CHAPTER – V

CROP COMBINATION REGIONS

Agriculture in itself involves complex functioning of a host of elements which together make it a complex system. The components of this system are crop raising, horticulture, animal husbandry etc Each functional element exists in association, in which each lone element plays a vital role (Rizvi, S.M H., unpublished thesis). To identify their role, their mutual relationship and the significance of each of them becomes important objective of the students of agricultural land use. Here an attempt is made to understand the association of crops Weaver (1954) pointed out three reasons for the crop association and combination studies

1 Crop combinations are essential to an adequate understanding of crop geography.

2. Crop combination is in itself an integrated reality that demands definition and distributional analysis, and

3 Crop combination regions are essential for the construction of still more complex structure of valid agricultural regions Besides, such combination regions explains the attitude and preferential and selective abilities of the farmers, they are helpful in understanding the edaphics and agro-economics of the regions thus formed.

Several types of combinatorial studies have been introduced in the studies of agricultural geography, such as crop combination, crop livestock combination, agricultural enterprise combination etc Some of the techniques used for such an analysis are

1) Mean Positive Deviation Method (Panwall, 1953)
2) Minimum Deviation Method (Weaver, 1954)
3) Standard Deviation Method (Nelson, 1955)
4) Quartile Method (Johnson, 1958)
5) Modified Minimum Deviation Method (Doi, 1959)
6) Least Squared Deviation Method (Thomas, 1963)
7) Minimum Positive Deviation Method (Refiullah, 1965)
8) Lower Limit Method (Athawle; 1966).
9) Maximum Distance Method (Ayyar, 1969)
10) Successive Quotient Method (Kostrowicki, 1972)

For the present study Weaver's Minimum Deviation Method has been used. His method is the symbolic expression of the method of variance i e

$$S\ D.\ \frac{\sum d^2}{N}$$

Where

N = the number of observations (Crops)

S D. = Standard Deviation.

D^2 = sum of the squared percentage of area under each selected crop.

Although Weaver's method has been widely used by the students and scholars of agricultural geography during the fifties and sixties, it was highly criticised and partially modified by geographers of the later period With all its weaknesses, its following attributes attracted the present researcher to select it for the present study

(1) It gives the association of crops in a set of combinations according to their rank and order.
(2) It gives the minimum deviation from the mean of the standard deviation, and allows to include crops holding the maximum percentage (above 9 or so) and also those holding a minimum percentage share in the GCA

(3) It also reflects the reality of crop association in relation to the local situations of the unit areas (villages)

(4) Like other methods it puts no inhibition on the inclusion of crops for working out the combinational structure on the basis of the percentage GCA held by them

(5) Inspite of its defects, it is "admirably suitable for smaller administrative units, or where there is considerable crop specialization""(Majid, 1980 p 67)

Method :

To understand the relative strength of each crop the crops have been arranged in the descending order of their percentage share of GCA. The crops occupying as little as one per cent of GCA share have been included in this study. Crops of some species occupying less than one per cent of GCA have been grouped together to increase their group significance. Thus, pulses like Mung, Urad gram etc. were individually quite insignificant in terms of the area occupied by them, when added up they formed a group significant enough to be included in the ranking.

Based on the number of ranked crops of each village, their theoretical values were set, S D , worked out and arranged in descending order to recognise the regions with crop combinations and mapped Thus, the regionalization of the area on the basis of crop combinations for both the points of time has been done.

PADRA

As regards the combination regions of the base year, the southern chunk of Padra Taluka is well dominated by mono-cropping which was no other than cotton at places shared by tuer and tobacco. It is some where interspersed

with three crop and five crop enclaves. These enclaves are formed by kodra, tuer, cotton, bajri, rice, vegetables, oilseeds in differing sets of three from with in these crops, where as kodra, tuer and cotton have been mostly the combination making crops

The northern part of the taluka appears highly diversified with several sets of combinatorial crops, There sets include enclaves of the smallest one crop to the largest nine crops. The mono-cropping enclaves formed by tobacco encompasses three villages Luna, Tajpura and Jaspur at the top north of the taluka. Other combinations are dispersed with no significant pattern emerging from their distribution As such this part of the taluka has ever been highly diversified However, a significant pattern emerges from south ward to north ward direction starting with mono-cropping of cotton, tuer and tobacco, individually, but dominant by cotton to multi-cropping combinations of as many as nine crops.

In 1990-91, the crop combinations and their locations have radically changed. The erstwhile mono-cropping areas of the southern part of the taluka has gone to various combinatorial crops and their associations such as the dominating cotton region is replaced largely by tuer and slightly by tobacco. The vast mono-cropping belt extending in the entire southern part has shrunk to only a small part in the east (Fig 5 1 a & b) The rest of the area is occupied by several crops. The order and arrangement of the crops in the combination has also been found changed as against the former set e.g. bajra, tobacco, tuer, cotton, vegetables, wheat, rice, oilseeds, fodder, jowar etc. have together in varying proportions made their two to seven combinations however kodra which was very conspicuous by its presence, is now conspicuous by its absence

The appearance of the northern part of the taluka has remained more or less the same as that of the former year But the changes do have occurred The eight crop combination has absolutely disappeared The entire northern belt is divided into two crop regions to seven crop regions except one village Sandha in the western segment displaying nine crop region. However, the crops have more or less remained the same as in the southern segment Their proportions and arrangements are definitely differing, even in each set of their combinations (Table 5.1, Fig 5 1 a & b)

The diagnostic study has revealed that the crops sown at the first point of time have remained more or less same at the second point of time, except kodra which totally disappeared, and other pulses also lost their significance The notable change observed is in the farmers inclination towards the relative strength of the crops from the point of their sustainability and loss factor Thus, the combinatorial interchange between the same crops have been made e g cotton the erstwhile most desired crop is placed mostly in sub-order down to second and onwards At places the cereals undesirable at the first point of time acquired desirability. Tuer the sub order crop rose invariably as first order crop. But none of the already sown crops in the first to ninth order except kodra have been totally given up The priority, therefore, is based on the considerations of their input output ratio Table 5 1 shows the pattern of crop combination in Padra

P.T.O.

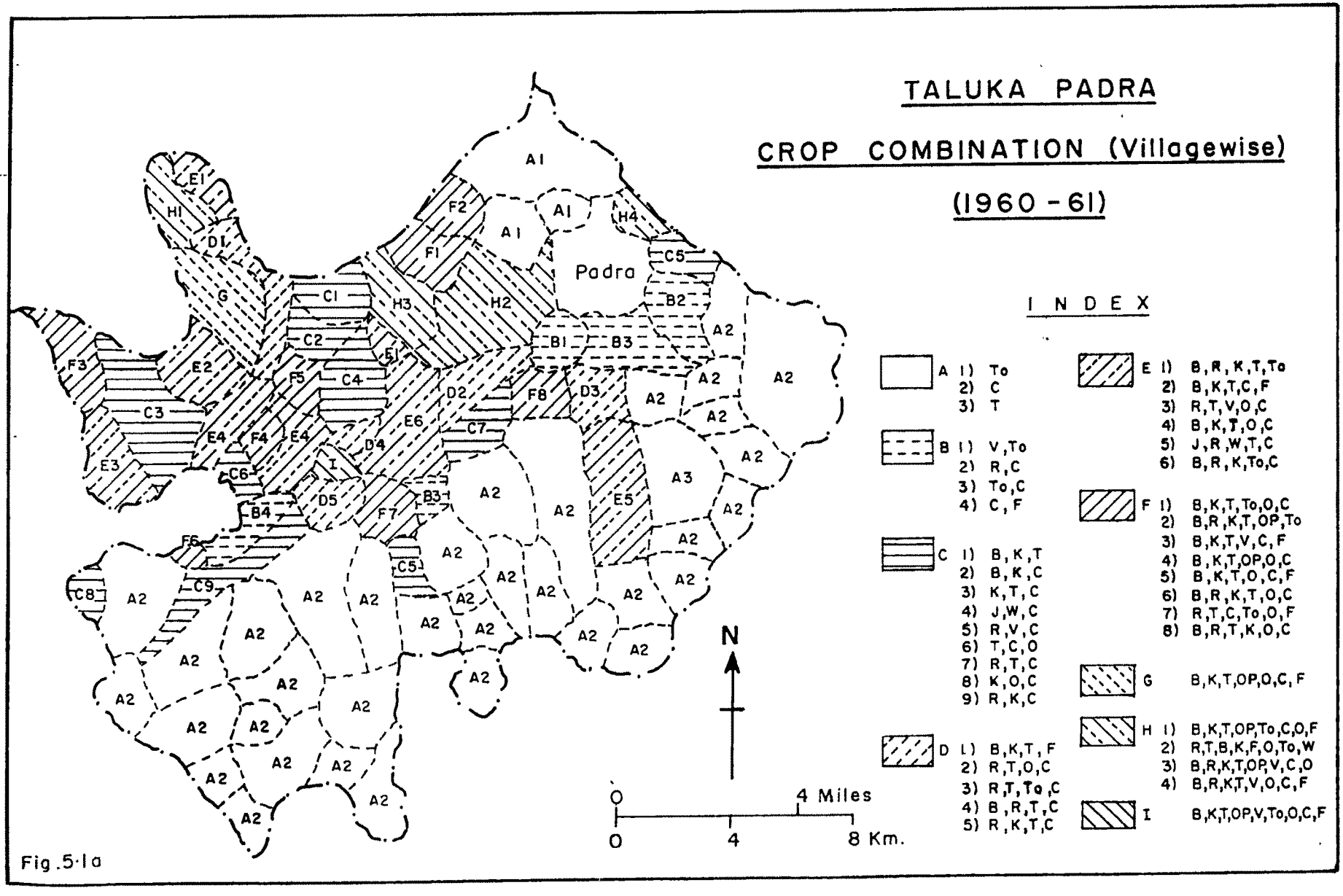
TALUKA PADRA
CROP COMBINATION (Villagewise)
(1960 - 61)
INDEX
A 1) To
2) C
3) T
B 1) V,To
2) R,C
3) To,C
4) C, F
C 1) B,K,T
2) B,K,C
3) K,T,C
4) J,W,C
5) R,V,C
6) T,C,O
7) R,T,C
8) K,O,C
9) R,K,C
D 1) B,K,T, F
2) R,T,O,C
3) R,T,To,C
4) B,R,T,C
5) R,K,T,C
E 1) B,R,K,T,To
2) B,K,T,C,F
3) R,T,V,O,C
4) B,K,T,O,C
5) J,R,W,T,C
6) B,R,K,To,C
F 1) B,K,T,To,O,C
2) B,R,K,T,OP,To
3) B,K,T,V,C,F
4) B,K,T,OP,O,C
5) B,K,T,O,C,F
6) B,R,K,T,O,C
7) R,T,C,To,O,F
8) B,R,T,K,O,C
G B,K,T,OP,O,C,F
H 1) B,K,T,OP,To,C,O,F
2) R,T,B,K,F,O,To,W
3) B,R,K,T,OP,V,C,O
4) B,R,K,T,V,O,C,F
I B,K,T,OP,V,To,O,C,F
Padra
N
0 4 Miles
0 4 8 Km.

Fig.5·1a

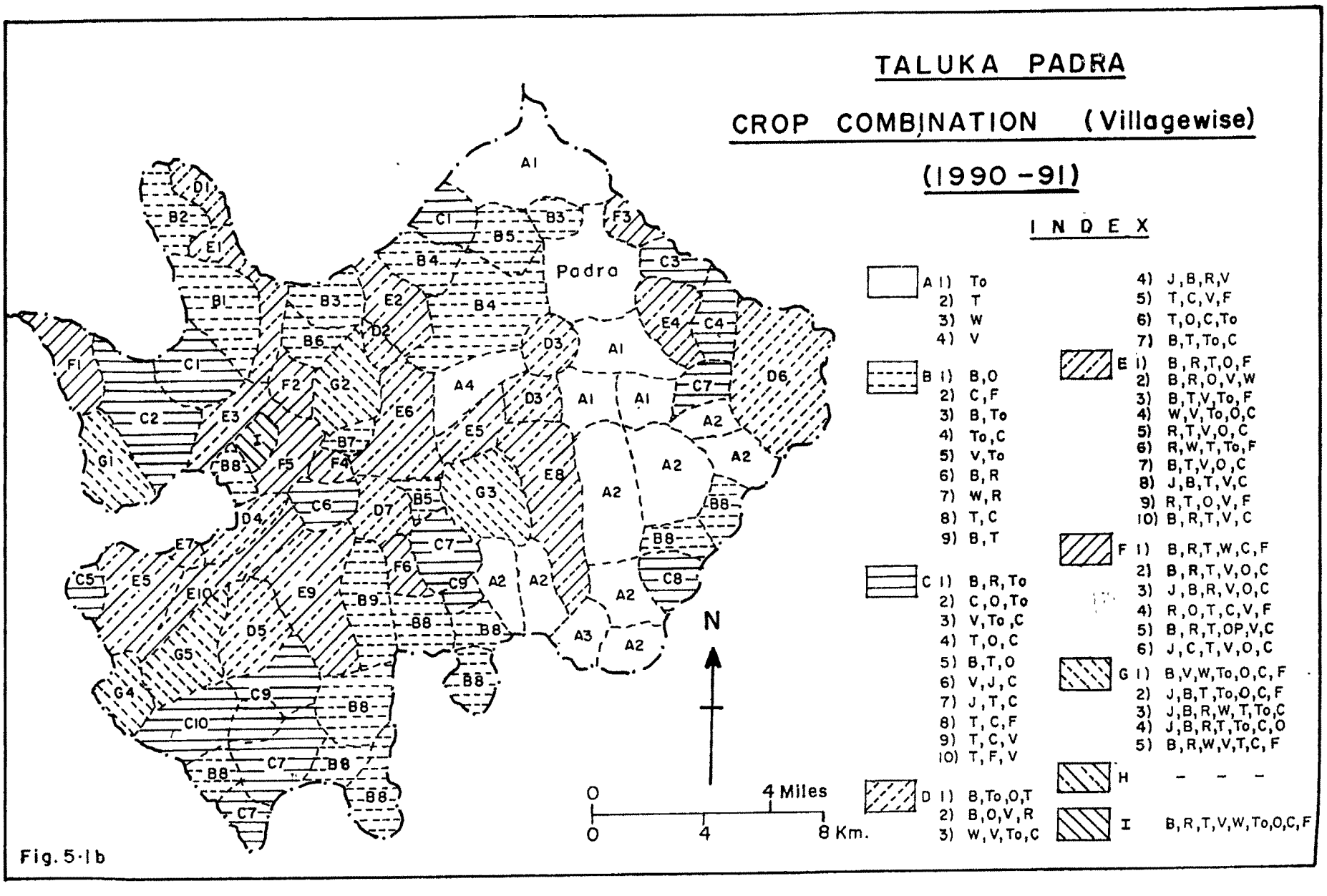
TALUKA PADRA
CROP COMBINATION (Villagewise)
(1990-91)
INDEX
A 1) To
2) T
3) W
4) V
B 1) B,O
2) C,F
3) B,To
4) To,C
5) V,To
6) B,R
7) W,R
8) T,C
9) B,T
C 1) B,R,To
2) C,O,To
3) V,To,C
4) T,O,C
5) B,T,O
6) V,J,C
7) J,T,C
8) T,C,F
9) T,C,V
10) T,F,V
D 1) B,To,O,T
2) B,O,V,R
3) W,V,To,C
4) J,B,R,V
5) T,C,V,F
6) T,O,C,To
7) B,T,To,C
E 1) B,R,T,O,F
2) B,R,O,V,W
3) B,T,V,To,F
4) W,V,To,O,C
5) R,T,V,O,C
6) R,W,T,To,F
7) B,T,V,O,C
8) J,B,T,V,C
9) R,T,O,V,F
10) B,R,T,V,C
F 1) B,R,T,W,C,F
2) B,R,T,V,O,C
3) J,B,R,V,O,C
4) R,O,T,C,V,F
5) B,R,T,OP,V,C
6) J,C,T,V,O,C
G 1) B,V,W,To,O,C,F
2) J,B,T,To,O,C,F
3) J,B,R,W,T,To,C
4) J,B,R,T,To,C,O
5) B,R,W,V,T,C,F
H - - -
I B,R,T,V,W,To,O,C,F
Padra
N
0 4 Miles
0 4 8 Km.

Fig. 5·1b

Table 5.1

Statement of Crop Combination in Padra

1960-61 & 1990-91

1960-61				1990-91			
Status	Association	No of Village	%	Status	Association	No of Village	%
Mono Crop	Cotton	36	43.89	Mono Crop	Tuer	8	9 75
	Tobacco	3	3.65		Tobacco	4	4 87
	Tuer	1	1.22		Vegetable	1	1.22
Two Crop	V-TO	1	1.22		Wheat	1	1 22
	R-C	1	1 22	Two Crop	B-O	1	1.22
	TO-C	2	2.44		C-F	1	1 22
	C-F	1	1 22		B-TO	2	2 44
Three crop	B-K-T	1	1.22		TO-C	2	2 44
	B-K-C	1	1.22		V-TO	2	2 44
	K-T-C	1	1 22		B-R	1	1 22
	J-W-C	1	1 22		W-R	1	1 22
	R-V-C	2	2 44		T-C	10	12 20
	T-C-O	1	1.22		B-T	1	1 22
	R-T-C	1	1.22	Three Crop	B-R-TO	2	2 44
	K-O-C	1	1 22		C-O-TO	1	1.22
	R-K-C	1	1.22		V-TO-C	1	1 22
Four Crop	B-K-T-F	1	1 22		T-O-C	1	1 22
	R-T-O-C	1	1 22		B-T-O	1	1 22
	R-T-TO-C	1	1 22		V-J-C	1	1 22
	B-R-K-C	1	1.22		J-T-C	4	4 87
	R-K-T-C	1	1.22		T-C-F	1	1 22
Five Crop	B-R-K-T-TO	2	2.44		T-C-V	3	3.65
	B-K-T-C-F	1	1 22		T-F-V	1	1 22
	R-T-V-O-C	1	1 22	Four Crop	B-TO-O-T	1	1 22
	B-K-T-O-C	2	2.44		B-O-V-R	1	1 22
	J-R-W-T-C	1	1.22		W-V-TO-C	2	2 44
	B-R-K-TO-C	1	1.22		J-B-R-V	1	1 22
Six Crop	B-K-T-TO-O-C	1	1.22		T-C-V-F	1	1 22
	B-R-K-T-OP-TO	1	1.22		T-O-C-TO	1	1 22
	B-K-T-V-C-F	1	1.22		B-T-TO-V	1	1.22
	B-K-T-OP-O-C	1	1.22	Five Crop	B-R-T-O-F	1	1 22
	B-K-T-O-C-F	1	1.22		B-R-O-V-W	1	1.22
	B-R-K-T-O-C	1	1.22		B-T-V-TO-F	1	1 22
	R-T-C-TO-O-F	1	1.22		W-V-TO-O-C	1	1.22
	B-R-T-K-O-C	1	1.22		R-T-V-O-C	2	2 44
Seven Crop.	B-K-T-OP-O-C-F	1	1.22		R-W-T-TO-F	1	1 22
Eight Crop	B-K-T-OP-TO-C-O-F	1	1 22		B-T-V-O-C	1	1 22
	R-T-B-K-F-O-TO-W	1	1 22		J-B-T-V-C	1	1 22
	B-R-K-T-OP-V-C-O	1	1 22		R-T-O-V-F	1	1 22
	B-R-K-T-V-O-C-F	1	1 22		B-R-T-V-C	1	1 22
Nine Crop	B-K-T-OP-V-TO-O-C-F	1	1.22	Six Crop	B-R-T-W-C-F	1	1 22
9	41	82	100		B-R-T-V-O-C	1	1 22
					J-B-R-V-O-C	1	1.22
					R-O-T-C-V-F	1	1.22
					B-R-T-OP-V-C	1	1.22
					J-C-T-V-O-C	1	1.22
				Seven Crop	B-W-V-TO-O-C-F	1	1 22
					J-B-T-TO-O-C-F	1	1 22
					J-B-R-W-T-TO-C	1	1 22
					J-B-R-I-TO-C-O	1	1.22
					B-R-W-V-T-C-F	1	1 22
				Eight crop	-	-	
				Nine crop	B-R-T-V-W-TO-O-C-F	1	1 22
				9	52	82	100

ABBRIVATIONS :

1. B=Bajra,
2. C=Cotton
3. F=Fodder
4. J=Jowar
5. K=Kodra
6. O-Oilseeds,
7. R=Rice,
8. T=Tuer,
9. TO=Tobacco
10. V=Vegetables,
11. W=Wheat

KARJAN

Karjan being a segment of the Kanam region (cotton belt of mainland Gujarat) cotton was the principal crop sweeping over the landscape By computation it is derived that is has prevailed over as many as 77 villages as a mono crop during the first point of time. It occupied the taluka in all its length and breadth leaving only marginal areas of only 16 villages for other crop combinations (Fig 5 2 A & B).

The conditions never remain uniform for all times The dominating cotton over two decades faced severe recession and shrunk to sub order crop giving the supreme place to tuer at the second point of time. Tuer, even though formally replaced cotton, it did not occupy the stature enjoyed by the erstwhile cotton, however, it become predominant in as many as 37 villages leaving one village Simali for cotton to enjoy its former status However, the former contiguous region of cotton have given place to several combinations leaving the tuer regions divided into several enclaves spread all over, but highly concentrated in north western, south eastern and mid western parts (Fig 5 2 a & b)

During the base year only the marginal areas are found having more than one combinatorial enclaves of them twelve villages opted for two crop combinations with cotton and jowar. Thus, cotton secured its higher position in this combination as well The villages Umaj, Abhara, Sambhoi and Manpur in the north west, Kiya in the mid west, Delwada Oz, Sayar, Alampura, Pura, Moti Koral and Nani Koral in the south east had opted for this combination with the same components

During the second point of time greater diversification is noted in which the former two components increased to seven of which the first crop being tuer instead of cotton, the second crops are cotton, fodder, oilseeds, vegetables and sugarcane etc. Another order is formed with Jowar as first crop, associated with cotton, tuer and vegetables Thus the whole structure has changed

Three crop combination formed only one enclave at the down south village, Somaj at the base year, and the four crop enclaves were in Karan in the southern part and Virjai village at the top north west of the taluka Five crop combination was a lone enclave in the village Sanapura west of the four crop combination enclave of village Karan

These combinations became multifarious and went up to seven at the second point of time Their combinatorial association was with jowar, tuer, wheat, rice, cotton, oilseeds, sugarcane, vegetables fodder and bajri These crops in their interchanging positions made two to seven combinations at Karjan in 1990-91. Table 5 2 gives the contrast between the combinational distribution in the taluka at the two points of time.

P.T.O.

Table 5.2

Statemtnt of Crop Combination in Karjan.

1970-71&1990-91

1970-71				1990-91			
St-atus	Association	No of Village	%	St-atus	Association	No of Village	%
Mono Crop	Cotton	77	82 79		T	37	39.78
					C	1	1 08
Two Crop	J-C	12	12 89	Two Crop	T-C	9	9 68
					J-T	8	8 60
					T-F	2	2 15
					T-O	3	3 23
					T-V	4	4 30
					T-S	2	2 15
					J-V	1	1 08
Three Crop	J-C-F	1	1 08	Three Crop	J-R-W	1	1 08
					J-T-O	2	2.15
					W-T-C	1	1 08
					T-C-F	1	1 08
					T-O-C	1	1 08
					T-C-S	2	2 15
Four Crop	J-W-R-C-	1	1 08		J-T-C	2	2 15
					T-C-V	1	1 08
	J-W-V-C	1	1.08		T-J-B	1	1 08
					T-F-V	1	1 08
					T-J-V	1	1.08
Five Crop	J-R-W-V-C	1	1 8		T-J-F	1	1 08
5	6	93	100	Four Crop	J-W-T-C	1	1 08
					J-T-S-O	1	1 08
					J-T-C-V	1	1 08
					T-J-F-O	1	1 08
					J-R-T-O	1	1.08
				Five Crop	J-T-F-C-O	1	1 08
				Six Crop	J-T-C-S-O-V	1	1.08
					J-T-V-O-C-F	1	1 08
					W-T-S-V-O-C	1	1 08
				Seven Crop	J-R-W-T-S-O-F	1	1 08
					J-W-B-T-V-S-F	1	1 08
				7	32	93	100.00

ABBRIVATIONS :

1. B=Bajra,
2. C=Cotton
3. F=Fodder
4. J=Jowar
5. K=Kodra
6. O-Oilseeds,
7. R=Rice,
8. T=Tuer,
9. V=Vegetables,
10. W=Wheat

In case of the three crop combinations and their distribution in the crop land milieu, it has increased both in numbers and crop species Where, at the base year, it appeared in a lone enclave at Somaj in the down south peripheral part, it increased to fifteen in number and in composition of ten crops making twelve combinations with interchange of each of them in order of their occupancy of the percentage share of the GCA This combination has formed fifteen enclaves all over the taluka barring its western part No regional impression is out coming from any area under this combination

The four crop combination is including jowar, tuer, wheat, rice, vegetables, oilseeds, cotton, fodder and the new entrant sugarcane In four enclaves it is dominated by jowar and in one by tuer Others are proportionately joined by these two leading crops. There are five such enclaves widely dispersed all over the taluka

Five crop region, better called enclave, has remained only one at both the points of time, however the combination and areal location has changed The crops making this combination at the base year were jowar, rice, wheat, vegetable and cotton, in 1990-91, jowar, tuer, fodder, cotton and oilseeds. However jowar and cotton are common, rice, wheat and vegetables are replaced by tuer, fodder and oilseeds Its enclave has shifted from Sanapura near the southern bank of Bhukhi river to Alampura in the south east near the eastern bank of Narmada river.

The six crop combination includes inter changeably the crops jowar, tuer, wheat, vegetables, cotton, oilseeds, sugarcane and fodder. They together in their respective proportion of the share of GCA have made three enclaves with three different combinations The leading crops in this combination are jowar, wheat and tuer. Their enclaves are also widely distributed in the southern and eastern parts

They are one village enclaves two of them on the southern and eastern tips viz Pura and Ranapur respectively and Kasampur in the eastern central area of the taluka

Seven crop combination includes the crops of the former combination (Six crop) with an addition of bajra There are two enclaves with jowar as a leading crop in both, followed by wheat, rice, tuer, sugarcane, oilseeds and fodder in one enclave and wheat bajra, tuer, vegetables, sugarcane and fodder in the other There locations are in Juni Jithardi in the north central and Ganpatpura in the north eastern parts of the taluka (Fig. 5.2 a&b)

A holistic view reveals the following observations

1 At both the points of time mono-cropping to four crop combinations are invariably constituted by the traditional crops grown all over the taluka by all cultivators and at all times; such crops are cotton, jowar, tuer, wheat, oilseeds, fodder, rice vegetables etc and they are widely grown in larger parts of the taluka
2 From five crop combinations to seven crop combination, the traditional crops do have their significance along with some new entrants in the fray viz. Sugarcane and bajri non existent at the first point of time and not significant in the four crop combination
3 The first four sets of combinations are generally led by the most significant crop viz cotton or tuer, the other sets are led by some of the sub-order crops as jowar, wheat etc
4. Tuer the sub-order crop of first point of time has got culmination to become a leading and first order crop at the second point of time, but, it did not receive the popularity as formerly enjoyed by cotton

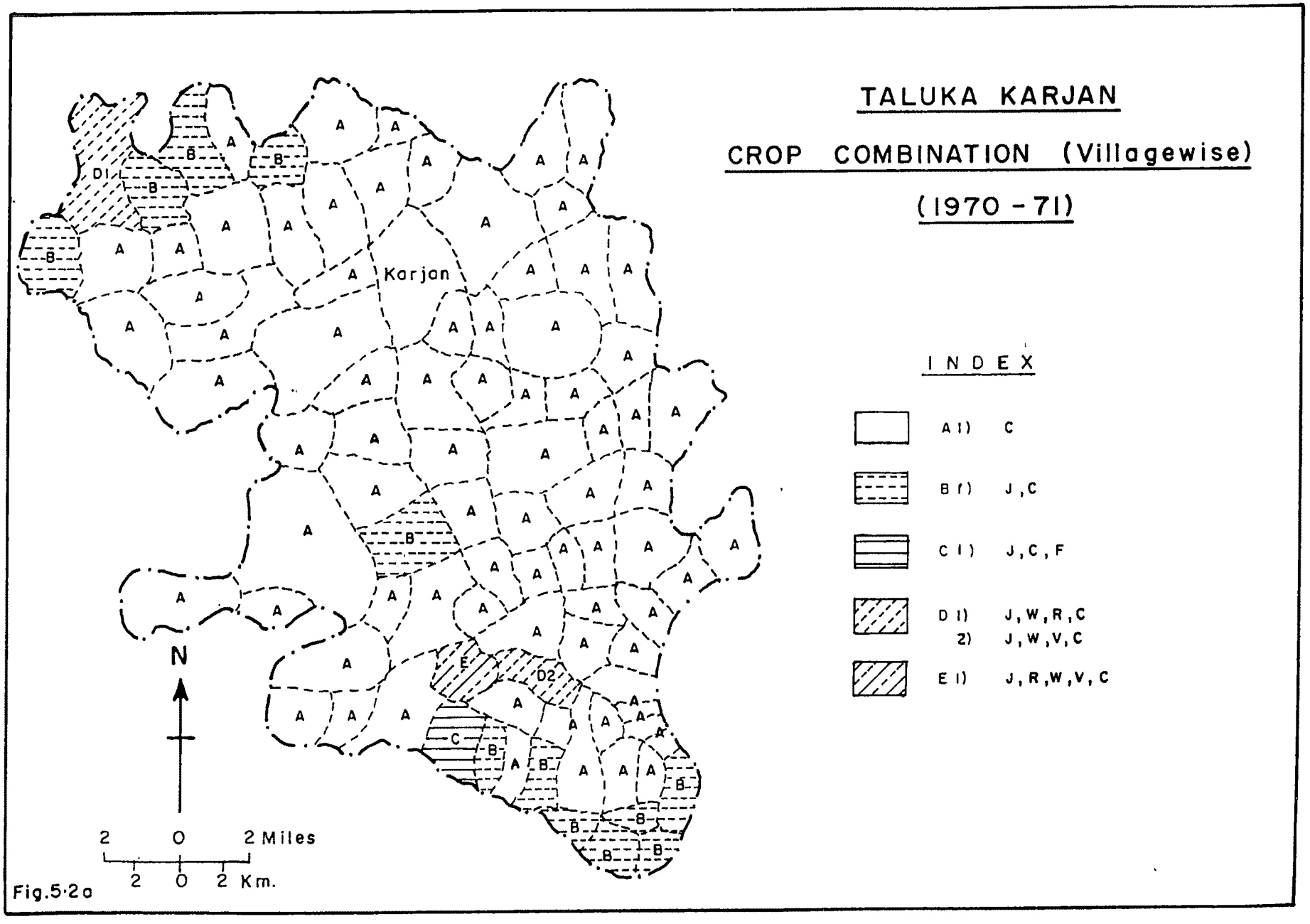
TALUKA KARJAN
CROP COMBINATION (Villagewise)
(1970 - 71)
INDEX
A 1) C
B 1) J, C
C 1) J, C, F
D 1) J, W, R, C
2) J, W, V, C
E 1) J, R, W, V, C
Karjan
N
2 0 2 Miles
2 0 2 Km.

Fig.5·2a

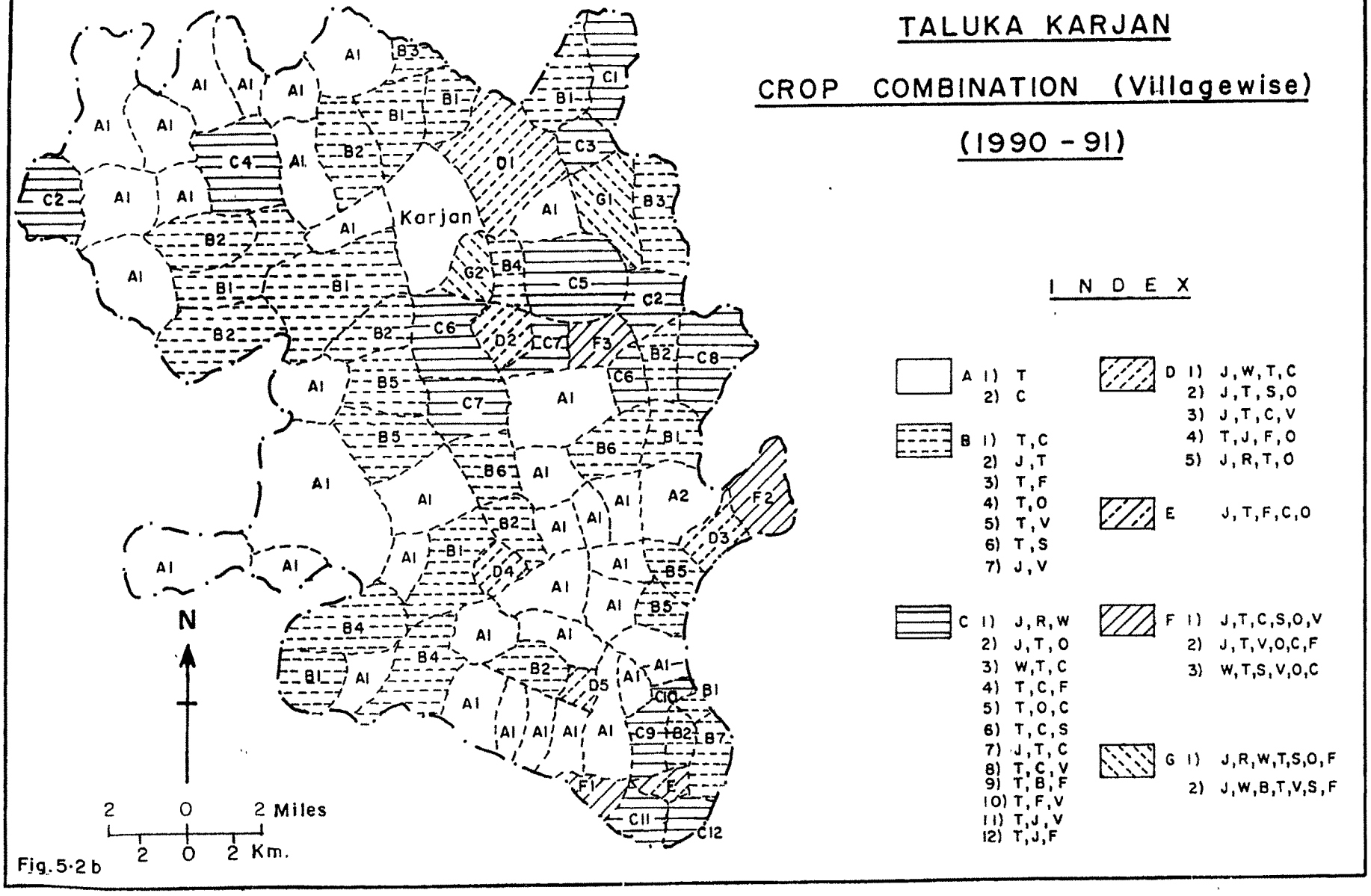
TALUKA KARJAN
CROP COMBINATION (Villagewise)
(1990 - 91)
INDEX
A 1) T
2) C
B 1) T,C
2) J,T
3) T,F
4) T,O
5) T,V
6) T,S
7) J,V
C 1) J,R,W
2) J,T,O
3) W,T,C
4) T,C,F
5) T,O,C
6) T,C,S
7) J,T,C
8) T,C,V
9) T,B,F
10) T,F,V
11) T,J,V
12) T,J,F
D 1) J,W,T,C
2) J,T,S,O
3) J,T,C,V
4) T,J,F,O
5) J,R,T,O
E J,T,F,C,O
F 1) J,T,C,S,O,V
2) J,T,V,O,C,F
3) W,T,S,V,O,C
G 1) J,R,W,T,S,O,F
2) J,W,B,T,V,S,F
Karjan
N
2 0 2 Miles
2 0 2 Km.

Fig. 5·2 b

PATTERN OF CROP DIVERSIFICATION

Crop diversification is an interesting aspect in the crop land use studies of any area It reveals the behaviour and choices of the cultivators on one hand and also indicates the precautions from risk factors on the other hand

"Essentially, diversification is an indicator of multiplication of agricultural activities which obviously involves intense competition among various activities for space" (Singh and Dhillon 1984). Definitions of diversification, more or less, give the same sense

(1) Normally the even proportion in any field of economic activity, be it industry, mining, cropping, employment's or livestock raising, is a rare possibility

(2) The competitive ability particularly among the crops is not self generated, but bestowed by the cultivators according to their value in terms of the prospects of consumption, and

(3) It is empirically proved that in no area each significant or insignificant crop occupies even proportion of space. Always, the significant crops occupy much larger and others smaller shares of GCA. This is a reality of all agricultural regions of India, and so is the case of the study area

On these grounds, the diversification may lie between the number of crops cultivated, and the percentage on actual share of GCA held by each.

It is empirically established that often the choice of single cropping have lead farmer to encounter heavy losses and the consequential high indebtedness Thus, a careful decision making of the farmer always attempts to avoid risk bearing except in unavoidable circumstances It is therefore wisely determined by them to have more than one crop so

that the loss of one may be made good by the gain of the other or others In the present work it is attempted to work out the measurement of crop diversification by the Gibbs Martin method, even though other researchers have also devised their formula viz. Bhatia (1965), S P Singh (1971), Jasbir Singh (1976) modified Bhatia's formula However, the present researcher, having attempted all found that Gibbs Martin's method is more result oriented and thus used it in this work The formula is

$$I\ D = 1 - \frac{\Sigma\ X^2}{\Sigma (X)^2} \times 100$$

Where X is the percentage of total cropped area occupied by each crop

By this method the range of the level of diversification swings between 'O' and '1' where zero is the 100 per cent specialization and one is the same amount of diversification

The study of diversification of cropping pattern is done in the regional perspective. The objective behind this study is to observe as to how the changing type of soils have influenced the specialization and its counterpart Table 5.3 givesthe diversification pattern of the three regions of Padra

P. T. O.

Table No. 5.3

Rank size Distribution Indices of Crop Diversification in Padra 1960-61 and 1990-91.

Range of Indices	REGION						Total
	I		II		III		
	Number of Villages		Number of Villages		Number of Villages		
	1960-61	1990-91	1960-61	1990-91	1960-61	1990-91	
0 – 0 20	-	1	-	2	-	-	3
0 20 – 0 40	-	-	1	-	9	-	10
0.40 – 0 60	2	4	3	1	18	6	34
0 60 – 0.80	8	18	4	3	5	21	59
0 80 & above	27	14	3	5	2	7	58
TOTAL	37	37	11	11	34	34	164

From the table the emerging pattern is found more towards a mixed picture almost at both the points of time in Padra. None of its villages are registered in the first two ranges which are nearer specialization Two, eight and twenty seven villages were with in the range of 0 40 – 0 60 to the last 0.80 and above showing greater degree of diversification at the first point of time in region I.

In Region II, no village is found in the lowest range, however, in the second range of 0 20 – 0 40 was only one village while from moderate to very high range were three, four and three respectively at the first point of time.

Region III shows relatively greater degree of specialization with no village in the lowest but nine villages in the low, and eighteen in the moderate range. The high and very high had five and two villages respectively Thus, the relative position of the region III is more towards specialization than diversification when all the three region are observed

The second point of time indicates greater degree of diversification in all the three region Region I had only one village in the lowest range, none in the low, four eighteen and fourteen in the moderate to very high ranges respectively.

The same trend continues in the region II where two villages being in the lowest range show specialization, while one, three and five villages ranging in moderate to very high give the acute impression of diversification

Region III which was found more inclined towards specialization at the first point of time has radically shifted the trend toward diversification with having no villages in the very low and low ranges while having six, twenty one and seven in the moderate to very high ranges

It is, therefore deduced that, where some element of specialization was discerned at the first point of time, the villages have totally biased towards diversification at the second point of time in all the regions of Padra. There were very few villages nearer low and very low ranges and more were nearer high and very high ranges The convincing reason for this emerging picture has been the fact that Padra had hardly cultivated smaller number of crops at any point of time. The association of crops ranged between the lowest six and the highest ten or more

KARJAN

Diversification is the natural dynamics of any phenomenon be it natural or human. Agriculture, most probably, since its inception had been dynamic inviting diversification on all fronts Crop diversification had been traditionally practiced in all agricultural regions of the world It is believed that one crop successively grown in a field usually spoils and deteriorates its fertility Thus crops are changed in their combination and association. However,

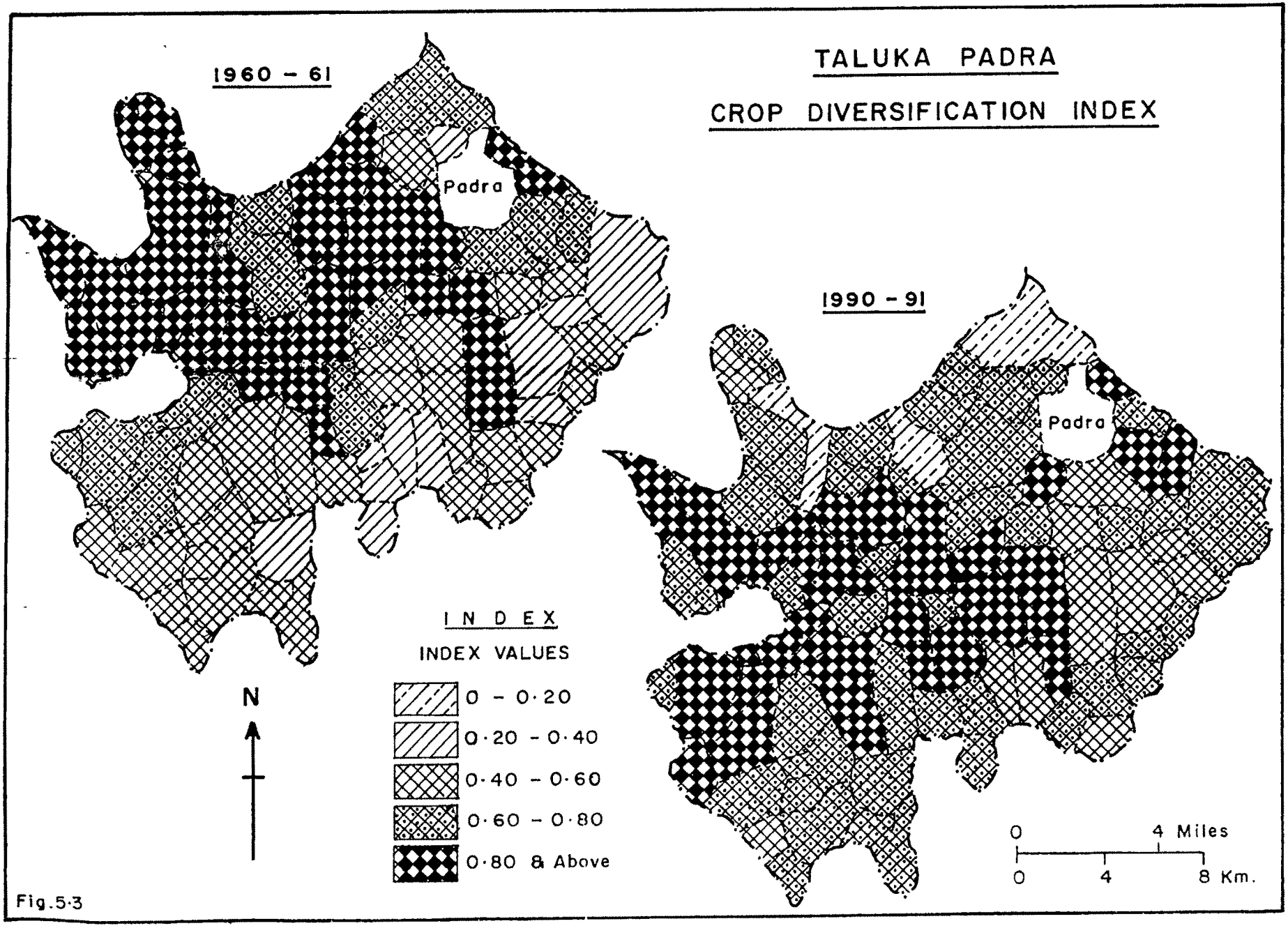
TALUKA PADRA
CROP DIVERSIFICATION INDEX
1960 - 61
Padra
1990 - 91
Padra
INDEX
INDEX VALUES
0 - 0·20
0·20 - 0·40
0·40 - 0·60
0·60 - 0·80
0·80 & Above
N
0
4 Miles
0
4
8 Km.

Fig.5·3

some crops have met their doom due to the use of chemical fertilizers Poor kodra is the victim of this innovation.

Karjan was once a citadel of cotton cultivation and some of the crops associated with it which could thrive well in the black cotton soil of this taluka had been found highly diversified when its cropping pattern of two points of time (1970-71 and 1990-91) has been studied.

Owing to the cotton crop prevailing in the largest chunk of Karjan taluka (Fig.4.18) its computed diversification level of the year 1970-71 seems to have been highly affected by the mono-cropping As a result the degree of diversification is relatively low in the entire taluka as well as in its three soil based regions Hereunder a study of the three soil based regions of Karjan is conducted which explains the regional and also the holistic trend of cropping at the two points of time The multi-cropping trends in the mono-cropping regions is probably the result of the failure of cotton putting the cultivators into great loss, so they took the precautionary steps. Tuer is, no doubt a replacement of cotton, but tuer did not attain the stature of cotton, the basic reason is the fright of failure Table 5 4 is representing the varying levels of diversification at the two points of time is given here under.

P.T.O.

Table · 5 4

Rank size Distribution Indices of Crop Diversification in Karjan 1970-71 & 1990-91

Range of Indices	REGION						Total
	I		II		III		
	Number of Villages		Number of Villages		Number of Villages		
	1970-71	1990-91	1970-71	1990-91	1970-71	1990-91	
0-020	2	-	-	-	-	-	2
0.20-040	15	2	5	2	6	2	32
040-060	12	10	7	1	26	13	69
060-080	6	19	2	7	10	27	71
080 & above	-	4	-	4	2	2	12
TOTAL	35	35	14	14	44	44	186

A glance at the table explains that the year 1970-71 was the year of flourishing mono-cropping particularly cotton. The computed level of diversification indicates the tilt of decision making towards one significant crop The index therefore ranges between very low to high (i e. 20 to 80 per cent in four grades). The very low index enfolded two villages, low and moderate ranges encompassed 15 and 12 villages respectively and the high range had only six villages in the region I consisting of thirty five villages.

Same trend is being reflected in region II The very low ranges of 0 – 20 per cent had no village at all The low and moderate had 05 and 07 villages, the high range of 60 – 80 per cent had lowest number of 02 villages at the first point of time

A slight deviation in established trend is notable in region III where no village is seen in the very low range of 0 – 20 per cent, but 06,10,02 are found from the low range of 20 – 40 per cent to the very high range of 80 and above. The indices make a parabolic trend ascending from 06 to 26, and descending to 10 and finally to 02 at the first point of time

The second point of time explains the bitter experiences of heavy losses borne by the farmers in cotton cultivation The trend, thus emerges that the smaller number of villages at the two ends of low and high are seen in each region. Very low is blank in all

Region I starts with two villages in the low range of the index, and then continues the ascent with 10 villages in moderate, 19 villages in high and 4 villages in very high.

Region II follows the same trend with two villages in low, one village in the moderate, seven villages in the high and only four villages in the very high ranges of the index

Region III begins with the same number of villages as the first two regions did and swings upto 13 and 27 villages in the subsequent ranges and keeps only two villages in the very high range

Tables 5 3 and 5.4 showing the trends of diversification give an ostensible pattern of diversification in Karjan as seen in Padra with slight variations in their regions that the cropping pattern at the first point of time was more twisted towards lower levels of diversification in each region of each taluka, whereas the same pattern is found more inclined towards greater levels of diversification at the second point of time In Karjan the level of diversification were more towards the lower ranges in all the regions at the base year, and abruptly went up at the second period of time, whereas Padra was relatively more diversified at both the points of time (Fig.5 4).

Rank and Order of Crops :

Study of crop land use invites the attention of a researcher to diagnose the inclination of the cultivators towards the kinds of crops It is but natural that the geographical conditions of any area in relation to the different kinds of crops are well known to them, and their

TALUKA KARJAN

CROP DIVERSIFICATION INDEX

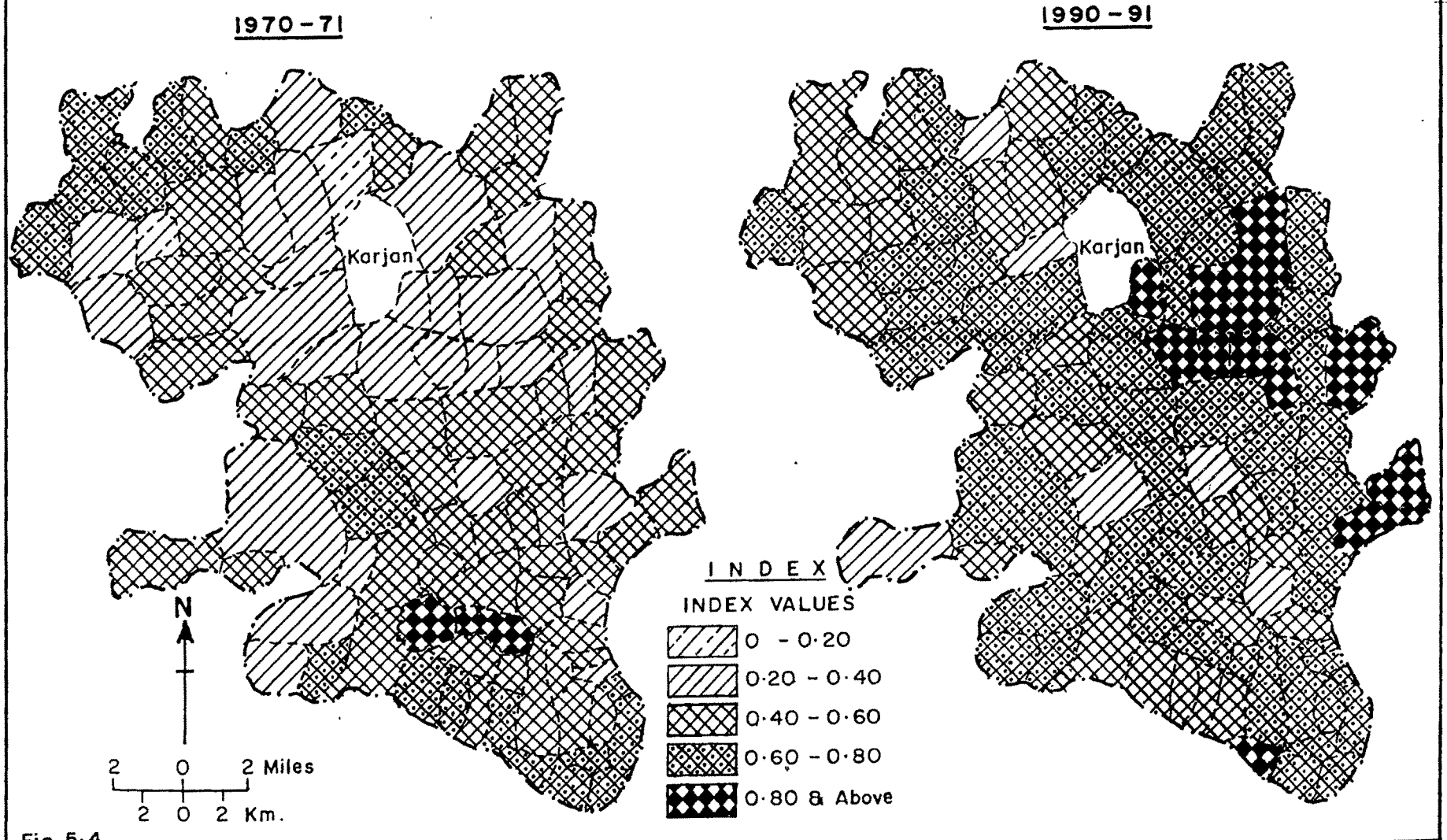

Fig. 5·4

experiences always guide them in case of the choice of crops and their respective fields, anticipating comparatively better advantages of the investment of labour and capital

It is also well established that all fields in a village are never suitable for all crops and various influencing factors play their vital role Thus all crops neither take equal input and nor give equal output For this reason the cultivators have given priority to the most suitable and highly paying crops under the existing set of environmental conditions and less to others

Thus a researcher has to make a keen observation of the realities of the space and establish the rank and order of the crops sown on the basis of the share of GCA allotted to them, and find out the position of each or a group of crops in their varying crop associations observed in each villages Since the picture of the ranking and order of crops is found clear and satisfying with the holistic study of talukas Padra and Karjan, its region wise and village wise descriptions are omitted in view of the problems arising out in their mapping

The environmental condition of Padra have been found differing in its northern and southern segments as a result the crop combinations, diversification's etc. are found distinctly differing These two studies paved the way to establish the rank and order of crops grown at the two points of time opted for this study The crops have therefore, been grouped into four classes according to their significance and adaptability to the geographic conditions of the taluka They are shown in the table 5.5 given below.

P.T.O.

Table 5.5

Rank and Order of crops in Padra 1960-61 and 1990-91

Rank	Percentage	1960-61			1990-91		
		Crops	Cultivating Village		Crops	Cultivating Village	
			Number	Percent		Number	Percent
First Rank	60 and above	Cotton	36	43 90	Tuer	9	10 97
		Tobacco	3	3.66	Tobacco	4	4 88
		Tuer	1	1.22	Vegetable	1	1 22
					Wheat	1	1 22
					Cotton	1	1 22
Second Rank	40 – 60	Cotton	7	8.54	Tuer	7	8 54
		Tobacco	4	4.88	Tobacco	4	4 88
					Bajra	3	3 66
					Cotton	2	2 44
					Vegetable	2	2.44
Third Rank	20 - 40	Cotton	12	14.63	Tuer	12	14 63
		Bajra	5	6.10	Cotton	11	13 41
		Tobacco	2	2 44	Tobacco	9	10 97
		Vegetable	1	1 22	Jowar	3	3 66
		Kodra	1	1 22	Rice	3	3 66
		Fodder	1	1 22	Vegetable	3	3 66
					Bajra	2	2 44
					Oilseeds	2	2 44
Fourth Rank	0 – 20	Vegetables	9	10.97	Vegetable	2	2 44
					Tobacco	1	1 22
			82	**100.00**		**82**	**100.00**

During the first point of time and earlier than it, the inclination was found tilted towards the cash crops, the most suiting to the geographic conditions of the taluka and its three micro regions However, at a few places the given order is found slightly changed with change of placement of the crops in the upper or lower positions. Thus, the classification is totally based on the general supremacy of the crops

Cotton the most widely cultivated crop in the southern segment of Padra and associated with other crops in the northern segment has in most of the i e 37 (45 12%) villages been placed in first rank with 60 and above percent of GCA

under its sway in the southern segment which is the third region of the taluka, and a segment of black cotton soil

The northern segment is composed of alluvial soils and has behaved differently in respect of the rank and order of the crops Tobacco, the most important crop of the alluvial soil regions of Gujarat locally known as "Wakad Pradesh" of which Kheda and Baroda districts are components. Upper Padra is falling in this regional division. Tobacco is the famous first order crop of this region and its other components Thus, three villages of the northern segment gave priority to tobacco allotting 60 per cent and above of their GCA to it at the base year

Thus, the two most important cash crops of Padra were cotton and tobacco holding the largest percentage of its GCA In the regional context also, these two crops have remained conspicuous by their presence and occupying substantial share of their GCA In order of the descent in occupied share of GCA i.e of 40 – 60 per cent (considered second rank and order of crop) It is discerned that cotton and tobacco have enjoyed the superior position in seven and four villages respectively

In case of the third rank order crops occupying 20 – 40 per cent of GCA; cotton and tobacco are much conspicuous along with bajra, vegetables, kodra and fodder crops Cotton was grown in 12 villages, tobacco in two, bajra in five and other in one each

In the fourth rank ranging between 0 and 20 per cent of GCA. Vegetables are the prominent crops grown in nine villages.

Thus it has become obvious that cotton dominated as first order crop in all ranges i e from 60 per cent and above, 40 – 60 per cent and 20 – 40 per cent, and tobacco, in the same ranges remained first rank in three, four and two villages respectively Other crops,viz bajra, vegetables,

kodra and fodder remained at the first rank in a few villages that too in the third range of 20 – 40 per cent Vegetables alone were an important crop in nine villages but in the lowest range (i.e. 0 – 20 per cent) of ranking It explains the dominating position of cotton and tobacco and also indicate the inclination of the farmers towards the higher paying crops.

Along with the drastic change having taken place in the cropping milieu of Padra in the last three decades the rank and order of crops has also seriously been affected The fall of cotton caused the rise of tuer, and others as vegetables, cereals, oilseeds and so on The trend of mono-cropping of 1960-61 has been replaced by multi-cropping Instead of one or two crops having their status as first ranking crops, several crops with their proportionate share of GCA scampered up the range of first ranking crop So is the case of other descending ranges and ranks

Where in 1960-61, cotton as first ranking crop was cultivated by 45.12 per cent of villages, it could manage to retain only 1.22 per cent at the second point of time. Tuer surely attained the first rank entering the range of 60 per cent and more of GCA, but its distribution was confined to only around 11 per cent of villages as against 45.12 per cent of cotton.

Tobacco in the first rank was grown by 3 66 per cent of villages, it made an insignificant stride acquiring one more village, i.e. four (04) as against three (03) of the base year Other crops as vegetables and wheat were elevated in one village each.

In the second rank and order i e in the range of 40 – 60 per cent of GCA, tuer and tobacco enjoyed the top position in 8 54 and 4.88 per cent of villages respectively However, tuer replaced cotton and enjoyed the same status while tobacco remained unchallenged at the second point of

time. Other crops in the same rank were bajra, cotton and vegetables in 3 (3 66%), 2(2 44%) and 2 (2 44%) villages respectively

Among the third order crops as many as 8 crops got entry against six crops of the former year They in all are seen widely distributed in as many as 45 (54 88%) villages of them tuer, cotton and tobacco were better status crops sown by 12,11 and 9 villages Other were grown by less number of villages

In the fourth ranking crops vegetable was alone in the former year and was cultivated in nine villages, while at the other point of time it was associated with tobacco in a reduced extent of two and one villages(Fig 5 5)

KARJAN

Karjan was comparatively more specialised in its cropping pattern than Padra In 1970-71, cotton was the first order crop sweeping over as many as 77 villages (82.80%) giving a conspicuous pattern of mono-cropping Table 5 6 shows the rank and order of crops of Karjan at the two points of time

P T.O

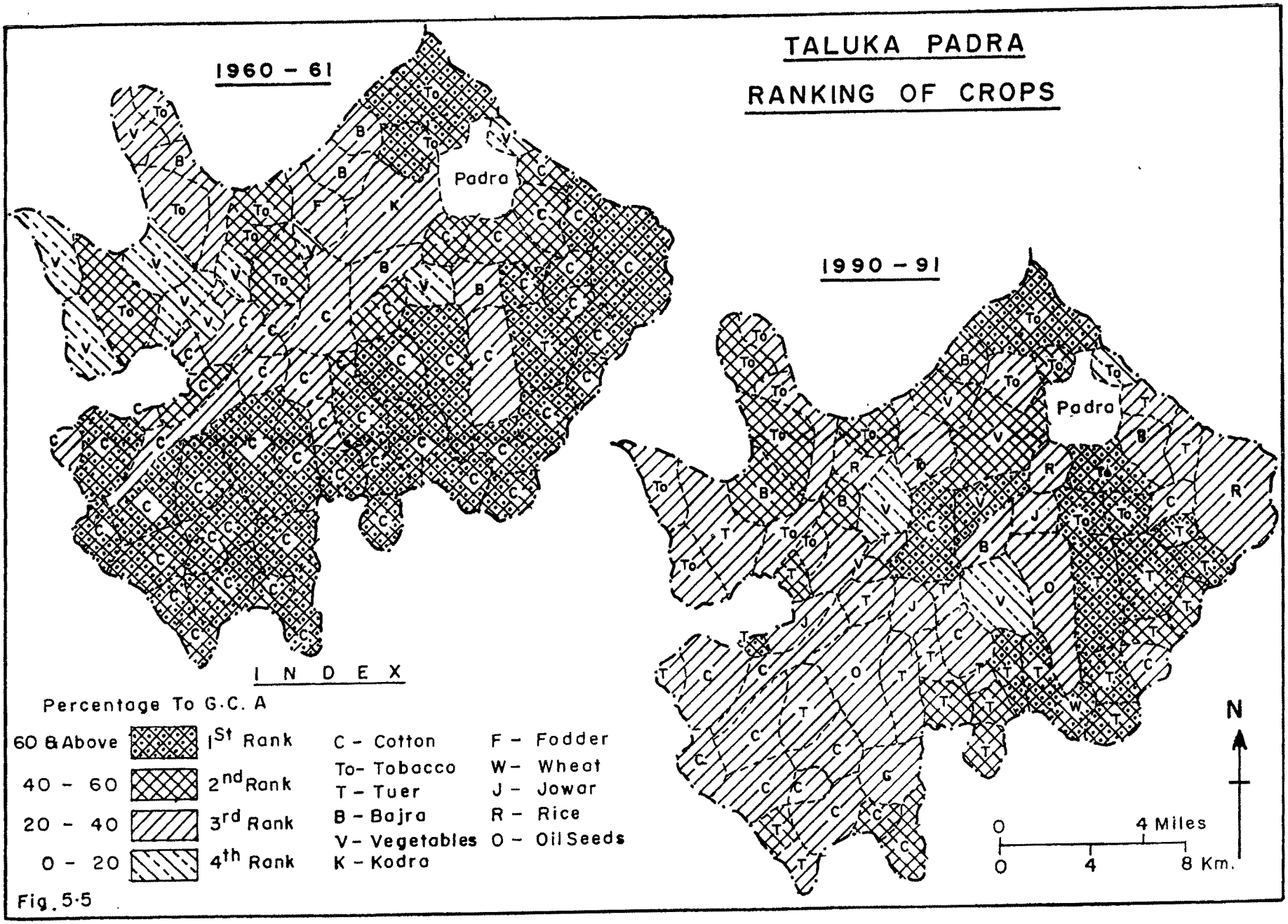
TALUKA PADRA
RANKING OF CROPS
1960 - 61
1990 - 91
Padra
Padra
INDEX
Percentage To G.C.A
60 & Above 1St Rank
40 - 60 2nd Rank
20 - 40 3rd Rank
0 - 20 4th Rank
C - Cotton
To- Tobacco
T - Tuer
B - Bajra
V - Vegetables
K - Kodra
F - Fodder
W - Wheat
J - Jowar
R - Rice
O - Oil Seeds
N
0 4 Miles
0 4 8 Km.

Fig. 5·5

Table 5 6

Rank and order of crops in Karjan 1970-71 & 1990-91

Rank	Percentage	1960-61			1990-91		
		Crops	Cultivating Village		Crops	Cultivating Village	
			Number	Percent		Number	Percent
First Rank	60 and above	Cotton	77	82 80	Tuer	37	39 79
Second Rank	40 – 60	Cotton	8	8 60	Tuer	22	23.66
		Jowar	4	4 30	Vegetables	3	3.23
					Jowar	2	2 16
					Cotton	1	1 07
					Sugarcane	1	1 07
					Fodder	1	1.07
Third Rank	20 - 40	Jowr	2	2 16	Tuer	10	10 76
		Wheat	1	1 07	Jowar	5	5 38
		Rice	1	1 07	Vegetables	3	3 23
					Wheat	1	1 07
					Cotton	1	1 07
					Sugarcane	1	1 07
					Oilseeds	1	1 07
Fourth Rank	0 – 20				Tuer	2	2 16
					Jowar	1	1 07
					Vegetables	1	1 07

In the second rank, however, jowar associated cotton in just the half of the number of villages Thus cotton maintained its supremacy with higher percentage share of GCA in as many as 8 villages (8 60%) Jowar could receive some favour in only four villages (4.30%).

The third rank crops included only cereals i e. jowar in two villages (2.16%) wheat and rice in one village each. The fourth rank was to tally blank

At the second point of time the pattern of first crop did not change much except that cotton was replaced by tuer and the number of villages were reduced from 77 to only 37 i.e.

from 82.80 to 39-79 per cent. Tuer, therefore could attain superiority in less than fifty per cent of the area occupied by cotton at the first point of time

In the second rank tuer topped the list of all six associated crops with 22 villages (23 66%) leaving three villages for vegetables, two for jowar and one each for cotton, sugarcane and fodder

The third rank crops include tuer, jowar, vegetables, wheat, cotton, sugarcane and oilseeds This order also shows tuer at the top with ten villages (10 76%), jowar by five villages (5 38%), vegetables by three villages (3 23%) and wheat, cotton, sugarcane and oilseeds by one each

In the fourth rank again tuer was leading in the three crop association with two villages (2 16%) cultivating it Jowar and vegetables by one village each

However, the notable fact is that cotton the most significant crop of the former year occupying a realm of 77 villages in the first order and eight villages in the second order was dashed down to one village each in the second and third ranks. Tuer, the sole competitor of cotton is found superior to all crops in all the ranks. While, the crops of lower status at the first point of time, such as jowar got greater significance than cotton in the descending ranks Rice disappeared, wheat retained the same position while some new crops as vegetables, sugarcane, oilseeds and fodder appeared with added values better than cotton at the second point of time (Fig. 5.6).

TALUKA KARJAN

RANKING OF CROPS

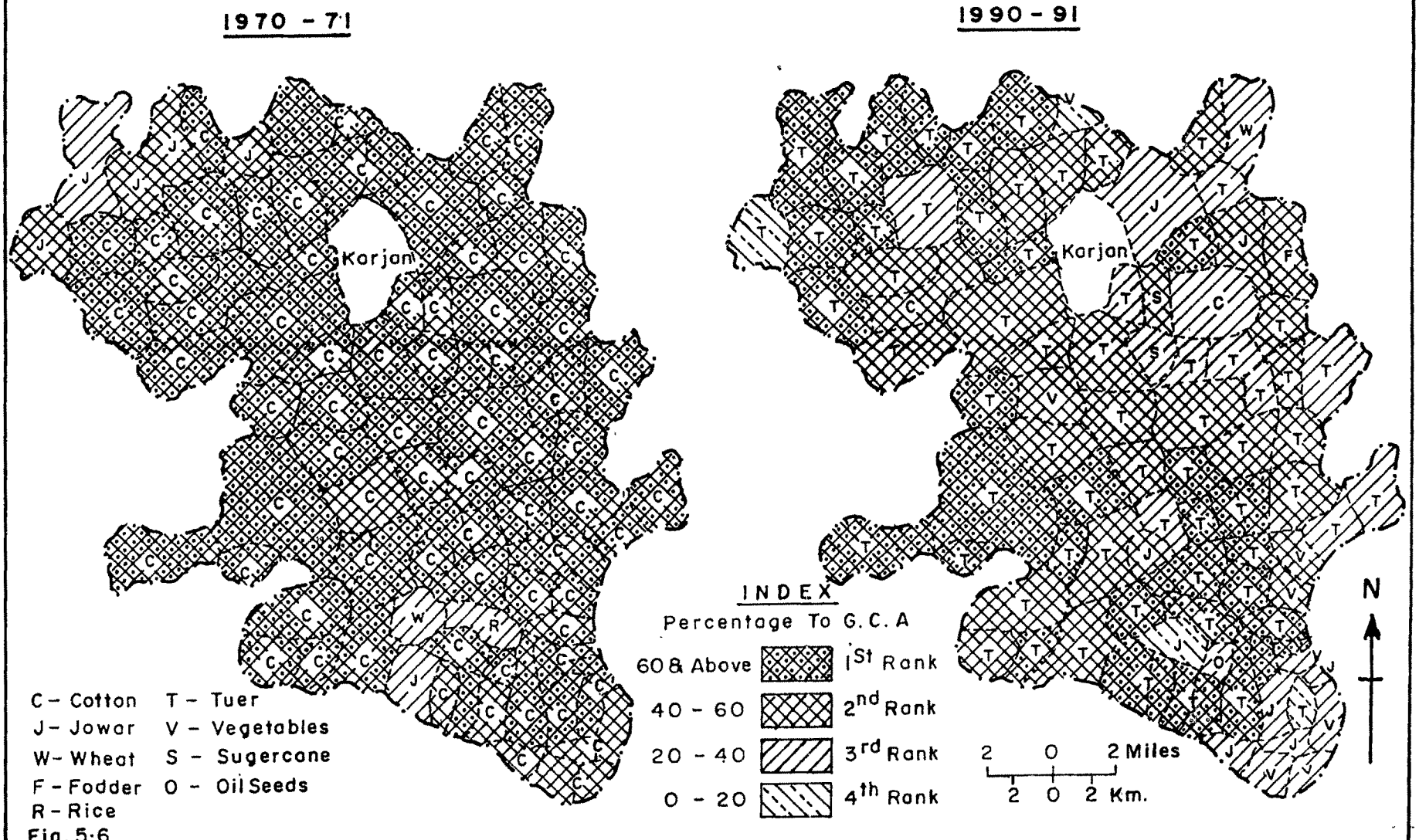

Fig. 5·6