
AGRICULTURAL PRODUCTIVITY AND MARKETING

A. PRODUCTIVITY OF PRINCIPAL CROPS

- i) Levels of Jowar productivity
- ii) Levels of Bajara productivity
- iii) Levels of Wheat productivity
- iv) Levels of Tur productivity
- v) Levels of Gram productivity
- vi) Levels of Groundnut productivity

B. MEASUREMENT OF AGRICULTURAL PRODUCTIVITY

- i) Measurement of productivity by Kendal's Ranking Co-efficient Method
- ii) Measurement of productivity by Yield Index Method
- iii) Measurement of productivity by Bhatia's Method

C. AGRICULTURAL MARKETING

Market Centres

- 1) Barshi
- 2) Solapur
- 3) Akluj
- 4) Karmala
- 5) Pandharpur
- 6) Mohol
- 7) Kurduwadi
- 8) Sangola
- 9) Akkalkot
- 10) Mangalvedha

CONCLUSION

REFERENCES

A study of the spatial variations in agricultural productivity is useful for identifying the weaker areas of agriculture. In developing countries, land is limited for making expansion in cultivated area. Further increasing pressure of population on land compels the scientists to think for the improvement of agricultural productivity. Thus, to solve the food problem a suitable way is to increase production per unit area and per unit of time; hence a measurement of the existing agricultural productivity becomes necessary before any remedial steps can be taken.

Agricultural productivity is the interplay of a multitude of factors such as environmental, socio-economic & technological. The agricultural productivity is closely related to the per hectare yields; where as the agricultural efficiency is much more than agricultural productivity and conveys a more comprehensive meaning. Agricultural productivity is the actual performance of the land in terms of per hectare yields, where as agricultural efficiency is a ratio between the achievement in terms of agricultural production and the actual potential of the land. Productivity is a physical rather than a value concept and describes the changing relation between output and one of the major inputs like land, labour, and capital (Ramanaiah, Y.V. & Reddy, N.B.K., 1984).

A. PRODUCTIVITY OF PRINCIPAL CROPS :

Jowar, bajara, wheat, tur, gram and groundnut are the important crops of the region. Jowar is accounting for more than

55 percent of the total cultivated area of the region. Jowar can be grown both as a Rabi and Kharif crops. Wheat is more common in dry areas. Sugarcane is a late arrival in the field of cash crops. Its cultivation is confined to the areas receiving adequate and timely irrigation.

The crop productivity changes have occurred in response to many technological developments in the period of 1951-1978. The adoption of seeds, fertilizer and irrigation resulted into increase of farm production and diversifying the production pattern. The soil conservation has been an additional, for increasing the productivity. Thus all these factors interact the changes in agriculture production. Fig.5.1 & 5.2 shows the yield pattern and trend of yield of principal crops viz. jowar, bajara, wheat, tur, gram and groundnut.

i) Levels of Jowar productivity :

There are wide variations in the yield of jowar in the region. The talukawise yields range from 202.4 kg/hectare to 812.8 kg/hectare with an overall yield of 472.8 kg/hectare for the region as a whole. Out of 11 talukas, three talukas have recorded a yield level of greater than 725 kg/hectare. The very high productivity is observed in Mangalvedha taluka with an average productivity of 812.8 kg/hectare. The improved dry farming techniques assured supply of water, use of new strains of seeds, proper dose of fertilizers and modern methods in jowar

husbandary are responsible for higher production. The moderate levels of productivity is noted in Karmala, Pandharpur, Mohol and South Solapur. At the other extreme, there are four low productivity talukas with output per hectare of less than 425 kg/hectare (Fig.5.1A).

The yield and production trend of jowar are shown in Fig.5.2A. It ~~has~~ decreased during 1964-65 and 1975. From 1975 onwards increasing trend is observed.

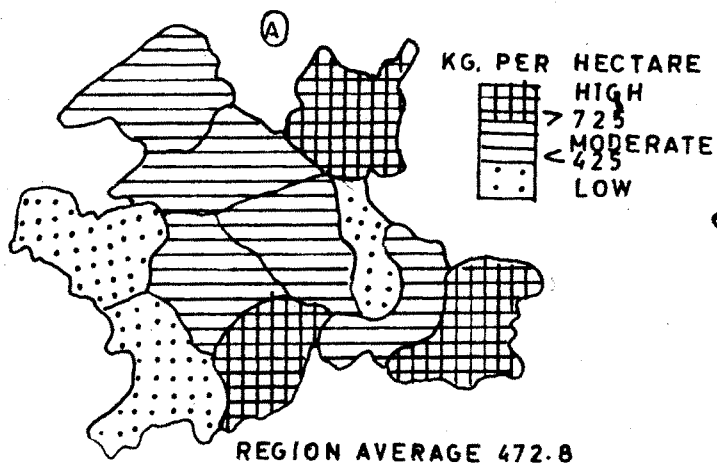
ii) Levels of Bajara productivity :

There are wide variations in the average level of productivity of bajara (Fig.5.1B). The average productivity of bajara in the region is 304 kg/hectare. Out of 11 talukas four talukas have a productivity above average and seven talukas below average. The major part of Solapur district i.e. Mohol and North Solapur have high level of bajara productivity. The moderate productivity is recorded in Barshi, Karmala, Malshiras, Sangola, and Mangalvedha talukas. In Madha, Pandharpur, South Solapur and Akkalkot, the productivity is low. Recently new strains and the improvement in dry farming techniques have improved bajara productivity.

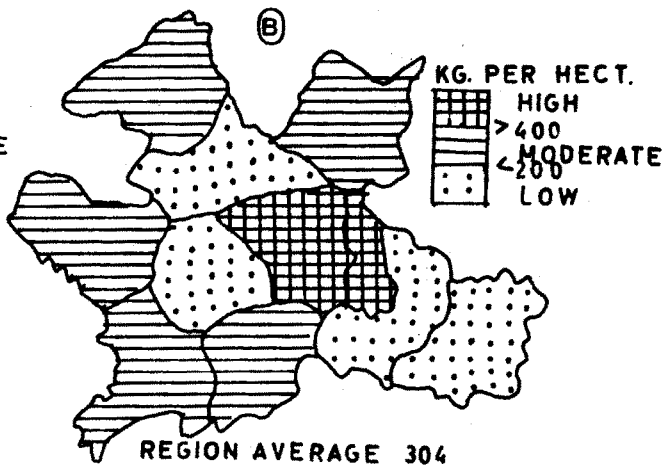
The highest yield and production are recorded in 1977-78 viz. 171 kg. yield per hectare and production 12,500 metric tonnes. Whereas the production and yield per hectare was decreased in 1959-60 (Fig.5.2B).

SOLAPUR DISTRICT

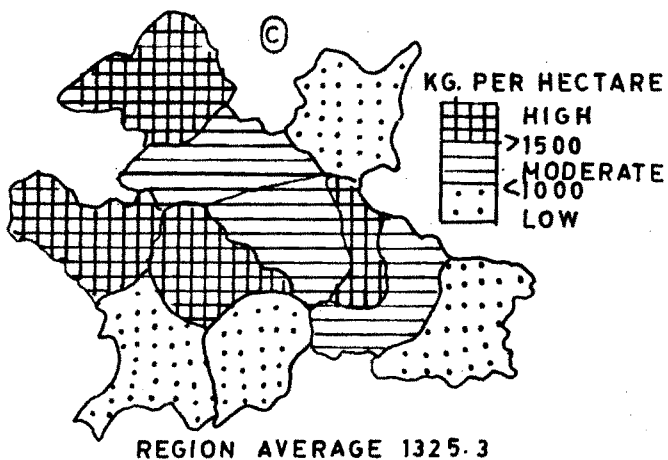
YIELD LEVEL OF JAWAR



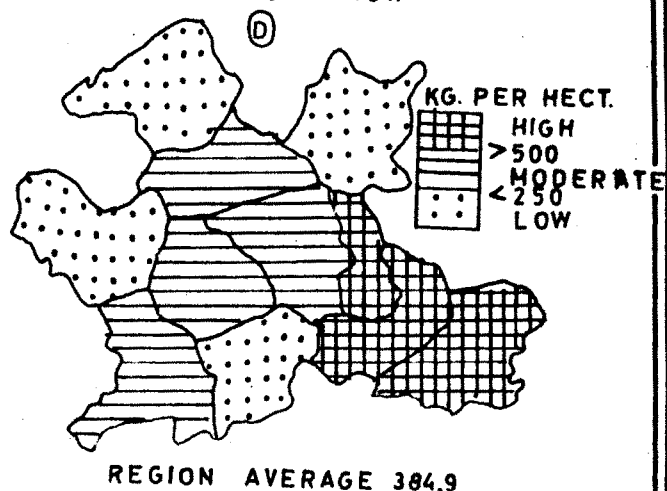
YIELD LEVEL OF BAJARA



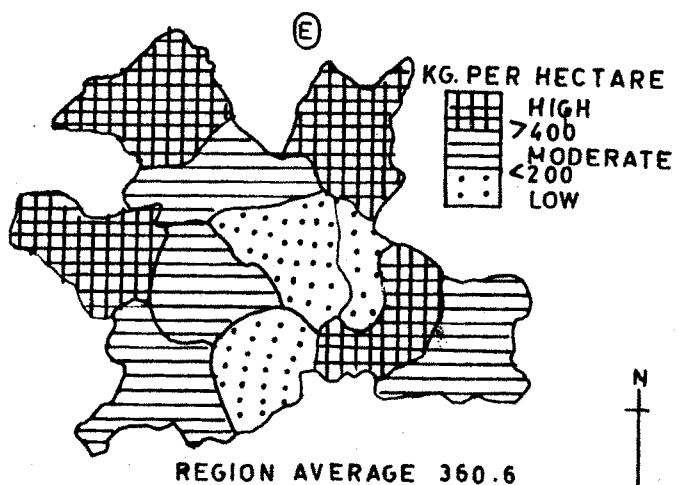
YIELD LEVEL OF WHEAT



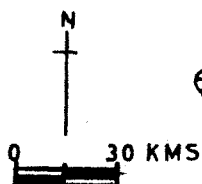
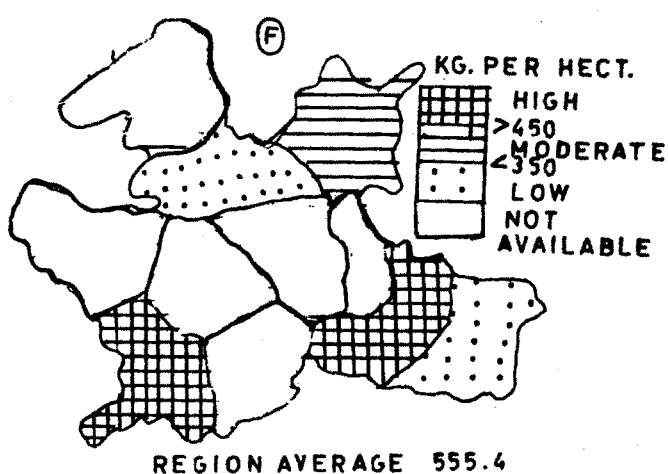
YIELD LEVEL OF TUR



YIELD LEVEL OF GRAM



YIELD LEVEL OF GROUNDNUT



iii) Levels of Wheat productivity :

The distribution pattern of wheat productivity is given in Fig.5.1C. The average productivity of region is 1325.3 kg./hectare. There are only four talukas which have a yield above 1500 kg./hectare. These four talukas namely Karmala, Malshiras, Pandharpur and North Solapur make a major contribution to wheat output in the region. The moderate production of wheat is observed in Madha, Mohol and South Solapur talukas and low production is in Barshi, Akkalkot, Mangalvedha and Sangola talukas with an average productivity of 1,000 kg./hectare.

The yield and production of wheat are the highest in the region but decreased during 1970 and from 1976 onwards yield per hectare and production have been increased (Fig.5.2C).

iv) Levels of Tur productivity :

Tur is a more important foodgrain of the region. The average productivity of the region is 384.9 kg./hectare. There are three talukas (North Solapur, South Solapur, Akkalkot) which record productivity level higher than 500 kg./hectare. At the extreme, the four talukas namely Barshi, Karmala, Malshiras and Mangalvedha which have productivity levels less than 250 kg./hect. Sangola, Pandharpur, Madha, Mohol talukas have productivity ranging between 250 to 500 kg./hectare (Fig.5.1D). The levels of tur productivity is very high in those parts of the district where tur concentration is significant.

SOLAHUR DISIRIKI

YIELD PER HECTARE AND OUT-TURN OF PRINCIPAL CROPS

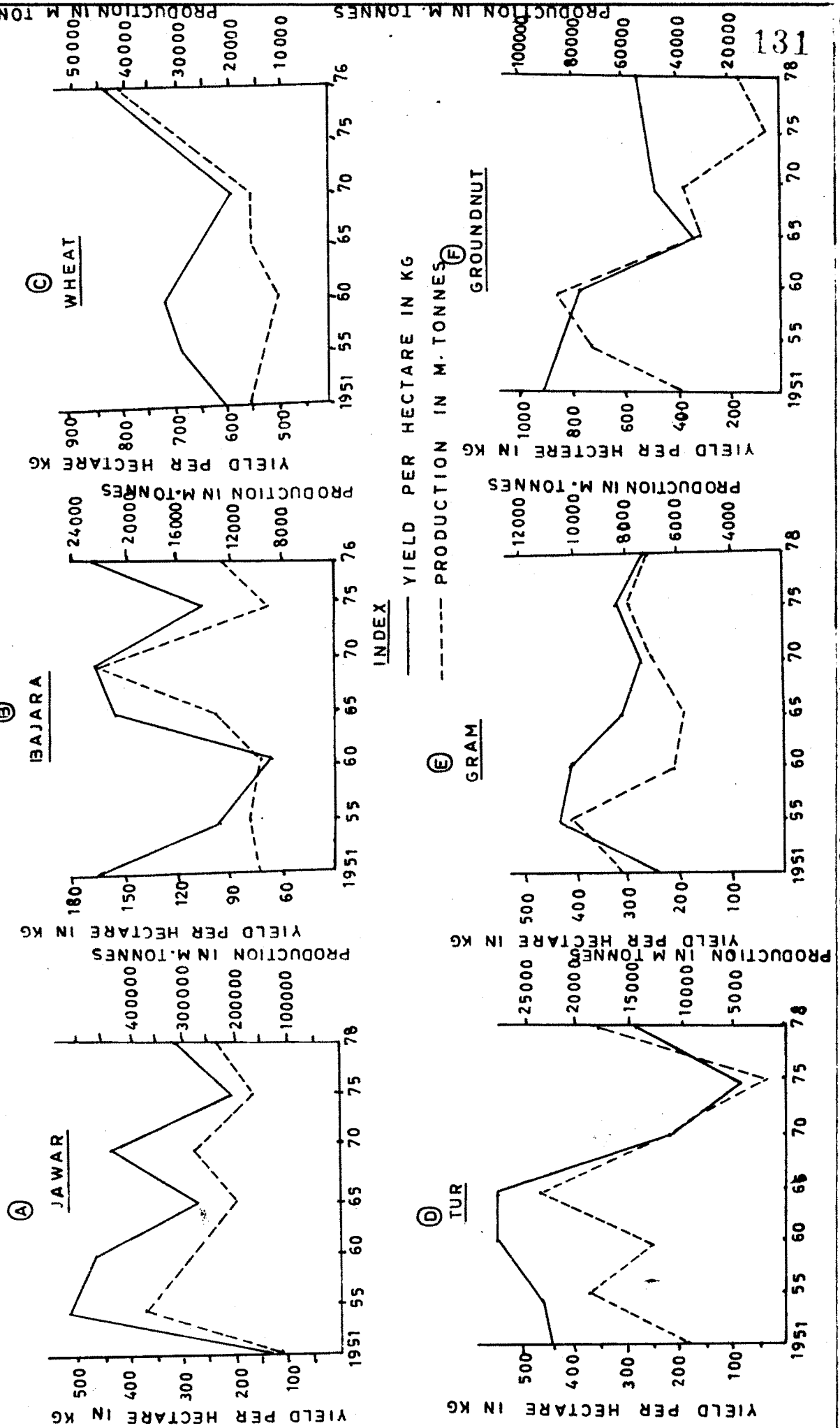


FIG. 5-2

The highest yield and production is in 1964-65 (yield 539 kg./hectare and production 23,700 metric tonnes), whereas the yield per hectare and production are relatively low in 1975 (Fig.5.2D).

v) Levels of Gram productivity :

Gram is known as 'Harbara' in rural area. The average productivity of region is 360.6 kg./hectare which is almost equal to the national average. There are four talukas (Barshi, Karmala, Malshiras and South Solapur) which have productivity levels higher than 400 kg./hectare. Three talukas which have productivity levels less than 200 kg./hectare. Low productivity occurs in North Solapur, Mangalvedha and Mohol, where local factors such as poor soils, relief and low intensity of irrigation affect the level of gram production. Elsewhere, the level of gram production ranges from 200 to 400 kg./hectare (Fig.5.1E).

The yield of gram in 1951 was 246 kg./hectare and production 8,100 metric tonnes. The highest yield and production are recorded in 1955. In 1978 the yield per hectare is 255 kg. and production 7,300 metric tonnes (Fig.5.2E).

vi) Level of Groundnut productivity :

Groundnut is the important oilseed crop of the region and its area of concentration is in southern part of South Solapur taluka. It records high productivity with an average productivity of 453.5 kg./hectare, low productivity is in

Akkalkot taluka with an average productivity of 169.8 kg./hectare. Elsewhere the levels of production are moderate due to agronomic limitations and the competition with grain crops (Fig.5.1F).

In 1951, the production was 35,200 metric tonnes and yield per hectare was 928 kg. After that the production and yield were increased in 1970 (production 8,300 metric tonnes and yield per hectare 793 kg.) (Fig.5.2F). Then there is a decrease in the production and yield upto the 1975. After 1975 the production and yield were increased slowly.

The productivity level of individual crop do not give the average picture of agricultural productivity, hence the overall level of agriculture productivity is attempted by applying standard quantitative methods as below.

B. MEASUREMENT OF AGRICULTURAL PRODUCTIVITY :

Identification and delination of weaker areas of agricultural productivity has been attempted by many scholars by using many techniques. In the present investigation three methods such as Kendal's ranking co-efficient method; Yield index method and Bhatia's method have been used for the measurement of productivity. The weakness of Kendal's ranking co-efficient method namely, neglect of the areal strength of crops was removed by Sapre and Deshpande (1964). After that further modification has been attempted by Bhatia (1967).

i) Measurement of productivity by Kendal's ranking co-efficient method :

Here, the Kendal's ranking co-efficient method (1968) is used, while applying this technique seven major crops grown in all the talukas of district are selected. The crops have ranked in order to their yield per unit area. Then the arithmetic mean of these ranks is obtained which Kendal called as 'ranking co-efficient' and the same is represented cartographically. Lower the co-efficient value, higher is the productivity level of agriculture.

Results and discussions :

Three areas of agricultural productivity have been identified in Fig.5.3A viz. (i) Areas of high productivity (ii) Areas of moderate productivity and (iii) Areas of low productivity.

(i) Areas of high productivity :

This category is confined largely to northern and eastern part of Solapur district comprising the talukas of South Solapur, North Solapur, Mohol, Barshi and Karmala. The rivers in this area provide water for irrigation in Rabi season. The river basins have fertile soils and many farmers in this area are adopting new inputs in agriculture e.g. fertilizers, machinery, improved seeds etc. All the favourable factors and human efforts have resulted in to the high agricultural productivity.

(ii) Areas of moderate productivity :

This category of productivity covers four talukas. The co-efficient value in this area ranges from 5.5 to 6.5. Akkalkot taluka is famous for pulses cultivation. Other Akkalkot, Sangola, Pandharpur, Malshiras talukas have fertile soil but paucity of water for irrigation and high variability of rainfall have resulted into moderate agricultural productivity.

(iii) Areas of low productivity :

The low productivity areas cover two talukas (Appendix I) where the co-efficient value is above 6.5. The high variability of rainfall and low intensity of irrigation have led to low agricultural productivity.

ii) Measurement of productivity by yield index method :

The regional imbalances in agricultural productivity of Solapur district is measured by using yield index method. While applying this method the seven crops grown in most of the talukas are selected. The yield index of each crop is calculated by the equation given below.

$$\frac{\text{Yield of crop 'a' in the areal unit}}{\text{Yield of crop 'a' in the region}} \times 100$$

Then the composite yield index was obtained for each taluka and the same is represented cartographically on the map of Solapur district.

Results and discussions :

Three categories viz. (i) Areas of high productivity (ii) Areas of moderate productivity and (iii) Areas of low productivity have been indentified as below.

(i) Areas of high productivity :

It is mainly confined to the central and eastern part of district excluding South Solapur taluka. Thus, the talukas of Mohol, Karmala and North Solapur record high productivity (Fig.5.3B).

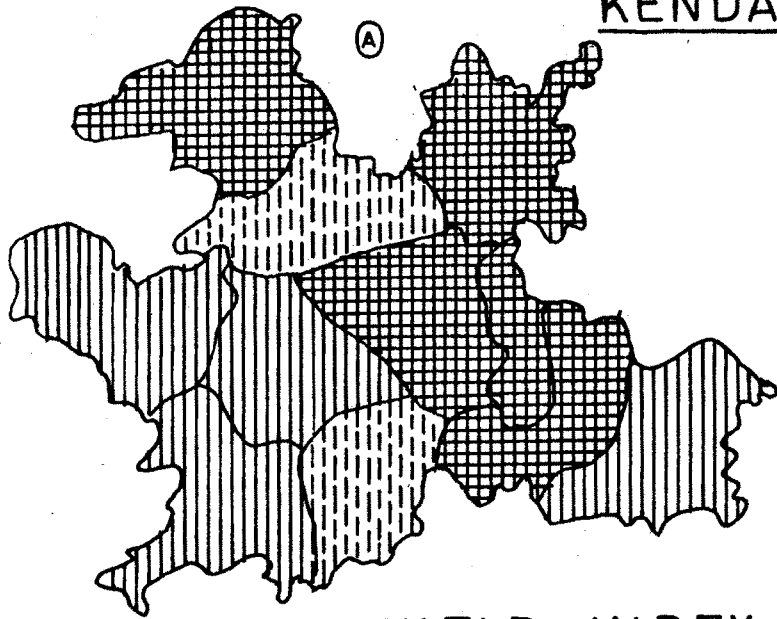
(ii) Areas of moderate productivity :

This category of productivity is mainly noted in western part of Solapur district (excluding Karmala taluka). The rainfall is low in Sangola taluka. Irrigation facilities are not more developed. The average yield of crops is low. Kharif crops are dependent on monsoon and Rabi crops are grown only where water is available.

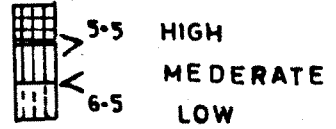
(iii) Areas of low productivity :

In the central part of Solapur district low production is recorded. It is in Madha, Pandharpur, Mangalvedha, and Akkalkot talukas (Fig.5.3B). Here the yield of crops is very low. The irrigation facilities are not developed. Agricultural impliments are old and traditional. Rainfall is uncertain. Thus the combined effect of all these factors lead to the low agricultural productivity.

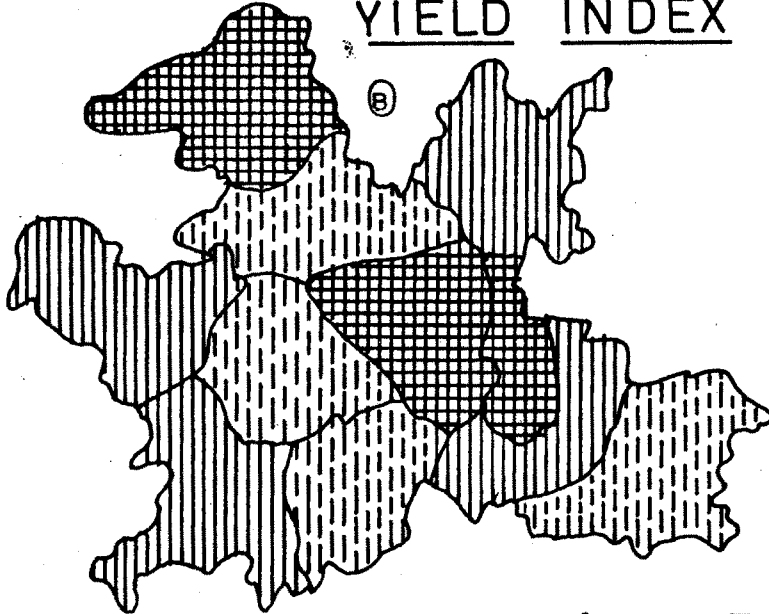
AGRICULTURAL PRODUCTIVITY KENDAL'S METHOD



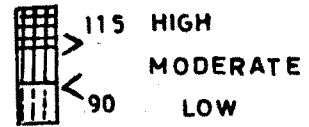
CO-EFFICIENT VALUE



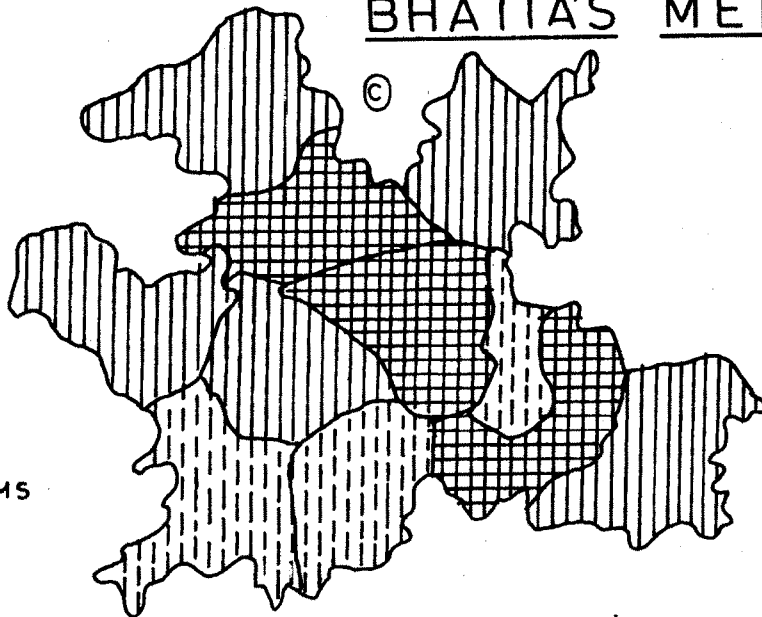
YIELD INDEX METHOD



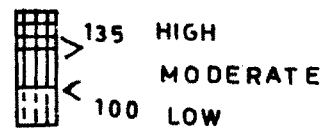
INDEX VALUE



BHATIA'S METHOD



INDEX VALUE



15 30 KMS

FIG. 5.3

iii) Measurement of productivity by Bhatia's method :

The levels of agricultural productivity are the result of natural environment and partly of human activities. It is a dynamic concept and any change in above factors may affect on agricultural production. Thus, to reckon the regional differences in levels of agricultural productivity here Bhatia's method of weighted average yield index is also used (Appendix II). Seven crops are selected for this purpose and weights are given by taking crop land devoted to each crop. This may be expressed as below :

$$i) \quad I_{ya} = \frac{y_c}{y_r} \times 100$$

I_{ya} = yield index of crop 'a'

y_c = yield of crop 'a' in the areal unit

y_r = yield of crop 'a' in the region

$$ii) \quad AP = \frac{I_{ya} \times c_a + I_{yb} \times c_b + \dots + I_{yn} \times c_n}{c_a + c_b + \dots + c_n}$$

AP = Agricultural productivity

$I_{ya}, I_{yb}, \dots, I_{yr}$ = Yield indices of various crops

c_a, c_b, \dots, c_n = % of cropland under different crops

On this basis, the agricultural productivity of each taluka of Solapur district has been computed and mapped (Fig. 5.3 C).

Results and discussions :

Fig.5.3C bring out the general patterns of regional imbalances in the levels of agricultural productivity. For discussion the region is grouped into three categories viz.

(i) Areas of high productivity (ii) Areas of moderate productivity and (iii) Areas of low productivity.

(i) Areas of high productivity :

The area of this category includes only three talukas of Solapur district namely South Solapur, Mohol and Madha. This area coincides with the area of laterite to deep black soils and high intensity of irrigation. This has been reflected in high agricultural productivity. The highest productivity is recorded in Madha taluka of Solapur district.

(ii) Areas of moderate productivity :

The talukas of Barshi, Karmala, Malshiras, and Akkalkot have moderate agricultural productivity. With the development of irrigation facilities these talukas may improve the productivity in future.

(iii) Areas of low productivity :

The areas of low level of agricultural productivity occurs in all the remaining talukas of Solapur district. Here local factor such as poor soils and very low intensity of irrigation affect the level of agricultural productivity. In this part of the district the level of crop production per unit

area can also be raised by the use of improved seeds and increasing irrigation facilities.

There is a close relation between agricultural production and market. In subsistence type of agriculture a small portion of agriculture production is also sent to market for earning cash. Therefore in the following paragraphs an account of agricultural market centres and pattern of agricultural marketing is attempted.

C. AGRICULTURAL MARKETING :

Agricultural marketing is one of the manifold problems which have a direct bearing upon the prosperity of the cultivators (Mamoria, 1969). The problem of marketing is greater in agriculture than industries, as the agricultural products are bulky and perishable. The producers of agricultural goods are scattered over large rural areas and all the surplus is not consumed locally and it is sent to a distant urban centres, hence the cost of transport is also high.

Marketing system in the region is of three types namely regulated, retail & wholesale and periodical. As far as the farmers and agriculture of the region are concerned, regulated, wholesale and periodical marketing are more important.

Regulated and wholesale market centres are located at the taluka headquarters and other urban centres. The regulated markets in the district are the wholesale trade centres which

are mainly the export centres of surplus commodities. All the regulated markets are established under the new Act of 1963 which was actually implemented in this district since 1967. All the talukas in the district are served by regulated markets.

The objectives of this establishment of market centres are (i) to bring about equity in bargaining power among the agriculturists and traders (ii) to prevent malpractices and (iii) to promote mutual confidence.

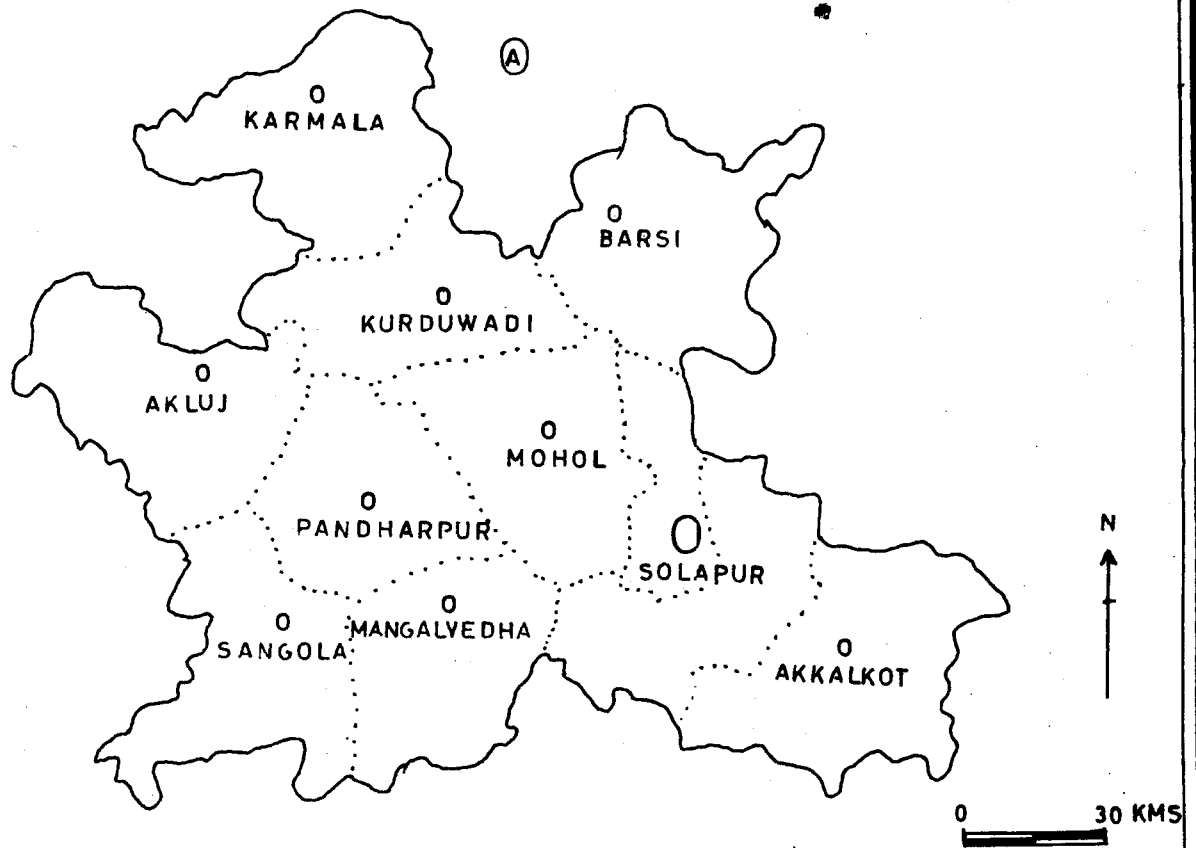
Hence, an attempt is made to analyse the role of agricultural market centres in the agriculture of the region under study. The marketing activity of major centres (Fig.5.4A) is given below.

Market Centres :

1) Barshi :

'The agricultural produce market committee' at Barshi was established on 11th June 1948. It is the biggest and the most important market in the district. This market is commonly called as 'Gateway of Marathwada' in the field of agricultural trade. A large amount of agricultural produce is brought for sale at this market. It is served by convenient means of transport and communications which attract agriculturists and traders from Marathwada region. The Latur-Miraj narrow gauge line of South Central Railway as well as many state highways serve the centre. The important regulated commodities are groundnut, mug

MARKETING CENTRES 142



SUPPLY OF TURDAL AND JAWAR

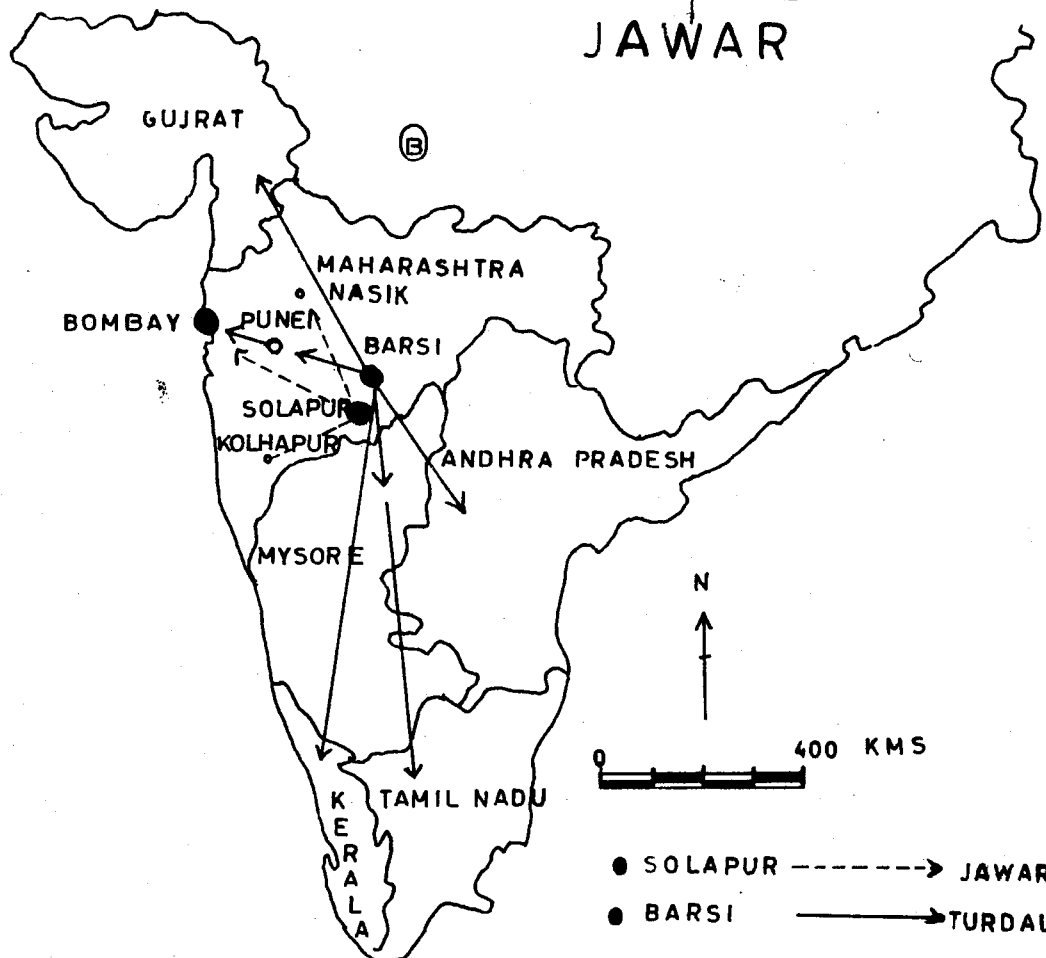


FIG. 5.4

(green, yellow, mongalai), udid, safflower, jowar (maldandi, dagadi, jogali) bajari, wheat, gram, turmeric, chillis, gur, tamarind, etc. Besides, the market committee has also regulated cattle trade consisting of cows, bullocks, she and he buffaloes, sheep and goats since 1964.

The Barshi market is an assembling as well as distributing centre of all agricultural commodities. Of the total assembled produce, 20 percent is retained for local consumption and 80 percent is exported to distant market centres (Fig.5.4B). The following commodities are exported to the destinations mentioned against them.

Sr. No.	Commodity	Destination
1.	Groundnut	Bombay
2.	Mug	Goa, Bombay, Gujarat, Bihar, Madras Mysore, Kerala, Andra Pradesh
3.	Udid	Goa, Madras, Kerala, Bihar, Andra Pradesh
4.	Turmeric	Bombay, Sangli
5.	Tur and Turdal	Bombay, Pune, Gujarat, Madras, Mysore, Kerala
6.	Tamarind	Madras, Mysore, Bombay and Andra Pradesh

2) Solapur :

The Solapur market is one of the biggest wholesale markets in Maharashtra State. It is served by railway and road transport facilities. The Bombay-Madras railway line as well as the National and State Highways have brought the city into close contact with distant trade centres in Maharashtra, Andhra Pradesh, Tamilnadu and Karnataka states. Also a considerable produce from Osmanabad district is brought to Solapur for sale. The area of operation of the market committee extends over two talukas viz., South and North Solapur. In this market the commodities as under are marketed. They are groundnut (shelled and unshelled), linseed, tur, mug, jowar, gram, wheat, chillis, rice, gur, onions and livestock such as goats, sheep, she and he buffaloes, cows, bullocks and horses. The market is famous for groundnut, jowar, karadi and it is exported to other markets (Fig.5.4B). The market committee has introduced the commercial grading system since 1963 and has a unit of five graders. The Maharashtra State Warehousing Corporation has built four godowns on the market yard, the storage capacity of each of them being 72,000 bags.

3) Akluj :

The Agricultural Produce Market Committee at Akluj was established in 1950. It is one of the big markets in the district. It is however handicapped by the lack of convenient means of rail transport.



The market has regulated the commodities viz. gur, cotton (Laxmi, Javilla and Nimkar) groundnut, safflower, tur gram, jowar, wheat. The cattle trade consisting of sheep, goats, he and she buffaloes and horses is also regulated since 1961. Gur is important commodity in this market. In the cattle market, the sheep and goats are very popular to sale & purchase.

4) Karmala :

The Agricultural Produce Market Committee at Karmala was established on 1st January 1943. The market has jurisdiction over 96 villages which are frequented by recurring conditions of scarcity. Some villages from Karjat and Jamkhed talukas of Ahmadnagar district and some villages from Parenda and Ashti talukas of Osmanabad and Bhir districts get the benefit of this market. Though Karmala is in the chronic drought area, there is a considerable turn over of trade.

Though the market is situated in the drought stricken area, about 70 percent of the assembled produce is exported outside the Karmala taluka after meeting the local demand. The direction of export trade is as under.

Jowar	: Solapur, Ratnagiri, Karad, Sangli and Kolhapur
Bajari	: Nasik, Thane, Pune and Bombay
Wheat	: Banglore, Andra Pradesh, Solapur, Satara and Pune
Groundnut	: Pune, Bombay and Solapur
Sesamum	: Baroda and Bombay
Gur	: Barshi, Kolhapur, Ahmadnagar, Pune and Gadag
Chillis	: Bombay and Pune
Mug	: Madras, Gujarat, Mysore, Bombay and Andhra Pradesh

5) Pandharpur :

Pandharpur market committee was started in 1949 and has developed into a very big market of agricultural produce. The market yard of Pandharpur is conveniently located as regards to easy means of transport and communications. It is served by the Latur-Miraj narrow gauge line of the South Central Railway and many important state highways. In this market all agricultural commodities such as groundnut, safflower, tur (red, white & mixed), gram, jowar (Maldandi 35-1, and hybrid) wheat (bansi N146), onions (white and red) are marketed. Besides, the market committee has also regulated the trade of cows, bullocks, horses, sheep and goats and he and she buffaloes.

About 30 percent of the total produce is retained by the agriculturists, and about 70 percent is brought for sale. The import and export of agricultural produce is done by motor transport as well as by railway. The transport charges per quintal from Pandharpur to Bombay rupees 4, Kolhapur rupees 3, Satara and Sangli are Rs.2.50. The co-operative marketing societies have played an important role in the regulation of trade at this market.

6) Mohol :

This market was started in 1956. The area of operation of the market committee is whole Mohol taluka. This market has not much scope for its development as a large quantity of

agricultural produce is diverted to other markets. Jowar, bajari, wheat, maize, gram, tur, mug, gur, onions, chillis and groundnut are the important commodities of this market.

7) Kurduwadi :

This market committee was established on 1st May 1950. The market is served by convenient means of transport and communication. The Bombay-Pune-Madras railwayline and Latur-Miraj narrow gauge line of the South Central Railway as well as the Bombay-Hyderabad national highway are the important trade routes passing through Kurduwadi. The area of operation of the market extends over the entire Madha taluka. Groundnut, wheat, jowar, chillis, gram, tur, mug, gur, maize, bajari are the regulated commodities. Also cattle market is there.

About 80 percent of the total agricultural produce is brought for sale in the market and 20 percent is consumed locally. Jowar is the main commodity of this market. The agricultural produce is exported to Bombay, Madras, Aurangabad, Pune and Gujarat state. The daily attendance of the agriculturists at Kurduwadi market ranges from 300 to 400.

8) Sangola :

Sangola is situated within the chronic drought belt. This factor has reduced its importance as a centre of trade in agricultural commodities. It is very famous for the trading of

livestocks such as bullocks of the Khilar breed and also for sheep and goats. The regulated commodities are groundnut, tur, jowar, bajari, wheat, chillis, gur, hulaga and mataki. About 70 percent of the total produce is retained by the agriculturists, while only 30 percent is handled at the market yard.

9) Akkalkot :

Akkalkot market committee was established in 1952. The convenient transport facilities have helped for development of the market. The area of operation of the market committee extends over the entire Akkalkot taluka. The regulated commodities are groundnut, tur, mug, udid, karadi, gur, chillis, jowar, wheat, bajari, gram, onions, ambadi and cattle market. The Akkalkot taluka Kharedi Vikri Sangh Limited play an important role in marketing activities.

10) Mangalwedha :

The Mangalwedha market committee was established in 1965 at Mangalwedha. Till that date there was a sub-market yard at Mangalwedha under the charge of the Pandharpur market committee. Since its establishment the committee has maintained steady development in regard to the regulation of agricultural commodities. Groundnut, Safflower, tur, gram, jowar, bajari, wheat, hulaga, mataki, gur are the market commodities in this market. There is a cattle market also.

CONCLUSION :

The agricultural productivity is not accidental or stagnant. It can be transformed into different grades such as desert soils can be made productive by application of fertilizers and irrigation, vice versa the good fertile soils can be classified as poor agricultural productivity, if market facilities and other inputs are not available cheaply. With these views in mind the author has reached to certain conclusions of agricultural productivity regarding the region under study.

The physical condition of the region play an important role in determining the agricultural productivity. So the agricultural productivity is the outcome of agricultural inputs and local physical conditions.

There are remarkable disparities in the level of agricultural productivity in the region. The high productivity zone is continued to middle part of the region. Other area may be regarded as weaker zone in respect of agricultural productivity. In Solapur district, there is a considerable scope to increase the agricultural productivity, If the farmers are provided with implements, adequate amount of fertilizers, seeds and the necessary irrigation facilities.

In Solapur district all the talukas are served by regulated markets. Barshi and Solapur market are the biggest market centres

in the district and are famous for turdal and jowar. They are assembling as well as distributing centres of all agricultural commodities. Many market centres are served by convenient means of transport and communication, hence different commodities are sent to distant trade centres in other states. Every market centre besides agricultural commodities also regulate the cattle trade.

REFERENCES

1. Bhatia, S.S. (1967) : Spatial variations, changes and trends in agricultural efficiency in U.P. 1953-1963. Indian Journal of Agricultural Economics, Vol.22, No.1., pp.66-80.
2. Kendal, M.G.W. (1968) : The geographical distribution of crop productivity in England, 'Spatial Analysis' : A Reader in Statistical Geography. Ed. Barry and Marble., pp.387-406.
3. Momoria, C.B. (1969) : Agricultural problems of India. Kitab Mahal, Allahabad.,p.718.
4. Ramanaiah, Y.V. and Reddy, N.B.K. (1984) : Regionalisation of agricultural productivity in A.P. Transactions Institute of Indian Geographers, Vol.6, No.1., pp.1-17.
5. Sapre, S.G. and Deshpande, V.D. (1964) : Inter-district variations in agricultural efficiency in Maharashtra state. Indian Journal of Agricultural Economics, Vol.19, No.1., pp.242-252.