Chapter - 18

Agriculture

From ancient period, India is amongst the dominant agricultural countries. When most of the nations were nomads, Indians were very much expert in agricultural activities. Harappa and Mohenjodaro civilization are the illustrations, which had developed cities and store houses of food grains. Most of the agricultural scientists accept the beginning of production of food grains and animal rearing around 8000 B.C. and probably in South-East Monsoon Asia. Russian expert Vevilov in 1951, demarcated eight centres / areas of beginning of agriculture and India is one of them.

Importance of Agriculture

Even today, India is a major agricultural nation and about 54.6 % of its population is directly related to agriculture. Agriculture is the most important source of livelihood. Most of the industries directly or indirectly depend on agriculture, which ultimately provides employment to lakhs of people.

The contribution of agriculture and related sectors in India was 53 % in 1950-51 which is 17.5 % of the Gross Domestic Production in 2014-15.

Due to the dependence of Indian agriculture on monsoon, Indian agriculture and economy are said to be the gamble of monsoon. Agriculture occupies important places in India's total exports. It contributes nearly 12.5 % of the country's total export value.

Indian culture is rooted in agriculture, with which many festival and occasions are related. It is the base of economy, society and culture.

Nature too has provided various diversities to India, which are not found in any other nation of the world, as it possesses very good geographical location, fertile land, plains, sufficient water supply, monsoon climate etc. These factors make India a special country in the field of agriculture.

Out of the total geographical area of India 32,87,263 sq kms agriculture is done on 40.5 % of its area. Due to these characteristics, there is a diversity in agricultural practices and crops in India.

The Importance of Indian Agriculture is clear from the following points :-

1. Source of maximum employment
2. Supply of raw material for industries
3. Source of National Income.
4. Receives Foreign exchange.
5. Production of nutritious substances
6. Development of means of transportation

Characteristics of Indian Agriculture

Most of Indian agriculture has been done traditionally in the form of food grains, since ancient times. In the recent decades, modernization and scientification of agriculture is being done. The main features are as follows :-

1. Population dependency
2. Depends on monsoon
3. Lack of irrigation facilities
4. Low production per hectare
5. Shortage of fodder crops
6. Small size to land holdings
7. Prime importance of food grains
8. Diversity of crops

Major problems of Indian agriculture

1. Increasing pressure of population on land
2. Non-uniform distribution of land
3. Low productivity of agriculture
4. Vagaries of weather like heavy rainfall and drought
5. Fatalist approach of farmers
6. Agriculture is taken as a source of livin instead of profession
7. Limited development of the means of irrigation
8. Uneducated and traditional approaches of farmers
9. No proper marketing system
10. The benefit of various schemes not reaching to the common farmer

Types of Agriculture

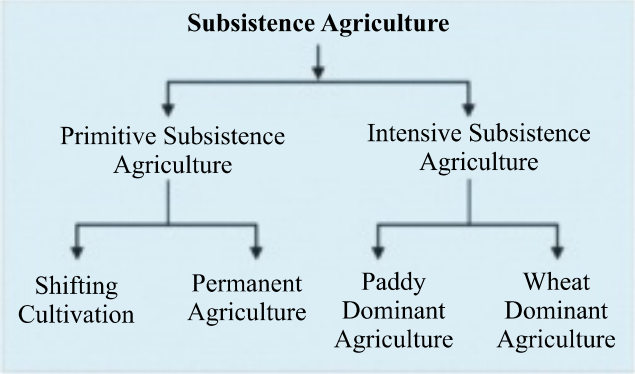
Due to diversities in natural conditions, climate, soils, different types of agriculture is practiced in the country. The following types of agriculture are practiced in India :-

Subsistence and Commercial Agriculture :-

1. Subsistence Agriculture

Subsistence Agriculture in India is a form of traditional agriculture. It was prevalent in the form of an intensive agriculture from the pre-independence era. The term 'intensive' implies that farmers must put in a large amount of effort to produce the maximum feasible yield from a given parcel of land. Subsistence means that the corps grown is largely consumed by the farmers and his family. Main features are small patches of lands, traditional methods of agriculture and dominant role of manual labour especially with family members, less use of chemical fertilizers etc. are the main characteristics of this type of agriculture. There is no surplus production and if it is, then it is kept for next year's requirement. Animal rearing has little importance in this. After 1960, the need for surplus production was felt. The Green Revolution and then organic and chemical agriculture were developed in India.

Subsistence farming is of following types -



(a) Primitive Subsistence Agriculture

It can be divided into two types :-

(i) Shifting Cultivation : Shifting cultivation is the oldest form of agriculture which originated about 7000-8000 B.C. when man made an attempt to switch to food production from food gathering activities. In India, shifting cultivation is practiced in various parts by forest dwellers.

Farmers usually clear the land for planting by slashing the vegetation and burning it. Farmers grow crops on a cleared field for only three years and then leave it fallow for many years through this agriculture, farmers gets the necessary food to survive.

A number of food crops are simultaneously grown on the same plot. In some areas Tobacco is also grown. In India, it is known by several names

such as Jhooming in north-east India, Bewar or Dahia in Madhya Pradesh and Chhattisgarh, Podu in Andhra Pradesh, Dabi, Ponum in Kerela, Chippa, Penda in South India (Gonds), Kumari in Western Ghats, Kheel in Himalayas and Walra in South-Eastern Rajasthan.

(ii) Permanent Agriculture : In such tribal areas, where the pressure of the population increases on agriculture land, the place of shifting agriculture is taken up by permanent cultivation. This type of agriculture is advanced and become somewhat productive. Productivity is maintained with animals manure. Animal husbandry is also practiced along with this, which are helpful in agriculture. Mainly practiced in mid-himalayan region and Peninsula's North eastern parts.

(b) Intensive Subsistence Agriculture

Intensive Subsistence Agriculture is best developed and practically confined to the monsoon lands of India. Mainly done in great plains and coastal plains of India. Rice is grown in the areas of adequate rainfall areas, whereas wheat in the low rainfall areas. Human labour is commonly used, but use of machines have increased now a days. Crop rotation is also done in intensive subsistence agriculture. It's prevailing in its major areas. On the basis of dominant crop, it is of two types.

(i) Intensive Subsistence Agriculture Paddy Dominant : This agriculture occurs in the areas receiving rainfall above 100 cms, and in the areas with fertile alluvial soil. Mainly practiced in West Bengal, Bihar, Eastern Uttar Pradesh and Madhya Pradesh and Coastal Plains. Rice (Paddy) is the main crop in such areas, where 2 or 3 crops annually produced.

(ii) Intensive Subsistence Agriculture Wheat dominant : This type of agriculture is mainly practiced in Punjab, Haryana, Western Uttar Pradesh, Madhya Pradesh, Rajasthan and Western parts of Peninsular Plateau. Due to lack of rainfall, wheat takes the place of paddy. Along with Wheat, Cotton, Jawar, Bajra, Pulses etc. are also grown. Commercial grain farming is developed in areas having better irrigation facilities, machines, fertilizers. Croprotation contributes mainly in this agriculture.

2. Commercial Agriculture

Surplus production is done under commercial agriculture for export. It's dependency has increased with the advancement of means of transport and telecommunications. In this type of farming a single crop is produced in place of many crops with suitable geographical conditions. Uttar Pradesh, Haryana, Punjab, Gujarat, Maharashtra, Kerala are the major contributing states in this agriculture.

Moist and Dry Agriculture :

1. Moist Agriculture : This type of agriculture is done in the areas of high rainfall, generally the average rainfall is 100 to 200 cms. Mid valley of Ganges, North-eastern Peninsula and moist coastal areas are the major regions of moist agriculture. In these areas two crops in the year and in some places, three crops can be taken. The region between eastern Uttar Pradesh to Arunachal Pradesh practices moist agriculture.

2. Dry Agriculture : This type of agriculture is done in the areas which receives annual rainfall less than 50 cms and lack irrigation facilities. For optimum use of water resources sprinklers system, drip system and fountain system etc. are mainly utilized. Crops resistant to dryness are usually sown such as Jawar, Bajra, Barley, Gram, Cotton and Wheat etc. Main characteristics of Dry Agriculture are

(1) Fields are plouged before rain, so that the land become soft.

(2) After rainfall field are deeply plouged so that the rain water reaches deep into the fields.

(3) To utilize the water of rain, fields are divided into several parts. This prevents rain water from flowing out.

(4) For protecting the moisture of the soil, a layer of dry soil is spread over the fields.

(5) Unwanted vegetation is removed to avoid

wastage of water.

(6) Drought resistant crops are mainly produced.

In India such agriculture is done in the areas of less rainfall in Western Uttar Pradesh to the West of Aravali in Western Rajasthan, Gujarat, Maharashtra, Andhra Pradesh etc.

Research centre for dry agriculture is situated at Ranchi. It frames plans for dry agriculture with suitable climate, natural conditions and adequate seeds.

Intensive and Extensive Agriculture

1. Intensive Agriculture

In India, the practice of intensive agriculture has been prevalent in most parts of the country, with the aim of producing more in less area which is mainly done due to dense population and less agricultural land. The main features are

(1) Availability of land in proportion to the population is less in intensive agricultural areas.

(2) The number of agricultural workers is high per hectare land.

(3) More than one crop is grown in a year.

(4) Crop rotation is adopted.

(5) More production from small area of land is taken due to high population pressure.

(6) In this type of agriculture, human labour is preferred over capital and machines.

Northern part of India practices Intensive Agriculture.

2. Extensive Agriculture

Usually practiced in the nations where land is more in proportion to the population. That is why, the farms are vast and extensive, where agriculture is done with machines. Huge capital is needed in extensive agriculture.

In India, land is less available in ratio to the population and farms are divided into families with generations. They make them more small in size and the cost of agriculture is high and production is low in such fields. To combat this, consolidation scheme (chakbandi) of 4.5 to 5 million hectare land has been done. Many farms are of small sizes are combined. It make it easy to control the irrigation and other management of the fields. Punjab, Uttar Pradesh and Haryana governments have completed it. In almost all parts of these states, extensive mechanical farming is practiced and it is under process in other states. e.g. The area irrigated by Rajasthan canal started extensive agriculture in Rajasthan.

Horticulture

Horticulture is an intensive agriculture, which has very high level of specialization and it is mostly done in small scale. Similar to the dairy industry, horticulture has also developed due to the demands of vegetables and fruits by urban markets. Small sectors of land produce high quantity.

Fig. 18.1 : Cultivation of Flowers & Vegetables

Sub-types of Horticulture

There are six sub-types :-

(i) Vegetable farming near market

(ii) Truck farming

(iii) Green House farming

(iv) Floriculture

(v) Plant Nursery

(vi) Commercial Orchard

Among above these olericulture, truck farming

and Commercial Orchard are most important.

Major Horticulture crops in India : According to the major Horticulture crops 2013-14, the leading producers are Tamilnadu - fruits, Gujarat - spices, West Bengal - vegetables, Uttar Pradesh - potatoes.

There is a rise of 34 % in horticulture between 2004-05 to 2014-15. The total production of 167 million tons raised to 283 million tons in 2014-15.

Organic Farming

It is a method of farming system which primarily aimed at cultivating the land and raising crops in such a way, as to keep the soil alive and in good health by use of organic wastes (crops, animal and farm wastes, aquatic wastes) and other biological materials along with beneficial microbes (Bio-fertilizers) to retain nutrients of crops for increased sustainable production in an eco friendly & pollution free environment.

With the increase in population our compulsion would be not only to stabilize agricultural production but to increase it further in sustainable manner. The destructive effects of chemical agriculture began to occur through the food chain on the organisms and insects, as well as bio-diversity began to vanish rapidly.

Fig. 18.2 : Organic Farming

There is a decline in the quality of soil and the threat of extinction of many species of insects. Due to chemical agriculture, the ground level of water decline rapidly and the quality of soil deteriorate. Since human beings have been aware of the consequences of chemical farming, Since then, awareness has come in the context of their health and environment protection and world is redirecting towards organic agriculture i.e. traditional agriculture. Around 3.7 million hectare land is used for organic farming, which is 0.9 % of the total land of world.

Organic Farming in India

Organic farming is being done on 7.23 lakhs hectare area in India. Maharashtra, Meghalaya, Mizoram, Punjab, Uttar Pradesh, Andhra Pradesh, Karnataka, Jharkhand, Bihar and Rajasthan are leading in adopting organic farming.

Sikkim is the country's first full organic farming state on January 18, 2016 with 'Tikau Sustainable Agriculture Summit' at Gangtok (Sikkim). The cultivation of organic farming in Sikkim was started from the year 2003. The use of chemical fertilizers has been banned for environmental protection. Around 75000 hectare of land is used for organic farming under sustainable agriculture. Because of all these factors Sikkim became cleanest state in 2016.

India's crops have been divided into three parts according to the climate :-

1. Kharif : The crops planted before the arrival of Monsoon in June-July and cultivated in September to October are known as 'Kharif' crops. They mainly constitute Rice, Jawar, Bajra, Maize, Cotton, Jute, Groundnut, Sesame, Sugarcane, Urad, Moong, Moth etc.

2. Rabi : These crops are sown in the winter season mainly in October-November and cultivated in March-April are called Rabi crops. They mostly need irrigation. Main crops are Wheat, Barley, Gram, Mustard, Peas, Arhar, Masoor etc.

3. Zayad : Crops sown in between Rabi and Kharif crops are called zayad crops. They mainly include vegetables, Cucumber, Melon, Watermelon, Chari (Jwar) etc.

Differences in Organic and Chemical farming

S.No.	Organic Farming	Chemical Farming
1	Farming done with traditional and organic manure is called as organic farming.	Farming done with chemical manures and pesticides are called chemical farming.
2	Manures/Fertilizers are made by biological materials.	Chemical fertilizers and pesticides are used.
3	More human labour required.	Machines are mainly used instead of humans.
4	Organic fertilizers are mainly prepared at home or at farms.	Chemical fertilizers are prepared at factories.
5	They are helpful to increase the fertility of the land.	They destroy the fertile power of the land.
6	By creating an ideal relationship with nature by organic farming, agricultural production is increased.	With considering the profit-loss, chemical fertilizers are used to increase production in chemical farming.
7	The use of organic food produced by organic farming has a favorable effect on human health.	Many diseases are occurring in human and other organisms with the use of food grains from chemical fertilizers.
8	Biological diversity does not have negative and distructional impact in organic farming.	Biodiversity have directly distructional and negative impact in chemical farming.
9	Compost of organic fertilizers includes cow's urine, Vermicompost, Neem-cake and rotten materials from organisms.	Chemical fertilizers include Phosphate, Nitrogen, Ammonia etc. chemical elements which create negative impact on land.
10	Fertility and productions both use timely raised in organic farming.	Fertility is maintained only for short duration in chemical farming. Deterioration of fertility of land gradually.
11	Less requirement of water is needed in it.	Whereas large quantity of water is required.
12	No negative impact on purity of underground water reservoirs.	Directly affect the quality of water with the chemical farming.
13	Due to useful for human health the requirement of organic farming is raising day by day.	Chemical fertilizers and pesticides directly affect the human health. Also equally pollute land and underground water sources which creates lots of diseases.
14	Organic farming is a link between human and nature. As farmer uses the natural products in natural way.	It mainly depends on market as seeds, fertilizers, medicines, equipments and technology are purchased by market.

On the basis of use, crops are divided as :-

1. **Food crops** : Rice, Wheat, Bajra, Jwar, Maize, Pulses
2. **Plantation Crops** : Tea, Coffee and Tobacco
3. **Cash Crops :** Sugarcane, Oilseeds, Soyabean, Rye, Mustard
4. **Fibrous Crops :** Cotton and Jute

Main Agricultural Crops are described as under -

1. Wheat

Wheat is the most important bread-making grain which forms the staple diet of the inhabitants of the mid latitudes and dry sub-tropical regions. Archaeological evidences reveal that it is being cultivated since the past 7000 years in Mohenjodaro. There is a description of rice, wheat and moong in the hymns of Rigveda. It is second major food crop after rice in India. Around 11.7 % of total wheat in the world is produced in India from 23 % of total cultivated land under foodgrains.

Geographical Conditions for Growth

Temperature : It is a sub-tropical temperate crop which is mainly sown in India in October-November and harvested in March-April. Wheat requires mild temperatures of 10°C at the time of sowing, 15°C at the time of growing and 20°C to 28°C at the time of ripening, and it needs 100 frost free days for better production.

Rainfall : Ideally wheat requires 50-75 cms of average annual rainfall. Also need irrigation in areas of low rainfall. 'Mavaat' is best for wheat. Hailstorms at ripening is harmful.

Soil : Fertile soils with fine texture, sandy loamy, alluvial and black soil are good for wheat cultivation.

Land Surface : Land should be plain so that equipments can be used easily and water can drain out naturally.

Labour : Labour for various works needed at cheaper rates. But now a days machines are widely used in wheat farming.

Fertilizers : Wheat requires the use of fertilizers especially nitrates or phosphates, organic compost, dung and chemical fertilizers.

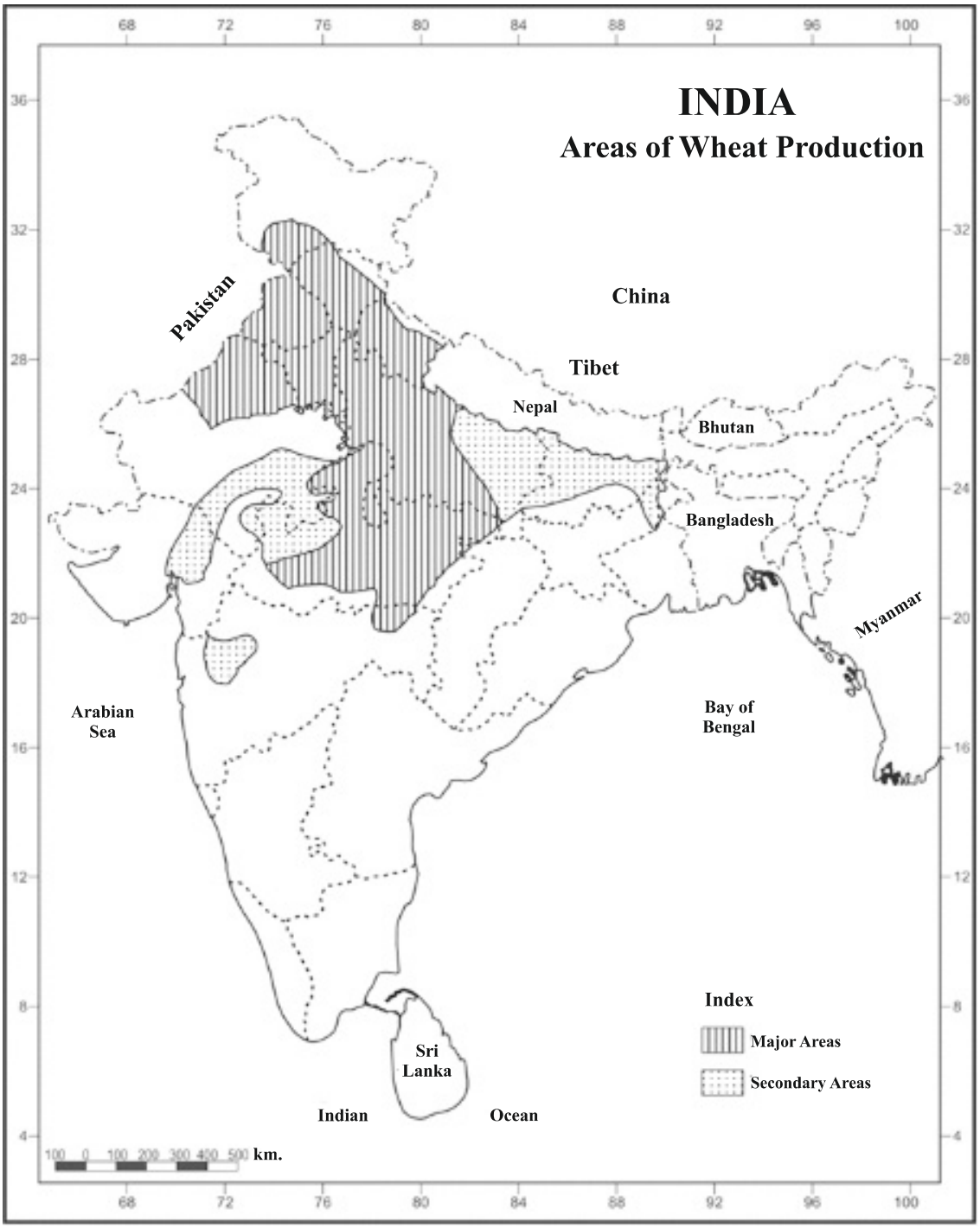
Production and Distribution

From production point of view, the major contributing areas are plains of Ganges, Satluj and Yamuna. Due to adequate water and fertile plains, they contribute 68 % of the total production in India. The average production is 1307 kgs per hectare in 1970-71, whereas 3145 kgs per hectare in 2013-14. But in 2014-15 is 88.9 lakh million ton production over 31 million hectare land with 2872 kgs per hectare production.

Uttar Pradesh : It is Ideal state in wheat production in India. Except Northern Hilly and Southern Plateau areas of the state, whole state produces wheat. The areas of Ganges-Yamuna, Ganges-Ghaghara plain are dominant in wheat production. This produces 75 % of the total wheat of the state. Main districts are Saharanpur, Muzaffarnagar, Meerut, Muradabad, Rampur, Badayu and Bulandshahar etc. Uttar Pradesh produced 25.2 million ton in 2014-15 of wheat, which is a record production 28.4 % of the country.

Punjab : Green Revolution have magnificent impact in wheat production in Punjab where over 30 % of the total cropped area, produces wheat. With adequate irrigation, fertile plains and high breed seeds helps to produce 5017 kgs per hectare. In 2014-15 the state produces 15.8 million ton production of wheat, which is 17.7 % of the nation and stood second overall. Main contributing districts are Ludhiana, Jalandhar, Amritsar, Kapurthala, Firozepur, Bhatinda, Patiala and Sangrur.

Haryana : Although small in area but with advance irrigation facilities, it produces 13.5% of wheat of the country. Main districts are Rohtak, Hisar, Jind, Kurukshetra, Sirsa, Fatehabad, Ambala, Gurgaon and Faridabad constitute 8 % of the producing area of India.



Map 18.1 : Wheat Production in India

Madhya Pradesh : Plains and Malwa Plateau with black soil produces wheat with irrigation facilities in 2014-15 the state produces 14.2 million ton of wheat which is 15.9 % of the total production of India and stood third overall. Main districts are Guna, Bhind, Gwalior, Ujjain, Sagar, Indore and Jabalpur.

Rajasthan : Due to lack of rainfall and irrigation facilities wheat is sown in Rajasthan. About around 18 % of the total state's land wheat

farming is done. Production is also raised with Indira Gandhi canal. The state produces 7-9 % of the total wheat production in the country. Main districts are Sriganganagar, Bharatpur, Kota, Alwar, Baran, Jaipur, Bhilwara, Sawai Madhopur, Banswara etc.

Bihar : Wheat is produced in the northern plains of the state, where 14 % of total land is under wheat farming. It produces 6 % of the nation. Champaran, Shahbad, Darbhanga, Gaya, Muzaffarnagar, Patna are the main districts.

Other wheat producing states are West Bengal (Nadia, Murshidabad, Veerbhumi, Dinajpur) Himachal Pradesh (Kangra, Mandi, Shimla) Karnataka (Bijapur, Dharwar, Belgaon), Maharashtra, Gujarat, Tamilnadu and Andhra Pradesh.

2. Rice

Globally, the dominance of Wheat and Rice in human diet is almost equal. Rice is the main staple food of the people of tropical countries, whereas wheat is consumed universally. In fact, rice is a necessity in the densely populated parts of the monsoon lands, as it gives more calories of energy per hectare than wheat. In India also it is the prominent food crop. Around three-fourth of population use it in their food.

Around 19 % of total rice production of the world is produced in India. In 2014-15 around 35.9 % of land was sown with Rice.

According to Russian Agronomist Vevilor, India is native place of Rice and from India, it spreads towards east and China around 3000 B.C. Evidences of Rice is also found in the civilizations of Harappa and Mohenjodaro. From the Vedic era rice is used in holy and cultural events.

Geographical Conditions

Temperature : It is a tropical plant. It requires a temperature of 20°C during sowing and 27°C at the time of ripening. It can't survive below 19°C temperature.

Rainfall : Around 75 days, the fields should be filled with water. Rainfall needed is 100 to 200 cms annually. Less rainfall required irrigation.

Soil : Rice requires highly fertile soils. Alluvial loamy with high silt and clay content are the best for it, as it prevents rain water from seepage.

Ground : Plains are suitable for rice farming, but in Hilly areas steps farms are also suitable for rice farming.

Labour : Plants are developed at farms which need human labour. At the time of cutting labourers at cheap rate are needed. It needs abundant human labour.

Fertilizers : Rice is an exhaustive crop and, as such, requires lot of fertilizers and manures- as Ammonium Sulphate and Nitrate fertilizers in Rice farming.

Varities of Rice

Around 200 varities of Rice are found in India.

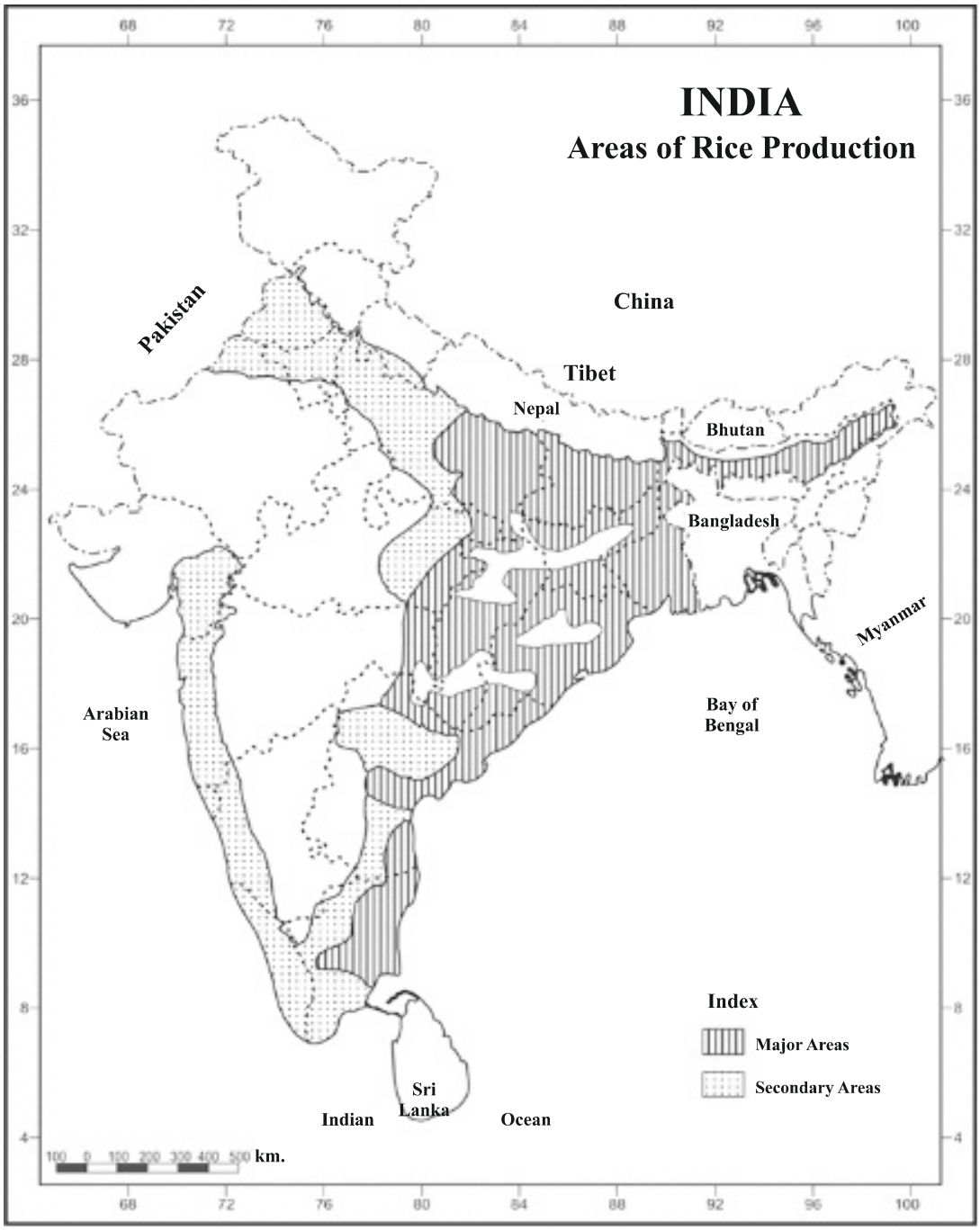
"Low land" or "Swamp Rice" are more tasty and per hectare production is also high. Most of the Rice in India is produced in swampy or low land.

"High land" or "upland" rice : The plants are dwarf and red coloured. It grows with little rain and ripe early. It is hard and low in taste.

Producing Areas

In 2015-16 around 252.33 million ton total food crops produces out of it 103.36 is shared by Rice which is 40.97 %. The rice producing states in India are as follows :-

Fig 18.3 : Rice production in Hilly region



Map 18.2 : Rice Production in India

West Bengal : It produces 14 % of the total of the nation. In 2014-15, it stood first with 14.32% production. Almost every district of West Bengal produces rice, which covers 70 % of the land. Main districts are Cooch Behar, Jalpaiguri, Bakunra, Midnapur, Darjeeling etc 75 % of total rice production is from Aman crop. Here Aus, Aman and Boro, three crops are cultivated. Soils from flood need less fertilizers.

Uttar Pradesh : Significant growth after Green Revolution. Earlier only 6 to 8% rice production which raise to 12% main areas are - Saharanpur, Devria, Gorakhpur, Lucknow,

Fig 18.4 : Rice cultivation in Punjab

Bahraich, Gonda, Balia, Raibareli, Pilibhit etc. Western parts of state also produce rice with irrigation. In 2014-15, 12.2 million ton rice produced, which is 11.7 % of India.

Andhra Pradesh : Stood third in nation in 2014-15 with 11 % of the total production.

Punjab : After Green Revolution Rice production also increased with wheat in Punjab. In 2011-12 around 108.3 million ton rice produced which was 11.29 % of the nation. Main districts are Hoshiyarpur, Gurudaspur, Jalandhar, Amritsar, Roopnagar, Ludhiana, Kapurthala etc. per hectare production with 3952 kgs is highest in India.

Bihar : Two crops are produced in a year in Bihar. About 40 % of total cultivated area is under Rice main districts are Sharan, Champaran, Gaya, Darbhanga, Munger, Purnia.

Tamilnadu : It contribute around 6-10 % of total production of rice in the country. Located in the Delta basin of Cauvery river, Thanjavur district contributes 25 % of rice production in the state.

Chhattisgarh : Plains of Chhattisgarh, which also considered as rice bowl, produces rice. Major producing districts are Bilaspur, Bastar, Sarguja, Raigarh, Dantewada, Narayanpur.

Madhya Pradesh : Around 14 % of total agricultural land produces rice in the state. Here valleys of Narmada and Tapti rivers are leading areas. Here, nation's lowest per hectare 1474 kgs rice is produced.

Odisha : Out of the total agricultural land of the state, 58 % of it produces rice. It contribute around 6 to 8 % of the total nations production of rice. Main districts are Balasor, Cuttak, Puri, Mayurbhanj, Kalahandi etc. Cuttak has Indian Rice Research Institute.

Rajasthan : Dungarpur, Bundi, Banswara, Hanumangarh, Ganganagar districts produce some rice in the state.

Maharashtra, Karnatak, Assam, Meghalaya, Kerala, Goa, Manipur, Nagaland, Mizoram etc. are the rice producing states.

Cotton

Cotton is native of India, as mentioned in Rigved and Manusmirti. The illustrations are mentioned of cotton threads. Indus valley with cotton excavation also found as evidences of cotton clothes, which were used in 5000 to 8000 B.C. Greece's Herodotus and Marcopolo's records mention the use and production of cotton in India.

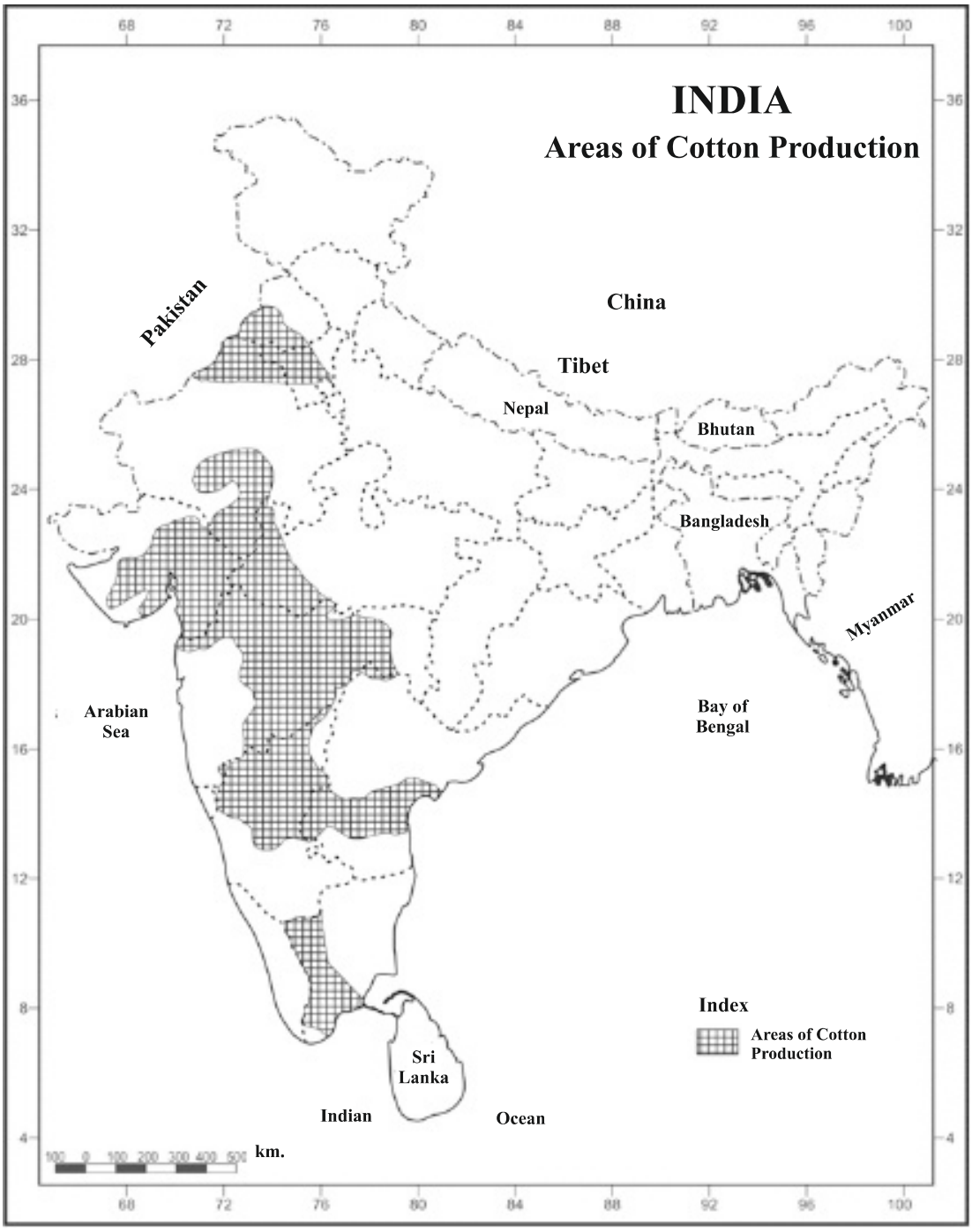
Around 12 % of total world's cotton production is produced in India. Cotton plant is like shrub, which gain height from 1.5 to 2 metres, which have staple fiber that grows in a ball, or protective case. The fiber is almost pure cellulose. The fiber is most often spin into yarn or thread and used to make a soft, breathable textile.

Geographical Conditions

Cotton is a sub-tropical plant, requiring a long growing season. During the period of growth sunshine must be abundant and the days as well as nights must be warm.

Temperature : For cotton sub-tropical plant, 21°C to 25°C temperature is ideal, but it can be grown in temperatures up to 40°C and 200 frost free days are required with clear sky.

Rainfall : The cotton plant need a moderate amount of moisture, well distributed throughout the growing period, annual rainfall around 50 to 100



Map 18.3 : Areas of Cotton Production in India

cms is sufficient but deficit rainfall needs irrigation.

Soils : Alluvial and black soils are best suited for cotton plant, whereas sandy and loamy soils of Kutch. Black soils of Northern India and Southern plateau region, which are also called Regur soil are best for cotton plants.

Surface : For agriculture of cotton, surface should have better drainage. Fields filled with water is harmful.

Labour : Much of the works like sowing, irrigating and harvesting of cotton is still done by hand. As such, availability of cheap labour is a factor

for limiting areas of cotton production.

Production

Country's 60 % of cotton production is produced by four states Gujarat, Maharashtra, Andhra Pradesh and Telangana.

Gujarat : It contributes over 34.09 % of total cotton production of the nation and stands first. Here suitable climate conditions and soils are ideal for cotton growth. 70 % of its total production is covered by Barodara, Ahmedabad, Surat, Bharuch, Sabarmati, Panchmahal , Surendernagar districts.

Maharashtra : This state covers 20.45 % of the total cotton production of India, with second position. long staple cotton is grown here. As state's black lava soil suits the best Nagpur, Akola, Amravati, Vardha, Nanded, Jalgaon, Buldana are the main producing districts, although per hectare production is less in the state.

Andhra Pradesh : It's the third highest cotton producing state in India. About 13.92 % of the total is shared by Andhra Pradesh. Farming of cotton is done in Krishna river valley. Cotton production has increased sharply in the last decade. Guntur, Anantpur, Kurnool, Krishna are major producing districts.

Punjab : From last few years, the production and producing areas in the state has increased. Fertile soil and irrigation facilities help to produce good cotton. Maximum production of cotton is of American Punjab cotton. Main districts are Firozepur, Bhatinda, Ludhiana, Amritsar and Sangrur.

Haryana : With fertile soil and irrigation facilities, per hectare production is second in the nation. Long staple cotton is mainly produced. Hisar and Sirsa are the two districts producing 80 % of the state's total cotton production.

Rajasthan : With the help of irrigation, cotton farming is done, which constitutes 6.6 % of the nation's total. Hanumangarh alone shares 30 % of state total production. Other districts are Sriganganagar, Bhilwara, Ajmer, Bundi, Tonk, Pali, Kota and Jhalawar etc. The state has many possibilities, if irrigation facilities can be available.

Tamilnadu : It shares 5 % of the total production of the country. Good quality cotton with long staple fibers are cropped. Madurai, Coimbatore, Trichurapalli, Salem, Tanjavur are the major producing districts.

Karnataka : There are two major cotton producing areas, one is black soil region which is called as Salhatti which covers Bellari, Shimoga, Chikmagalur, Chittaldurg. Second region is Red soil region which are called as 'Daudhatti' which covers 50 % of state cotton production in Raichur and Dharwar districts.

Other areas of Cotton production : Valleys of Narmada and Tapti rivers constitute 80 % of the states production in Madhya Pradesh, whereas Kerala, Odisha, Himachal Pradesh, Jammu Kashmir, Assam and Bihar are other producers in the country.

B.T. Cotton

G.M. Crop : Genetically Modified Crop Strains of the bacterium Bacillus thuringiensis produce over 200 different B.T. toxins, each harmful to different insects. Most notably, B.T. toxins are insecticidal to the larae of moths and butterflies, beetlers, cotton bollworms and ghtu flies but are harmless to other forms of life. With the use of this per hectare production increased surprisingly. But now staple has now developed in super bug which absorbs the B.T. cotton's poison. Recently in Punjab, the outbreak of white fly, a type of super pest proved deadly on B.T. cotton.

4. Sugarcane

Sugarcane is also a native of India. Its description is found in Vedic literature. Then it got spread in Java, China and in other countries.

Sugarcane is one of the most important commercial crop. 35 % of the world's total sugarcane is produced in India. India remains at first or second position in sugarcane production. Brazil and Cuba also have almost equal production like

India.

Upto 1850, the 86 % of sugar got manufactured from sugarcane, but now sugar beet have competition with sugarcane, so its share in sugar production has fallen to 55 to 60 %.

Geographical Conditions

Sugarcane is an equatorial plant, as it is grown between 8°N to 32°N latitudes.

Temperature : Temperature around 20° to 30°C is most suitable for sugarcane. Frost is harmful to it. Regular similar temperature raise the sweetness in sugarcane.

Rainfall : 100 to 200 cms of annual rainfall is best suitable for sugarcane. Areas with drought or less rainfall use irrigation for the production.

Soil : Soil with Nitrogen and Humus are good for production. Sugarcane is grown in different types of soils, such as deep fertile loamy soils of river valleys in northern India, and black soil of Deccan Plateaus are best suited for sugarcane production.

Fertilizers : Sugarcane being an exhaustive plant, requires heavy doses of fertilizers as dung, compost, green manure, organic and chemical manures.

Earlier, the North India contributed the major portion of its production but now South India has the dominance in sugarcane production. Coastal climatic conditions suit it very well. Per hectare production is also high in South India. Although 60 % of total production is shared by the North Indian states. Sugarcane cultivation in India is governed by the National Sugar Policy.

A huge quantity of sugarcane is consumed by Gur (40 %) and Khandsari industry,which affects supplies to the sugar mills.

Uttar Pradesh, Maharashtra and Karnataka combinedly produce 73 % of India's total production.

In 2014-15, about 5 million hectare area were sown with sugarcane, which produces 359.3 million ton sugarcane. Areas of upper Ganges and Mid Ganges have dominance in sugarcane production.

Fig 18.5 : Sugarcane production in India

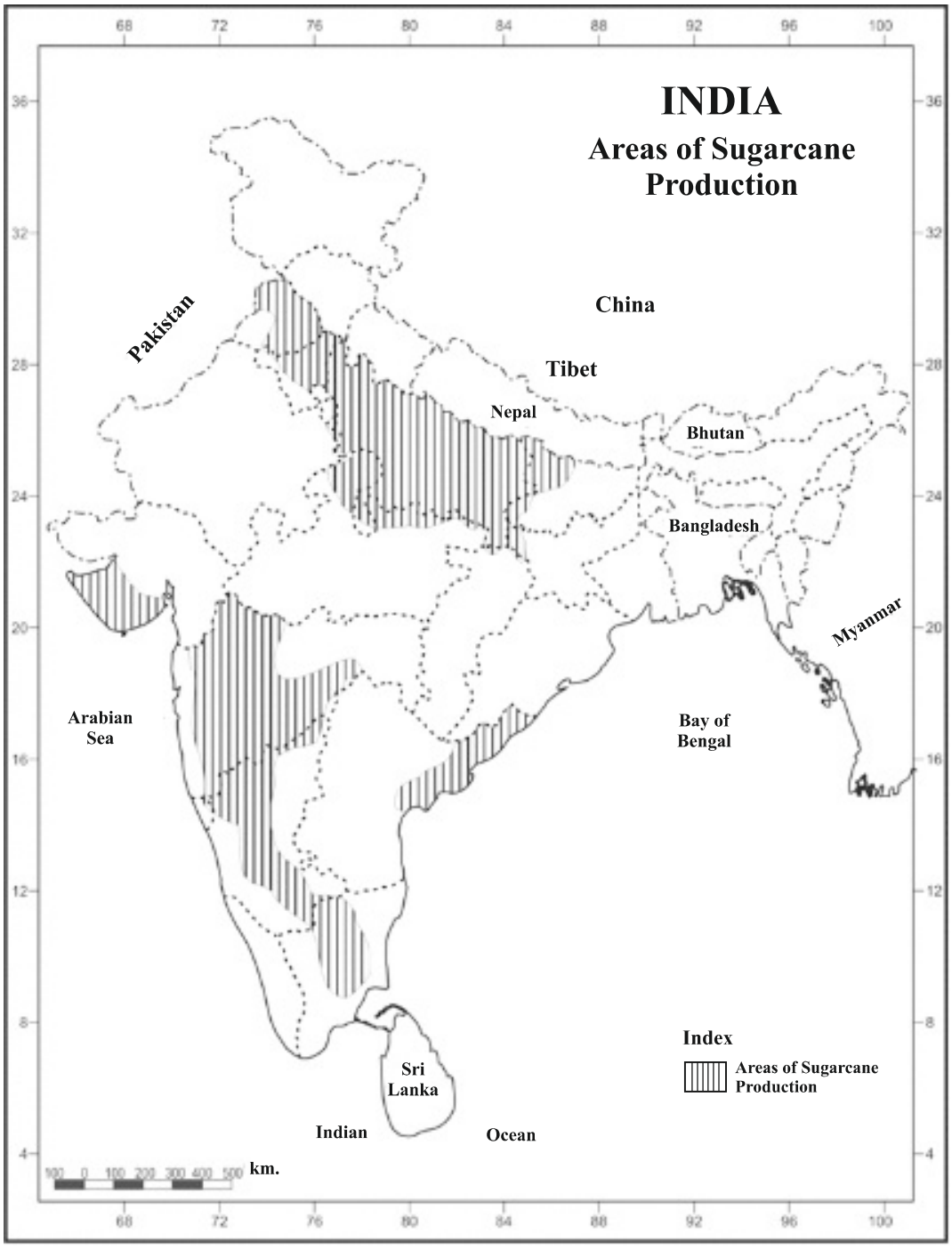
Uttar Pradesh : In 2013-14, Uttar Pradesh stood first in the country with 38.56 % of the total production and area sown. There are two major regions :-

(a) Tarai Region : Rampur to Barelli, Pilibhit, Sitapur, Khiri, Muradabad, Faizabad, Azamgarh, Jaunpur, Gorakhpur to Bihar's Champaran.

(b) Doab Region : Ganga-Yamuna doab which extends from Meerut to Allahabad. Meerut's sugarcane is of best quality for making Gur.

Maharashtra : Second highest producer of sugarcane in India. As in 2013-14 is produces 818.60 lakh ton sugarcane with 22.89 % of total production. Godavari upper valley is famous for sugarcane production. Most part of it is used in making sugar, as it stood first in sugar making in the country. Ahmednagar, Nashik, Pune, Sholapur and Ratnagiri are very famous for production of sugarcane.

Tamilnadu : This state holds third position in the production of sugarcane with highest per hectare (113.41 ton) production. It shares 10.68 % of the nation's total. As the state has sea coastal climatic condition, the sweetness is high in sugarcane. National Sugarcane Research Institute is located at Coimbatore.



Map 18.4 : Areas of Sugarcane Production in India

Karnataka : With the availability of sea coastal climate conditions and river valleys, the production is increasing continuously in the state. Around 10 to 12 % of the total production is produced in Karnataka. Main contributing districts are Belgaon, Belari, Mandva, Kolar, Mysore, Tumkur, Raichur etc.

Andhra Pradesh : Deltaic regions of Krishna-Godavari rivers produce 4.67 % of the nation's total mainly in the East and West Godavari,

Srikakulam, Vishakapattanam and Chittor districts.

Gujarat : This state shares 3.17 % of the nation's production, major districts are Surat, Bhavnagar, Jamnagar, Rajkot and Junagarh.

Punjab : Punjab contributes 2.21 % of the total production. Amritsar, Jalahdhar, Firozepur, Gurudaspur are main districts.

Haryana : It produces 2.04 % of the total production. Fertile soil and better regular irigation facilities like Punjab has increased per hectare prodution.

Rajasthan : Bundi, Udaipur, Bhilwara, Sriganganagar, Chittorgarh and Kota are the main producing districts.

Others : Other producers are Terai districts Champaran, Gaya, Darbhanga, Sharan of Bihar, Puri, Cuttak, Sambalpur of Odisha and Muraina, Gwalior and Shivpuri of Madhya Pradesh.

Problems in Sugarcane Production

(1) Northern India have long dry weather, which lessen the juice in sugarcane whereas the southern India have suitable sea-coastal climatic conditions.

(2) Lack and lesser use of advance technology.

(3) Farmers do not get the proper price and payment of their crops.

(4) Adverse weather

(5) No clear decision over the right price of the crop.

5. Tea

Tea is one of the important and foremost plantation crop which provides energy and is treated as a medicinal drink. These bushes were grown in the eastern hills from ancient time in a forested form. Around 1830-40 Britishers cultivated it in North-east. India have adequate conditions for its growth and development and hence, India stood first in the world in area and production.

Due to local consumption of Tea in India, it stand's second in its export after Srilanka. In 2014-15 the exported tea had a value of Rs. 4171 crores. This garden crop provides employment to 20 lakh people directly or indirectly. Only at Assam 4 lakh workers are employed.

Fig 18.6 (a) : Tea Plantation in Neelgiri Hills

Fig 18.6 (b) : Tea Plantation in Darjeeling Hills

Necessary Geographical Conditions

Tea is essentially a plant of the monsoon tropics and grows well in the hilly land, Wetter parts of the monsoon region and of the rainy tropics. It is however, tolerant of a wide range of warmth such as prevails in the tropical and sub-tropical regions.

Temperature : As it is a tropical plant, it requires temperature between 25°C to 30°C. The bush or plant growth need shade and dry air.

Rainfall : Average annual rainfall needed is between 200 to 250 cms. Showers at various period is very good for their growth. Morning sunlight is also suitable for development.

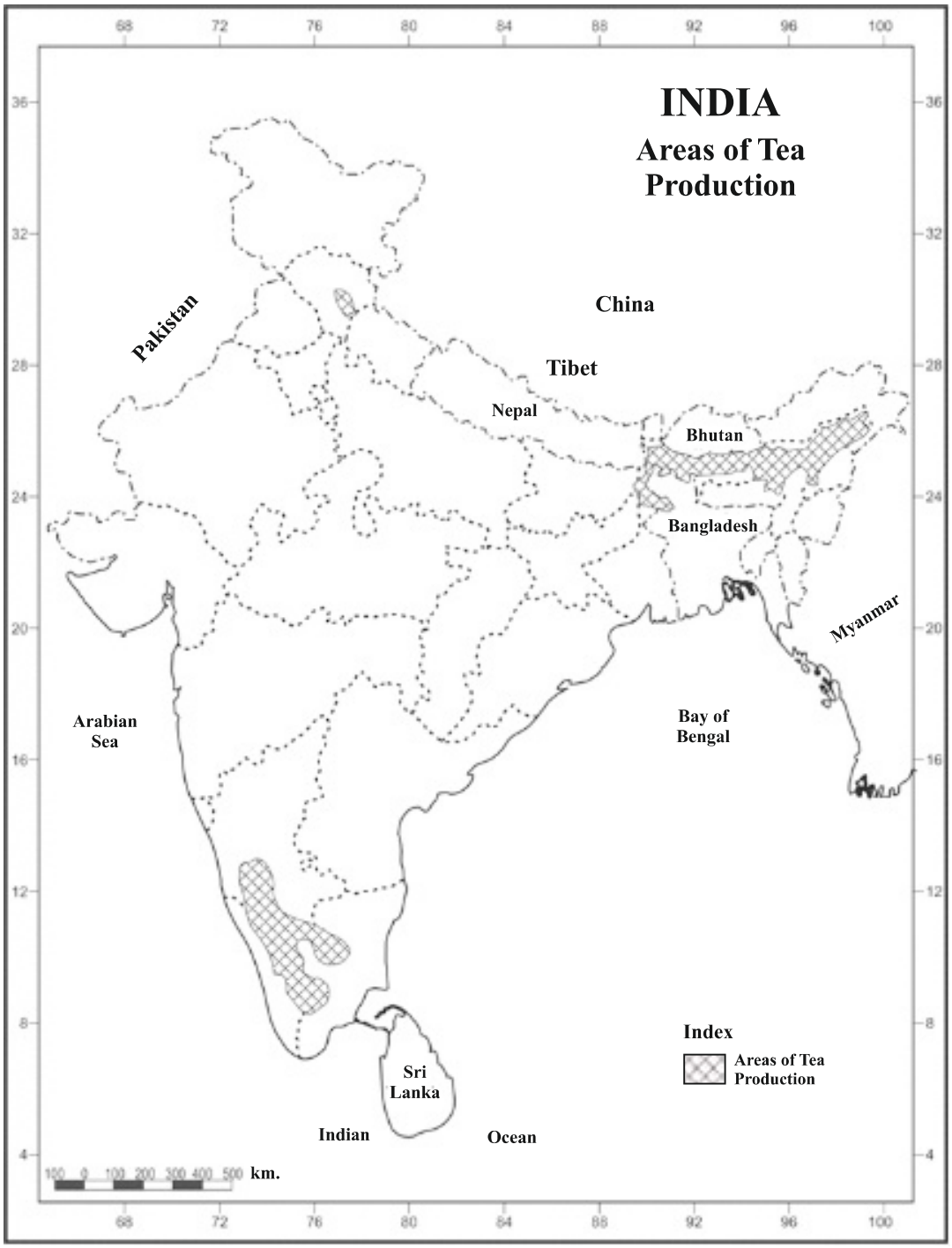
Soils : Fertile soil rich in organic matter

(humus) with an element of sulphur is ideal for tea cultivation.

Surface : The land should be gently rolling so as to prevent water logging hence it is cultivated on hilly slopes.

Fertilizers : Tea is an exhaustive crop. Therefore, it requires constant use of fertilizers, and green manure to maintain soil fertiliy.

Labour : The tea industry requires an abundant supply of cheap labour. Plucking of leaves, pruning of plants need considerable skills. Machines cannot do these jobs. Therefore, tea



Map 18.5 : Tea Production in India

plantation can only be set up where density of population is high and cheap labour is available.

Tea production and Distribution

Tea farming is done in 16 states of India. Assam, West Bengal, Tamilnadu and Kerala combinedly constitutes 95 % of the total production. In 2014-15, per hectare production was 2170 kgs, which was highest in Tamilnadu and lowest in Himachal Pradesh. Trichur district of Kerala tops with 3145 kgs per hectare production.

Assam : Nearly two-third of the country's tea comes from Assam region. The flat alluvial lands on either side of the Brahmaputra River and Surma Valley are the principal producers of tea in the country. Assam covers 52 % of tea region and 54 % of the total production. Shivsagar, Lakhimpur, Darang, Golpada, Naugaon etc are the main districts.

West Bengal : It is the second highest producer in the country with 22.36 % of total production. Darjeeling, Jalpaidgudi, Cooch Behar, Purlia are major contributors. Tea of Darjeeling is of best quality, which is demanded all over the world.

Tamilnadu : It produces 12 % of the total production in the country and stood third. Nilgiri and Annamalai contribute 46 % and 33 % of the state production. The tea of Tamilnadu is mostly demanded in Europe.

Kerala : It shares 8.5 % of the total production of tea. Trichur, Palghat, Kannanor, Trivendram, Kozhikode, Mallapuram are the main producing districts.

Other producing states :

Himachal Pradesh : Green tea is grown in Kangra, Mandi districts. **Uttrakhand :** Dehradun, Almora, Garhwal districts. **Karnataka :** Coorg, Mysore, Chikmagalor districts. Manipur, Tripura, Meghalaya, Arunachal Pradesh are the smaller contributors in production. These all share 1 % of the total production.

Truck Farming

"Truck farming, horticultural practice of growing one or more vegetable crops, fruits etc. on a large scale for shipment to distant markets. It is usually less intensive and diversified than market gardening. At first, this type of farming entirely depends on local and regional markets. As the use of rail roads and large capacity trucks expanded and refrigerated carriers were introduced, truck farms spread to the cheaper lands of the west and south. Shipping seasonal crops to relatively distant markets where their cultivation is limited by climate. Truck farming first got started in California, then it spread to western Europe's Britain, Belgium, Germany and Denmark. In India metropolitan and industrial centres were supplied vegetable and fruits by trucks and railways to remote and near by places. In India varities of vegetables and fruits were produced due to varities in soils and climate conditions.

Main characteristics of Truck farming are as under :

1. The size of farms are small.
2. Intensive form of agriculture is adopted to produce 3-4 crops per year.
3. Human labour intensive.
4. The fields are managed by scientific methods.
5. To maintain fertility, more fertilizers are being used.
6. Air conditioned trucks are needed.
7. Huge capital is required.

India is second largest producer of fruits and vegetables in the world. The contribution of horticulture is 30% in total domestic production and it covers 17 % of the sown area. There is about 34 % increase in the horticulture production between 2004-05 to 2014-15. The area under horticulture corps increased from 18.7 to 24.2 million hectare and the production has increased from 16.07 to 283 million tonnes. So like this horticulture crops are

Fig 18.7 : Truck Farming

high than food crops in production. The average availability of fruits is 189 grams per day and 357 grams vegetables per day per person in India. In the production of vegetables, India stands second after China. First in Peas, second in Brinjal, Cabbage and third in Potato and Tomato.

According to a report of 2013-14, Tamilnadu is first in flower production, Gujarat is first in Spices, Maharashtra is first in fruits and West Bengal in vegetables production.

Fruit Farming

India can be sub-divided in following region in fruit farming-

(1) Himalayan hilly temperate regions : In includes the valleys of Srinagar-Kulu, Kangra, Mountains of Kumaun, Himachal Pradesh. This area mainly produces Apple, Grapes, Pear, Litchi, Figs, Plums, Almonds, Walnuts, Berry, Apricots and Strawberry.

(2) North-East Moist Region : This includes West Bengal, Jharkhand, Bihar, East Uttar Pradesh, Chhattisgarh, Odisha which produces Mangoes,

Fig 18.8 : Vegetable Market

Banana, Guava, Pear, Litchi, Pineapple, Chickoo, Papaya, Custard apple etc.

(3) Dry and Semi-Arid Region : This region covers the states of Punjab, Rajasthan, West Uttar Pradesh, Madhya Pradesh which produces fruits like Mango, Blackberry, Orange, Malta, Banana, Lemon, Pomegranate, Dates, Grapes, Papaya, Guava, Figs etc.

(4) Southern Region : It covers Maharashtra, Kerala, Tamilnadu and Andhra Pradesh which produces Mango, Orange, Banana, Guaa, Pineapple, Grapes, Pomegranate, Coconut, Cashew nut, Papaya etc.

(5) Coastal Region : It includes the Peninsular India's coastal parts which produces Coconut, Banana, Mango, Papaya, Orange etc.

Olericulture (Vegetable Farming)

Due to varieties of natural regions various types of vegetables are grown in India Ladyfinger, Pumpkin, Ridge gourd, Radish, Carrot, Gourd, Cabbage, Cauliflower, Peas, Tomato, Fenugreek, Turnips, Yam, Legumes, Bittergourd, Brinjal, Potato, Onion, Garlic, Corriander, Peppermint etc. Which get supplied to cities, Metropolitan and other places through trucks.

Characteristics of Olericulture

(1) Fertilizers used in abundance

(2) Trained labour needed

(3) Highly intensive in nature

(4) Need more and regular irrigation

(5) To prevent from pest and insects medicines and chemical spray needed at proper time.

(6) Proper packing is needed

(7) Prompt transportation is must

(8) Good return or profits

IMPORTANT POINTS

1. Agriculture is the ancient occupation of India, In the production of fruits and vegetables, India stands at second place in the world in the economy. 54.5 % of the population is directly dependent on agriculture.

2. Due to the dependence on the monsoon, Indian agriculture is called gamble of monsoons.

3. **Characteristics of Indian farming**
   - Dependency of population on agriculture
   - Agriculture depends on monsoon
   - Lack of irrigation facilities
   - Less per hectare production
   - Scarcity of fodder crops
   - Small land holdings
   - Abundance of food grains
   - Diversity of crops etc

4. **Reasons responsible for less production in agriculture**
   - Weather vagaries on agriculture
   - Fatal point of view of farmers
   - Agriculture is taken as source of living instead of business
   - Misuse of manures and fertilizers
   - Restricted development of irrigation facilities
   - Best seeds are out of reach of farmers
   - Agricultural diseases
   - Inferior quality animals
   - Less fertile soils
   - Minimizing size of small land holdings

5. **Type of Indian agriculture**
   - Subsistence and commercial agriculture
   - Wet and Dry agriculture
   - Intensive and Extensive agriculture
   - Garden farming
   - Organic agriculture

6. On the basis of usage, Indian agriculture is divided into food grains, beverages, fiber crops, commercial crops etc.

7. Organic farming has origin in the ancient civilisations. Sikkim is the first complete state with organic agriculture.

8. Wheat is second most important food grain of India. India produces 11.7 % of the world production. There has been tremendous progress after green revolution. In 2014-15 per hectare production was 2872 kgs. Main contributing states are Uttar Pradesh, Punjab, Haryana, Madhya Pradesh, Rajasthan and Bihar etc.

9. Rice is the main food crop of India. Native place of Rice is India. India produces19% of the world's total production. Out of total production in the country 97 % is shared by Andhra Pradesh, Assam, Bihar, Maharashtra, Madhya Pradesh, Tamilnadu, Odisha, Punjab, Uttar Pradesh, Kerala, West Bengal etc.

10. India is native place of cotton. It is one of the most important commercial and fibrous crop whose per hectare production is 510 kgs. Gujarat and Punjab lead the country in per hectare production.

11. Sugarcane is a native of India, Uttar Pradesh leads the nation in area and production of sugarcane, whereas highest per hectare production is in West Bengal and lowest is in Jammu and Kashmir.

12. Tea is main cash crop of India. India leads in the production and consumption of tea in the world. India is second largest exporter of tea in the world mainly contributed by Assam, West Bengal, Tamilnadu and Kerala states.

13. Truck Farming is a type of horticulture, in which fruits and vegetables are supplied to the cities, and metropolitan cities by the refrigerated vans and trucks. It started in California of USA. West Bengal in India is leading in vegetable production whereas Maharashtra leads in fruits production.

EXERCISE

Multiple Choice Type Questions

1. Indian farming is popularly known as -
   (a) Farmer farming
   (b) Gamble of Monsoon
   (c) Labour farming
   (d) Commercial farming

2. First complete organic farming state in India is-
   (a) Sikkim (b) Bihar
   (c) Assam (d) Rajasthan

3. Leading spice producing state of India is -
   (a) Tamilnadu (b) Karnataka
   (c) Gujarat (d) Maharashtra

4. Which state in India is the leading wheat producer-
   (a) Punjab (b) Haryana
   (c) Gujarat (d) Uttar Pradesh

5. Which district of Tamilnadu is largest producer of Rice -
   (a) Tejabur (b) Madurai
   (c) Ramnathpuram (d) Chennai

6. Gujarat produces _____ percentage of cotton production of the country-
   (a) 30% (b) 34% (c) 38% (d) 40%

7. Which state is highest producer of sugarcane?
   (a) Tamilnadu (b) Punjab
   (c) Maharashtra (d) Uttar Pradesh

8. India is at _____place in exporting Tea in the world-
   (a) First (b) Second (c) Third (d) Fifth

9. Assam produces percentage of Tea in India -
   (a) 50% (b) 60% (c) 54% (d) 45%

Very Short Answer Type Questions

10. In which occupation most of India's population is employed / engaged?

11. By which name the shifting cultivation is known in Rajasthan?

12. Which state of India is at the first place in vegetable production?

13. What is the place of Assam in tea production in India ?

14. Which state of India is honoured with complete organic farming?

Short Answer Type Questions

15. Write the characteristics of Truck farming?

16. Why is the Indian economy called gamble of Monsoon?

17. Write any four characteristics of Indian agriculture.

18. Name the major sugarcane producing states in India.

Essay Type Questions

19. Explain the difference between organic and chemical agriculture while explaining the development of organic farming in India.

20. Explain the importance of Indian agriculture and briefly describe the major types of agriculture.

21. Describe the necessary geographical conditions for wheat production and also mention the distribution and production of wheat in India.