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Irrigation System and Intensity of Irrigation in Chamarajanagar District: A Geographical Approach

Mutharaj. D.
Lecturers, in Geography, GFGC Kanakapura

ABSTRACT: "While low rainfall and its variable nature necessities the development of artificial means of moisture supply, the increasing use of fertilizers and to some extent, of improved variety of seeds make timely need of water as a prerequisite 'In the foregoing, analysis and evaluation of the aspects of irrigation in Dakshina Kannada district, has been made in detail in order to understand the role and impact of irrigation in development of agriculture and its efficiency. The study on irrigation paper certainly contributes to a greater extent to understanding the future course of probable change in land use of Dakshina Kannada district and there by arising needs for planning of agriculture in Chamarajanagar district.

KEYWORDS: Irrigation, Intensity, HYV, Fertilizer.

INTRODUCTION

Irrigation has become an important aspect of agriculture. Recently irrigation becomes most essential and without it most crops cannot be grown. It becomes essential part due to variation of monsoon and uneven distribution of rainfall throughout the year. Even those crops, which are grown during rainy season, also depend upon irrigation because farmers try to irrigate the crops in time so that crops might be ready in time and give higher yield. In case of failure of rainfall use of irrigation becomes much more essential areas growing multiple crops need intensive irrigation facilities. Irrigation is considered to be one of the most important and basic factors in the process of transformation of agriculture. Irrigation is the basic determinant of agriculture because its inadequacies are the most powerful constrains on the increase of agricultural production, particularly in the dry farming regions. In traditional agriculture, irrigation was recognized only for its protective role of insurance against the vagaries of rainfall and drought. But the adoption of high yielding varieties, chemical fertilization and multiple cropping, controlled irrigation has become the chief factor in increasing productivity. Whereas sugar cane, groundnuts etc are totally depend on artificial irrigation. The surface water irrigation practices like the tank, river and canal play vital role in irrigation. Whereas underground water is also being tapped by dug and tube wells and these became important due to reliance.

WATER RESOURCES AND IRRIGATION

Agriculture without irrigation in areas having less than fifteen centimeters rainfall is a suicidal uneconomic venture. The increasing demand of water for agriculture may be met by intensive and extensive use of the available water resources. Thus, one of the major purposes of enquiry of the available water resources is to define the regional pattern of their quality, quantity and utilization. In fact, there are three sources of water available i.e. surface water, ground water and ocean water. Thus, the surface water in the form of rivers, streams, and lakes are the most important sources to be used for irrigation purpose. The uses of irrigation are conditioned by several variables. The problem of low agricultural productivity can be tackled by improving farm facilities and irrigation facilities. Irrigation disparity accounts for a substantial amount of variation in agricultural output between regions. If constant supply of water is ensured, transformation and expansion of agriculture can take place. Without irrigation very little can be expected from extensive cultivation. Besides, irrigation helps greatly in raising the yield of land. The importance of irrigation may be judged from protective and productive angles. The protective irrigation makeup the moisture deficiency in soil to ensure proper and sustained growth of crops. The productive irrigation enables raising of second and third crops on the lands provided with irrigation which could otherwise not be cultivated efficiently more particularly during the post and pre-monsoon period.

STUDY AREA

The study area forms a distinct land unit, besides being a cultural unity lying between 76°.24' and 77°.43' east longitudes and 11°.32' and 12°.16' north latitudes. It is bordered by Mysore and Mandya district of Karnataka state in the North, Nilgiris and Coimbatore districts of Tamilnadu state in the South-East, Waynad district of Kerala state in South-West. It has Geographical area of 5671.71 Sq. Kms. Chamarajanagar district lies in the southernmost part of Karnataka state. The general elevation of the district ranges between 700 to 900 meters above sea level. The district is almost surrounded by eastern and western Ghats where some places are having an elevation of more than 1200 meters above sea level.

METHODOLOGY

The present research work is based on the secondary sources of data. The data collected and used for the period 2001-02 to 2020-21. The secondary data is obtained from Chamarajanagar district at a glance (2001-02 to 2020-21) and irrigation department. Simple techniques have been used to analyzed secondary data and based on the results, tables, maps and diagrams are prepared.

The intensity of irrigation is controlled by various factors such as source of irrigation, types of crops grown, cropping season, quantity and quality of water supply and density of network of water channels etc. The benefits of intensity of irrigation are reflected in the cropping pattern, productivity of land, land use efficiency and method of cultivation. The intensity of irrigation is worked out by using the following formula.

$$\text{Formula} = \frac{\text{Gross area irrigated}}{\text{Net Area Irrigated}} \times 100$$

SOURCES OF IRRIGATION

Irrigation plays a vital role in the agricultural regeneration of a district. As such, great importance has been laid on accelerating the extension of water in the dry season within the shortest possible time. The sources of irrigation are greatly affected by the geological, physical and climatologically conditions. According to the availability of surface of ground water, types of relief, soils and moisture requirements of crops, the sources of irrigation have been categorized.

The important irrigation sources available in the study area, fall- into the four traditional types, namely canals, wells, tanks and tube well irrigation. Out of the 56,362 hectares of the net irrigated area canal irrigation alone shared 14,298 hectares (25.37%), 5,804 hectares (10.30%) were under tank irrigation, 17,799 hectares (31.58%) under well irrigation and 18,461 hectares (32.75%) under tube well irrigation during the year 2001-02. Whereas in the year 2020-21 out of 72,270 hectares of net irrigated area, 21,040 hectares (29.11%), were under canal irrigation, 5,290 hectares (7.32%) under tank irrigation, 1,870 hectares (2.59%) under well irrigation and 44,070 hectares (60.98%) by tube well irrigation.

It is clear from the table that the share of canal irrigation has increased from 25.0 per cent to 29.0 per cent, and tube well irrigation from 33.0 per cent to 61.0 per cent. Whereas well and tank irrigation decreased from 32.0 per cent to 3.0 per cent and 10.0 percent to 7.0 per cent respectively during the period of study

S.N	Taluks	Years	AREA IRRIGATED BY DIFFERENCT SOURCES (2001-02 and 2020-21)				
			Canal	Tank	Well	Tube Well	Net Irrigated Area
1	Chamarajanagara	2001-02	21.44	20.14	1.79	56.63	32.69
		2020-21	12.04	1.15	5.03	81.78	21.72
		Change	**-9.40**	**-18.99**	**3.24**	**25.15**	**-10.96**
2	Gundlupete	2001-02	0.00	1.50	25.10	73.40	15.36
		2020-21	0.00	0.00	4.93	95.07	18.79
		Change	**0.00**	**-1.50**	**-20.16**	**21.66**	**3.43**
3	Kollegala	2001-02	30.89	3.34	61.05	4.72	36.62
		2020-21	40.09	14.41	1.19	44.31	47.81
		Change	**9.20**	**11.07**	**-59.86**	**39.59**	**11.19**
4	Yalanduru	2001-02	45.98	14.74	31.20	8.08	15.33
		2020-21	62.80	1.54	0.00	35.66	11.68
		Change	**16.82**	**-13.20**	**-31.20**	**27.59**	**-3.66**
District Total		2001-02	25.37	10.30	31.58	32.75	100.00
		2020-21	29.11	7.32	2.59	60.98	100.00
		Change	**3.74**	**-2.98**	**-28.99**	**28.23**	**0.00**

S.N	Taluks	Years	AREA IRRIGATED BY DIFFERENCT SOURCES (2001-02 and 2020-21)				
			Canal	Tank	Well	Tube Well	Net Irrigated Area
1	Chamarajanagara	2001-02	3950	3710	330	10433	18423
		2020-21	1890	180	790	12840	15700
		Change	**-2060**	**-3530**	**460**	**2407**	**-2723**
2	Gundlupete	2001-02	0	130	2173	6356	8659
		2020-21	0	0	670	12910	13580
		Change	**0**	**-130**	**-1503**	**6554**	**4921**
3	Kollegala	2001-02	6374	690	12599	974	20637
		2020-21	13850	4980	410	15310	34550
		Change	**7476**	**4290**	**-12189**	**14336**	**13913**
4	Yalanduru	2001-02	3974	1274	2697	698	8643
		2020-21	5300	130	0	3010	8440
		Change	**1326**	**-1144**	**-2697**	**2312**	**-203**
District Total		2001-02	14298	5804	17799	18461	56362
		2020-21	21040	5290	1870	44070	72270
		Change	**6742**	**-514**	**-15929**	**25609**	**15908**

CANAL IRRIGATION

There are no major rivers flowing in the district, however Cauvery the perennial river flows along the border of Kollegala taluk of Chamarajanagar district with its tributaries like Suvarnavathy and Chikkahole. In canal irrigation water is utilized by gravity flow. It requires almost plane topography with lesser degree of slopes. Canal irrigation is a way to water crops by digging channels, which draw their water supplies from rivers. These artificial waterways divert the river water into multiple ditches that provide irrigation to the crops. Attempts should be made to use available surface water to the maximum possible extent.

Table explains the taluk wise percentage of area under irrigation in the district. It reveals the fact that 14,298 (25.37%) hectares of area was under canal irrigation in the year 2001-02, and it rose to 21,040 (29.11%) hectares in 2020-21. During the study period, the net increase of area under irrigation by canal is 6,742 hectares (3.74%). The table shows that positive canal irrigation area is found in Yalanduru and Kollegala taluks. The negative canal irrigation is found in Chamarajanagar taluk and no canal irrigation in Gundlupete taluk. The increase of canal irrigation was observed in two taluks i.e. Kollegala 7,476 hectares (9.20%) and Yalanduru 1,326 hectares (16.82%). It is because of extension of canal irrigation by the Cauvery and Suvarnavathy rivers. The decrease in canal irrigation was observed in Chamarajanagar -2,060 hectares (-9.40%) taluk because of the decrease in the amount of water in Suvarnavathy river.

TANK IRRIGATION

Tank irrigation is defined as an artificial means applied for improving the cultivation in India. Tank is a reservoir of any specific size. Tanks are an integral part of the ancient tradition of yielding and storing the water from rainfall and from streams or rivers. Water is stored for later use mainly in agriculture.

In the year 2001-02, tank irrigation was 5,804 hectares (10.30%) and this reduced to 5,290 hectares (7.32%) by the year 2020-21. During the study period, the net decrease of area under irrigation by tank is -514 hectares (-2.98%), due to the silting up of tank development of irrigation by tube wells. In the tank irrigation, the overall taluks in Chamarajanagar districts namely Chamarajanagar -3,530 hectares (-18.99%), Gundlupete -130 hectares (-1.50%) and Yalanduru -1,144 hectares (-13.20%) shows a declining trend whereas Kollegala Taluk shows an increase of area in tank irrigation i.e. 4,290 hectares (11.07%)

As compared, in Gundlupete taluk during 2001-02, the area of tank irrigation was 130 hectares (1.50%) but in 2020-21, there was no tank irrigation found in the taluk. In Chamarajanagar and Yalanduru taluks the tank irrigation is seen to be more declining in 2020-21 compared to 2001-02.

WELL IRRIGATION

Well Irrigation is a principal method of irrigation used in India. Underground water is tapped for drinking purposes and at the same time it is also tapped for irrigating the cultivated land. The distribution of wells is different according to the taluks. This may be attributed either to geological quality of the land, that is quality of underground water or absence of substitute means of irrigation. Well Irrigation is the negligible source of irrigation in the district, in 2001-02 the area under well irrigation was 17,799 hectares (31.58%), whereas in the year 2020-21, it went down to 1,870 hectares (2.59%) .This reduced to -15,929 hectares (-28.99%), because insufficient of rain fall, the ground water table is goes on decreasing. Among the four taluks, only Chamarajanagar taluk have shown an increasing trend of 460 hectares (3.24%) whereas in the other remaining taluks i.e. Gundlupete, Kollegala and Yalanduru there was a decrease of well irrigation of -1,503 hectares (-20.16%), -12,189 hectares (-59.86%) and -2,697 hectares (-31.20%) respectively. In Yalanduru taluk during 2001-02, the area of well irrigation was 2,697 hectares (31.20%) but in 2020-21, there was no well irrigation found in that taluk.

TUBE WELL IRRIGATION

A tube well is a water well consisting of a long tube bored into the ground and sunk to the depth of the water table. Tube well irrigation is rapidly developed irrigation system, amongst all the irrigation sources in the district. It plays an important role in agricultural development in the study area. Out of the total irrigated area in Chamarajanagar district during 2001-02 the area under tube well irrigation shared 32.75% (18,461 hectares) and further highly increased by 60.98% (44,070 hectares) during 2020-21. In the tube well irrigation, it is seen that the there is a rise in the overall area of the district i.e. 25,609 hectares (28.23%).

The taluks wise share of area under tube well irrigation during 2001-02 was as follows; 10,433 hectares (56.63%) in Chamarajanagar, 6,356 hectares (73.40%) in Gundlupete, 974 hectares (4.72%) in Kollegala and 698 hectares (8.08%) in Yalanduru taluks land under tube well irrigation in the study area. In the year 2020-21 it was 12,840 hectares (81.78%) in Chamarajanagar, 12,910 hectares (95.07%) in Gundlupete, 15,310 hectares (44.31%) in Kollegala and 3,010 hectares (35.66%) in Yalanduru taluks respectively during both the study period. In all the taluks, it was found that Kollegala taluk has more area covered under tube well irrigation compared 2001-02 i.e. 14336 hectares (39.59%). In the remaining taluks, there was also an increasing trend of tube well irrigation i.e. Chamarajanagar 2,407 hectares (25.15%), Gundlupete 6,554 hectares (21.66%) and Yalanduru 2,312 hectares (27.59%).

INTENSITY OF IRRIGATION

Irrigation intensity is the chief measurement for measuring agricultural pattern and level of development in the district. It is so because in the present day modernized agricultural pattern, the increasing use of modern agricultural inputs and marking the use of various chemicals for soil conservation more effective, require more water for irrigation. The less use of agricultural inputs results only in a low level of production. Thus, we see that irrigation affects the level of agricultural production.

Intensity of Irrigation: Method and Formulae

The investigation is totally based on relevant secondary data obtained from the District stastical officer, district irrigation department and district socio-economic review. The analysis investigates ranking of source wise irrigation and the average taluks wise intensity of irrigation in Chamarajanagar district, for the year 2001-02 and 2020-21. Intensity of irrigation means the percentage ratio between the irrigated area and the total agriculture area. The following formulae have been used in order to measure irrigation intensity.

$$\text{Intensity of Irrigation} = \frac{\text{Gross area irrigated}}{\text{Net areas irrigated}} \times 100$$

The above formula is the find the percentage ratio between the irrigated are and the total agricultural land area. This helps in determining the percentage of the agricultural area which still requires the development of the irrigation facilities. It also helps us in finding whether; the available irrigation facilities are sufficient or deficient to meet the irrigation requirements or the agricultural area available in the study region.

INTENSITY OF IRRIGATION:

RESULTS

If the intensity of irrigation is 100 then it proves that the entire agriculture area it irrigated and if it is less than 100 it indicated lower intensity of irrigation. Table shows that the regional variations in the intensity of irrigation are great and at once impressive.

Low Intensity of irrigation (< 105):-Yalanduru taluk was categorized as low intensity area in irrigation in two periods (2001-02 and 2020-21). Chamarajanagar Taluk was the low area of intensity in irrigation during 2020-21.

Medium Intensity of irrigation (106 - 110):-Kollegala taluk was categorized as medium intensity of irrigation in two periods i.e. 2001-02 and 2020-21.

High Intensity of irrigation (> 111):- Gundlupete taluk was categorized as high intensity of irrigation during both decades i.e. 2001-02 and 2020-21. Chamarajanagar taluk during 2001-02, showed high intensity of irrigation but in 2020-21, the intensity of irrigation came down to low, because of the decreasing of net irrigation area.

Taluk Wise Intensity of Irrigation for 2001-02 and 2020-21 in Chamarajanagar District

INTENSITY OF IRRIGATION - 2001-02 and 2020-21

SI. NO	Taluk	2001-02	2020-21	Change (+) or (-)	Increase (or) Decrease
1	Chamarajanagar	114.11	101.96	-12.15	Decrease
2	Gundlupete	112.87	111.83	-1.03	Decrease
3	Kollegala	105.05	108.95	3.90	Increase
4	Yalanduru	100.12	101.36	1.25	Increase
District Total		108.46	107.09	-1.37	Decrease
Mean		108.12	106.24		
Standard Deviation		5.75	4.51		

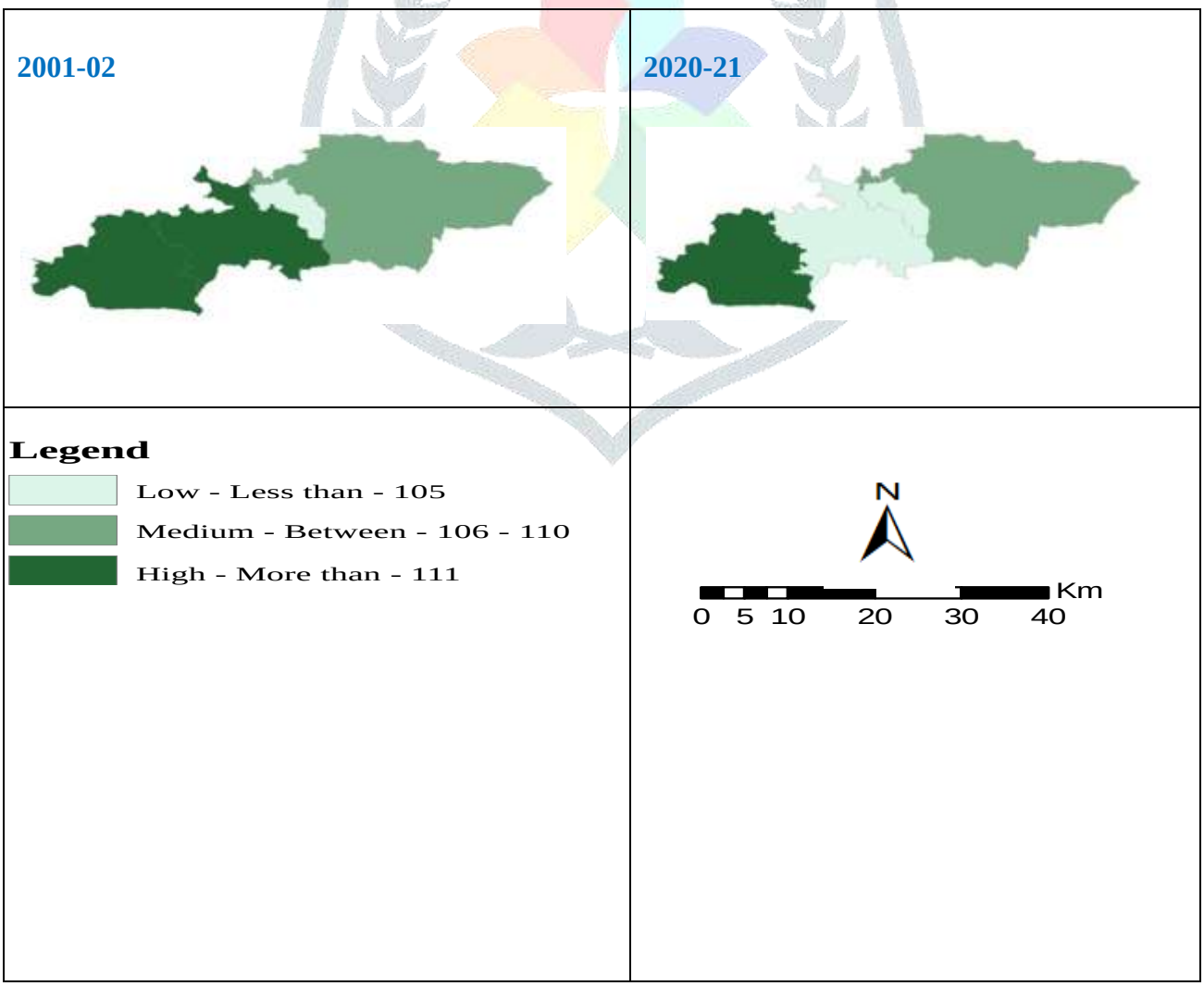
Result on Intensity of Irrigation

INTENSITY OF IRRIGATION

Intensity of Regions	Range of Intensity	2001-02		2020-21	
		Number of Taluks	Name of the Taluks	Number of Taluks	Name of the Taluks
Low	Less than - 105	1	YAL	2	YAL, CHA
Medium	Between - 106 - 110	1	KOL	1	KOL
High	More than - 111	2	CHA, GUN	1	GUN

CHA = Chamarajanagar, GUN = Gundlupete, KOL = Kollegala, YAL = Yalanduru

INTENSITY OF IRRIGATION



CHANGE IN INTENSITY OF IRRIGATION:

RESULTS

Increased Intensity of Irrigation:- Over a period of time there are minimal changes in the intensity of irrigation. As per our observation during 2001-02 and 2020-21 Kollegala and Yalanduru taluks has increased in the intensity of irrigation above 3.90%.

Decreased Intensity of Irrigation:-Chamarajanagar (-12.15%) and Gundlupete (-1.03%) taluks have decreased intensity of irrigation during 2001-02 and 2020-21**.**

CHANGE IN INTENSITY OF IRRIGATION

2001-02 to 2020-21

CONCLUSION

Water plays a significant role in the development of agriculture. It is a medium for transport of nutrients and photosynthesis. Therefore, land owners and cultivators will have to select appropriate adaptable crop to the existing physical environment. Since agriculture is directly related to its physical environment variation, in it are bound to affect agriculture land use. Thus, agriculture is not only an economic activity, but also a farm of applied ecology. Due to the irrigation there will be change in the agriculture, not only in the crop production, but also economic structure of the society. In this respect the study region is not exceptional one. Now a day, farmers have shifted from traditional crop pattern to the commercial farming pattern by irrigating the crops. There will be economic improvement in village or taluks provided whole or part of the agricultural area of the study region is irrigated by pace wise development. Conservation and management of soil are also important factors for a stable and sustained agricultural growth. Because of inadequate rainfall it is essential to make use of the underground and surface water resources for agricultural growth. We must also test the water whether it is saline-free or not, if it is saline-free then only we can make use of such water for agriculture development. Because of the fast growth of population and livestock, we have to raise the yields per unit area and we cannot bring new land for agriculture. We must adopt new methods and technology for the modern agricultural development to meet the food requirement of growing population whatever water is available for irrigation purposes we must use it properly without wasting any type of water resources.

REFERENCE

Ali Mohammad (1978), 'Studies in Agricultural Geography', Rajesh Publication New Delhi-1978. pp-1-6 .
Agarwal A.N. (1951): Indian agriculture and its problems: publish shed by Ranjit printers and publishers.
Baker, 1923. Barlowe, R, (1963), 'Land Resources Economics' Prentice Hall, Englewood Cliffs p.1.
Bhargava Gopal (1992): Environmental Challenges and Ecological disaster.
Bhat L. S (1976): Macro level planning A case study of karnal area, K.B. Publ. new Delhi.
Chatterjee (1952), 'Land utilization survey of Howrah Districts', Geographical Review of India. Vol. 14, No, 13.
.**Gupta S. K. (2000):** water resources management, natural resources and management for agricultural production in India, New Delhi.
Kumar J. (1986), 'Land use Analysis: A case study of Nalanda District', Bihar Inter-India Publications New Delhi-p.
Gurjar R.K ., Jat, B.C. (2008): Geography of Water Resources Rawat Publication, jaipur (India)
Lenka D: Irrigation and Drainage, Kalyani Publication, Ludhiana.
Mahindra Dev S. (2006): Managing Water Resources, Oxford University press, New Delhi.
Nageshwara Rao K. and Vaidyanathan R. (1981), 'Land use capability studies from Arial Photo Interpretation -A case study from Krishna Delha', India Geographical Review of India. Vol.43, No.3 pp226-236.
Patil, A. A. (2002): 'Changes in Agricultural productivity in Upper Bhima and Upper Krishna Basin in Maharashtra- A Geographical Analysis' Unpublished Ph.D. Thesis submitted to Shivaji University, Kolhapur p.94-102.
Shaffi M. (1961), 'Land utilization in western U. P.' published by Aligarh Muslim University.
Singh J., (1974), 'An Agricultural Atlas of Indian-A Geographical Analysis', Vishal Publications, Kurukshetra.