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IRRIGATION AND CROPPING PATTERN

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In the earlier chapter an attempt has been made to investigate the spatio temporal pattern of irrigation facilities during the period under review. This chapter deals with an analysis of general landuse, cropping pattern and irrigated cropping pattern and changes therein. An attempt has also been made to findout the intensity of cropping, leading crops of increase and decrease and overall changes therein.

3.1 THE GENERAL LANDUSE PATTERN :

Land is the basic resource of human society and landuse is the surface utilization of all developed and vacant land. It is the use made of the land by man in a series of recognised category. Landuse is an important economic activity of man, it is the function of four variables, viz. land, water, air and man (Singh, 1981). Certain proportion of it is available for cultivation which is the best base for agricultural production. Landuse changes occur to meet the variable demands of the society in its new way of life.

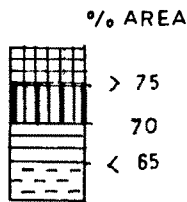
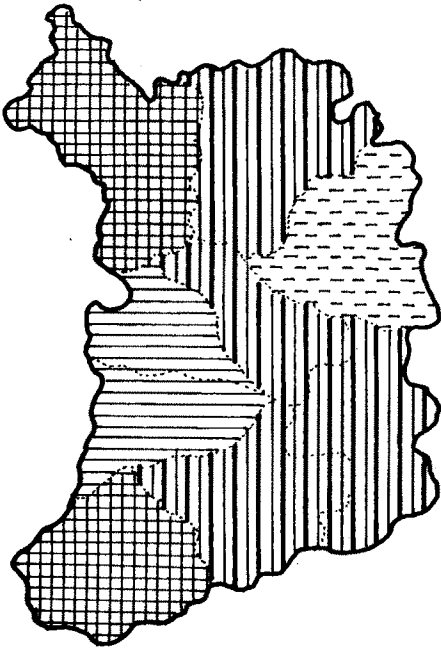
The primary use of land is for crops, forest, pasture, mining, transportation, gardening, residential, recreational, industrial, commercial, cultivable waste, barren and fallow land. The landuse study in its spatial context is essential to understand the regional zonation of the areas of optimum landuse, degraded area etc. (Shinde, et al., 1987).

The change in the landuse pattern of Karad taluka depicts the interaction among all these elements. To study these changes

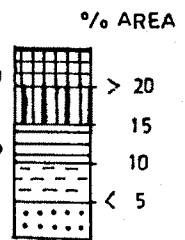
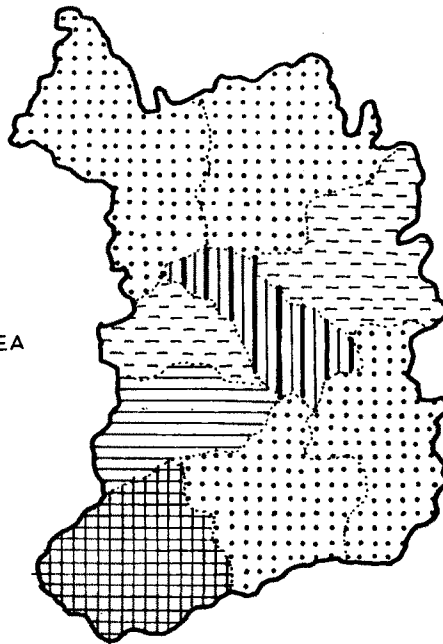
KARAD TALUKA

◎ GENERAL LANDUSE PATTERN◎
(1984-87 AVERAGE)

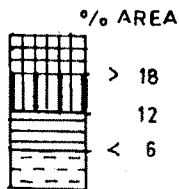
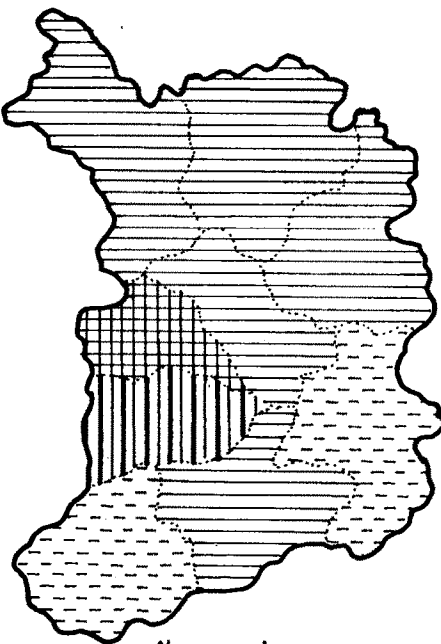
(A) NET AREA SOWN



(B) OTHER UNCULTIVATED AREA



(C) FOREST



(D) AREA NOT AVAILABLE FOR CULTIVATION

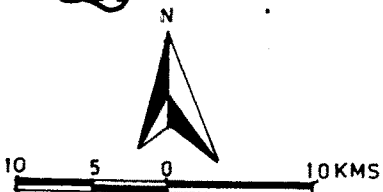
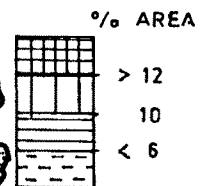


FIG. 3.1

the total area has been studied under two heads viz. i) Non-cultivable and ii) Cultivable land (Table 3.1).

i) Non cultivable land :

The non cultivable land comprises forest land and area not available for cultivation. Forest occupies about 11.66% of total geographical area in 1984-87 which was about 12.90% in 1961-64. The forest area is in western part of the study area which coincides with the rainfall distribution and topography. Area not available for cultivation is about 9.02% (9,491 hect.) of the total study region. It includes land which cannot be brought under cultivation unless at a very heavy cost. The land put to non agricultural use is 5.27% (5,540 hect.) and barren and uncultivated land is 3.76% (3,951 hect.) of the total area of the Karad taluka. Fig.3.1-D shows the regional distribution of area not available for cultivation. Its proportion is high in the south-eastern, central and north-western part of the study area.

ii) Cultivable land :

The cultivable land which includes the net area sown and fallow land shares about 72.78 percent of the geographical area. In the present study the same meaning is taken for analysing the impact of irrigation. The north western and south western circles have high percentage (over 75%). Generally, the high proportion of net area sown is due to level land. The north eastern and south central circles have moderate (70 to 75%)

TABLE 3.1 : Landuse pattern of Karad taluka.

Sr. No.	Landuse Category	Area in hect. 1961-64	Percentage	Area in hect. 1984-87	Percentage	Changes
I - NON CULTIVABLE LAND						
1.	Forest	13,566	12.90	12,261	11.66	- 1.23
2	Area not available for cultivation	10,438	9.93	9,491	9.02	- 0.91
	a) Land put to non-agricultural use	84	0.08	5,540	5.27	+ 5.19
	b) Barren and uncultivable land	10,354	9.85	3,951	3.76	- 6.09
II - CULTIVABLE LAND						
3	Net area sown	74,860	71.17	76,550	72.78	+ 1.61
4	Fallow land	1,920	1.83	2,301	2.19	+ 0.36
	a) Current fallow	1,018	0.97	1,140	1.08	+ 0.11
	b) Other fallow	902	0.86	1,161	1.10	+ 0.24
5	Other uncultivated land	4,390	4.17	4,571	4.35	+ 0.18
	a) Cultivable waste land	1,661	1.57	1,865	1.77	+ 0.20
	b) Permanent pasture	2,729	2.59	2,706	2.57	- 0.02
<hr/>						
Total Geographical Area		105,174	100.00	105,174	100.00	± 7.32

SOURCE : i) Socio-economic review and district statistical abstracts of Satara Dist.
ii) Compiled by the Author.

area under this category. The low (65 to 70%) intensity of net area sown lies in Supne and Kole circles. Moreover very low (below 65%) of net area sown is observed in Koparde circle (Fig.3.1-A). Here the land is highly undulated resulting in a very low percentage of net sown area.

The land which remains vacant for 6 to 10 crop seasons comes under fallow class. The total fallow land accounts to 2.19% (2301 hect.). Out of this 1.08% (1140 hect.) is current fallow and 1.10% (1161 hect.) is other fallow land (Table 3.1).

The other uncultivable land consists of cultivable waste and permanent pasture. Total area under this landuse category is 4.35% (4571 hect.). Out of this 1.77% (1865 hect.) is uncultivable waste land and 2.57% (2706 hect.) is permanent pasture. The spatial distribution of uncultivable land exhibited in Fig.3.1-B is uneven, it varies from under 5 to over 20 percent. The southwestern circles have very high percentage (over 20%). Moreover high (15 to 20%) of this category is noted in Karad taluka. The moderate (10.15%) is observed in Kole circle. The low (5 to 10%) and very low (below 5%) intensity of uncultivable land is noted in Koparde, Umbraj, Masur, Kale and Shenoli circles.

Some changes in general landuse have been observed during the period under investigation. The area under forest has decreased marginally (1.23%). The negative change is also observed in the case of the area not available for cultivation (0.91%), whereas other uncultivable land records positive change by (0.18%).

The region has noted increase by 0.36 percent in fallow land during the period 1961-64 to 1984-87. There has been increase in net sown area (1.61%) due to increase in irrigation facilities in the study area.

3.2 CROPPING PATTERN AND CHANGES :

Cropping pattern is the use of land for the cultivation of crops, in other words it is the proportion of area under different crops at a point of time. According to agricultural economists a cropping pattern means the proportion of area under various crops at a point of time (Kanwar, 1972).

Cropping pattern is not the same all over the taluka under study. Variation in cropping patterns are related to physical and non-physical conditions. Moreover, it is governed by the farmers cropping choices. These choices are directly governed by specific purposes for which the irrigated crops are to be grown and these are conditioned by geographical factors to be grown and these are conditioned by geographical factors and modified by the emergent social and economic circumstances (Mamoria, 1979).

A) Overall Cropping Pattern :

In the area under study, various crops are grown in kharif and rabi season. The rice, ragi, maize, jowar, pulses are kharif crops; whereas, wheat, gram sugarcane and oil seeds

are rabi crops. However, food crops constitute a major portion of agricultural land. Nearly, 64.82% (58,388 hect.) of the gross cropped area is under food crop. Among food crops, food-grain register 46.10% (41,537 hect.) of the gross cropped area. In foodgrains cereal covers 43.14% (38,862 hect.) and pulses cover only 2.98% (2675 hect.). The main foodgrains grown are jowar (27.55%), rice (9.72%), pulses (2.97%), wheat (2.27%), bajara (1.02%), and maize (0.87%).

In the pulses, gram covers (0.75%), tur occupy (0.50%) of the gross cropped area. Among the non food crops groundnut cover 16.13% (14,531.79 hect.), sugarcane shares about 14.59 (13,142 hect.). Fruits and vegetables cover 1.90% and chillies share 0.33% area (Table 3.2).

B) Irrigated Cropping Pattern :

Partial failure of rain or delayed arrival of the monsoon cause damage to crops. It is also concentrated in a brief period of 4 to 5 months. So efforts are made to supply the irrigation water to most of the crops of the region. Irrigation of second crop and cash crop is a common practice in the taluka. Sugarcane, maize and wheat are the principal irrigated crops. The other crops like rice, jowar and groundnut are also partially irrigated. The major irrigated crops, their spatial distribution and changes therein are as follows.

TABLE 3.2 : Karad taluka - Area under different crops.

Sr. No.	Crops	1961-64		1984-87		Changes 1961-64 to 1984-87
		Area in hect.	% to * G.C.A.	Area in hect.	% to * G.C.A.	
1	Rice	6,325	7.99	8,754	9.72	+ 1.73
2	Wheat	2,498	3.16	2,048	2.27	- 0.89
3	Jowar	22,623	28.60	24,816	27.55	- 1.05
4	Bajara	1,660	2.10	923	1.02	- 1.08
5	Maize	938	1.19	790	0.87	- 0.32
6	Other cereals	1,291	1.63	1,531	1.70	+ 0.07
	<u>Total Cereals</u>	35,358	44.68	38,862	43.14	- 1.54
7	Gram	1,229	1.55	681	0.75	- 0.80
8	Tur	897	1.13	457	0.50	- 0.63
9	Other pulses	2,745	3.47	1,537	1.71	- 1.76
	<u>Total Pulses</u>	4,871	6.16	2,675	2.97	- 3.19
	<u>TOTAL FOODGRAINS</u>	40,229	50.87	41,537	46.10	- 4.77
10	Sugarcane	6,758	3.55	13,142	14.59	+ 6.04
11	Fruits and Vegetables	1,355	1.71	1,709	1.90	+ 0.19
	<u>TOTAL FOOD CROPS</u>	48,342	61.13	58,388	64.82	+ 3.68
12	Groundnut	18,512	23.41	14,532	16.13	- 7.27
	<u>Other non food crop</u>	12,224	15.45	17,163	19.05	- 3.60
	Total non food crop	30,736	38.87	31,695	35.18	- 3.69
	Gross cropped Area	79,078	100.00	90,083	100.00	+13.92

SOURCE : i) Record of Circle Inspector (Taluka Namuna No.20).
ii) Compiled by the Author.

* Gross Cropped Area

TABLE 3.3 : Karad taluka irrigated area under different crops.

Sr. No.	Crops	1961-64		1984-87		Changes 1961-64 to 1984-87
		Area in hect.	% to G.C.A.	Area in hect.	% to G.C.A.	
1	Rice	5,733	1.71	9,837	16.35	+ 4.64
2	Wheat	1,916	3.92	1,775	2.95	- 0.97
3	Jowar	15,569	31.82	18,732	31.13	- 0.69
4	Bajara	1,301	2.66	245	0.40	- 2.26
5	Maize	454	0.93	778	1.29	+ 0.36
6	Other cereals	770	1.57	629	1.04	- 0.53
7	Total cereals	25,743	52.61	31,996	53.17	+ 0.56
8	Gram	684	1.40	270	0.45	- 0.95
9	Tur	390	0.79	227	0.37	- 0.42
10	Other pulses	1,805	3.68	1,079	1.79	- 1.89
11	Total pulses	2,829	5.87	1,576	2.61	- 3.26
12	Total foodgrains	28,622	58.48	33,572	55.78	- 2.70
13	Sugarcane	8,251	6.86	17,176	28.54	+ 11.68
14	Chillies	577	1.18	823	1.37	+ 0.19
15	Fruits and Vegetables	348	1.74	1,181	1.96	+ 0.22
16	Total food crops	38,298	78.26	52,752	87.65	+ 9.39
17	Groundnut	10,319	21.10	7,215	11.99	- 9.11
18	Other non-food crop	314	0.62	215	0.36	- 0.28
19	Total non food crop	10,633	21.74	7,430	12.35	- 9.39
20	Gross Irrigated Area	48,931	100.00	60,182	100.00	± 17.09

SOURCE : 1) Record of Circle Inspector (Taluka Namuna No.20).
ii) Compiled by the Author.

1) Jowar :

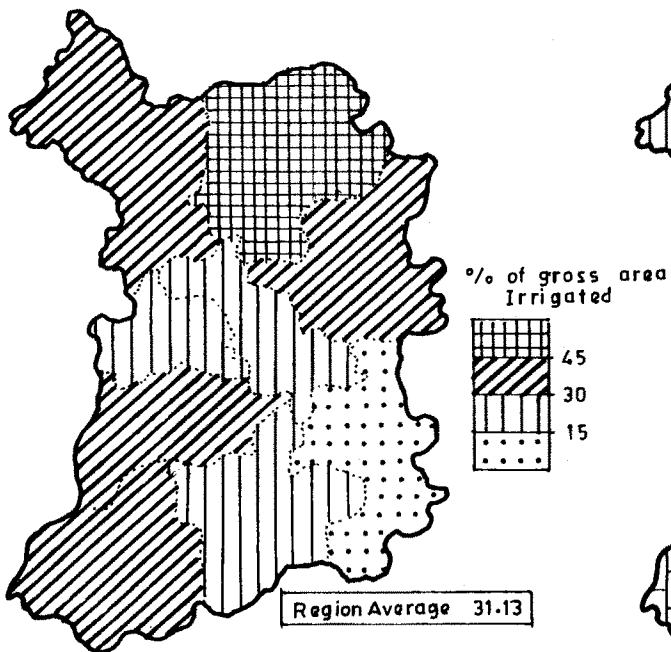
Jowar is a staple food which is grown both as kharif and rabi crop. It is largely grown as a rainfed crop but to some extent it is also grown under irrigation. Jowar shares about 31.13% of gross irrigated area. The black clay loam soil of Krishna Valley is considered to be the most ideal for jowar cultivation. Very high (above 45%) and high (30 to 45%) percentage of the total irrigated area is under jowar confined to the Masur, Koparde, Umbraj, Kole and Undale circles of Karad taluka (Fig.3.2-B). The moderate proportion of irrigated cropping (15 to 30%) is observed in Karad, Supne and Kale circles. Elsewhere the irrigated hectarage under jowar is very insignificant.

The irrigated hectarage under jowar has increased from 15,569 hectares to (31.82%) 18,732 hectares (31.13%) during the last 27 years. In jowar cultivation, no significant change is observed in the region as a whole. However, circle level analysis reveals that positive change (12.69%) has observed in Masur, whereas moderate positive change (upto 5.71%) is noted in Koparde circle. The low positive change (below 2%) is in Umbraj circle (Fig.3.2-B).

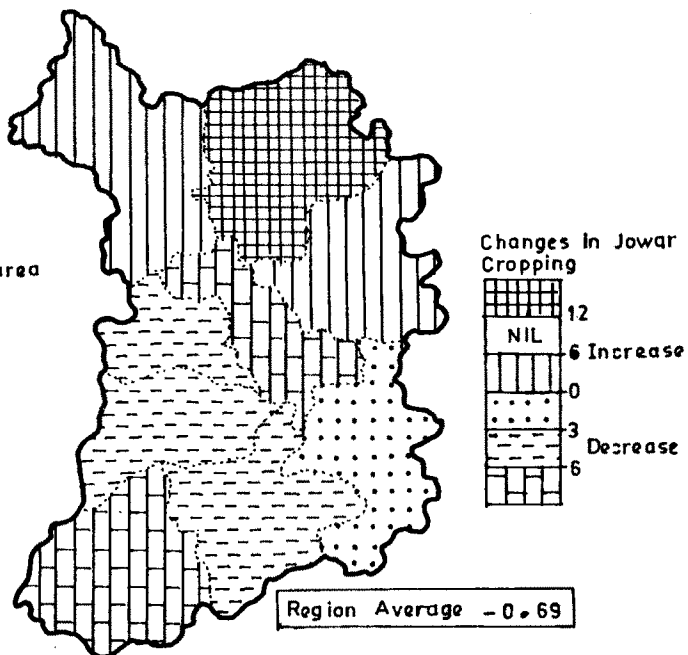
The negative change is observed in few circles like Shenoli, Supne, Kole, Kale and Undale where increased irrigated facilities are diverted for sugarcane cultivation. However, due

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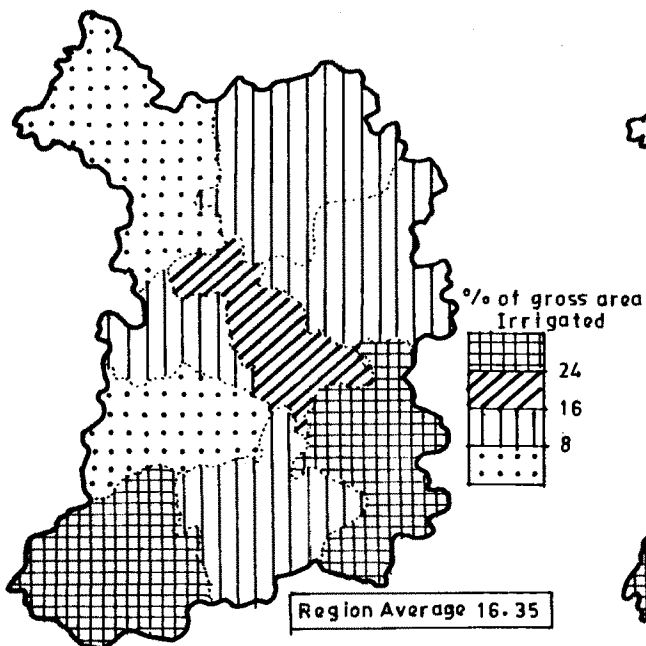
(A) JOWAR CROPPING 1984-87



(B) CHANGES IN JOWAR CROPPING 1961-64 TO 1984-87



(C) RICE CROPPING 1984-87



(D) CHANGES IN RICE CROPPING 1961-64 TO 1984-87

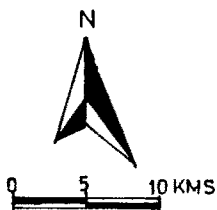
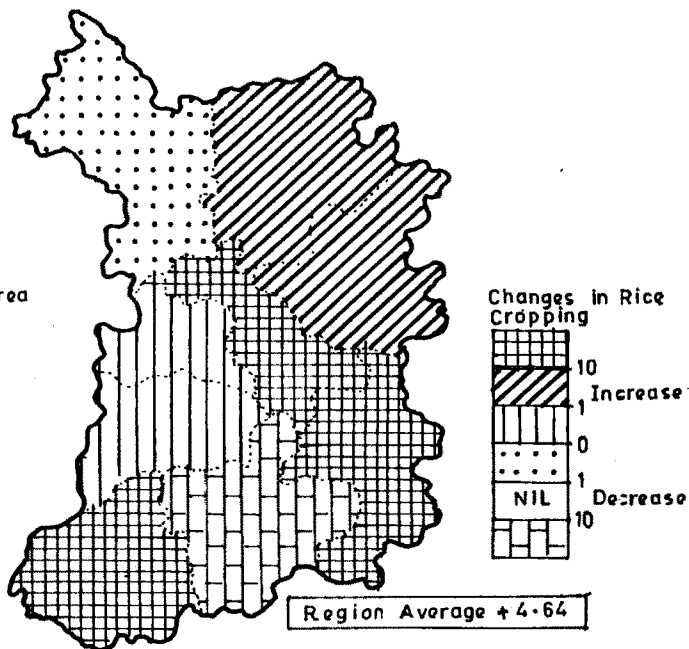


FIG. 3-2

to introduction of HYV seeds, use of pesticides along with irrigation facilities have stimulated jowar cultivation.

ii) Rice :

Among cereals rice crop is more important requiring high temperature and rainfall. Rice occupies about 9.72% of total cropped area and 16.35% of irrigated area having more variations at circle level. Shenoli and Undale circles have very high (above 24%) and Karad circle has high (16 to 24%) proportion of rice. The northern Masur and Koparde, the southern Kale and Supne have recorded moderate (8 to 16%) percent of rice whereas low share of this crop is confined to Umbraj and Kole circles (Fig.3.2-C).

Area under rice cultivation has increased from 1.71 to 16.35 percent during the last 27 years. The significant increase (above 10%) in the area under rice has been found in Karad, Shenoli and Undale circles. Whereas, the circles of Masur and Koparde have recorded moderate increase (1 to 10%) in the area under rice cultivation. The low positive change (below 1%) is noted in Supne and Kole circle. Introduction of high yielding varieties, irrigation facilities and attractive prices seem to have encouraged rice cultivation. However, the circle of Umbraj and Kale have shown declining trend by 1 and 10% respectively (Fig.3.2-D).

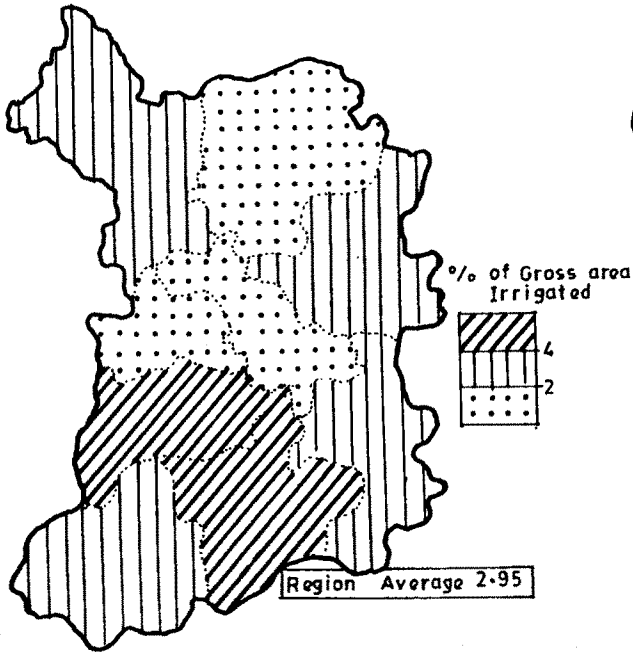
111) Wheat :

Wheat is the most significant cereal crop grown during the winter season. It requires a cool climate with moderate rainfall less than 50 cm and irrigation. As such in the study region the post monsoon rainfall is not sufficient for optimum production. Therefore, it is the irrigation which determines its areal extent. Wheat occupies about 2,048 hectares i.e. 2.27% of the total cultivated area and 2.95% of the gross irrigated area in the year 1984-87. Wheat establishes strong relationship with irrigated area in the taluka. The wheat cultivation is mainly observed in southern circles namely Kole and Kale. Relatively high irrigated area (above 4%) under wheat is observed in the above circles, while the moderate percentage 2 to 4% is noted in Koparde, Umbraj, Shenoli and Undale circles. Low percentage (below 2%) is observed in Karad, Supne and Masur circles (Fig.3.3-A).

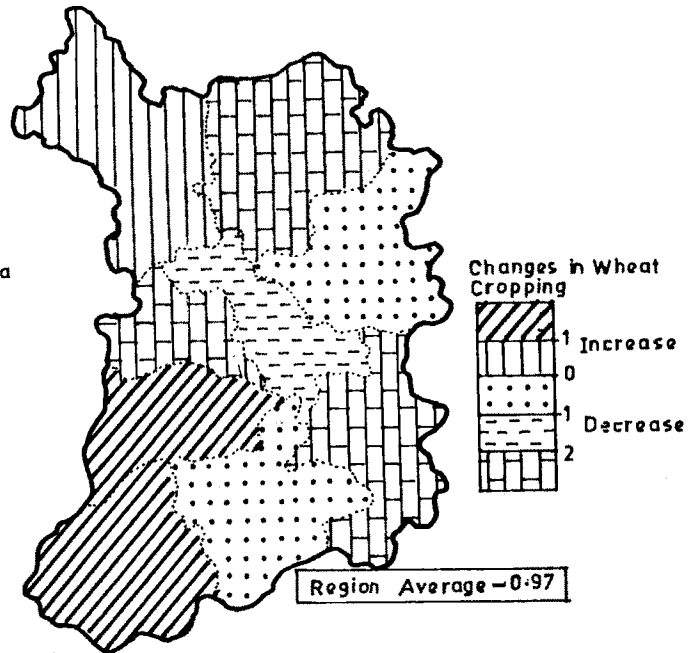
The increase in area is recorded in Kole and Undale circles by (1%) and below 1% in Umbraj circle. The hectarage under wheat has decreased from 1916 hect. (3.92%) to 1775 hect. (2.95%) during the last 27 years (Table 3.3). The decrease by 1% is noted in Koparde and Kale circle whereas Karad circle has shown decrease by (1 to 2%) and Masur, Supne and Shenoli circles have shown decrease by (2%) (Fig.3.3-B).

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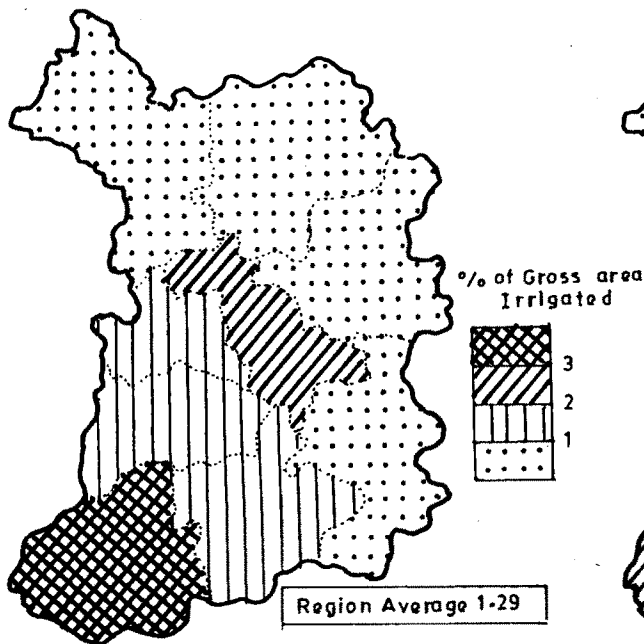
(A) WHEAT CROPPING 1984-87



(B) CHANGES IN WHEAT CROPPING 1961-64 TO 1984-87



(C) MAIZE CROPPING 1984-87



(D) CHANGES IN MAIZE CROPPING 1961-64 TO 1984-87

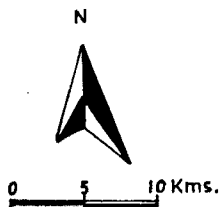
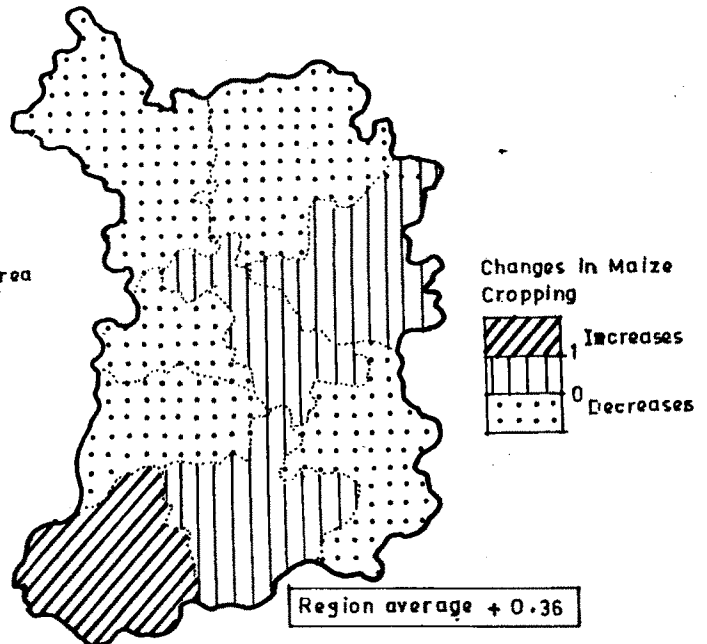


FIG. 3.3

iv) Maize :

Maize occupied about 1.29% of the gross irrigated area. The south-west and central circles have 2 to 3% of total irrigated area under maize. The high percentage of maize is observed in Undale, Karad circles whereas the moderate (1 to 2%) percent of irrigated cropping is recorded in Kale, Kole and Supne circles (Fig.3.3-C). The low (below 1%) is noted in Umbraj, Masur, Koparde and Shenoli circles of the study area.

It seems that maize has established the high relationship with irrigated area in the taluka. The irrigated hectarage under maize has increased from 454 hect. (0.93%) to 778 hect.(1.29%) during the last 27 years. It has witnessed positive change in Undale, Karad, Koparde and Kale circles (Fig.3.3-D).

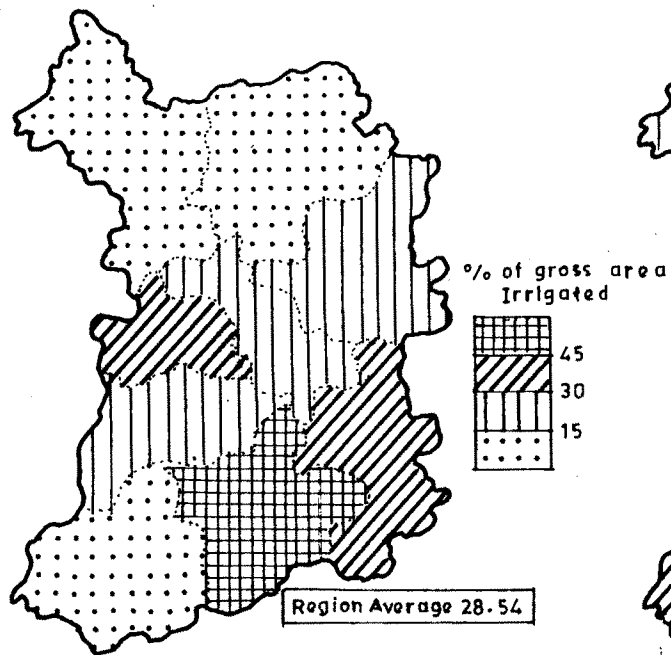
A negative change is noted in Umbraj, Masur, Supne, Kole and Shenoli circles. In general an introduction of hybrid varieties of maize and development of irrigation facilities seem to have stimulated maize cultivation in the study area.

v) Sugarcane :

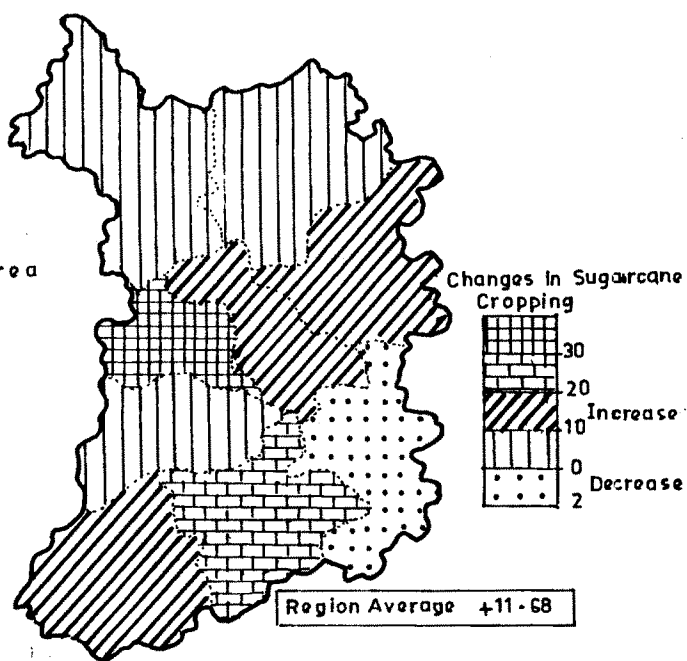
Sugarcane comprises about 17,176 hect. which come to 28.54% of gross irrigated area in the year 1984-87. Sugarcane holds a great attraction to the farmers and it has made rapid strides particularly in the irrigated tracts of the Krishna Valley in the recent years. However, its uneven spatial distribution in Karad taluka is concerned with spatial distribution of

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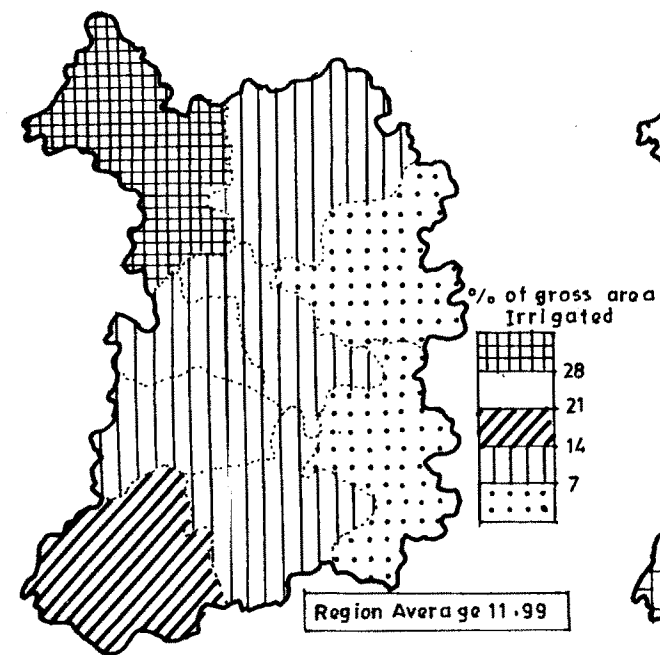
(A) SUGARCANE CROPPING 1984-87



(B) CHANGES IN SUGARCANE CROPPING 1961-64 TO 1984-87



(C) GROUND-NUT CROPPING 1984-87



(D) CHANGES IN GROUND NUT CROPPING 1961-64 TO 1984-87

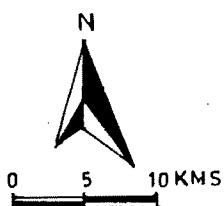
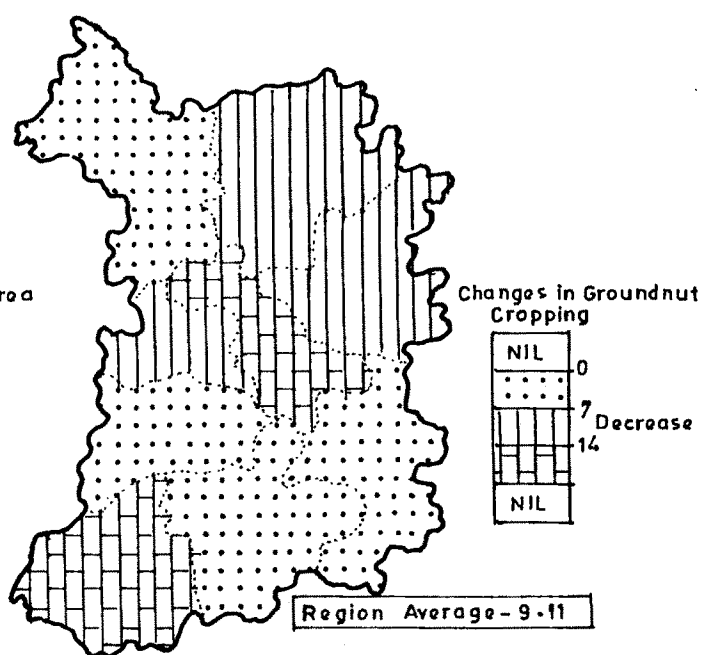


FIG. 3-4

the soil fertility and irrigation facilities. Sugarcane cultivation is largely confined to the southeastern and central circles of Karad taluka (Fig.3.4-A).

Kale, Shenoli and Supne have a relatively higher proportion (above 30%) under this crop. This is the area where irrigation facilities are comparatively more developed. The moderate (15 to 30%) percent under this crop is observed in Koparde, Kole and Karad circles. The fertile soil, better irrigation facilities and other agro-climatic conditions are responsible for concentration of cane cultivation in this part of the taluka. The Masur, Umbraj and Undale circles of the study area have noted very low (below 15%) proportion of cane cultivation which can be related to the low development of irrigation facilities (Fig.3.4-A).

The period under investigation has witnessed phenomenal growth in the area under cane, which rose from 6.86% (8251 hect.) in 1961-64 to 28.54% (17,176 hect.) in 1984-87. The significant positive change (over 30%) is observed in Supne circle, moreover high (20 to 30%) percent of positive change in Kale circle which is confined to the confluence areas of river Koyana and Krishna. It is made possible due to the increase in irrigation and the special efforts made by co-operative sugar factories. The moderate positive change (10 to 20%) is found in Koparde, Karad and Undale circles whereas insignificant (below 10%) positive change is confined to the circles of Kole, Masur and Umbraj. In general the increase in the sugarcane is proportionate to the increase in the irrigated area (Fig.3.4-B).

The negative changes (below 2%) in area under cane are noted only in Shenoli circle of Karad taluka. It may be due to change in farmer's attitude. They are preferring other cash crops like maize and chillies.

vi) Groundnut :

Groundnut is a leguminous crop and can synthesize atmospheric nitrogen and thereby increase fertility. Sandy loams, loams and well drained black soils which allow enough of root turning are suitable for groundnut cultivation. It cannot stand for severe drought and water stagnation. Groundnut is cultivated in the Kharif and Rabi season and also it can grow both as an irrigated and rainfed crop.

Relatively Karad taluka has very high percentage (over 11.99%) of area under irrigated groundnut cultivation in the Satara district. The very high (over 28%) percentage is noted in Umbraj circle and high (14 to 21%) is observed in Undale circle. The moderate (7 to 14%) of land is observed in Masur, Supne, Kole, Karad and Kale circles. The low (below 7%) is noted in Koparde and Shenoli circles (Fig.3.4-C).

During the last 27 years irrigated hectareage under groundnut has declined from 10,319 hectares to 7,215 hectares. The percentage share has decreased from 21.10 (1961-64) to 11.99% (1984-87). It is due to the fact that irrigated hectareage may be brought largely under sugarcane cultivation.

The negative change (over 14%) is noted in Undale and Karad circles. The moderate negative change (7 to 14%) is observed in Masur, Koparde and Supne circles. Whereas insignificant decrease (below 7%) is found in Umbraj, Kole, Kale and Shenoli circles. The positive change is not observed in the taluka (Fig.3.4-D).

3.3 OVERALL CHANGES IN IRRIGATED CROPPING :

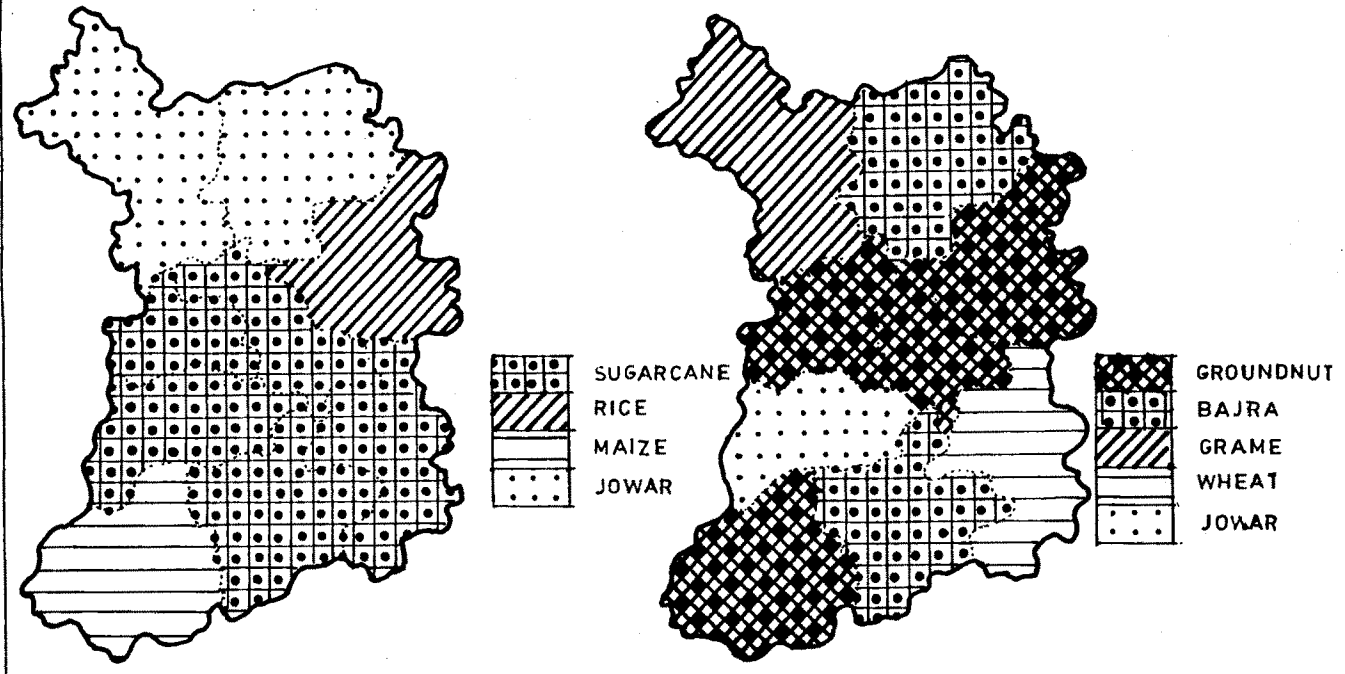
Irrigation facilities have made significant change in cropping pattern from 1961-64 to 1984-87. The change in irrigated cropping implies a change in the proportion of area under different crops at two different times. The percentage of irrigated area involved in change is compiled for each component area and mapped in Fig.3.5. The map has provided overall comparative picture of areas where the irrigated cropping pattern has been relatively dynamic.

The four outstanding areas of change are noted. The very high percentage (above 30%) of overall change is noted in the Karad, Kale and Undale circles. The crops of leading increase noted are sugarcane and maize while crops of leading decrease are groundnut and bajara. The proportion of 20 to 30% change is confined to Kole and Koparde circles. Here the expansion is in sugarcane and rice while reduction is in areas of groundnut. The moderate percentage (10 - 20%) of overall change is observed in Umbraj, Supne and Shenoli circles. Here the crops of leading

KARAD TALUKA

(A) IRRIGATED CROPS OF LEADING INCREASE
(1961-64 TO 1984-87)

(B) IRRIGATED CROPS OF LEADING DECREASE
(1961-64 TO 1984-87)



(C) OVERALL CHANGE IN IRRIGATED CROPPING PATTERN
1961-64 TO-1984-87

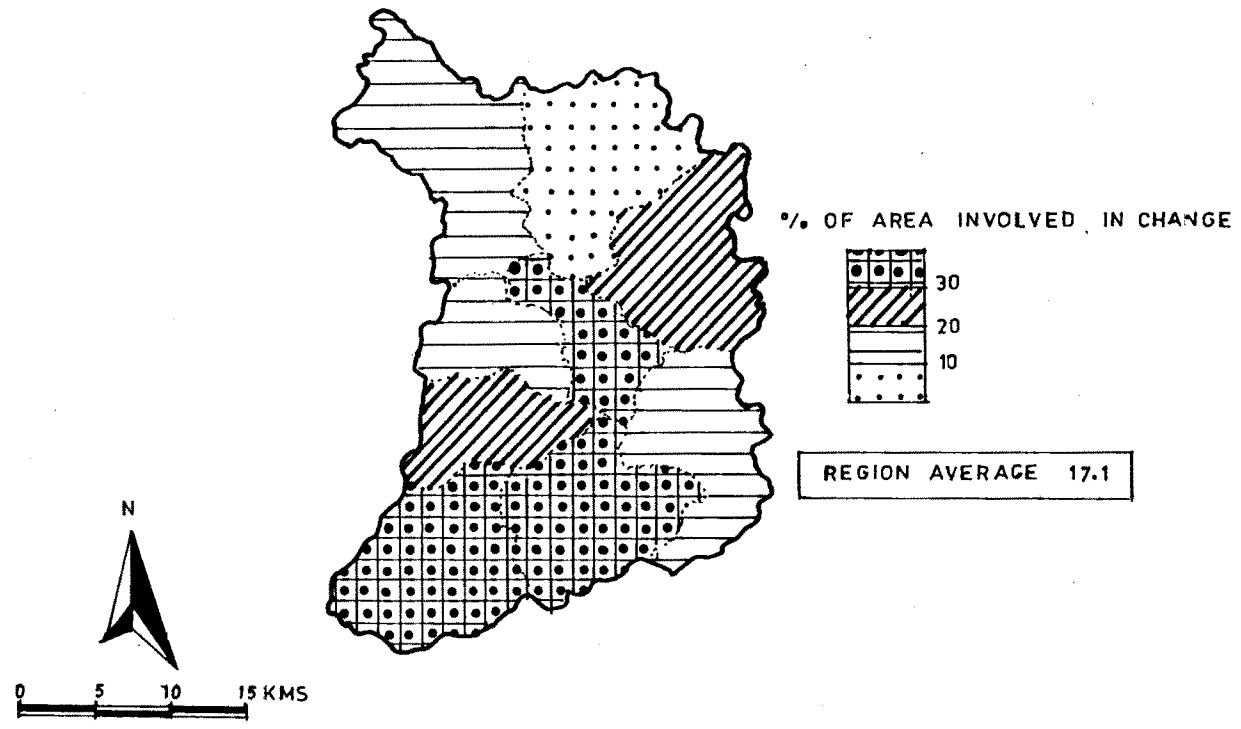


FIG 3.5

increase noted are sugarcane and jowar, while crops of leading decrease are groundnut, jowar and gram. The low percentage (below 10%) of overall change is noted in Masur circle only, where major crop of increase is jowar and decrease is bajara.

3.4 INTENSITY OF CROPPING AND CHANGES :

The intensity of cropping is not uniform in the study region. In fact, it is controlled by various factors such as climatic conditions, the soil fertility and the regular supply of water. A temporal study of cropping intensity of area expresses the actual development in the agricultural landscape. The intensity of cropping refers to that number of crops raised on a field during an agricultural year. The intensity of cropping is defined as 'the extent to which the net area sown is cropped or resown.' The gross cropped area as a percentage of the net area sown gives a measure of landuse efficiency which really means the intensity of cropping (Singh, 1981). In Karad taluka, the intensity of cropping is 115.37% generally which is more than district average of 109.44%.

1) Pattern of Cropping Intensity :

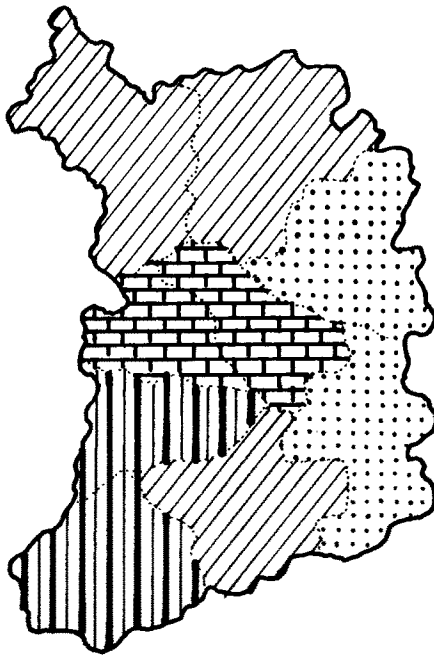
The very high (above 150%) and high (140 to 150%) percentage is observed in Shenoli, Supne, Umbraj and Kole circle. This can be well attributed to the better irrigation facilities and presence of deep black alluvial soil, but use of modern

KARAD TALUKA

INTENSITY OF CROPPING

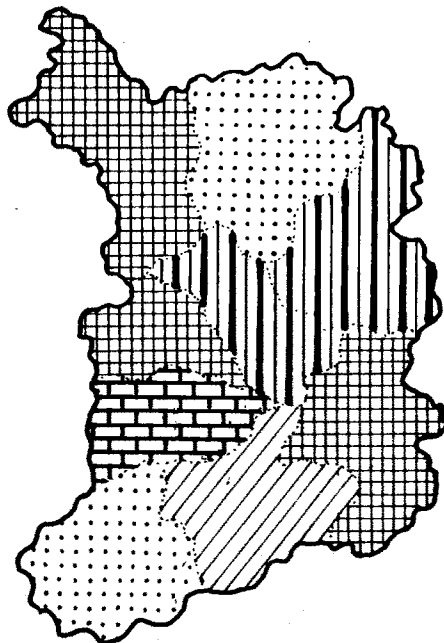
(A)

1961-1964



(B)

1984-1987



TOTAL GROSS CROPPED AREA
AS P.C. OF N. S. AREA.

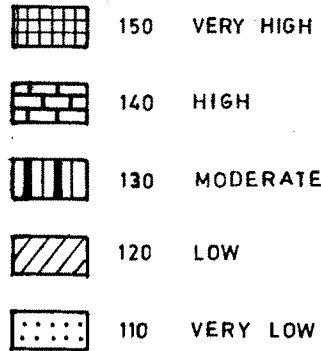


FIG. 3-6

agricultural technology is also partly responsible for very high intensity (Fig.3.6-B). The moderate intensity of cropping (120 to 130%) is confined to the central circles of Karad taluka viz. Karad, Kale and Koparde. The inadequate supply of surface water restricted on cropping intensity. The low intensity of cropping (below 110%) is noted in Undale and Masur circles. The undulating topography, shallow soils and inadequate supply of irrigation water are responsible for low intensity of cropping.

ii) Changes in Intensity :

Fig.3.6 reveals the changes in the intensity of cropping during the period under investigation. The circles of Shenoli, Umbraj and Supne have recorded increase in the intensity of cropping, whereas Undale and Masur have noted decrease in the intensity. During the period under study no change is observed in Kale circle of the taluka.

3.5 QUANTITATIVE ANALYSIS :

Irrigation have made significant changes in the cropping pattern of the region. This change in cropping pattern during the period under investigation is studied cartographically. Here an attempt is made to study the association between the two by applying simple correlation technique and scatter diagram.

The positive and very close relationship between hectarage of sugarcane, wheat and rice and net irrigated have been recorded

CORRELATION BETWEEN NET AREA IRRIGATED AND CROP HECTARAGE IN KARAD TALUKA

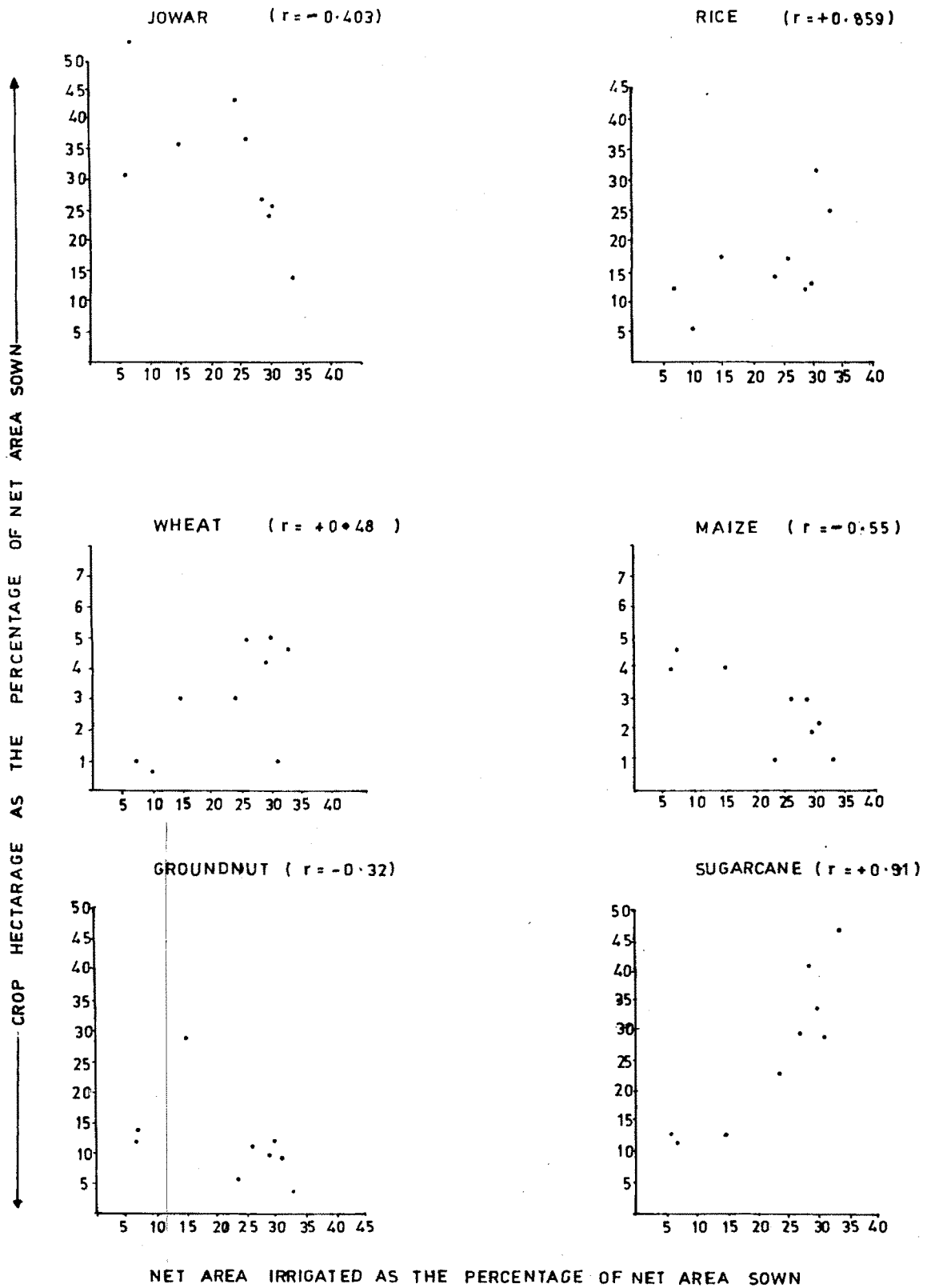


FIG. 3.7

(Fig.3.7). In the region the area under sugarcane has increased with increased irrigation facilities. There is a positive relationship ($r = + 0.91$) between two. It is to be noted that with the introduction of irrigation facilities the area under foodgrains have been diverted to sugarcane. Rice also requires assured supply of water, hence the association between rice and net irrigated area is also positive ($r = 0.85$) and the correlation value for wheat is about $r = + 0.48$. But irrigation does not appear to influence the jowar, maize and groundnut. The negative association between irrigated area and these crops are registered in the taluka.

The above analysis reveals that irrigation plays a vital role in the changing the cropping pattern but along with the irrigation, high yielding seeds, machinery and fertilizers have also played a important role in changing the crop hectarage.



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