Chapter – 1

INTRODUCTION
Indian agriculture has been undergoing spectacular changes in recent period. These changes are manifestations of large scale commercialization and diversification taking place in the agricultural sector. They broadly include cultivation of new crops and varieties, increase in the share of area under cash crops, large scale spread of livestock activities and fisheries, pursuance of hi-tech agriculture in the areas of aquaculture, bio-technology, horticulture, processing, etc. The latest changes are basically responses of our agriculture to new economic environment ushered in by the process of liberalization.

**Historical Perspective**

Before the advent of the British rule, crops such as cotton, tobacco and sugarcane were grown fairly extensively since land revenue had to be paid mostly in cash and the prices of these crops, relative to those of food grains, were much higher at that time. Even during the British rule, the situation did not change much. Though the primary concern of the rulers from then onwards was the expansion of trade, some of the policies in pursuit of this objective introduced market forces into agriculture. In the process, land was rendered marketable in principle as the British vested the property rights on land with the individual farmers for the first time. This, coupled with the growth in population and infrastructural investments in irrigation, communication and transport, resulted in rise in land value.
Besides, expanding trade opportunities in agricultural produce also brought forth inflow of finance from rent-seeking urban traders and money lenders to agriculture. This set off the emergence of a different outlook for farm enterprise from an enterprise that provided a source of livelihood to one that had the potential of a commercial venture.¹

The All India Rural Credit Survey (AIRCS), 1951-52 was a pioneering attempt to capture the salient features of the agrarian structure. The survey report threw up a fair idea as to the extent of commercialisation with its regional perspective along with its correlates such as cropping pattern, value of gross produce per unit of land, distribution of holdings, land rent paid in cash and kind, wages paid in cash and kind, borrowings, etc. AIRCS classified the regions under three categories, viz., (i) subsistence region characterized by lower proportion of cash expenses in total expenses and lower proportion of cash proceeds from crop sales to gross value of output, (ii) monetised regions which had significantly higher proportion of cash transactions but with relatively low share of cash crops in the net sown area and (iii) commercialised and monetised regions having a high share of cash crops in the net sown area besides higher proportion of cash transactions. Further, it was observed that the average rent paid in cash and kind to landlords as proportion of gross value of produce was twice as high in the commercialised regions compared to
subsistence regions. Similarly, the proportion of wages and salaries also was significantly higher in commercialised regions.

The onset of green revolution during mid-sixties resulted in widespread use of modern inputs such as High Yielding Varieties (HYV) seeds, water, fertilisers and pesticides leading to impressive growth in yield levels. As a result, there was a spurt in marketable surplus. For instance, according to the estimates of Directorate of Marketing and Inspection (1981), the net marketable surplus of paddy was 31.14 per cent of the production from HYVs whereas it was (-)0.7 per cent in case of traditional varieties during 1972-73. The growth in agricultural output also owed it to favourable public policy on prices, marketing and credit, besides widespread adoption of new agricultural technology. The Commission for Agricultural Costs and Prices (CACP), (the erstwhile Agricultural Price Commission) set up in 1966 has played an important role in recommending remunerative prices for various crops. Regulation of markets has also been given due importance during the post Green Revolution period. On the credit front too, several innovations had been introduced to augment the working capital of the cultivators as well as to enhance their investment capabilities.²
Agricultural sector has witnessed significant changes in the crop-mix over time in favour of superior cereals, non-traditional oilseeds such as sunflower, soyabean, etc. These changes have been largely the manifestations of conscious public policy support through price incentives, investment in generation of new technology, etc. Diversification of agriculture, outside the crop sector by way of subsidiary enterprises in animal husbandry, poultry, fisheries, sericulture, etc., has been an important development that accompanied commercialisation. There has been acceleration in the commercialisation, growth and diversification of agriculture since 1980s, especially during 1990s. The positive feature of this phase of commercialisation is the coverage of even small and marginal farmers and backward regions. Before going in to the details of the agricultural development an attempt here is made to discuss geographical situation, the soil texture, climate and agro-climatic zones, which have far reaching effect on agriculture development in the country.

**Geographical Situation**

India has a geographical area of 327.4 million hectares. The sub-continent lies between $8^\circ$ – $37^\circ$ North latitude and $69^\circ$- $93^\circ$ East longitude. The northern boundary of the country has a chain of Himalayas extending all along the northern side, bordering Pakistan on the west and Burma on
the east. The remaining south, east and west borders are surrounded by Indian Ocean, Bay of Bengal' and Arabian Sea respectively.

**Soils of India**

National progress is dependent upon the rapid development of agriculture. Agricultural production is mainly dependent upon the maintenance and improvement of soil productivity. So farmers should be educated to use lands according to their capabilities and to adopt proper soil conservation measures. In view of this, it is very essential to impart knowledge about different soils that are existing in their own country.

Soil is a vital natural resource. The soil and land form a precious finite heritage that we must use judiciously according to their potential to meet the demands of ever growing population. People are dependent on soils and conversely, good soils are dependent on people and the use they make of the land. Soils are natural bodies in which plants grow and they provide the starting point for successful agriculture. To ensure optimum agricultural production first it is imperative to know the basic facts about our soil and then its management with judicious use of fertilizer to achieve high productivity. We know that maximum population in India is depend on agriculture and is the base of agriculture. Nature of soil differs from area to
area and so different types of soils that are seathered throughout the country need a detailed description.³

**Major Soil Groups in India**

Volcker (1893) and Reathee (1898), classified the Indian soils into Indo-gangetic alluvium, black cotton, red and laterite soils. Later in 1940s, Indian Agricultural Research Institute had set-up a soil-survey committee which identified major soil groups in our country that are shown in Map1.1.
MAP-1.1
Map of India Showing Soil Types
1. Black soils

The principal region of black soils is the Deccan plateau and its periphery extending from 8°45' to 26° North latitude and 68° to 83°45' East longitude. They are formed from Deccan basalt trap rocks and occur in areas under the monsoon climate, mostly of semi-arid and sub-humid types. The overall climate of black soil region may be described as hot and dry summer, 40-100 cm rainfall per annum, mild to moderate winters and annual temperature ranges from 24-30° centigrade, mean maximum temperature during April-May ranges from 36~42°C and mean minimum temperature during winter ranges from 15-24° centigrade. Semi-arid to sub-humid, tropical to sub-tropical monsoon type climate with alternate dry and wet periods and calcification (formation of calcium carbonate) are favourable to the formation of black soils. The soils are characterised by dark grey to black colour with 35-60 per cent clay, neutral to slightly alkaline reaction, high swelling and shrinkage, plasticity, deep cracks during summer and poor status of organic matter, nitrogen and phosphorus. Impeded drainage and low permeability are the major problems. Black soils are divided into shallow black soil of a depth of 30-50 cms, medium black soils of 50-120 cm and deep black soils of more than 120 centimeters. The natural vegetation comprises dry deciduous species, viz palas (Butes frondoss), sisam (Dalbergia sisu), neem (Azadirachta
indica) and teak (Tectona grandis). Cotton, sugarcane, groundnut, millets, maize, pulses, safflower are the common crops grown on these soils. Because of their inherent drainage problem, they are prone to salinity and sodicity under irrigated conditions unless proper drainage is ensured. Because of its high water retaining capacity, rainfed crops like minor millets, pulses like horse gram are vegetables of different types and citrus fruits can also be grown. These soils are also known as regurs, nullah regadi (a telugu word meaning black clay) and black cotton soils as cotton was the major crop grown in these soils.4

2. Red soils

These soils are derived from granite, gneiss and other metamorphic rocks. These soils are formed under well drained condition. The climate is semi-arid tropical with mean annual temperature of 25°C and mean annual rainfall from 75-100 cm. The soils are higher textured, friable structure and contain low soluble salts. They are slightly acidic to slightly alkaline, well drained with moderate permeability.

They are generally poor in nitrogen, phosphorus, lime, humus etc. In this soil, lime concretions and free carbonates are absent. The red colour is due to the higher degree of hydration of the fericoxide in the soils. On uplands, they are gravelly sandy or stony and porous and light coloured on
which food crops like bajra can be grown. On the lower plains and valleys, they are dark, coloured fertile loams, irrigated crops like maize, wheat, pulses, potatoes, fruits, millets etc can be grown. These soils have also been found under forest vegetation. Sometimes they found along with black soils (side by side) and also yellow soils (red and yellow soils). 5

Excessive gravelliness, surface crust formation and susceptibility to erosion due to high slopes are some of the problems in these soils which can be overcome by adopting suitable measures.

Morphologically the red soils can be divided into red loams which have a cloddy structure and argillaceous soil and red earths with loose friable top soil rich in sesquioxide type of minerals.

3. Laterites and lateritic soils

Laterite is a geological term and means literally a rock. The laterites and lateritic soils have been loosely used in the same sense. The lateritic soils are enriched with oxides of iron and aluminium, under the conditions of high rainfall with alternate dry and wet periods. During rainfall silica is leached downwards and iron and aluminium oxides remains in the top layers.
Laterites are usually shallow and gravelly at higher lands, but are very deep loam to clay soils in the valleys where good paddy crops are produced. Higher landy soils are poor in nutrient status whereas lower level soils are dark and richer in nutrients and organic matter. All lateritic soils are poor in calcium, magnesium, nitrogen, phosphorus and potash. They are generally well drained and porous. The soil reaction is more on the acidic side.

On laterites, as already mentioned, rice is grown at lower elevations and at higher elevations, tea, coffee, cinchona, rubber and cashewnut can be grown under good soil management conditions. On the whole, laterites are poor in fertility and readily respond to manuring and good cultivation. Based on the climate lateritic soils are grouped into high rainfall areas with strongly and weakly expressed dry season and humid zones with pronounced dry and wet periods.

4. Alluvial soils

Alluvial soils, cover the largest area in India (approximately 7 lakh km²) and these are the most important soils from agricultural point of view. The main features of alluvial soils have been derived as silt deposition laid down by the Indian river systems like the Indus, the Ganges, the Brahmaputra and the rivers like Narmada, Tapti: Mahanadi, Godavari,
Krishna and Cauvery. These rivers carry the products of weathering of rocks constituting the mountains and deposit them along their path as they flow down the plain land towards the sea.

Geologically, the alluvium is divided into recent alluvium which is known as Khadar and old alluvium, as bhangar. The newer alluvium is sandy and light coloured whereas older alluvium is more clayey, dark coloured and contains lime concretions. The soils have a wide range in soil characteristics viz. acid to alkaline sandy to clay, normal to saline, sodic and calcareous, shallow to very deep. The climate ranges from arid to humid sub-tropical.\(^7\)

The following groupings of alluvial soils may be recognised: alluvial soils (Khadar, bhangar and highly calcareous), deltaic alluvium, coastal alluvium, coastal sands, calcareous sierocomic and grey-brown soils.

**a. Alluvial soils**

The alluvial soils occurring in the Indo-Gangetic plains and the Brahmaputra valley cover a large area. The soils are transported and deposited by the rivers from the parent material. The rivers are the Ganga, Jamuna, Brahmaputra and their tributaries. The soils are deep and hard pans in the subsoil are calcareous (made of calcium carbonate) and acidic. These are deficient in nitrogen, phosphorous and humus, but not in potash
and lime. These soils are fertile amongst all the soils of India. They produce a wide variety of crops like rice, wheat, sugarcane, jute and potato. They are distributed mainly in the northern, north-western and north-eastern parts of our country.⁸

b. Deltaic alluvial soils

They are formed from sediments carried by rivers and deposited in the mouths of rivers joining the sea. The deltas of the Ganga, Brahmaputra, Mahanadi, Godavari, Krishna and Cauvery are the most important ones. In Gujarat, the deltaic alluvial soils which are sandy loam to clay loam are locally called Goradu soils. The Godavari and Krishna rivers pass through basaltic region having black soils and these soils are dark and fine textured. The Cauvery delta soils are significantly clayey and Ganga delta soils show high accumulation of organic matter, as in the Sunderbans of West Bengal, due to swampy vegetation. These soils are fertile and grow a wide variety of crops suited to climatic conditions.⁹

c. Coastal alluvium

Soils developed on coastal alluvium are found along the sea coasts. Soils are dark coloured, coarse textured and poor in fertility. Some soils are saline due to the inundation of sea water. Such soils in the Konkan coast of Maharashtra are called Khar soils.
d. Coastal sands

Sandy soils occur prominently in the coastal area of Tanjavur district of Tamil Nadu, along the Kerala coast, Bapatla in Guntur district of Andhra Pradesh and Puri district in Orissa. If sandy soils are not saline, plantation crops like coconut, cashew and casuarina can be taken up for cultivation.

Other soils under alluvium are calcareous sierozomes and grey brown soils. Calcareous sierozomes can be seen in the desertic region of Haryana and Punjab. The word 'sierozem' denotes a group of soils having a brownish-grey surface horizon with a sub-layer of carbonates which is developed under mixed shrub vegetation in a-temperate to cool, arid climate. Grey-brown soils as the name itself indicates its nature, can be found in, desert soils of Rajasthan.  

5. Desert soils

In the north-western part of India, desert soils occur over an area of 0.29 million hectares, which includes a major part of Rajasthan, south of Haryana and Punjab and northern part of Gujarat. Rainfall ranges from less than 10 cms to 50 cms, mostly contributed during monsoon season.

The region consists of sand dunes and undulating sandy plains. The temperature regime is very high throughout the year and a maximum of
50-60°C is recorded during summer. Due to high temperature organic-matter built up is very low.

The soils in the plains are mostly derived from alluvium and are pale brown to brown to yellow brown and fine sandy to loamy fine sand and are structure less. The clay contents low and presence of alkaline earth carbonates is an important feature. The nitrate nitrogen and phosphorus makes the desert soils fertile and productive under proper moisture supply. By increasing the water holding capacity, the productivity of the soils can be increased which involves addition of organic matter and clay.11

6. Tarai soils

The word "tarai" is a hindi word, which means moist. Thus, is is a wet regime having high water table. Tarai soils are foot hill soils and extend in strips of varying widths at the foot of Himalayas in Jammu and Kashmir, Uttar-Pradesh, Bihar and West-Bengal.

Soils under the natural conditions are thickly vegetated and swampy. Several types of grasses and trees from the native vegetation on removal of which the soils become highly productive.

The soils are formed from the materials that are washed down by the erosion of mountains. They are alluvial origin. High soil moisture content all through the year results in luxuriant vegetation dominated by tall grasses.
They are neutral to slightly alkaline with significant amounts of organic matter. The texture varies from sandy loam to silty loam. Generally, these soils are fertile and by providing proper drainage, the productivity can be increased.\(^\text{12}\)

7. Brown hill soils

These soils are formed under forests mainly in Himalayas and occur on the hills. They are dark brown, loam to silty clay in texture and acidic to neutral in reaction,

8. Sub-mountain soils

The soils are formed in the sub-Himalayan region under coniferous forests. An annual rainfall of 120-225 cm is recorded in this region. This high rainfall is responsible for the accumulation of organic matter, absence of free lime and acidity of the soils.

9. Mountain meadow soils

These soils occur at higher elevations in the Himalayas above the zones of tree growth. The soils are shallow with mostly grass vegetation.

10. Peaty and marshy soils

Peaty soils are formed due to the accumulation of organic matter in humid regions. In Kerala, these peaty soils are rich in soluble salts which
are known as Kari soils. During the monsoon season, the soils get submerged in water. Soon after the monsoon, the water recedes and rice cultivation is taken up. The soils are black clayey and highly acidic (due to sulphuric acid). They contain 10-40 per cent organic matter.\(^\text{13}\)

Marshy soils occur on the coastal tracts of Orissa, in the Sunderbans of West Bengal and south-east coast of Tamil Nadu.

11. **Saline and sodic soils**

The soils are salt affected and unless and until reclamation measures are taken up, the soils cannot become productive. In India, around 7 million are salt affected distributed in different states.

Saline soils are formed due to accumulation of soluble salts which consists of chlorides and sulphates of calcium and magnesium. Excess salts can be removed by leaching, Sodic soils have high amounts of sodium and about 3 million hectares are affected by this sodicity. These soils can be reclaimed by adding amendments like gypsum.\(^\text{14}\)

**Soil characteristics**

Soils are the outcome or a combined action of climate and vegetation on parent rocks and are conditioned by the topography over a period of time. Depending on the soil forming factors a variety of soils -are
formed. Soils in India are classified into 16 groups which are super-imposed on the physiographic map of India to identify the combined effect of these two in preparing the agro-ecological regional map of India. Therefore soil type number is attached to capital alphabets denoting physiographic regions:

The soil-scapes specifying the soils and their physiography are described as follows.

1. Red loamy soils
   These occur in eastern Himalayas, Eastern Ghats and Tamil Nadu uplands and is represented by "1".

2. Red and lateritic soils
   These are observed in eastern plateau, north eastern hills and Western Ghats and in patches, in Eastern Ghats and is represented by "2".

3. Red and yellow soils
   These are observed in parts of eastern plateau adjoining the central highlands and is represented by "3".

4. Shallow and medium black soils (with inclusions of deep phases). These occur dominantly in Deccan plateau, including central Maharashtra and Karnataka plateau and is represented by "4".
5. Medium and deep black soils (with inclusions of shallow phases).

These observed dominantly in Central highlands and Narmada valley, including Malwa plateau, Bundelkhand up land and Kathiawar peninsula and is represented by "5".

6. Mixed red and black soils

These occur dominantly in parts of Deccan Plateau, including Telangana plateau, western part of Eastern Ghats, Anantapur and Bellary region of northern Karnataka plateau and is represented by "6".

7. Coastal alluvium-derived soils

These dominantly occur in the eastern coastal plains and in narrow strips along the western coastal plain and is represented by "7".

8. Alluvium-derived soils

These occur in the western, northern and eastern, including Bengal and Assam plains and is represented by "8".

9. Desert soils

These dominantly occur in south-western parts of punjab and Haryana plains, Rajasthan Bagar, Marusthali and Kachchh peninsula and is represented by "9".
10. Tarai soils

These mainly occur in the foot-hills of central and eastern Himalayas and is represented by "10".

11. Brown and red hill soils

These occur in association with red loamy soils in parts of eastern Himalayas and is represented by "11".

12. Saline and alkaline soils

These occur in Kathiawar peninsula and in the alluvial plain areas of Uttar Pradesh, Haryana, Punjab and Rajasthan and is represented by "12".

13. Shallow and skeletal soils

These are observed in Ladakh plateau and rugged ranges of Kashmir Himalayas and is represented by "13".

14. Grey brown soils

These occur along the foot-hills of Aravallis and is represented by "14".

15. Brown forest and podzolic soils

These are observed in the north-west Himalayas and is represented by "15".
16. Sandy and littoral soils

These occur in Lakshadweep and coastal areas of Andaman and Nicobar Islands and is represented by "16".

Climate

The climate of India is of monsoon type. There are two distinct periods of rainfall in a year, viz. the south-west monsoon during the months of June-September and the northeast monsoon during the winter months. The climate is influenced by the Himalayan mountains as well as the Indian ocean, the Arabian sea and Bay of Bengal. The Himalayas obstruct the path of entry of cold winds from the north, giving a continental type of climate. The seas produce a hot monsoonic type of tropical climate.\textsuperscript{15}

The rainfall is controlled by topography as the high mountains lying across the path of the monsoon winds helps to precipitate their moisture as rain on the windward side. Therefore, the western ghats and the Assam ranges receive high rainfall of about more than 200 mm per annum. As the south-west monsoon is deflected towards upper India by the Himalayas, the Gangetic plains and Punjab and Haryana receive good rainfall. The moisture bearing winds from Arabian sea pass unobstructed over
Rajasthan as the Aravallis lie along their way. This is the cause of scanty rainfall in Rajasthan (around 25 mm/annum).

The south-west monsoon wind enters India, both from the Arabian sea and the Bay of Bengal. The Arabian sea branch is more important for South India. The Bay of Bengal branch benefits the east coast and the northern oceans. The south-west monsoon is followed by the north-east monsoon towards the end of September.\(^\text{16}\)

The temperature is equally variable like rainfall. Usually the temperature rises continually during the summer months (March to June). The air temperature rises to about 45°C in the north and north-western plains. The high altitudes in the Himalayas and in the Nilgiris have low temperature. The mean annual temperature in the Indo-Gangetic plains is around 24 degree centigrade. The climate thus varies from extreme aridity to high humidity and from scanty to torrential rainfall. The area between latitudes 20° north and 20° south has been considered tropical.
Distribution of Soils in India

Different types of soils in each state are mentioned in Table No.1.

**Table 1.1**

**Soils of India**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Soil groups</th>
<th>Area (M.ha)</th>
<th>Distribution in the states</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red loamy</td>
<td>21.3</td>
<td>AP, TN, KT, KR, MP, O, R</td>
</tr>
<tr>
<td>2</td>
<td>Red sandy</td>
<td>33.0</td>
<td>TN, KT, AP, B, WB</td>
</tr>
<tr>
<td>4</td>
<td>Red &amp; yellow</td>
<td>40.3</td>
<td>MP, O, B</td>
</tr>
<tr>
<td>5</td>
<td>Shallow black</td>
<td>3.1</td>
<td>M</td>
</tr>
<tr>
<td>6</td>
<td>Medium black</td>
<td>43.0</td>
<td>M, MP, GJ, AP, KT, R</td>
</tr>
<tr>
<td>7</td>
<td>Deep black</td>
<td>11.2</td>
<td>M, AP, KT, MP, GJ, R</td>
</tr>
<tr>
<td>8</td>
<td>Mixed red &amp; black</td>
<td>16.2</td>
<td>KT, TN, M, MP, AP, B</td>
</tr>
<tr>
<td>9</td>
<td>Coastal alluvium</td>
<td>5.4</td>
<td>TN, KR, KT, AP, M, G, WB, AN</td>
</tr>
<tr>
<td>10</td>
<td>Coastal sands</td>
<td>0.45</td>
<td>O, TN, AP, PO</td>
</tr>
<tr>
<td>11</td>
<td>Deltaic alluvium</td>
<td>8.70</td>
<td>TN, AP, O, WB</td>
</tr>
<tr>
<td>12</td>
<td>Alluvial (Recent &amp; old)</td>
<td>35.67</td>
<td>UP, P, B, WB, A, H, AP, GJ, JK, HR, MP, R, D</td>
</tr>
<tr>
<td>13</td>
<td>Alluvial (Calcereous)</td>
<td>1.3</td>
<td>UP, B</td>
</tr>
<tr>
<td>14</td>
<td>Calcareous sierozemic</td>
<td>4.5</td>
<td>P, H, R</td>
</tr>
<tr>
<td>15</td>
<td>Grey brown</td>
<td>10.1</td>
<td>GJ, R</td>
</tr>
<tr>
<td>16</td>
<td>Desert</td>
<td>18.2</td>
<td>R, G, H</td>
</tr>
<tr>
<td>17</td>
<td>Tarai</td>
<td>2.8</td>
<td>UP, B, WB, AN</td>
</tr>
<tr>
<td>19</td>
<td>Sub montane</td>
<td>7.6</td>
<td>UP, JK, HP</td>
</tr>
<tr>
<td>20</td>
<td>Mountain meadow</td>
<td>5.9</td>
<td>JK</td>
</tr>
<tr>
<td>22</td>
<td>Peaty</td>
<td>0.27</td>
<td>KR, WB</td>
</tr>
<tr>
<td>23</td>
<td>Skeletal</td>
<td>7.9</td>
<td>MP</td>
</tr>
<tr>
<td>24</td>
<td>Glaciers &amp; eternal snow</td>
<td>2.9</td>
<td>UP, JK</td>
</tr>
<tr>
<td>25</td>
<td>Others</td>
<td>24.9</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, GOI.

Symbols for the states- AN-Andaman & Nicobar islands; AP –Andhra Pradesh; A-Assam; B-Bihar; D-Delhi; G-Goa; GJ-Gujarat; H-Haryana; HP-Himachal Pradesh; JK-Jammu & Kashmir; KT-Karnataka; KR-Kerala; MP-Madhya Pradesh; M-Maharashtra; O-Orissa; PO-Pondicherry; P- Punjab; R-Rajasthan; TN- Tamilnada; UP-Uttar Pradesh; WB- West Bengal.

According to these areas of distribution, National Bureau of Soil Survey and Land Use Planning classified the soils and a soil map of India
was prepared. As the soil survey programme in the country still in process, regions not covered by soil survey are not included in the soil map. After this progress only, a more accurate soil map of India will be available.

**Agro-Climatic Regions**

Planning Commission has demarcated the geographical area of India into 15 agro-climatic regions. The 15 agro-climatic zones are:

1. Western Himalayan Region: J&K, HP, UP, Uttarakhand
2. Eastern Himalayan Region: Assam Sikkim, W.Bengal & all Northeastern states
3. Lower Gangetic Plains Region: W.Bengal
4. Middle Gangetic Plains Region: UP, Bihar
5. Upper Gangetic Plains Region: UP
6. Trans-Gangetic Plains Region: Punjab, Haryana, Delhi & Rajasthan
7. Eastern Plateau and Hills Region: Maharashtra, UP, Orissa & W.Bengal
8. Central Plateau and Hills Region: MP, Rajasthan, UP
9. Western Plateau and Hills Region: Maharashtra, MP & Rajasthan
10. Southern Plateau and Hills Region: AP, Karnataka, Tamil Nadu
11. East Coast Plains and Hills Region: Orissa, AP, TN & Pondicherry
12. West Coast Plains and Ghat Region: TN, Kerala, Goa, Karnataka, Maharashtra
13. Gujarat Plains and Hills Region: Gujarat
14. Western Dry Region: Rajasthan
15. The Islands Region: Andman & Nicobar, Laksha Dweep.

**Land Utilisation**

The land utilization particulars have been presented in the table 1.2.
<table>
<thead>
<tr>
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<tr>
<td>Geographical Area</td>
<td>328.73</td>
<td>328.73</td>
<td>328.73</td>
<td>328.73</td>
<td>328.73</td>
<td>328.73</td>
<td>328.73</td>
<td>328.73</td>
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</tr>
<tr>
<td>Reporting Area for Land Utilisation Statistics (1 to 5)</td>
<td>305.18</td>
<td>305.12</td>
<td>305.34</td>
<td>305.56</td>
<td>305.58</td>
<td>305.43</td>
<td>305.64</td>
<td>305.68</td>
<td>305.69</td>
</tr>
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<td>1. Forest</td>
<td>69.53</td>
<td>69.41</td>
<td>69.57</td>
<td>69.65</td>
<td>69.65</td>
<td>69.68</td>
<td>69.69</td>
<td>69.62</td>
<td>69.63</td>
</tr>
<tr>
<td>%</td>
<td>22.78</td>
<td>22.75</td>
<td>22.78</td>
<td>22.80</td>
<td>22.81</td>
<td>22.80</td>
<td>22.78</td>
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<tr>
<td>2. Not Available for Cultivation (A+B)</td>
<td>41.48</td>
<td>41.57</td>
<td>42.07</td>
<td>42.23</td>
<td>42.47</td>
<td>42.56</td>
<td>42.97</td>
<td>43.19</td>
<td>43.32</td>
</tr>
<tr>
<td>(A) Area Under Non-agricultural Uses</td>
<td>23.89</td>
<td>24.05</td>
<td>24.26</td>
<td>24.65</td>
<td>24.89</td>
<td>25.12</td>
<td>25.57</td>
<td>26.02</td>
<td>26.31</td>
</tr>
<tr>
<td>%</td>
<td>7.83</td>
<td>7.88</td>
<td>7.95</td>
<td>8.07</td>
<td>8.15</td>
<td>8.22</td>
<td>8.37</td>
<td>8.51</td>
<td>8.61</td>
</tr>
<tr>
<td>(B) Barren &amp; Un-cultivable Land</td>
<td>17.59</td>
<td>17.52</td>
<td>17.80</td>
<td>17.58</td>
<td>17.58</td>
<td>17.44</td>
<td>17.40</td>
<td>17.17</td>
<td>17.02</td>
</tr>
<tr>
<td>%</td>
<td>5.76</td>
<td>5.74</td>
<td>5.83</td>
<td>5.75</td>
<td>5.75</td>
<td>5.71</td>
<td>5.69</td>
<td>5.62</td>
<td>5.57</td>
</tr>
<tr>
<td>3. Other Uncultivated land excluding Fallow Land (A+B+C)</td>
<td>27.74</td>
<td>27.50</td>
<td>27.50</td>
<td>27.11</td>
<td>27.13</td>
<td>27.06</td>
<td>27.05</td>
<td>26.85</td>
<td>26.51</td>
</tr>
<tr>
<td>(A) Permanent Pasture &amp; other Grazing Land</td>
<td>10.67</td>
<td>10.53</td>
<td>10.54</td>
<td>10.49</td>
<td>10.46</td>
<td>10.45</td>
<td>10.42</td>
<td>10.36</td>
<td>10.34</td>
</tr>
<tr>
<td>%</td>
<td>3.49</td>
<td>3.45</td>
<td>3.45</td>
<td>3.43</td>
<td>3.42</td>
<td>3.42</td>
<td>3.41</td>
<td>3.39</td>
<td>3.38</td>
</tr>
<tr>
<td>(B) Land under Miscellaneous Tree Crops &amp; Groves not included in Net Area Sown</td>
<td>3.44</td>
<td>3.45</td>
<td>3.36</td>
<td>3.38</td>
<td>3.40</td>
<td>3.39</td>
<td>3.36</td>
<td>3.42</td>
<td>3.40</td>
</tr>
<tr>
<td>%</td>
<td>1.13</td>
<td>1.13</td>
<td>1.10</td>
<td>1.11</td>
<td>1.11</td>
<td>1.11</td>
<td>1.10</td>
<td>1.12</td>
<td>1.11</td>
</tr>
<tr>
<td>%</td>
<td>4.47</td>
<td>4.43</td>
<td>4.46</td>
<td>4.33</td>
<td>4.34</td>
<td>4.33</td>
<td>4.34</td>
<td>4.27</td>
<td>4.17</td>
</tr>
<tr>
<td>(A) Fallow Lands other than Current Fallows</td>
<td>10.29</td>
<td>10.56</td>
<td>11.88</td>
<td>11.34</td>
<td>10.69</td>
<td>10.60</td>
<td>10.51</td>
<td>10.35</td>
<td>10.32</td>
</tr>
<tr>
<td>%</td>
<td>3.37</td>
<td>3.46</td>
<td>3.89</td>
<td>3.71</td>
<td>3.50</td>
<td>3.47</td>
<td>3.44</td>
<td>3.39</td>
<td>3.37</td>
</tr>
<tr>
<td>(B) Current Fallows</td>
<td>14.78</td>
<td>15.35</td>
<td>21.86</td>
<td>14.47</td>
<td>14.48</td>
<td>14.06</td>
<td>15.43</td>
<td>14.76</td>
<td>14.54</td>
</tr>
<tr>
<td>%</td>
<td>4.84</td>
<td>5.03</td>
<td>7.16</td>
<td>4.74</td>
<td>4.74</td>
<td>4.60</td>
<td>5.05</td>
<td>4.83</td>
<td>4.76</td>
</tr>
<tr>
<td>5. Net Area Sown (6-7)</td>
<td>141.36</td>
<td>140.73</td>
<td>132.47</td>
<td>140.76</td>
<td>141.17</td>
<td>141.46</td>
<td>140.00</td>
<td>140.90</td>
<td>141.36</td>
</tr>
<tr>
<td>%</td>
<td>46.32</td>
<td>46.12</td>
<td>43.38</td>
<td>46.07</td>
<td>46.20</td>
<td>46.32</td>
<td>45.81</td>
<td>46.09</td>
<td>46.24</td>
</tr>
<tr>
<td>6. Total Cropped Area (Gross Cropped Area)</td>
<td>185.34</td>
<td>188.29</td>
<td>175.58</td>
<td>190.08</td>
<td>191.55</td>
<td>193.32</td>
<td>192.49</td>
<td>195.16</td>
<td>195.10</td>
</tr>
<tr>
<td>7. Area Sown more than once</td>
<td>43.98</td>
<td>47.55</td>
<td>43.11</td>
<td>49.32</td>
<td>50.38</td>
<td>51.85</td>
<td>52.49</td>
<td>54.25</td>
<td>53.74</td>
</tr>
<tr>
<td>8. Cropping Intensity*</td>
<td>131.11</td>
<td>133.79</td>
<td>132.55</td>
<td>135.04</td>
<td>135.69</td>
<td>136.66</td>
<td>137.50</td>
<td>138.50</td>
<td>138.01</td>
</tr>
<tr>
<td>Net Irrigated Area</td>
<td>55.13</td>
<td>56.92</td>
<td>53.87</td>
<td>56.96</td>
<td>59.21</td>
<td>60.79</td>
<td>62.70</td>
<td>63.10</td>
<td>63.20</td>
</tr>
<tr>
<td>Gross Irrigated Area</td>
<td>76.19</td>
<td>78.42</td>
<td>73.41</td>
<td>78.15</td>
<td>81.18</td>
<td>84.26</td>
<td>86.77</td>
<td>87.92</td>
<td>88.42</td>
</tr>
</tbody>
</table>

Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, GOI.
The major trends in land use over the years 2000-01 to 2008-09 have been the following:

▲ Net sown area remained constant from 2000-01 to 2008-09 141.36 million hectares but the net area sown in 2002-03 is lowest and stood at 132.47 million hectares.

▲ Over the period 2000-01 to 2008-09 gross cropped area increased from 185.34 million hectares to 195.10 million hectares. While between 2000-01 and 2008-09, the increase was 9.66 million hectares, between 2000-01 and 2008-09 with net area sown remaining at 141.36 million hectares gross cropped area increased by only 9.66 million hectares.

▲ Area under forests increased from 69.53 million hectares to 69.63 million hectares but the increase is only minimal i.e 0.10 million hectares. More important, as a recent study notes that "more than 40 per cent of total forest lands have poor tree cover and can roughly be described as degraded forest lands".

▲ Area under non-agricultural use expanded from 23.89 million hectares to 26.31 million hectares while there was a steep decline in barren and uncultivable land, apparently due mainly to shift to non-agricultural use.

The categories of land of particular interest are pastures, area under tree crops, cultivable waste and fallows. Area under tree crops seems to have practically remained same while pastures registered little decrease
from 10.67 million hectares in 2000-2001 to 10.34 million hectares by 2008-09. Besides, there was a slight decline - instead of an increase - between 2000-01 and 2008-09 in case of cultivable waste decreased from 13.63 million hectares to 12.67 million hectares but there is no sign of the area having been added to any productive category like pastures, area under tree crops or net area sown. Fallows went down from 25.07 million hectares from 2000-01 to 24.86 million hectares in 2008-09. Both current fallows and other fallow lands decreased indicative of growing land exhaustion. The gross irrigated as well as net irrigated land registered positive growth during 9 years of study.

**Land holdings**

It is worth noting that by the early nineties, over 96 per cent of owned holdings belonged to the size-groups marginal, small and semi-medium i.e., owners ranging between vulnerable to those likely to have only modest potential for viability. More important, over two-thirds of owned land was with the lower three groups with the medium and large owners accounting for less than a third of total land. Around the mid-fifties Professor Dantwala had drawn attention to the feature of the Indian agriculture that while the small and marginal holdings predominated in numbers, large part of land was in the hands of medium and large owners. Thus, apparently, the marginalization process has brought about a major
change in the production structure in agriculture. Much more than before, the small and marginal owners would have to shoulder in future the responsibility for the tasks necessitated by agricultural growth and modernization. The table 1.3 gives clear picture of operational landholdings in India.

Table 1.3
Number and Area of Operational Holdings by Size Group

<table>
<thead>
<tr>
<th>Category of Holdings</th>
<th>Number of Holdings</th>
<th>Area Operated: ('000 Hectares)</th>
<th>Average Size of Holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marginal</td>
<td>75408</td>
<td>83694</td>
<td>29814</td>
</tr>
<tr>
<td>(Less than 1 hectare)</td>
<td>(62.3)</td>
<td>(64.8)</td>
<td>(18.7)</td>
</tr>
<tr>
<td>Small</td>
<td>22695</td>
<td>23930</td>
<td>32139</td>
</tr>
<tr>
<td>(1.0 to 2.0 hectares)</td>
<td>(19.0)</td>
<td>(18.5)</td>
<td>(20.2)</td>
</tr>
<tr>
<td>Semi-Medium</td>
<td>14021</td>
<td>14127</td>
<td>38193</td>
</tr>
<tr>
<td>(2.0 to 4.0 hectares)</td>
<td>(11.8)</td>
<td>(10.9)</td>
<td>(24.0)</td>
</tr>
<tr>
<td>Medium</td>
<td>6577</td>
<td>6375</td>
<td>38217</td>
</tr>
<tr>
<td>(4.0 to 10.0 hectares)</td>
<td>(5.5)</td>
<td>(4.5)</td>
<td>(24.0)</td>
</tr>
<tr>
<td>Large</td>
<td>1230</td>
<td>1096</td>
<td>21072</td>
</tr>
<tr>
<td>(10.0 hectares and above)</td>
<td>(1.0)</td>
<td>(0.8)</td>
<td>(13.2)</td>
</tr>
<tr>
<td><strong>All Holdings</strong></td>
<td><strong>119931</strong></td>
<td><strong>129222</strong></td>
<td><strong>159436</strong></td>
</tr>
</tbody>
</table>

Source: Department of Agriculture and Cooperation, Agricultural Census Division.
Note: Figures in parentheses indicate the percentage to total.

The table 1.3 makes it clear that large number holdings in India are either marginal or small. In 2000-01 nearly 81.3 per cent of landholdings are under their possession. By 2005-06 it increased to 83.3 per cent. It means that year by year the size of land holdings is further decreasing.
But the area under their possession is 38.9 per cent and 41.1 per cent in 2000-01 and 2005-06 respectively. The area under semi medium and medium landholdings is 48 and 49 per cent in 2000-01 and 2005-06 respectively. The area under large holdings is 13.2 per cent and 11.8 per cent in 2000-01 and 2005-06 respectively.

The average size of landholdings is increasing with an increase in the category of landholding. The average landholding size of marginal category is 0.4 and 0.38 hectares in 2000-01 and 2005-06 respectively. It increased to 1.42 and 1.38 hectares in case of small holding category in 2000-01 and 2005-06 respectively. It further increased in case of semi medium and medium landholding categories. In case of large landholding category it stood at 17.02 and 17.08 hectares in 2000-01 and 2005-06 respectively.

**Agriculture development in India**

Since India is the second largest populous country in the world, there is a great need to concentrate on the agricultural production to ensure food security to the large population. If agriculture is neglected, it is not possible to import required food grains from abroad because India is suffering from inadequate balance of payments. Achieving self-sufficiency
in agricultural production is necessary for the agrarian economies with large populations like India.

The Government of India introduced the High Yielding Varieties (HYV) programme during the agricultural year 1966-67 with the main objective of covering maximum area under High Yielding Varieties of five crops viz., Rice, Wheat, Jowar, Bajra and Maize to increase production in order to achieve self sufficiency in food grains. The introduction of High Yielding Varieties (HYV) programme led to higher productivity in food grains and this achievement is named as “Green Revolution” in the history of Indian Agriculture. The impact of Green Revolution on Indian agriculture resulted in the achievement of self-sufficiency in food grains by the year 1976. However, Indian Agriculture is backward compared to other developed countries, especially in terms of productivity. It indicates that India is backward in adopting modern agricultural technologies, developing required infrastructure and institutions for the development of agricultural sector.

After observing this situation, the Government of India established the Regional Rural Banks for providing financial facilities to the farmers to purchase and use modern agricultural inputs such as Fertilizers, Pesticides and Irrigation Pump sets for development of productivity of crops in their
fields. The central government established “Cotton Technology Development Mission (1978) and six private banks were nationalized in the year of 1980. The introduction of these facilities resulted in the higher production of food grains in the year 1981-82. This achievement was termed as the “Second Phase of Green Revolution” in the history of Indian agriculture.

The agriculture sector has performed impressively in terms of increasing productivity and intensity of cultivation. It is by no means a small achievement that the food grain availability per capita at country level has increased to high level over the last six decades, in the face of an assault of population pressure and declining per capita land availability. In the same period, irrigation availability has doubled and cropping intensity has increased significantly at the country level. This could be possible due to cutting edge of science, coupled with fast adoption of technology by the farmers, and above all, the government decision to accord a high priority to agriculture by making large plan investments in infrastructure. As a result of technological developments and their effective dissemination, the total food grains production increased from 52 million tones to 236 million tones in between 1950-51 and 2007-08. Unlike in the past, crisis situations of drought or flood are now considerably well managed without any panic or large-scale imports. On the contrary, India faced successfully the worst
drought of the century in the year 1987-88 which speaks of resilience of Indian agriculture.

During the post-green revolution period, area under major cereal crops would ordinarily be changing substantially from year to year. The major technological improvement in agriculture sector is accompanied by an upward trend, both in its area and yield. Factors promoting growth of agriculture are usually the factors, bringing about change in crop composition of agriculture.

An important dimension of agricultural growth is the spatial variations which is very relevant in a vast country like India, giving a wide range of crop-soil-weather conditions. It is observed that the states recording above national average annual growth in food grain output were predominantly Punjab, Madhya Pradesh, Bihar, Haryana, Uttar Pradesh and West Bengal. The states of Gujarat, Kerala and Maharashtra had witnessed negative rates of growth in 1980s as compared to the preceding decade 1970s. While the rate of total food grain output for the country as a whole has increased from 2.31 per cent (1967-68 to 1977-78) to 2.68 per cent (1977-78 to 1988-89). The considerable year to year variations in food grain output occur on account of inherently adverse agro-climatic situation persisting in certain areas of the country.
The post-green revolution period till the end of 1980s witnessed reliance on high productivity regions and productivity augmenting techniques, which were often short-term resource exploitation measures leading to instances of water-logging problem, soils and other resource related problems. Growth in agriculture would, thus, have to be achieved through the adoption of a disaggregated approach which gives due attention to the inherent differences of environment.

Even though self-sufficiency of food production has been achieved, the population of India still lacks access to balanced food, particularly in backward regions of the country. It is a matter of grave concern that even though cereal production has kept pace with the increasing requirements and average per capita intakes of cereals have remained satisfactory, there has been a fall in the per capita consumption of pulses. This is because the Government of India neglected many backward regions and non-cereal crops for development during green revolution period.

The Green Revolution was successful only in the regions and states where there are ample irrigation sources and fertile lands. It was not benefited the regions and states with poor irrigation sources and dominated dry land agriculture or rain fed agriculture. Hence, it can be
observed that the Green Revolution has developed disparities among regions, crops and sections of people.

After independence the per capita availability of protein food (pulses) and pets (oil food) declined continuously. As a result nutrition food crisis occurred in the country. To get rid of the problem the Government of India established the “Oilseeds & Pulses Technology Mission” in the year of 1986. Similarly another attempt also made to utilize the ground water facility for agriculture development and stabilization, which was “Million Wells Programme” in the year of 1988-89.

The new economic policy announced on July 24, 1991 has bypassed the agriculture sector in terms of direct reforms, except with trade liberalization. The economic reforms provided relaxation of export controls over agricultural products. After the introduction of economic reforms the public investment has declined continuously in the agriculture sector and the subsidies also declined on agricultural inputs in the country. As a result agriculture became a costly activity. From the consequence the farmer’s attitude changed towards commercial crops. With more liberalized regime, Indian agricultural commodities, excluding oil seeds, have become more efficient exportable or more efficient import substitutes. Another objective of the National Agricultural Policies is ‘growth that is demand-
driven and caters to domestic markets and maximizes benefits from
exports of agricultural products in the face of challenges from economic
liberalization and globalization’. Even after implementation of 10 Five Year
Plans, India has not reached the goal of ‘Balanced Regional Growth’ in
Agriculture.

After the Green Revolution of the 1970s which enabled India to
achieve self-sufficiency in food grains, agricultural growth has slowed -
from 3.5 per cent in mid 1980s to 1990s to less than 2 per cent in mid
1990s to 2000s. Slow agricultural growth and the consequent widening of
the gap between rural and urban incomes has become a major cause for
concern. The Government of India is therefore placing high priority on
reducing poverty by raising agricultural productivity.

Share of Agriculture in Total GDP

The performance of the agricultural sector influences the growth of
the Indian economy. Agriculture (including allied activities) accounted for
17.8 per cent of the Gross Domestic Product (GDP-at constant prices) in
2007-08 as compared to 21.7 per cent in 2003-04. Notwithstanding the fact
that the share of agriculture and allied sector in GDP has been declining
over the years. The table 1.4 gives clear picture.
Table 1.4

Gross Domestic Product (GDP) from Agriculture and Allied Sector and its Percentage Share to Total GDP

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP Total At Current Prices</th>
<th>GDP Total At 1999-2000 Prices</th>
<th>GDP Agriculture and Allied sector At Current Prices</th>
<th>GDP Agriculture and Allied sector At 1999-2000 Prices</th>
<th>% Share of Agriculture and Allied sector to total GDP</th>
<th>Growth Rate of GDP Agri. &amp; Allied Sector At Current Prices</th>
<th>Growth Rate of GDP Agri. &amp; Allied Sector At 1999-2000 Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-01</td>
<td>1,925,016</td>
<td>1,864,300</td>
<td>449,565</td>
<td>445,403</td>
<td>23.35</td>
<td>0.68</td>
<td>-0.25</td>
</tr>
<tr>
<td>2001-02</td>
<td>2,097,726</td>
<td>1,972,605</td>
<td>486,617</td>
<td>473,248</td>
<td>23.2</td>
<td>8.24</td>
<td>6.25</td>
</tr>
<tr>
<td>2002-03</td>
<td>2,261,415</td>
<td>2,048,287</td>
<td>472,060</td>
<td>438,966</td>
<td>20.87</td>
<td>-2.99</td>
<td>-7.24</td>
</tr>
<tr>
<td>2003-04</td>
<td>2,538,170</td>
<td>2,222,759</td>
<td>532,342</td>
<td>482,677</td>
<td>20.97</td>
<td>12.77</td>
<td>9.96</td>
</tr>
<tr>
<td>2004-05</td>
<td>2,967,599</td>
<td>2,967,599</td>
<td>560,308</td>
<td>560,308</td>
<td>18.9</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>2005-06</td>
<td>3,402,316</td>
<td>3,249,130</td>
<td>639,990</td>
<td>589,697</td>
<td>18.8</td>
<td>14.22</td>
<td>5.25</td>
</tr>
<tr>
<td>2006-07</td>
<td>3,941,865</td>
<td>3,564,627</td>
<td>714,254</td>
<td>611,409</td>
<td>18.1</td>
<td>11.6</td>
<td>3.68</td>
</tr>
<tr>
<td>2007-08</td>
<td>4,540,987</td>
<td>3,893,457</td>
<td>815,399</td>
<td>640,315</td>
<td>18.0</td>
<td>14.16</td>
<td>4.73</td>
</tr>
<tr>
<td>2008-09</td>
<td>5,228,650</td>
<td>4,154,973</td>
<td>898,378</td>
<td>650,461</td>
<td>17.2</td>
<td>10.18</td>
<td>1.58</td>
</tr>
<tr>
<td>2009-10</td>
<td>5,868,331</td>
<td>4,464,081</td>
<td>1,004,594</td>
<td>651,901</td>
<td>17.1</td>
<td>11.82</td>
<td>0.22</td>
</tr>
</tbody>
</table>

Source: Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, GOI.
As per the table 1.4 the share of agriculture sector in total GDP is decreasing year by year both in terms of current prices as well as 1999-200 and 2004-05 prices. The share of agriculture and allied sectors at current prices in 200-2001 is 23.35 per cent and it declined to 17.1 per cent by 2009-10. In terms of 1999-2000 prices the share of agriculture and allied sectors is 23.89 per cent in 2000-01 and declined to 21.72 per cent by 2003-04 and in terms of 2004-05 prices it declined from 18.9 per cent in 2004-05 to 14.6 per cent by 2009-10. The growth rate of agriculture and allied sectors GDP is not evenly distributed. In 2002-03 it registered negative growth rate both in terms of current and 1999-2000 prices. Highest growth rate of GDP of agriculture and allied sectors registered in 2005-06 (14.22) at current prices. In terms of 1999-2000 prices highest growth rate GDP of agriculture and allied sectors is registered in 2003-04. In case 2004-05 prices highest growth rate GDP of agriculture and allied sectors is registered in 2005-06.

**Capital Formation**

Capital formation is one of the basic factors for increasing production. This is all the more important in agriculture where we are faced with the task of increasing production to keep pace with the increase in population against the odds of the vagaries of monsoon. Judicious use of natural resources for sustainable production of agriculture, adoption of
advanced technology and development of infrastructure for facilitating all agricultural activities, ensuring food security in the broader sense of making adequate nutritious food available and accessible to all and making agriculture a profitable commercial activity at par with other industries in the arena of global economy are the problems that can be successfully tackled only with a strong capital base. This requires a close monitoring of the status of capital formation which in turn hinges on the nature of statistical system and quality of data available for measurement of capital formation.

At present, the official source of information on capital formation is the Central Statistical Organization who provide estimates of capital formation for the economy as a whole as well for the individual industrial sectors including agriculture, as part of compilation of National Accounts Statistics in accordance with the concepts and definitions contained in the System of National Accounts (SNA) of the United Nations. Capital formation in SNA has been defined within the framework of the national accounts system. There are conceptual dilemmas and practical difficulties in adopting a broader definition of capital formation in SNA. These are clearly brought out dialogically by SNA-1993 in a separate section. However, for enhancing the utility and resourcefulness of national accounts in economic analysis, policy making and decision taking, SNA
recommends compilation of detailed accounts for sub-sectors of the economy as well as satellite accounts wherein alternative concepts, definitions and classifications can be introduced. For monitoring agricultural growth it is necessary to have a broader measure of agricultural capital formation that includes capital formation in all these activities, which can be called capital formation for agriculture. The table 1.5 gives the data on capital formation of agriculture and allied activities.

### Table-1.5
Gross Capital Formation in Agriculture & Allied Sector (At 2004-05 Prices)
(Rs.in Crore)

<table>
<thead>
<tr>
<th>Year</th>
<th>GCF in Agriculture &amp; Allied Sector</th>
<th>GCF of Economy (by industry of use)</th>
<th>Share of Agriculture &amp; Allied Sector in Total GCF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Public</td>
<td>Private</td>
<td>Total</td>
</tr>
<tr>
<td>At 1999-2000 Prices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000-01</td>
<td>8084</td>
<td>37396</td>
<td>45480</td>
</tr>
<tr>
<td>2001-02</td>
<td>9712</td>
<td>47267</td>
<td>56979</td>
</tr>
<tr>
<td>2002-03</td>
<td>8734</td>
<td>46934</td>
<td>55668</td>
</tr>
<tr>
<td>2003-04</td>
<td>10804</td>
<td>42737</td>
<td>53541</td>
</tr>
<tr>
<td>At 2004-05 Prices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004-05</td>
<td>16187</td>
<td>59909</td>
<td>76096</td>
</tr>
<tr>
<td>2005-06</td>
<td>19940</td>
<td>66671</td>
<td>86611</td>
</tr>
<tr>
<td>2006-07</td>
<td>22987</td>
<td>67723</td>
<td>90710</td>
</tr>
<tr>
<td>2007-08</td>
<td>23257</td>
<td>81777</td>
<td>105034</td>
</tr>
<tr>
<td>2008-09</td>
<td>22628</td>
<td>106031</td>
<td>128659</td>
</tr>
<tr>
<td>2009-10</td>
<td>23635</td>
<td>109742</td>
<td>133377</td>
</tr>
</tbody>
</table>

Source: - Central Statistics Office, New Delhi.
As per the table 1.5 the GCF in agriculture and allied sector under public sector is Rs. 8084 crores in 2000-01 and increased to Rs. 23635 crores in 2009-10. Whereas under the private sector the amount of GCF in agriculture and allied sector is Rs. 37396 crores in 2000-01 and increased to Rs. 109742 crores. The percentage of share public sector agricultural GCF to total GCF ranges between 7.4 per cent to 5.2 per cent. In case of private sector the GCF in agriculture and allied sector ranges between 6.5 per cent to 11.5 per cent to total private sector GCF.

**Exports and Imports**

Depending on domestic availability, Government allows exports and imports of food items especially wheat, rice, and pulses. Government has reduced the import duty on wheat to nil from 9 September 2006 to augment its supply. Export of wheat has been prohibited since 8 October 2007. The import duty on semi-milled or wholly milled rice has been reduced to nil from 20 March 2008 to augment its supply. Export of non-basmati rice has been prohibited since 15 October 2007 except for a quantity of 10,000 tonnes per annum of organic non-basmati rice permitted since 7 December 2009.

Further, export of non-basmati rice is permitted on diplomatic/humanitarian considerations. Export of basmati rice is permitted with a
Minimum Export Price (MEP) of US $ 900 per ton or '41, 400 per ton. Government has reduced the import duty on pulses to nil from 8 June 2006 to augment their supply. Export of pulses except kabuli chana (chickpeas) has been prohibited with effect from April 2008. The table 1.6 gives the share of agricultural exports and imports to total exports and imports.

Table-1.6
India's Imports and Exports of Agricultural Commodities vis-à-vis Total National Imports/ Exports

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture Imports</th>
<th>Total National Imports</th>
<th>%age of Agriculture Imports to Total National Imports</th>
<th>Agriculture Exports</th>
<th>Total National Exports</th>
<th>%age of Agriculture Exports to Total National Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000-01</td>
<td>12086.23</td>
<td>228306.64</td>
<td>5.29</td>
<td>28657.37</td>
<td>201356.45</td>
<td>14.23</td>
</tr>
<tr>
<td>2001-02</td>
<td>16256.61</td>
<td>245199.72</td>
<td>6.63</td>
<td>29728.61</td>
<td>209017.97</td>
<td>14.22</td>
</tr>
<tr>
<td>2002-03</td>
<td>17608.83</td>
<td>297205.87</td>
<td>5.92</td>
<td>34653.94</td>
<td>255137.28</td>
<td>13.58</td>
</tr>
<tr>
<td>2003-04</td>
<td>21972.68</td>
<td>359107.66</td>
<td>6.12</td>
<td>37266.52</td>
<td>293366.75</td>
<td>12.70</td>
</tr>
<tr>
<td>2004-05</td>
<td>22811.84</td>
<td>501064.54</td>
<td>4.55</td>
<td>41602.65</td>
<td>375339.53</td>
<td>11.08</td>
</tr>
<tr>
<td>2005-06</td>
<td>21499.22</td>
<td>660408.90</td>
<td>3.26</td>
<td>49216.96</td>
<td>456417.86</td>
<td>10.78</td>
</tr>
<tr>
<td>2006-07</td>
<td>29637.86</td>
<td>840506.31</td>
<td>3.53</td>
<td>62411.42</td>
<td>571779.28</td>
<td>10.92</td>
</tr>
<tr>
<td>2007-08</td>
<td>29906.24</td>
<td>1012311.70</td>
<td>2.95</td>
<td>79039.72</td>
<td>655863.52</td>
<td>12.05</td>
</tr>
<tr>
<td>2008-09</td>
<td>37183.03</td>
<td>1374435.55</td>
<td>2.71</td>
<td>85951.67</td>
<td>840755.06</td>
<td>10.22</td>
</tr>
<tr>
<td>2009-10</td>
<td>59528.34</td>
<td>1363735.55</td>
<td>4.37</td>
<td>89341.33</td>
<td>845533.64</td>
<td>10.57</td>
</tr>
</tbody>
</table>

Source: Director General of Commercial Intelligence & Statistics, Ministry of Commerce, Kolkata.

It is crystal clear from the table 1.6 that the value of agricultural imports is gradually increasing except in 2005-06. On the other hand the
value of exports is more sharply increasing year by year. Moreover, the value of exports is higher than the value of imports during 10 years of study. The percentage of agricultural imports to total national imports never reached to the two digit number. In 2001-02 the highest percentage of 6.63 was registered in agricultural imports to national imports. In 2008-09 the value of agricultural imports registered 2.71 per cent of total imports, which is the least during 10 years of study. The share of agricultural exports to total national exports is gradually decreased during 2000-01 to 2006-07. In 2007-08 it slightly increased and there after the decline continued.

**Need for the Study**

The studies reviewed here above have not focused on the specific issues on which the present study embarked on. The study is steered in the direction of assessing the trends in area, production and productivity of selected food and non-food crops in Anantapur District. The present study also concentrates on analyzing the changes in the cropping pattern of Anantapur District. Since most of the earlier studies have concentrated either on single crop or on macro level, but not focused on district level issues, the present study assumes importance and further believed that it would fill the gap in the knowledge stream in this regard.
Sustainable growth in agriculture sector is the “need of the hour” not only for the state of Andhra Pradesh, but also for the country as a whole. Economy of Andhra Pradesh continues to be predominantly agrarian. Andhra Pradesh being an important producer of Groundnut, Cotton, Chillies, Sugarcane, etc. and quite a number of Horticultural Crops, such secondary linkages of agriculture assumes added importance to its rural economy, more so now in the context of new Agricultural Policy initiatives taken up by the Government.

The development thinkers of India including the then President A. P. J. Abdul Kalam have been discussing about need of second green revolution in India to reach the goal of ‘Balanced Regional Growth’ in Agriculture. He has called for a second green revolution, while inaugurating the triennial conference on Global Forum on Agricultural Research at New Delhi on 9th November 2006. This is not the first time that he has spoken about this issue. Five years ago, he had outlined the applications of technological innovations to meet future foodgrain needs demanded by the increasing population growth.

The Government of India, while preparing Eleventh Five Year Plan, considered the present inequalities and disparities among the regions and states in agriculture sector and proposed to have Inclusive Growth Policy,
which demands to include all those regions and states that were neglected in the development earlier. The National Agricultural Policy-2000 as well as the Eleventh Five Year Plan has fixed the target of 4 per cent annual growth rate of agricultural production in India. This 4 per cent growth rate should be inclusive growth rate and it should include all the neglected backward districts. In this context, the present study tries to identify the excluded things in agricultural development in the case of a drought-prone district of Anantapur, in Andhra Pradesh and propose the needed measures that should be included in future Agricultural Policy.

**Statement of the Problem**

For the past decade as Indian industry went places, recording a hearty rate of growth, the story of Indian agriculture remained an also ran. Successive governments have put in plenty of effort to increase agricultural production but the results were still weak. This is surprising as in the same period except for 2008; the monsoon went through one of the longest periods of regular annual rainfall pattern. Despite this favourable initial condition, the rate of growth of the agriculture sector has been low. The one spoilsport in the agriculture story was of course the stagnant rate of public investment. The state, hamstrung by vastly competitive demands on its resources, initially and also by the realisation that public investments
in irrigation and others were not yielding quick results, moved the money elsewhere.

But now, in the aftermath of the global meltdown, the consensus of informed opinion has switched to the view that consumption demand from rural India has been the great stabilizer for industry. The impetus for that rural consumption demand has to come from rising productivity in agriculture. In turn rising productivity can only come if adequate investment is made at all stages of agricultural operation. Not surprisingly the push for these improvements has come from one of the longest spells of rise in prices of food products—the persisting inflation in food that has just begun to soften. So we have a fortuitous combination of circumstances that, if harvested, can create huge value up-gradation for the Indian agriculture sector and in turn for the entire economy. The components of these improvements are well known like seed technology, better management of post harvest operations like preservation of produce in warehouses and of agricultural marketing. As Anatapur District is also included under the districts of severe drought conditions in Andhra Pradesh, the analysis of growth and instability of selected food and non-food crops in Anantapur District assumes importance.
Significance of the Study

Agriculture will continue to play an important role in the economic development and poverty alleviation in India even in the era of economic liberalization and globalization. Generation of gainful employment and income for the rural poor, strengthening of household food and nutritional security and sustainable use of natural resources shall continue to be the main objectives of agricultural development in the country.

Objectives

The present study takes the following as its objectives:

1. To study the development of agriculture sector and its contribution to Indian economy.
2. To examine the production trends of food and non-food crops in Andhra Pradesh.
3. To assess the growth rates in area, production and productivity of food and non-food crops in Anantapur district, during the last ten years.
4. To study the causal relationship between rainfall and agriculture production, under the prevailing climatic conditions of Anantapur district.
5. To suggest various measures to increase the agricultural production in India in general and Anantapur district in particular.
Hypotheses of the Study

The present study takes the following hypotheses for testing:

1. There is no significant change in cropping pattern of Anantapur District during the study period.
2. There are significant variations in the growth rates of area, production and productivity of food and non-food crops.
3. There is correlation between rainfall and agriculture production.

Methodology

The source material has been collected from both primary and secondary sources. The method followed is historical and descriptive. The material has been collected from the Libraries of Sri Krishnadevaraya University, Anantapur, Sri Venkateswara University, Tirupati, Osmania University, Hyderabad, Bangalore University, Bangalore, National Law School of India University, Nagarbhavi, Bangalore, Institute of Social and Economic Change, Nagarabavi, Bangalore. The material collected has been thoroughly analysed and utilized purposefully.

Sources of Data/Information

The present study is mainly based on secondary sources of data/information. The secondary data have been collected from the following sources:
• Directorate of Economics and Statistics, Hyderabad: Season and Crop Reports;
• Directorate of Economics and Statistics, Hyderabad: Statistical Abstracts of Andhra Pradesh;
• District Hand Books of Statistics from 2000 to 2010; and
• Research Publications from different Institutions and Journals.

**Period of the Study**

The study takes 10 years from 2000-2001 to 2009-10 as the period of the study.

**Scope of the Study**

The study deals with growth in production and productivity of food and non-food crops in Anantapur District, which is quite different from other parts of the country with respect to agro-climatic conditions. Hence the conclusion of the study would only be helpful in formulating policies and strategies for agricultural development in the regions having typical agro-climatic situations of Anantapur. It may provide useful information for formulating hypotheses for further research in agricultural growth, either with the help of cross-sectional data or time series data. The findings of the study relating to components of production/growth of food grains and non-
food crops could be utilized for assigning priority in agricultural development programs in the project area.

**Limitation of the Study**

The study is confined to the drought prone Anantapur district of Andhra Pradesh. Another major limitation of the study is non availability of uniform time series data for the period before starting of the Green Revolution. Owing to this, the present Study is limited to the Post-Green Revolution period only.

**Chapter Scheme**

The thesis is presented in seven chapters as indicated below:

**Chapter-I:** This chapter reviews the development of agriculture in India in detail and examine the trends in production of food and non food crops production and explains the importance of study along with the need for the study, statement of the problem, objectives, hypotheses, period and limitation of the present study;

**Chapter-II:** The second chapter reviews the available literature on the status of agriculture in India and the production trends in food and non-food crops.
Chapter-III: The third chapter contains Section-I & II.
Section-I: The first section analyses the area, production and productivity of food crops in India.
Section-II: The second section examines the growth rates in the production of non-food crops in Andhra Pradesh.

Chapter-IV: The fourth chapter presents the socio-economic and agricultural profile of Anantapur district.

Chapter-V: The fifth chapter assesses the trends in area, production and productivity of food crops in Anantapur district.

Chapter-VI: The sixth chapter analyses the growth in area, production and productivity of non-food crops in Anantapur district.

Chapter-VII: The last chapter summarizes the research findings of the study and suggests suitable measures to increase the growth performance of food and non-food crops and to reduce the instability in their Area, Production and Productivity.
References


14. Jha, M.N.; Gupta, M.K. and Dimri, B.M. (2002). Impact of changing natural forest cover and site conditions on the soil resources in

