CHAPTER - V
THE GEOGRAPHY OF GROUNDNUT FARMING

Analytical geographical investigation of specific crop farming and its planning is of paramount importance concerned to the areas of crop-regional specialisation. Obviously, the environmental relationships determine the suitability and sustainability of the areas of primary crop production while the socio-economic relationships determine its spatial spread. As a result of these physical and non-physical basis of farming, the groundnut cultivation has got spectacular momentum in the drought prone area of Anantapur district. This is evident from the fact that about 68 per cent of the cultivated land in Anantapur district is found under groundnut cultivation. It is also significant to state that Anantapur district is the largest producer of
groundnut and has maximum hectarage under groundnut crop in Andhra Pradesh State. In view of the overwhelming dominance of groundnut cultivation in the crop scenario of the district, a systematic study of its farming in the spatio-temporal perspective in relation to its growth requirements, distribution, production and associated geographic relationships is essential. Such an analytical study certainly provides a comprehensive evaluation of the problems and performances of the specialisation of crop farming and it immensely helps to design future crop planning at regional scale in the light of agro-climatological socio-economic and techno-organisational setting.

The present study endeavours to analysis (i) the growth requirements of groundnut cultivation (ii) the spatial distribution of the crop for Kharif, rabi and gross periods, (iii) the temporal variation and changing trend of the area under the crop, (iv) the changing trend of the crop yield level, and (v) the impact of rainfall on the area and yield levels of groundnut cultivation.
Methodology employed:

In the present study "Mandal" is taken as the unit for the purpose of spatial analysis of groundnut crop land for the Khari, rabi, and gross periods. The changing patterns are examined between three points of time namely, 1962-65, 1972-75 and 1982-85, at taluk level. Linear regression trend and the coefficient of determination ($r^2$) are found out for the area under the crop and the yield levels. The impact of rainfall on either increase or shrinkage of the area and yield levels of the groundnut cultivation is measured with the help of correlation technique.

Significance of groundnut cultivation.

Groundnut (Arachis hypogaea) is believed to be a native plant of Brazil. It was introduced into India during the first half of the 16 century (ICAR p.221). Today India ranks first in area and production of groundnut in the world. Groundnut is an important cash crop of India.

It is the largest single oil seed crop in the country which accounts for 60 per cent of total oil seed production. In the country, Andhra Pradesh State has occupied second position in Groundnut production, the first being the Gujarat State.
The present study region, Anantapur district, has occupied first place both in area and production of groundnut in Andhra Pradesh State. Groundnut oil is an edible oil extensively used in cooking. It is also used in soap making, and in manufacturing of cosmetics and lubricants etc. Kernels are rich in protein and vitamin content. They are also eaten raw or roasted. Their caloric value is 349 per 100 grammes (ICAR, 1972, p.922) The residual oil cake largely used as a fertiliser as well as an important protein supplement in cattle and poultry feed. The haulms (Plant stalks) are fed to livestock and also used as a green manure to the soil. Groundnut shell is used as a fuel and also as a manure to the soil. Groundnut cultivation is considered to be as an important for crop rotation. Being a leguminous crop with root nodules, it helps for nitrogen fixation and thereby improves the soil fertility.

Groundnut cultivation is one of the most important contributing factors for the development of agro-based industries. It is evident from the fact that a large number of agro based industries both in the State and in the District are by and large concentrated and distributed in the chief groundnut growing area.
By all means namely, commercial, dietary, industrial, and manurial, aspects the groundnut crop in the complete form i.e., from its haulms to seed shells is the most economically valuable crop of the agricultural economy of any region.

Geographical Conditions Required:
Groundnut is essentially a tropical plant and needs long and warm growing season. It is successfully grown in regions receiving rainfall between 500mm and 1250 mm per annum well distribution of rainfall is essentially required during the flowering and pegging of the crop. The total amount of rainfall required for sowing is 150mm and for flowering and pod development an even distributed rainfall of 400 -500mm is required. Warm dry weather is essential during the ripening period. The groundnut crop, however, cannot stand frost, long and severe drought or water stagnation. However, In Anantapur district groundnut cultivation is being carried out with a rainfall ranging between 400 and 600mm per annum Anantapur district scarce rainfall zone and chronic drought prone area not only in the State but also in the country, cultivating groundnut on an extensive spatial scale.
Groundnut is grown on a wide variety of soil types. However, the crop does best on sandy loam and loamy soils and in black soils with good drainage. It does well on light soils rather than heavy soils. In Anantapur district, the crops is predominantly cultivating on red loam and red sandy soils. These very light soils are practically encouraging for the strong concentration of groundnut cultivation in the district. The crop is being raised in the district on all types of terrain namely, plains, undulating and rugged terraces and on slopes.

**Practices of Groundnut Cultivation:**

In Anantapur district, groundnut is cultivated predominantly as a rainfed kharif crop. Normally it is sown in the months of June and July and harvests in October, November. Some times where and when the monsoon is delayed, it is sown in the months of August and early September. Groundnut is also grown as an irrigated crop during rabi season. In rabi season, it is sown in the months of December/January and harvests in March/April. Before sowing, the field is given two/three ploughings and soil is pulverized well to obtain a good tilth. The seeds may be sown with the help of bullock drawn drilling harrows. Usually, the cow and sheep dung and
a little amount of chemical fertilizers will be applied to the field before sowing. After 30-45 days of the crop, another small dose of chemical fertiliser content will be applied to the crop field when weeding operations are completed. Weeding is carried out very quickly in the light soils of the district with the help of bullock drawn harrowers as well as with the help of human labour. The harvesting is normally done by hand pulling when there is an adequate moisture in the soil or otherwise if there is no sufficient moisture in the soil to pluck the plant, the harvesting is done by ploughing or working block harrow is the most prevalent method. The pulled-out plant are stacked for a few days for drying and are stripped afterwards which involves heavy labour input.

It is significant to state that the interculture i.e., the cultivation of grams, castor, cotton, jowar etc., in between the rows of groundnut crop in the field is the usual practice of rain fed cultivation in this drought district.
Spatial distribution of groundnut cultivation
(Gross cropped Area - 1987-90)

It is significant to state that the groundnut cultivation is predominant in the crop scenario of Anantapur district with as much as 68 per cent (1987-90) of the gross sown area of the district. It is found that the groundnut is most preferable crop of this district due to favourable agro-climatic, edaphic, terrain and socio-economic conditions. The crop is cultivated both in Kharif and rabi seasons both under irrigation and rainfed conditions. Overwhelmingly, groundnut is essentially a kharif crop cultivated mostly as a rainfed crop.

The spatial distributional pattern of groundnut cultivation in Anantapur District exhibited a spectacular spatial variation which ranging from a maximum of 96.3 per cent in Roddam mandal to a minimum of 8.4 per cent in D.Harihal mandal. High (60%-75%) and very very high (>76%) concentrations of groundnut cultivation are found in 35 mandals, which accounted for 55.6 per cent of the total mandals of the district. They are distributed in southern, south eastern and central parts of the district. This zone is mostly covered by red soils and comparatively endowed with high rainfall conditions in the district.
ANANTAPUR DISTRICT
SPATIAL DISTRIBUTION OF GROUNDNUT CULTIVATION (GROSS)

PERCENT TO TOTAL CROPPED AREA

LEGEND

FIG-51
Moderate concentration (45%-60%) of groundnut cultivation is noticed in 14 mandals distributed in western, southwestern and central parts of the district. Low (30%-45%) and very low (<30%) concentrations of groundnut cultivation are found in 14 mandals which accounted for 22.2 per cent of the total mandals of the district. They are located largely in north-western and north-eastern parts of the district. The spatial spread of groundnut cultivation in these areas is restricted due to (i) the present of black soils (ii) relatively low rainfall conditions, and (iii) the competition existed from the most preferential crops of black soils like jowar and cotton and the other inferior millet crops of scarce rainfall conditions.

To a large extent, the groundnut is cultivated depending on rainfall conditions. On the whole only 9.4 per cent of the total area under groundnut cultivation is irrigated in the district and the rest 90.6 per cent of groundnut crop area is irrigated and depends upon rainfall. The proportion of irrigated groundnut is found maximum in Putlur mandal which accounted for 44.2 per cent of the total groundnut crop area of the mandal. The proportion of irrigated groundnut of the total area of the groundnut is not even one per cent in 8 mandals which are located in southern part of the district. A very high proportion (>15%) of irrigated groundnut is found in 11 mandals distributed in central, north-eastern, and north-western parts of the district. In many of these mandals, groundnut cultivation is not that spectacular.
ANANTAPUR DISTRICT
SPATIAL PATTERN OF IRRIGATED GROUNDNUT (GROSS)

LEGEND

PERCENT TO TOTAL GROUNDNUT CROPPED AREA

≤ 0.1
0.1 - 5
5 - 10
10 - 15
> 15

0 KM

FIG-52
Hither to most of there mandals are being supplemented by canal water through major and medium irrigation projects namely, Tungabhadra High Level canal, Upper Pennar and B.T. Project. Moderate proportion (5%-10%) or irrigated groundnut is found in 8 mandals distributed in central and northern parts of the district. Low proportion (1%-5%) or irrigated groundnut is found in as many as 36 mandals distrusted ubiquitously in all over the district.

Distribution of groundnut cultivation  
(Kharif - 1987-90)  
Groundnut is essentially a kharif crop in Anantapur district which is evident from the fact that it accounted for 70 per cent of the total kharif cropped area of the district. However, the concentration of groundnut cultivation varies from a maximum of 98.9 per cent in Roddam mandal to a minimum of 10.3 per cent in D.Harihal mandal. High (60%-75%) and very high (>75%) concentrations of groundnut cultivation are found in 43 mandals which accounted for 68.3 per cent of the total number of mandals of the district. Low (30%-45%) and very low (<30%) concentrations of groundnut cultivation are noticed in 12 mandals only which accounted for 19 per cent of the total number of mandals of the district.
Low kharif groundnut spatial concentration is found in north, eastern and north-western parts of the district where millets and cotton are the most competitive crops of groundnut on black soils.

Groundnut is mostly cultivated as a rainfed crop during kharif season. The farming operations of groundnut cultivation are totally depends upon the onset of south-west monsoon. If the monsoon is delayed, the operations of its cultivation will also be delayed. The irrigated groundnut in kharif season is very insignificant which accounted for only 4.5 per cent of the total area under kharif groundnut cultivation. Tadipatri mandal is registered with the highest percentage of 39.8 per cent irrigated groundnut to the total groundnut crop area of the mandal. It is followed by Putlur (34.3%), B.R.Samudram (29.4%), Singanamala (26.8%), Narpala (25.2%) and Garladinne (25%) mandals in north-eastern region, and Bommanahal (34.5%) and Vidapanakal (26%) mandals in north-western region of the district. Well irrigation is the main source of irrigation. Which accounted for more than 50 per cent of the total irrigation in the district. In as many as 44 mandals of the district, the cultivation of kharif groundnut under irrigation is negligible which is not even found with one per cent. It indicates that the crop farming overwhelmingly a rainfed in many number of mandals of the district.
### ANANTAPUR DISTRICT

**Spatial Pattern of Irrigated Groundnut (Kharif)**

<table>
<thead>
<tr>
<th>PERCENT TO KHARIF GROUNDNUT CROPPED AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 10%</td>
</tr>
<tr>
<td>11 - 15%</td>
</tr>
<tr>
<td>16 - 20%</td>
</tr>
<tr>
<td>21 - 25%</td>
</tr>
<tr>
<td>&gt; 25%</td>
</tr>
</tbody>
</table>

**Legend**

- **ANANTAPUR**

**Note**: The map shows the distribution of irrigated groundnut crops in the ANANTAPUR district, with different patterns indicating the percentage of cropland used for Kharif groundnut during the respective period.
Distribution of Groundnut Cultivation:
(Rabi-1987-1990)
The spatial spread of groundnut cultivation in rabi cropping is not as significant as in kharif. In rabi, groundnut is totally cultivated under irrigation. Because of limited sources of irrigation and competition from other more remunerative crops, the spatial extent of groundnut cultivation is very low which accounted for 26 per cent of the total rabi cropped area.

In rabi also, there is a significant spatial variation in the distribution of groundnut cultivation which ranging from a maximum of 72 per cent in Kudair mandal to a minimum of 0.2 per cent in Vajrakarur mandal. High (30-40%) and very high (>40%) concentrations of groundnut cultivation are found in 18 mandals distributed mostly in central, western and south-western parts of the district.

A striking concentration of more than half of the total rabi crop area under groundnut cultivation is found in Kudair (72%), Atmakur (67%), Rapthadu (66%), B.Samudram (62%), Narpala (56%), Bathalapalli (55%), Gooty (50%), Tadipatri (50%), and B.R.Samudram (50%). In many parts of the district, where irrigation facilities are available in rabi, groundnut is cultivated as a rotation crop especially in the paddy fallows.
ANANTAPUR DISTRICT
SPATIAL DISTRIBUTION OF GROUNDNUT CULTIVATION (RABI)

LEGEND
PERCENT TO TOTAL RABI CROPPED AREA

0

0-5

10-15

20-30

30-40

>40

FIG-55
25 KM
A moderate concentration (20-30%) of rabi groundnut is found in 13 mandals distributed in south-central and south-western parts of the district. Low (10-20%) and very low (<10%) concentrations of rabi groundnut cultivation are noticed in 32 mandals which accounted half of the total number of mandals in the district. Many of these mandals are located in southern, eastern, northern and north-western parts of the district.

The cultivation of groundnut in rabi is involved with high-input application, since it is cultivated under irrigation. Without irrigation, the crop cannot be cultivated in rabi. The HYV groundnut particularly JL-24 is the dominant variety of groundnut raised in rabi with sufficient inputs of fertilizer and pesticide composition.

Changing Pattern of Groundnut Cultivation:
(1962-65 to 1982-85)
It is pertinent to state that there has been a spectacular spatial extension in the concentration of groundnut cultivation between 1962-65 and 1987-90 increased by 47.5 per cent in the district. In terms of hectarage, more than a three times increase is observed i.e., from 210 thousand hectares in 1962-65 to 620 thousand hectares in 1987-90 showing a net area gain of 410 thousand hectares.
Table 5.1a Changing pattern of groundnut cultivation in Anantapur District

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Percentage of groundnut crop to gross cropped area</th>
<th>Per cent variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>District average</td>
<td>20.5</td>
<td>26.2</td>
</tr>
<tr>
<td>Lowest value in the district</td>
<td>10.0</td>
<td>11.9</td>
</tr>
<tr>
<td>Highest value in the district</td>
<td>38.4</td>
<td>55.8</td>
</tr>
</tbody>
</table>

The proportion of the area under groundnut cultivation to the gross cropped area in the district was only 20.5 per cent in 1962-65. Its concentration was increased to 26.2 per cent in 1972-75. In the last two decades, groundnut cultivation has been received much preferential treatment in the cropping pattern of Anantapur district. It is due to cumulative effect of many physico-socio-economic conditions. As a result of which, the concentration of groundnut cultivation was further increased to 48 per cent in 1982-85 which is a striking increase indeed. Within a short span of half decade, again, its concentration was further increased to 68 per cent in 1987-90. It is interesting to state that
Table 5.1b Changing Spatial Distribution of Groundnut Cultivation (Gross) in Anantapur District

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Taluk</th>
<th>Percentage of Groundnut crop area to Gross cropped area</th>
<th>Variation to 1962-65</th>
<th>Variation to 1972-75</th>
<th>Variation to 1982-85</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anantapur</td>
<td>21.3 35.1 49.7 13.8 14.6 25.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Tadipatri</td>
<td>17.1 11.9 26.3 -5.2 14.4 9.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Gooty</td>
<td>21.1 35.9 51.2 14.9 15.3 30.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Urvakonda</td>
<td>10.6 18.3 28.3 7.7 -10.0 17.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Dharmavaram</td>
<td>23.2 33.1 78.5 9.9 45.4 55.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Kalyandurg</td>
<td>10.0 16.9 48.6 6.9 31.7 36.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Rayadurg</td>
<td>14.6 15.8 23.3 -1.2 7.5 8.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Penukonda</td>
<td>26.1 34.8 69.9 8.7 35.1 43.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Kadiri</td>
<td>38.4 55.8 65.5 17.4 9.7 17.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Hindupur</td>
<td>22.9 28.8 33.7 5.9 4.9 10.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Madakasira</td>
<td>18.7 22.4 53.0 3.7 30.6 14.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Anantapur District</td>
<td>20.5 26.2 48.0 5.7 21.8 27.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
the increase in the concentration of groundnut cultivation is registered in all taluks of the district. But a striking increase is recorded in Dharmavaram, Penukonda, Kalyanadurg, Madakasira, Gooty, Anantapur and Kadiri taluks. A low increase in the proportion of groundnut cultivation is found in Rayadurg, Tadipatri and Hindupur taluks where the low rainfall conditions, presence of black soils, extensive cultivation of millets and cotton in dry areas and paddy, mulberry and orchards in wet soils have been restricted the spatial spread of groundnut cultivation.

The proportion of irrigated groundnut to the total area under groundnut cultivation has also been increased in the district from 2.4 per cent in 1962-65 to 13.4 per cent in 1982-85, thus registering a net proportional change of 11 per cent in the 20 year period. However, there was a decrease in the proportion of irrigated groundnut during 1987-90 which accounted for 9.4 per cent only. In the recent years i.e., in the last one decade there has been a competition among the irrigated crops for their intensity under irrigation due to introduction of more remunerative crops like mulberry, fruit farming and sunflower etc., Between 1962-65 and 1982-85 an increase in the proportion of irrigated groundnut to its total area is found in all taluks of the district. A significant increase is registered in
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Taluk</th>
<th>Percentage of irrigated Groundnut to total 1962-65</th>
<th>Per cent variation 1962-65 to 1972-75</th>
<th>Per cent variation 1972-75 to 1982-85</th>
<th>Per cent variation 1962-65 to 1982-85</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anantapur</td>
<td>6.0</td>
<td>27.0</td>
<td>32.0</td>
<td>21.0</td>
</tr>
<tr>
<td>2.</td>
<td>Tadipatri</td>
<td>2.0</td>
<td>20.0</td>
<td>22.0</td>
<td>18.0</td>
</tr>
<tr>
<td>3.</td>
<td>Gooty</td>
<td>1.0</td>
<td>5.0</td>
<td>12.0</td>
<td>4.0</td>
</tr>
<tr>
<td>4.</td>
<td>Urvakananda</td>
<td>0.1</td>
<td>2.1</td>
<td>6.8</td>
<td>2.0</td>
</tr>
<tr>
<td>5.</td>
<td>Dharmavaram</td>
<td>1.9</td>
<td>9.7</td>
<td>14.2</td>
<td>7.8</td>
</tr>
<tr>
<td>6.</td>
<td>Kalyandurg</td>
<td>5.7</td>
<td>7.5</td>
<td>13.2</td>
<td>1.8</td>
</tr>
<tr>
<td>7.</td>
<td>Ravadurg</td>
<td>7.0</td>
<td>11.3</td>
<td>17.1</td>
<td>4.3</td>
</tr>
<tr>
<td>8.</td>
<td>Penukonda</td>
<td>0.5</td>
<td>4.5</td>
<td>11.4</td>
<td>4.0</td>
</tr>
<tr>
<td>9.</td>
<td>Kadiri</td>
<td>0.1</td>
<td>8.7</td>
<td>3.8</td>
<td>3.6</td>
</tr>
<tr>
<td>10.</td>
<td>Hindupur</td>
<td>0.4</td>
<td>0.9</td>
<td>3.4</td>
<td>0.5</td>
</tr>
<tr>
<td>11.</td>
<td>Madakasira</td>
<td>1.7</td>
<td>9.8</td>
<td>14.6</td>
<td>8.1</td>
</tr>
<tr>
<td>12.</td>
<td>Anantapur District</td>
<td>2.4</td>
<td>9.2</td>
<td>13.4</td>
<td>6.8</td>
</tr>
</tbody>
</table>
Table 5.3 Changing Distribution of Irrigation to Groundnut Cultivation in Anantapur District

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Cultivation</th>
<th>Percentage of Groundnut Cultivation in the total irrigation to 1962-65 1972-75 1982-85</th>
<th>Per cent Variation to 1962-65 1972-75 1982-85</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anantapur</td>
<td>8.0 28.0 36.0 20.0 8.0 28.0</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Tadipatri</td>
<td>4.0 13.0 23.0 9.0 10.0 19.0</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Gooty</td>
<td>2.0 18.0 40.0 16.0 22.0 38.0</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Urvakonda</td>
<td>1.0 9.5 21.0 8.5 11.9 20.0</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Dharmavaram</td>
<td>2.2 14.0 12.8 11.8 -1.2 10.6</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Kalyandurg</td>
<td>9.0 12.5 10.9 3.5 -1.6 1.9</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Rayadurg</td>
<td>6.7 5.5 7.9 -1.2 2.4 1.2</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Penukonda</td>
<td>0.7 6.1 6.4 5.4 0.3 5.7</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Kadiri</td>
<td>0.4 6.7 2.1 6.3 -4.6 1.7</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Hindupur</td>
<td>0.4 0.8 6.1 0.4 5.3 5.7</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Macakasira</td>
<td>1.5 8.6 11.0 7.1 2.4 9.5</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Anantapur District</td>
<td>3.3 11.2 16.1 7.9 4.9 12.8</td>
<td></td>
</tr>
</tbody>
</table>
Anantapur, Tadipatri Madakasira, Dharmavaram and Gooty taluks. In southern taluks namely, Kadiri, Penukonda and Hindupur, the competition that existed from mulberry cultivation has reduced the importance of irrigated groundnut cultivation. Scanty irrigation facilities in some of the northern and western taluks like Uravakonda, Kalyandurg and Rayadurg have naturally restricted the spatial extent of irrigated groundnut cultivation.

Change in the Concentration of Kharif Groundnut Cultivation (1962-65 to 1982-85)
The proportion of groundnut crop area in the total kharif cropped area was increased from 22.8 per cent in 1962-65 to 54.3 per cent in 1982-85 and further it increased to 70 per cent in 1987-90, thus showing a net proportional increase of 47.2 per cent in the last 25 years period in the district. Between 1962-65 and 1982-85, the increase in the concentration of kharif groundnut cultivation is found in all taluks of the district. A striking increase is recorded in Dharmavaram, Kalyandurg, Penukonda, Uravakonda, Madakasira and Rayadurg taluks.
## Table 5.4 Changing Spatial Distribution of Groundnut cultivation (Kharif) in Anantapur District

<table>
<thead>
<tr>
<th>S.No</th>
<th>Name of Taluk</th>
<th>Percentage of Groundnut Kharif cropped area to total 1962-65</th>
<th>1972-75</th>
<th>Variation to 1962-65 1982-85</th>
<th>Per cent Variation 1972-75 to 1982-85</th>
<th>1982-85</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Anantapur</td>
<td>30.0</td>
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<td>36.0</td>
<td>3.0</td>
<td>3.0</td>
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<td>2.</td>
<td>Tadipatri</td>
<td>22.0</td>
<td>13.0</td>
<td>32.0</td>
<td>-9.0</td>
<td>19.0</td>
</tr>
<tr>
<td>3.</td>
<td>Gooty</td>
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<td>37.0</td>
<td>44.0</td>
<td>11.0</td>
<td>7.0</td>
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<tr>
<td>4.</td>
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<td>43.0</td>
<td>62.2</td>
<td>20.0</td>
<td>19.2</td>
</tr>
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<td>5.</td>
<td>Dharmavaram</td>
<td>32.1</td>
<td>39.5</td>
<td>83.1</td>
<td>7.4</td>
<td>43.6</td>
</tr>
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<td>Kalyandurg</td>
<td>14.7</td>
<td>20.0</td>
<td>56.4</td>
<td>5.3</td>
<td>36.4</td>
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<td>7.</td>
<td>Rayadurg</td>
<td>19.7</td>
<td>13.1</td>
<td>45.1</td>
<td>-6.6</td>
<td>32.4</td>
</tr>
<tr>
<td>8.</td>
<td>Penukonda</td>
<td>33.8</td>
<td>42.8</td>
<td>74.9</td>
<td>9.0</td>
<td>31.3</td>
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<td>9.</td>
<td>Kadiri</td>
<td>53.9</td>
<td>60.3</td>
<td>67.9</td>
<td>6.4</td>
<td>7.6</td>
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<tr>
<td>10.</td>
<td>Hindupur</td>
<td>27.9</td>
<td>31.7</td>
<td>45.8</td>
<td>3.8</td>
<td>14.1</td>
</tr>
<tr>
<td>11.</td>
<td>Madakasira</td>
<td>22.9</td>
<td>23.5</td>
<td>54.8</td>
<td>0.6</td>
<td>31.3</td>
</tr>
<tr>
<td>12.</td>
<td>Anantapur District</td>
<td>22.8</td>
<td>31.4</td>
<td>54.3</td>
<td>8.6</td>
<td>22.9</td>
</tr>
</tbody>
</table>
Changes in the Concentration of Rabi Groundnut Cultivation:
(1962-82 to 1982-85)
The spatial spread of the concentration of rabi groundnut
cultivation has not been significant, uniform and continuous in
the district. It is evident from the fact that the concentration
of rabi groundnut was decreased from 11.8 per cent in 1962-65 to
10.9 per cent in 1972-75 but in 1982-85 it was increased to 12
per cent and further increased to 26 per cent in 1987-90.
Between 1962-85 and 1982-85, the increase in the concentration
was only 0.2 per cent, but in 1987-90, it was 14.2 per cent.

The differences in the concentration of rabi groundnut either
positive or negative were due to fluctuations in the availability
of irrigation facilities and the competition aroused from more
remunerative crops. Within the district, there are five taluks
namely, Dharmavaram, Anantapur, Madakasira, Kalyandurg and
Hindupur taluks have shown an increase in the concentration of
groundnut cultivation between 1982-85 and 1982-85. The rest of
the six taluks namely, Kadiri, Gooty, Uravakonda, Rayadurg,
Penukonda and Tadipatri have shown decrease in the
concentration of rabi groundnut cultivation.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of Taluk</th>
<th>Percentage of Groundnut Crop area to total rabi cropped area</th>
<th>Variation to 1972-75 to 1982-85</th>
<th>Variation to 1962-65 to 1972-75 to 1982-85</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anantapur</td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>Tadipatri</td>
<td>11.0 14.0 9.0 3.0 -5.0 -2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Gooty</td>
<td>19.0 20.0 11.0 1.0 -9.0 -8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Urvakonda</td>
<td>4.0 1.1 0.7 -2.9 -0.5 -3.4</td>
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<td></td>
</tr>
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<td>5</td>
<td>Dharmavaram</td>
<td>9.2 15.3 29.6 6.1 14.3 20.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Kalyandurg</td>
<td>3.7 7.6 9.6 3.9 2.0 5.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Rayadurg</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Kadiri</td>
<td>19.8 5.1 7.0 -14.7 1.9 -12.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Hindupur</td>
<td>8.6 41.5 10.0 32.9 -31.5 1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Madakasira</td>
<td>5.3 14.5 23.7 9.2 9.2 18.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Anantapur District</td>
<td>11.8 10.9 12.0 -0.9 1.1 0.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Changing Trend of Groundnut Cultivation: (1983-'84)
The regression trend analysis has revealed that there has been a high positive trend of increase in the area under groundnut cultivation in the 22 year period i.e., from 1963-64 to 1984-85. This positive trend of increase is very significantly accounted for by 95 per cent of coefficient of determination. It suggests that there has been a steady and continuous regular increase of the area under groundnut cultivation through time. The trend of increase of the area under groundnut cultivation is found in all taluks of the district except Anantapur taluk.

A striking trend of increase with a very high coefficient of determination is found in Penukonda, Madakasira, Kalyandurg, Kadiri, Hindupur, Uravakonda and Rayadurg taluks. In these taluks the increase of area of the crop is continuous from year to year and yearly fluctuations are inconsistent. In Dharmavaram taluk, the trend of increase is steep but is accounted by only 11 per cent of the coefficient of determination which reveals that there are significant fluctuations in the cultivation of groundnut from year to year. In Tadipatri and Gooty taluks, the slope of the positive trend line is not only insignificant but also
accounted by very low value of coefficient of determination and thus indicating the considerable yearly fluctuations in the area of the crop. The trend of decrease is found in Anantapur taluk only where the trend line is accounted by 26 per cent coefficient of determination and indicating the sharp yearly fluctuations in groundnut cultivation.

The trend of increase in the area under groundnut cultivation is also found in the district during kharif cropping. This positive trend during kharif is registered in all taluks of the district. But a steady and sharp increase is found in many taluks of the district. But in Anantapur, Tadipatri and Gooty taluks, the trend of increase is not much significant which accounted by a low value of coefficient of determination.

In rabi cropping, the trend of the area under groundnut cultivation is negative in the district. However, this trend of decrease is only a marginal and accounted by a small value of 10 per cent coefficient of determination and thus indicating the significant yearly fluctuations in the
ANANTAPUR TALUK - CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

AREA IN HECTARES (Thousands)

YEARS (r²=0.13)

GROSS + Y = A + BX

FIG 5.6a

ANANTAPUR TALUK - CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

AREA IN HECTARES (Thousands)

YEARS (r²=0.16)

Gross + Y = A + BX

FIG 5.6b
DHARMAVARAM TALUK-CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

\[ Y = A + BX \]

DHARMAVARAM TALUK-CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

\[ Y = A + BX \]
HINDUPUR TALUK-CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

\[ Y = A + BX \]

YEARS. \((r^2=0.67)\)

FIG. 5.6a

HINDUPUR TALUK-CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

\[ Y = A + BX \]

YEARS. \((r^2=0.86)\)

FIG. 5.6b
PENUKONDA TALUK—CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

\[ \text{Area in hectares} (\text{Thousands}) \]

YEARS (r²=0.46)

F16.5.9a  \[ \text{GROSS} + y = A + BX \]

PENUKONDA TALUK—CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

\[ \text{Area in hectares} (\text{Thousands}) \]

YEARS (r²=0.93)

F16.5.9b  \[ \text{GROSS} + y = A + BX \]
MADAKASIRA TALUK - CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS) AREA IN HECTARES (Thousands)

YEARS (r²=0.13)

FIG.5.10a  □ GROSS + Y = A + BX

MADAKASIRA TALUK - CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS) AREA IN HECTARES (Thousands)

YEARS (r²=0.16)

FIG.5.10b  □ Gross + Y=A+BX
GOOTY TALUK-CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

YEARS. (r^2=0.37)

AREA IN HECTARES (Thousands)

FIG.5.11a □ GROSS + Y=A+BX

GOOTY TALUK-CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

YEARS. (r^2=0.11)

AREA IN HECTARES (Thousands)

FIG.5.11b □ GROSS + Y=A+BX
TADIPATRI TALUK-CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

YEARS (r²=0.87)

FIG 5.12a

TADIPATRI TALUK-CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

YEARS (r²=0.14)

FIG 5.12b
KADIRI TALUK-CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

YEARS \( r^2 = 0.01 \)

\[ \text{GROSS} + V = A + BX \]

KADIRI TALUK-CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

YEARS \( r^2 = 0.86 \)

\[ \text{GROSS} + V = A + BX \]
RAYADURG TALUK—CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

AREA IN HECTARES (Thousands)

YEARS (r^2=0.80)

FIG 5.14a  □ GROSS  + Y=A+BX

RAYADURG TALUK—CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

AREA IN HECTARES (Thousands)

YEARS (r^2=0.68)

FIG 5.14b  □ GROSS  + Y=A+BX
URAVAKONDA TALUK-CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

YIELDS (r^2=0.33)

\[ Y = A + BX \]

URAVAKONDA TALUK-CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

YIELDS (r^2=0.78)

\[ Y = A + BX \]
ANANTAPUR DISTRICT - CHANGING TREND OF IRRIGATED GROUNDNUT (KHARIF)

\[ Y = A + BX \]

\[ r^2 = 0.91 \]

ANANTAPUR DISTRICT - CHANGING TREND OF IRRIGATED GROUNDNUT (RABI)

\[ Y = A + BX \]

\[ r^2 = 0.78 \]

ANANTAPUR DISTRICT - CHANGING TREND OF IRRIGATED GROUNDNUT (GROSS)

\[ Y = A + BX \]

\[ r^2 = 0.91 \]
ANANTAPUR DISTRICT—CHANGING TREND OF GROUNDNUT CULTIVATION (KHARIF)

$V=A+BX$

FIG 5.18a  Kharif $r^2=0.95$

ANANTAPUR DISTRICT—CHANGING TREND OF GROUNDNUT CULTIVATION (RABI)

$V=A+BX$

FIG 5.18b  Rabi $r^2=0.10$

ANANTAPUR DISTRICT—CHANGING TREND OF GROUNDNUT CULTIVATION (GROSS)

$V=A+BX$

FIG 5.18c  Gross $r^2=0.95$
cultivation of the crop. The trend of decrease is found in five taluks namely, Anantapur, Hindupur, Gooty, Penukonda, and Rayadurg while in the rest of six taluks, the trend of increase is marginal.

**Changing Trend of Irrigated Groundnut Cultivation:**
The area under irrigated groundnut cultivation has shown a positive trend in the district from 1983-84 to 1984-85. This trend of increase is highly significant and is accounted by a very high value of 91 per cent coefficient of determination. It has revealed that absolute increase of irrigated groundnut area has been continuous in the time progression. A similar trend of increase in the area under irrigated groundnut is found in all taluks of the district except Kadiri taluk.

It is obvious to state that the recent hybridisation of groundnut farming has been alarmingly increased the irrigated groundnut cultivation in the district. A significant trend of increase in the area under irrigated groundnut with high value of coefficient of determination is found in Dharmavaram, Gooty, Kalyandurg, Rayadurg, Tadipatri and Uravakonda taluks. A moderate trend of increase is found in Madakasira, Hindupur and Penukonda taluks. In Kadiri, the trend is marginally negative which is accounted by low per cent coefficient of determination. In all the the southern taluks, the emergence of mulberry cultivation has largely affected the irrigated groundnut cultivation.
Observations and Findings of the Study:
The study has revealed that the spectacular spatial spread of groundnut cultivation in Anantapur district is due to the following reasons: (i) it is the most sustainable crop of red sandy and loamy soils under low to moderate rainfall conditions in the district, (ii) it gives higher net returns than the other dry subsistence or commercial crops even during drought conditions, (iii) it is a cash crop of all sections of farming community, (iv) it is a crop of short growing period, (v) the farming operations of the crop are easy and involve less labour input, (vi) it is a less disease prone than the other commercial crops due to seasonal fallowing of the cropped land, (vii) it is the most useful crop for rotation, (viii) the haulms (plant stalks) of the groundnut are by and large the source and supply of fodder for the livestock in the district, (ix) it has a higher price value and good market, and (x) the cost of cultivation is moderate.

In the field study, the farmers belonged to different sections of farming community from different parts of the district have expressed the following opinions about the areal expansion of groundnut cultivation in Anantapur district.
(i) The dietary habits of the farmers have been substantially changed from eating small and major millets like Korra, bajra, ragi and jowar to rice and Wheat. The Government welfare scheme Rs.2/- per Kg. rice to all weaker sections and small and marginal farmers has had a marked influence on the change of dietary aspect from millets to rice. This has resulted the replacement of millet fields with groundnut on a large scale in the district.

(ii) Some farmers have opined that the groundnut crop can be taken with a high degree of success under low rainfall conditions in the favourable soil conditions. After one month of sowing the crop, if one or two rains are received, groundnut yield is much better than the other dry crops. Besides the yield, the fodder is very important from the point of livestock feed. This is also one of the main reasons for the increase of area under groundnut cultivation.

(iii) Many farmers have felt that the groundnut has a high commercial value than the other dry crops in the recent years. The price value of the groundnut and marketing conditions are very attracting and encouraging the all sections of the farming community. In their view the net returns are high in the case of groundnut than the millets and pulses. Instead of cultivating millets and pulses, if groundnut is cultivated, more income can be obtained per unit of land and with that income the farmer can go far superior variety of foodgrains for the diet and also to fulfil other family needs.
Since groundnut is a cash crop of all sections of farmers in the district and the cumulative effect of all favourable agro-geographical conditions, the spatial expansion of groundnut cultivation has gradually tended to replace millets, pulses and cotton. In the extreme form, some of the minor millets, like korra, varagu and samai are getting eliminated from the cropping pattern in the process of crop transformation.

Productivity of Groundnut

The agricultural productivity and prosperity of Anantapur district mostly depends upon the contribution of the single most crop namely, groundnut, because of its wide spread cultivation in the district. Paradoxically, the improvement of the per hectare yield levels of groundnut crop in the district has been neglected. As a result, low per hectare yields of the crop with striking fluctuations from year to year are the common features of the performance of groundnut cultivation.
Table: 5.6: AVERAGE YIELD LEVELS OF GROUNDNUT IN ANANTAPUR DISTRICT, RAYALASEEMA REGION AND ANDHRA PRADESH STATE.

<table>
<thead>
<tr>
<th>Name of the Areal unit</th>
<th>Yield per hectare (in Kg)</th>
<th>Absolute change in the yield level to 1972-75 to 1982-85 to 1982-85</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1972-75 1982-85 1982-85</td>
<td></td>
</tr>
<tr>
<td>Anantapur District</td>
<td>669 805 787 136 -82 118</td>
<td></td>
</tr>
<tr>
<td>Rayalaseema Region</td>
<td>757 976 843 219 -132 86</td>
<td></td>
</tr>
<tr>
<td>Andhra Pradesh state</td>
<td>827 931 856 304 -75 229</td>
<td></td>
</tr>
</tbody>
</table>

The per hectare yield of groundnut in Anantapur district during the last triennium 1982-85 was 787 Kg compared to 843 Kg in the Rayalaseema region and 856 Kg in the State as a whole. The yield gap between Anantapur district and the Rayalaseema region as well as the State is negative which accounted for 7 per cent and 8 per cent respectively.

The per hectare yield level of groundnut during kharif is generally low compared to yield level during rabi, because Kharif groundnut is a rainfed crop while rabi groundnut is an irrigated crop.
The per hectare yield level of Kharif groundnut was recorded 773 Kg. While rabi groundnut recorded 1307 Kg during 1982-85 in the district. In the case of kharif groundnut yield level, Anantapur district has registered an edge (773 Kg/hectare) over the average yield level of groundnut in Rayalaseema region (760Kg/hectare) and in the State (730Kg/hectare) as a whole. It is interesting to state that during normal rainfall conditions, the favourable red soils in Anantapur district give good harvests of groundnut. While in rabi cropping, the hectare yield of groundnut in Anantapur district was low (1307Kg) when compared with the average yield of Rayalaseema region (1722Kg) and the State as a whole (1411 Kg). The cultivation or rabi groundnut is very less in the district when compared with the area under rabi groundnut in Rayalaseema region and the State. Low rainfall from north-east monsoon, unassured and untimely supply of irrigation water and low application of technological inputs are the reasons for the negative yield gap of 24.1 per cent and 7.3 per cent between Anantapur district and Rayalaseema region and the State respectively.
Changes in the Yield Levels of Groundnut

The hectare yield level of groundnut has shown an absolute increase of 118 Kg between the first triennium 1962-65 and the last triennium 1982-85 in Anantapur district. This increase is slightly higher than the increase of 88 Kg/hectare in Rayalaseema region but considerably lesser than the increase of 229 Kg per hectare in the State as a whole. Between 1962-65 and 1972-75, the positive change in the per hectare yield of groundnut was more than the increase between 1962-65 and 1982-85 in the district as well as in Rayalaseema region and the State. It is found that the hectare yield level of groundnut during the middle triennium 1972-75 was higher than the yield pattern during the last triennium 1982-85 in all the cases. The bumper yields of the crop during 1972-75 may be due to good rainfall conditions throughout the State. It is significant to state here that the yield patterns of groundnut by and large fluctuate from one year to another depending on variations in agro-climatic conditions.

The regression trend analysis has also shown a positive trend in the per hectare yield of groundnut in kharif and rabi as well as gross in the district during the period 1970-85.
ANANTAPUR DISTRICT-CHANGING TREND OF GROUNDNUT VEILD (KHARIF)

$$Y = A + BX$$

ANANTAPUR DISTRICT-CHANGING TREND OF GROUNDNUT VEILD (RABI)

$$Y = A + BX$$

ANANTAPUR DISTRICT-CHANGING TREND OF GROUNDNUT VEILD (GROSS)

$$Y = A + BX$$
However, the slope of the trend line is not very steep which indicates that the increase is not much in the last 15 year period. And also the present positive trend line is accounted by 42 per cent coefficient of determination which has revealed that the increase in the per hectare yield of groundnut in the district has not been perpetual with the progression of time i.e., from year to year. It is obvious to state that the groundnut yield patterns have been seriously suffering from yearly fluctuations in the district.

From the groundnut productivity analysis, it is found that the groundnut crop productivity in the drought prone area of Anantapur district has not only been suffering from low per hectare yield levels but also experiencing with high fluctuations from time to time. The reasons for such a state of erratic crop productivity in this chronic drought district are not for to seek. The frequent occurrences of drought, prolonged dry spells, presence of low moisture holding red soils, scanty irrigation facilities and a low level of agro-technification have had a debilitating effect on the crop productivity. The first and foremost effort which should be taken is to reduce the yearly fluctuations in the yield levels of the crop and next to enhance the present yield level by employing dry farming technology in order to reduce the yield gaps between the areas and the districts.
Impact of Rainfall on Groundnut Cultivation

In Anatapur district, where rainfed crop farming is predominant and irrigation development is too low, it is a common assumption that the increase or decrease in the area under groundnut cultivation as well as its yield level will be largely influenced by the success or failure of monsoons. Here, an endeavour is made to find out the relationship between the amount of rainfall during south-west monsoon and the area and per hectare yield level of groundnut during kharif cropping. The amount of south-west monsoon rainfall is taken to study its impact both on area and yield of groundnut cultivation because wide-spread cultivation of groundnut takes place in kharif depending upon south-west monsoon rainfall.

The coefficient of correlation between rainfall and area under groundnut in the district is significant to the tune of 0.6 coefficient value. It shows that there has been a considerable degree of impact of rainfall on the spatial spread of groundnut cultivation. It is also found that there is a high correlation between rainfall and the yield pattern of groundnut which is to the tune of 0.78 coefficient value. From the correlation analysis, it is inferred that both the
area and yield pattern of groundnut are mostly depending upon the distribution of south-west monsoonal rainfall. If there is a failure of the monsoon, especially the yield level of groundnut will be the worst affected. Hence, necessary scientific measures like soil and water conservation methods, suitable dry farming technology, and agricultural extension measures stressing and conveying upon agro-climatic information about groundnut cultivation are to be taken at massive scale to improve the performances of groundnut cultivation in Anantapur district.