya Pradesh and Gujarat.

Sheep

India has about 45 million sheep and they are found mostly in the cold and dry regions of the country. Hot and humid climate is harmful to sheep as they develop hoof diseases in such climates. The average yield of wool from sheep is one kg per year. More than half the wool produced in India is exported. Efforts are being made to improve the quality of sheep also. Ambica in Rajasthan and Hissar in Haryana have sheep research and training centres. The states with large number of sheep are Rajasthan, Jammu and Kashmir, Himachal Pradesh and Uttar Pradesh. Recently to increase the production of wool new breeds of sheep from New Zealand and Germany have been introduced in the Himalayan region.

Other Animals

Among the other animals, goats and pack animals are important. The goats are reared mainly for meat and milk and the pack animals are used for transporting loads in some parts of the country. Large number of goats are reared in Rajasthan, Gujarat, Madhya Pradesh and Uttar Pradesh. Among the pack animals the camels are reared in Rajasthan and Gujarat and the ponies and yaks are reared in the mountainous regions in the north.

Poultry

Poultry has also become an important occupation of the people in various parts of the country. There are more than 250 million poultry birds in India and they are reared for eggs as well as meat. The largest number of poultry birds are in Andhra Pradesh, West Bengal, Tamilnadu, Maharashtra, Karnataka and Punjab.

22.15 CHARACTERISTICS AND PROBLEMS OF ANIMAL RESOURCES IN INDIA

India has the largest number of animals in the world. However, the productivity of the animals in the country is very low. The major causes of the poor conditions of the animals and the low milk production are the following ones:

1. Pressure of animals on land is very high. The land left over from production of food products is not capable of producing enough fodder for the large animal population in the country. Due to the lack of fodder both draught and milch animals are weak and ill fed.
2. The breeds of Indian animals are also not very good. Animals of all types and quality are grazed over the same pastures. This results in declining quality of animals due to contact with the bulls of the poor breeds. There is a lack of centres of artificial insemination in the country.
3. Animals suffer from numerous diseases due to grazing together, drinking dirty water, eating rotten things and living in dark and unclean sheds.
4. Temperate climate is considered ideal for cattle rearing. But the climate of India is tropical. Therefore, the animals are generally weak and they are prone to diseases.

5. Proper facilities for cattle rearing are also not available in the country. There is a general lack of pastures in India. The farmers do not know much about the techniques of animal husbandry. Veterinary hospitals for treatment of diseased animals are also few and far between. Due to these reasons cattle rearing in India could not develop at a commercial scale as it has in some other countries.

* Problems of animals in India are lack of nutritious fodder, poor breeds of animals, tropical climate of the country, lack of centres for artificial insemination, lack of veterinary hospitals and doctors

22.16 MEASURES ADOPTED TO IMPROVE THE QUALITY OF ANIMAL RESOURCE

Animal rearing needs to be taken up in a scientific manner if the quality of the animal resources of the country is to be improved. The Central and the various State Governments have taken a number of steps to improve the quality of cattle in the country. Some of these steps are:

1. **Improvement in the Breeds of the Animals:** For improving the breeds of the animals, animal reproduction farms have been established at a number of places including Suratgarh (Rajasthan), Koraput (Orissa), Dhamrod (Gujarat) and Alamadhi (Tamilnadu).
2. **Import of Animals of Good Breed:** In order to developing good breeds of bulls at the government farms, they have been imported from Australia, New Zealand and USA. They are distributed in various parts of the country for improving the quality of the domestic cattle. In view of the requirements of the country in this regard, further extension of these activities is required.
3. **Control of Animal disease:** Veterinary hospitals are being established in various parts of the country with an aim of protecting the animals from various diseases. There are presently more than 8000 such hospitals in the country.
4. **Cattle Development Programme:** A number of cattle development programmes are being implemented with foreign collaboration and financial assistance at Hissar(Haryana), Barpeta(Andhra Pradesh), Shillong(Meghalaya) and Patiala(Punjab).
5. **Provision of Good Quality Fodder:** Farms producing and storing fodder and animal feed etc. have been established in different parts of the country.

* Various measures to improve the conditions of the animals have been taken by the Government of India. They are, improvement in the breeds of the cattle, import of cattle of good breeds, provision of veterinary hospitals, provision of nutritious fodder and feed, cattle development programme

22.16 DAIRY INDUSTRY IN INDIA

Dairying in India has not developed along scientific and commercial lines. Most of the animal rearing for milk purposes has been an activity subsidiary to crop farming. The dairy industry in the country therefore has remained in a backward state as compared to the dairy industry in countries such as the USA, Denmark, Australia and New Zealand. Due to their low yield of milk, the Indian cows are called the tea cup cows.

After Independence and more specifically after the Green Revolution, the Government of India has given ample attention to the development of dairy industry. This activity has witnessed a rapid progress as a result of improvement in methods of farming and breeds of cattle. The rapid increase in production of milk in the country is called *White Revolution*. Under various schemes, the small and marginal farmers are encouraged to rear animals of good breeds. Cows and buffaloes of good breeds are made available to the farmers and milk producers through co-operative institutions. Government has established milk centres in many large villages and these centres help in marketing the milk produced by the farmers in the villages.

The demand for milk and milk products is increasing rapidly as a consequence of growth of industrial centres and cities. The production of milk in India in 1951 was only 17.4 million tonnes which increased to 30.2 million tonnes in 1979-80 and more than 60 million tonnes in 1994-95. India produces about 6 per cent of the total milk produced in the world. Out of the total milk produced in the country, buffaloes account for about 53 per cent, the cows about 43 per cent and goats and sheep etc. account for the remaining about 14 per cent. The leading milk producing states in the country are Uttar Pradesh, Punjab, Haryana, Rajasthan, Gujarat, Tamilnadu and Madhya Pradesh. The per capita milk production in 1984-85 was the highest in Punjab, followed by Haryana, Rajasthan and Himachal Pradesh. Uttar Pradesh, the largest producer of milk, however, has a lower per capita production of milk (59.8 kg) which is about one fourth the per capita production of Punjab (213.4 kg). Caventers of Aligarh, Radha Swami Institution of Agra, Arey of Mumbai, Polson of Anand and Rayankera of Mysore are the important dairy organisations of India. As a result of the Intensive Dairy Development Projects, the production of milk in the country is rising rapidly. In order to increase the production of milk and its availability in the cities, the government started a project called *Operation Flood*. This scheme included collection of milk in small quantities from the rural areas, processing it for preservation and transport of the milk by refrigerated tankers to various areas of demand. It not only increased the supply of milk to the cities, but also ensured a market to small dairy operators in the rural areas. Today India has become the second largest producer of milk in the world and according to some of the scientists active in the field of dairy industry, we are in a position to export milk and milk products to even the developed countries of Europe. With increasing development of the dairy industry, a milk grid has developed. The metropolitan cities form the focal points of this grid with medium cities and towns acting as the feeder centres. The milk grid has made possible the adequate supplies of milk to the large metropolitan cities in the country.

* The rapid increase in the production of milk in the country is called **White Revolution**. The programme that aimed at increasing availability of milk in the cities is called **Operation Flood**.

22.17 FISHERIES IN INDIA

Fish is an important source of protein and it is an important component of the food of large number of people in the coastal areas. Fishing has been an important occupation of the people in the coastal regions of India since ancient times. However, commercial fishing has developed recently, and today it is an important activity. With a long coastline, India is in a position to develop fishing activity to a high level. The total potential of fish catch in Indian water is about 10 million tonnes per year. In 1995-96 the fish catch in the country amounted to nearly 5 million tonnes.

Fisheries are divided into two groups, the inland fisheries and the marine fisheries. The inland fishing is the activity of fishing in the inland waters such as rivers, tanks and ponds etc. The marine fishing refers to the fishing in the seas. Out of total catch of nearly 5 million tonnes in 1995-96 the inland fisheries accounted for over two million tonnes and the rest of it came from the marine fisheries. About 70 per cent of the marine fish catch is landed on the western coast of India in Kerala, Goa, Karnataka and Maharashtra. The remaining about 30 per cent is landed on the eastern coast in Tamilnadu, West Bengal, Andhra Pradesh and Orissa.

Although India has a huge potential of fish, the actual catch is not very large. The major factors responsible for the situation include the traditional methods and small craft used for fishing and the poor conditions of the fishermen. In order to increase the fish catch, the Government has taken a number of steps such as financial help to the fishermen for purchasing of more efficient boats, introduction of larger vessels, accident insurance scheme for the fishermen, better harbour and berthing facilities etc. As a result, the fish catch of the country is increasing. A number of government organisations are engaged in the development of fisheries in the inland areas. Rearing of prawns in the saline water ponds is becoming a popular occupation of many people in the coastal areas of Tamil Nadu and Andhra Pradesh. Development of fresh water inland fisheries is also being encouraged.

* Catching fish from rivers and ponds etc. is called **inland fishing**. The activity of catching fish from the ocean and seas is called **marine fishing**.

INTEXT QUESTION 22.6

1. Name the state with the largest population of cattle in India. _____
2. Which state has the highest production of milk in India ? _____
3. Name the state with the largest number of poultry birds in India. _____
4. What is Operation Flood concerned with ? _____
5. What is meant by White Revolution ? _____
6. Name two breeds of imported cows.
(i) _____ (ii) _____
7. Name two types of fishing.
(i) _____ (ii) _____

WHAT YOU HAVE LEARNT

- Agriculture forms the backbone of Indian economy as it provides employment to 65% of its total workers. It supplies raw materials to its major industries. It accounts for 29% of G.D.P. and 30% of export earnings. Nearly half of its total area is under the plough leaving very little scope for bringing further land under cultivation. Hence the food for ever increasing population can be provided only through improving productivity per hectare of land.
- Indian agriculture is characterised by low per capita availability of land, low yields per hectare and subsistence farming. However, diverse geographical, climatic and soil conditions ensure very wide variety of crops. A very wide variety of farm practices can be observed in different parts of the country e.g. from shifting agriculture to plantation agriculture, wet and dry farming, subsistence and commercial farming and the like.
- Over the past half century India has been able to register four fold increase in farm produce, through various ways like use of improved seeds, increased irrigation facilities enabling intensive cropping and far greater use of chemical fertilisers. Application of this triple technology has led to Green REvolution in India since seventies.
- Livestock sector accounts for a quarter of the total agricultural output. India has the highest animal density per hectare of cultivated land. The quality of its livestock has been poor. However, various measures are being adopted to improve the breeds of the livestock. As a result there has been White Revolution making India the world's second largest producer of milk. India has good potential to develop inland and marine fisheries on commercial lines.

TERMINAL QUESTIONS

- 1 Give four major reasons for backwardness of Indian agriculture. What steps have been taken since Independence to solve these problems?
- 2 What is meant by Green Revolution ? What factors have made it possible? Highlight the role of Green Revolution in solving the food problem in our country.
- 3 Why could the programme of Green Revolution not be implemented in the entire country?
- 4 Write short notes on the following:
 - (a) Intensity of cropping
 - (b) Crop rotation
 - (c) Multiple cropping
 - (d) White Revolution
- 5 Show the wheat and tea producing areas on an outline map of India.

CHECK YOUR ANSWERS**INTEXT QUESTIONS****22.1**

- | 1 | Types of Farming | Chief Characteristics | Major Areas |
|---|-------------------------|---|---------------------------------|
| | (i) Subsistence Farming | Most of the production consumed locally | Rice cultivation in West Bengal |
| | (ii) Plantation Farming | Factory like management | Tea cultivation in Assam |
| | (iii) Wet Farming | Practised in areas of high rainfall. | Malabar coast |
| | (iv) Commercial Farming | Large production for market | Terai region |
| | (v) Dry Farming | Practised in areas of low rainfall | Rajasthan and Gujarat |
2. (a) Wet farming, (b) commercial farming (c) intensive farming

22.2

- 1 (a) Growing a number of crops one after the other in a definite order so that the fertility of the soil is maintained, is called crop rotation.
 (b) Degree of utilisation of land for cropping is called cropping intensity.
 (c) The quick increase in the production of food grains using the package of new technology of high yielding varieties of seeds, chemical fertilisers and irrigation, has been called the Green Revolution.
2. means of irrigation
- 3 Use of high yielding varieties of seeds, use of chemical fertilisers, extension of irrigation facilities, use of insecticides and pesticides (any two of these)
4. (a) Punjab (b) Haryana

22.3

- 1 (a) (i) Rice (ii) Wheat
 (b) (i) Assam or West Bengal and Tamil Nadu
 (c) Second
 (d) 10 %
 (e) Uttar Pradesh
2. High temperature, heavy rainfall and well drained fertile alluvial soils (any two of these)

22.4

1. (a) 26 per cent (b) 25 per cent (c) 21 per cent

22.5

1. Uttar Pradesh 2. Uttar Pradesh 3. Andhra Pradesh
4. Operation flood is concerned with improving availability of milk in large cities.
5. The White Revolution stands for a rapid increase in the production of milk
6. Jersey, Holstein, Frezian (any two of these)

TERMINAL QUESTIONS

1. Refer to Section 22.4. Emphasize the role of small size of holdings, traditional methods of farming, high dependence on nature, poor quality of seeds, etc. in causing a low productivity in farming.
2. Refer to Section 22.10
3. Refer to Section 22.10. Highlight the need of a developed infrastructure for the successful application of the technology of Green Revolution and availability of these facilities only in a few regions of the country.
4. Refer to Sections 22.8, 22.5 and 22.15
5. Show the areas under wheat and tea taking help from the map showing the distribution of various crops in India.