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CROP COMBINATION REGIONS OF HAORA DISTRICT – A SPATIO-TEMPORAL ANALYSIS

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ABSTRACT: This paper attempts to examine the efficacy of a number of crop combinatorial techniques applied to the crop statistics of the district of Haora for 1934-39, 44-45, 54-57, 75-78 and 85-88. Among the three techniques of Weaver (1954), Raffiullah (1965) and Athawale (1968), it is found that the technique of Weaver is best suited to Haora on theoretical as well as practical grounds. The crop combination regions as derived from the application of Weaver's technique and their temporal alterations give a satisfactory background for studying the reasons behind spatial variations of agricultural activities in Haora during the last six decades. It is seen that the major forces which have conditioned the growth process of agriculture in Haora are irrigation and drainage improvements on the one hand and the spurt of industrial activities and rapid growth of population in the Calcutta Conurbation on the other.

1. INTRODUCTION

Crop combination regions often provide a sound basis for agricultural regionalization and planning. Besides, a particular crop combination is capable of bringing out clues to the economic and social behaviour of the people in the area concerned as it does not evolve by chance and is a function of economic and social factors in a particular ecological setting. The idea of crop combination makes possible the establishment of areas differentiated on the basis of the dominant crops, functionally related to one another and occurring together in varying proportions. An attempt has been made here to highlight the significance of crop combinations and dynamism of Haora district over time and space. However, a short account of the physical constraints will be of great help at this moment.

2. PHYSICAL SET-UP

Topographically, the district represents a nearly flat alluvial plain between the river Hugli to the east and Rupnarayan to the west. Geologically it is part of the Bengal basin and consists of alluvia brought down by the river Ganga from the Himalayas and a few east-flowing rivers from the Chhotonagpur plateau. The Hugli is the most important river flowing north-south along the eastern boundary of the district. East flowing rivers are the Damodar, Saraswati, Kana Damodar etc. Climatically the district is not very different from lower Bengal which has a distinct wet and a dry season during the course of the year. Soils are a valuable natural resource of the district since nearly 25 percent of the working population is directly dependent on agriculture occupying nearly 61 percent of

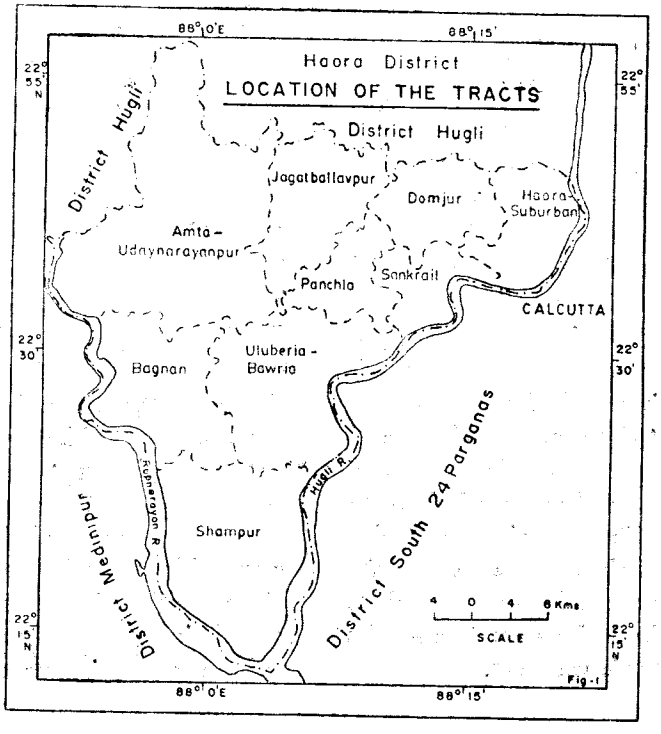
the total land area. Alluvial soils, deposited in great thicknesses are agriculturally very prospective. However, to the south the soils are rich in sodium chloride primarily due to tidal influence causing problems of salinity in some cases (Gupta & Mukherjee, 1970).

3. METHOD OF ENQUIRY

The study is based on police station level cross-sectional crop-statistics obtainable at five different time points of 1934-39, 1944-45, 1954-57, 1975-78 and 1985-88.

3.1 Changing Administrative Boudaries

At present the district has 13 police stations viz. Bally, Liluah, Haora (M.C.), Domjur, Sankrail, Panchla, Jagatballavpur, Udayanarayanpur, Amta, Bagnan, Uluberia, Bawria and Shampur. Though the study is based on police stations as units of information, the ditrict has been divided into a number of tracts comprising one or more police stations because the changing police station boundaries create problems of data availability and comparison. For instance, Udaynarayanpur police station came up in 1959 by taking a part of Amta police station; Liluah police station was formed in 1958 out of former Bally; Sibpur and Jagachha were merged with Haora city in 1961 and the agricultural data of Bawria were clubbed with that of Uluberia block II. For the above difficulty the spatial variations in crop combinations of the district for different time points have been examined in terms of certain tracts. Three of these tracts involve more than one police station. The Haora Suburban tract includes the police stations of Bally, Jagachha, Liluah, Sibpur and Haora city while the Amta-Udaynarayanpur and Uluberia-



Bawria tracts include such police stations as the names suggest. Ultimately 9 tracts stand as follows: (1) Haora-Suburban, (2) Domjur, (3) Sankrail, (4) Panchla, (5) Jagatballavpur, (6) Amta-Udaynarayanpur, (7) Bagnan, (8) Uluberia-Bawria, (9) Shampur (See fig. 1).

3.2 Combinatorial Techniques

A number of combinatorial techniques have been proposed by different authors for crop regionalization. Among them mention should be made of Weaver, Rafiullah (op. cit) and Athawale. The technique proposed by Weaver while working on crop combination regions of the American middle-west is based on the expression:

$$\alpha = \sqrt{\Sigma \ 100/N\text{-}A)^2/N}$$

where N = number of crops in a combination..

A = area of a crop as % of GCA (gross cropped area).

It should be carefully noted that N in this expression is not given but has to be determined through trial and error out of several alternatives by varying the N and identifying the case where d is minimum. In Weaver's own application of this technique crop areas having at least 1 per cent of total harvested croplands are taken for consideration.

Rafiullah basically followed the Weaverian assumptions, but instead of summing up all squared deviations, calculated the sum of squared differences between positive deviations and the sum of squared negative deviations. The maximum positive difference obtained through trial and error (by varying N) becomes an indicator of the appropriate number of crops in the combination.

Athawale on the other hand has attempted to ascertain the value of N (the number of crops to be included in the combination) to determine the crop combination. To attain the lower limit, in terms of acreages of crops, he introduced the formula as given below:

$$A = \frac{G}{3N}$$ where A is the lower limit in terms of acreage.

G = gross cropped area,

N = number of crops having acreage more than or equal to $\frac{G}{100}$

According to this formula, all crops having acreage more than 'A' will find place in crop combinations.

It will be interesting to note that almost all researchers endeavouring to work out a cut-off criterion according to which crops are to be included in or excluded out of a combination, face nearly insurmountable difficulty because in many combinations there is a very gradual decrease of acreage from the first to the **nth** ranked crop. It seems that there is no fullproof statistical solution to the problem of drawing a boundary between 'significant' and 'insignificant' crops.

We have, in this paper, applied the combinatorial techniques adopted by Weaver and Athawale. Weaver's method, though laborious, gives a reasonable solution because if takes into consideration a number of alternatives and finally selects one through trial and error. Athawale, on the otherhand, proposed a much simpler method which when applied to the case of our selected district gives ap-

parently heartening results. But the satisfaction becomes shortlived when we find that Athawale does not mention the background for selecting such a method, nor does he explain in any scientific terms the rationale for using his constant (3, 2 etc.) while finding out the 'appropriate' lower limit of acreage above which crops are considered to be constituents of a combination. It is only accidental that his method has given an apparently satisfactory solution in the case of Haora. We have presented the results obtained from Athawale's technique but we shall not recommend this for further application.

One of the main problems associated with the Indian subsistence agricultural scenery is that the principal food crops have an overwhelming dominance in acreage which in normal circumstances project only one or two crops as the significant members of most crop combinations. Yet, if we are not too keen to highlight this dominance then we should also recognize the significance of some lesser ranking crops which may assume prominence because of their relative concentration in atleast a few particular tracts compared to their average standing in the regional economy. Such a prominence may be projected through the method proposed by Weaver as he recognizes that the cut-off point should decrease proportionately with the degree of diversification attained.

Judging from a purely statistical point of view Weaver's technique suffers from serious methodological shortcomings; first because he uses a double standard when he considers even those crops having less than 1 percent land to arrive at the GCA and excludes them from the purview of his subsequent analysis; and second because the sum of positive deviations is not equal, to that of negative deviations in his method.

The other method which appears to be as important as Weaver's is that of Rafiullah who unlike Weaver takes the maximum positive deviation and suffers from a greater number of shortcomings than Weaver. Yet, keeping in mind the specificity of the Indian scene (overlominance of principal food crops) it is advisable to follow Weaver in order to get a proximate characterization of the real situation.

4. SPATIO-TEMPORAL VARIATIONS IN CROP COMBINATION

The techniques used in this paper help us to classify the tracts in several combinatorial **levels** again subdivided into combinatorial **types.** By a combinatorial level we mean the number of crops present in a combination and by combinatorial types we mean the actual names of the crops in a combination. Thus a two-crop combination implies only a level but when we come to the combinatorial type this two crops may be **aman** and **aus** or **aman** and jute or jute and vegetables and so on.

We shall first place the results of the computations in some summary forms in which we shall deal with only the combinatorial levels and not the combinatorial types. Here, it should be mentioned that some of the combinatorial levels may not at all figure in the district over any point of time, either through Weaver's or through Athawale's techniques.

4.1 Results

The summary table presented below shows that 9 Weaverian combinatorial levels stretching from one-crop to eleven-

Table — 1 : Combinatorial Levels (after Weaver & Athawale)

Tracts	Levels by Periods									
	1934-39		1944-45		1954-57		1975-78		1985-88	
	W	A	W	A	W	A	W	A	W	A
Amta-Udayanarayanpur	9	2	7	3	1	1	11	9	10	8
Domjur	6	3	7	3	6	3	9	4	8	4
Haora-Suburban	7	2	6	3	6	2	7	4	6	4
Sankrail	7	3	7	3	1	2	5	3	6	4
Panchla	6	2	1	3	1	2	8	4	8	5
Bagnan	1	2	1	1	1	1	10	5	9	5
Jagatballavpur	1	1	1	1	1	1	8	4	8	3
Shampur	2	1	2	2	1	1	1	2	5	2
Uluberia-Bawria	1	1	1	1	1	1	1	1	6	4
Absolute Level (District Total)	7	2	7	2	1	1	10	5	10	4

W = Following Weaver's Technique
A = Following Athawale's Technique

crop, three-and four-crop levels being totally absent, appear in the district at some point of time or other. It also shows that seven-combinatorial levels, from one to nine, except seven and eight, emerge through the application of Athawale's technique to the same time and space. The table also gives the absolute status of the district in different time points according to both Weaver and Athawale. This absolute status refers to the sum of all levels associated with the tracts in any specific time point.

4.2 A Methodological Comparison

A comparison between the results derived from the application of Weaver's and Athawale's methods may not be irrelevant inspite of the methodological shortcomings of the latter. While the Weaverian surface appears to be more discontinuous Athawale's space is more gradual. In the earlier periods (1934-39 & 1944-45), the difference between the two systems does not seem to be much except that the Weaverian surface is more variable than Athawale's. This difference is a direct result of Athawale's constant. But the repeated pattern through the three later periods (1954-57, 1975-78 & 1985-88) bring out the contrast quite vividly. Athawale's method projects an image of a relatively smooth spatial change with a lesser number of

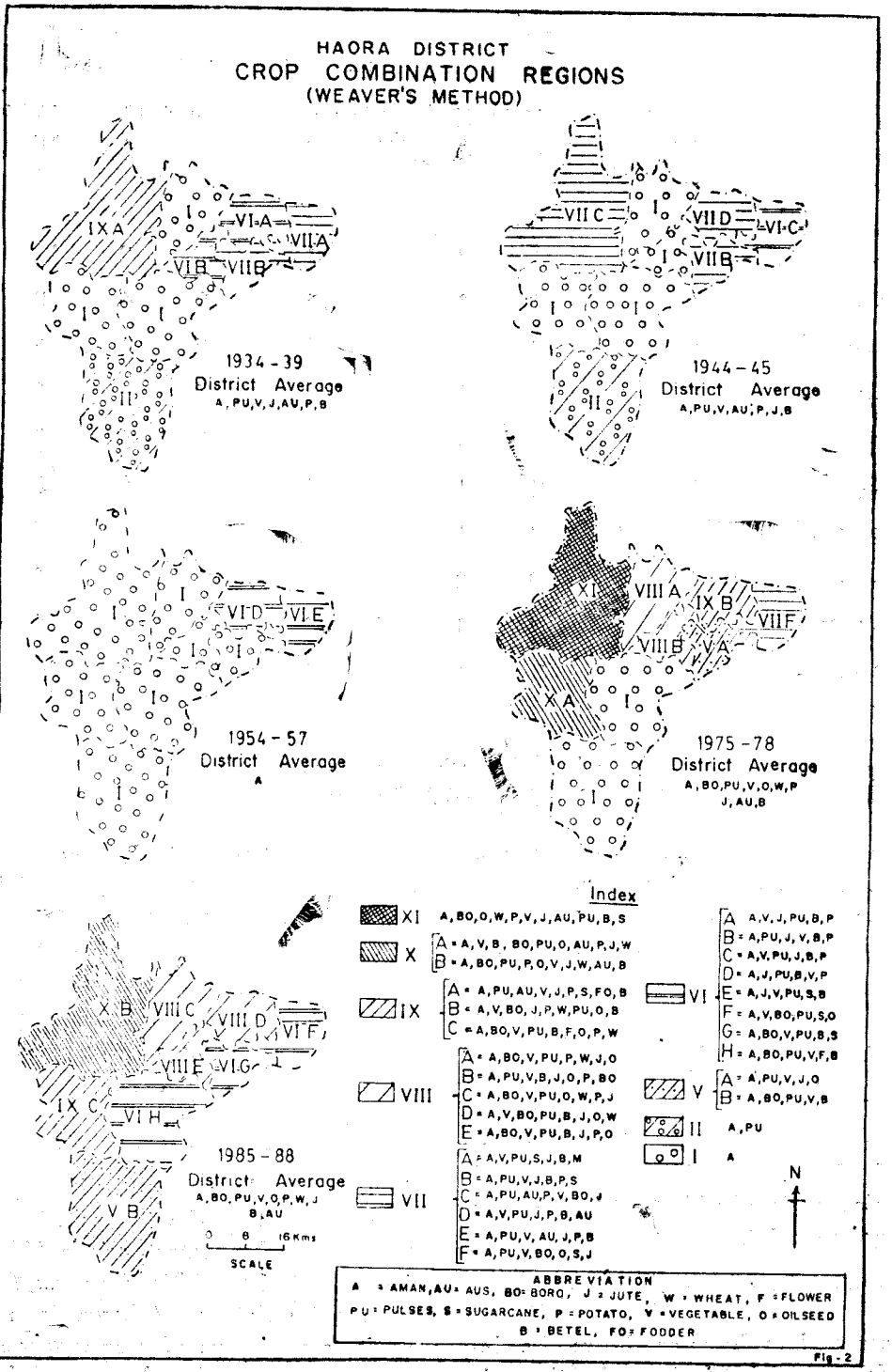
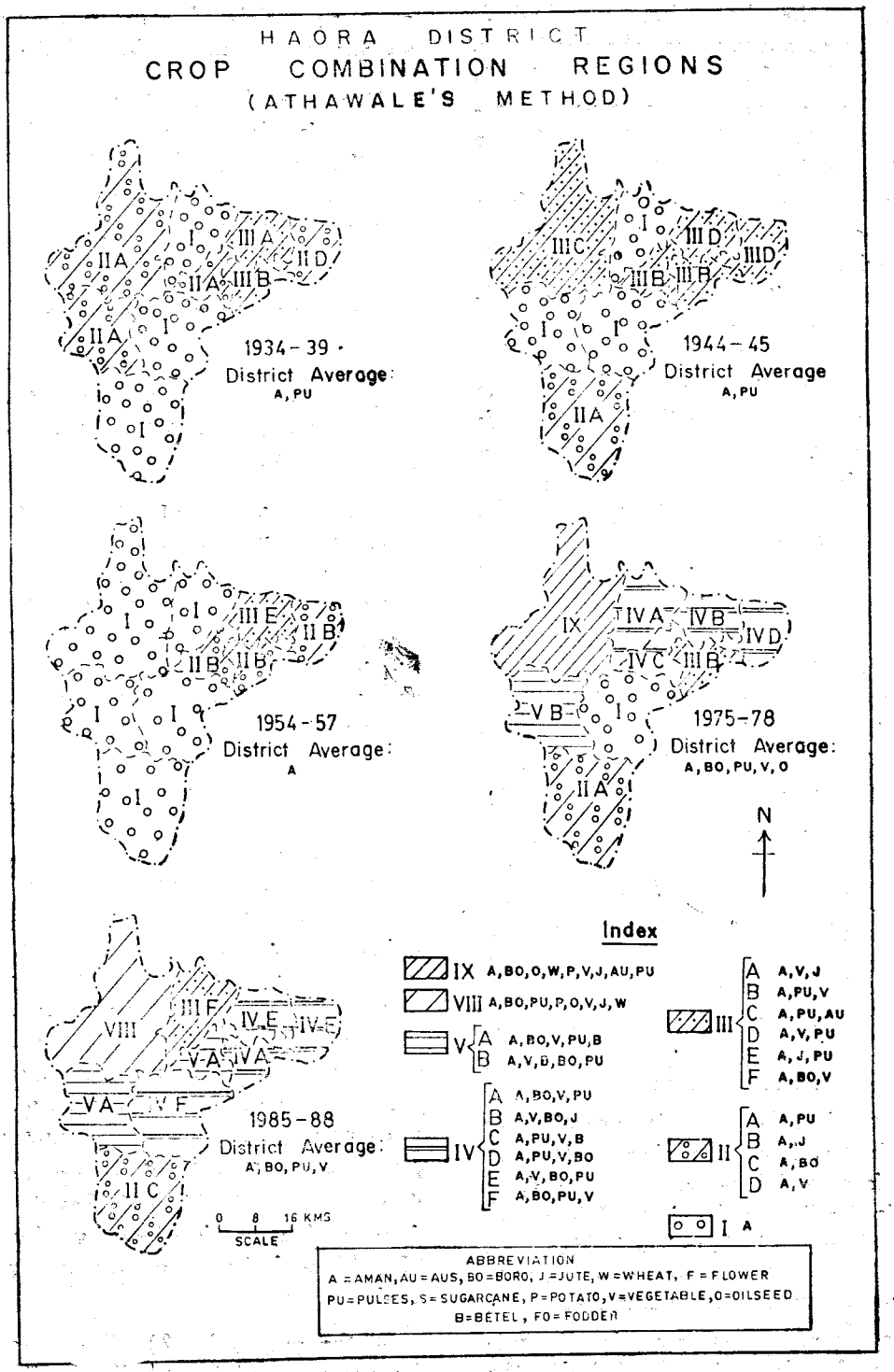

HAORA DISTRICT
CROP COMBINATION REGIONS
(WEAVER'S METHOD)
1934 - 39
District Average
A, PU, V, J, AU, P, B
1944 - 45
District Average
A, PU, V, AU, P, J, B
1954 - 57
District Average
A
1975 - 78
District Average
A, BO, PU, V, O, W, P
J, AU, B
1985 - 88
District Average
A, BO, PU, V, O, P, W, J
B, AU
0 8 16 Kms
SCALE
Index
XI A, BO, O, W, P, V, J, AU, PU, B, S
X A = A, V, B, BO, PU, O, AU, P, J, W
B = A, BO, PU, P, O, V, J, W, AU, B
IX A = A, PU, AU, V, J, P, S, FO, B
B = A, V, BO, J, P, W, PU, O, B
C = A, BO, V, PU, B, F, O, P, W
VIII A = A, BO, V, PU, P, W, J, O
B = A, PU, V, B, J, O, P, BO
C = A, BO, V, PU, O, W, P, J
D = A, V, BO, PU, B, J, O, W
E = A, BO, V, PU, B, J, P, O
VII A = A, V, PU, S, J, B, M
B = A, PU, V, J, B, P, S
C = A, PU, AU, P, V, BO, J
D = A, V, PU, J, P, B, AU
E = A, PU, V, AU, J, P, B
F = A, PU, V, BO, O, S, J
VI A = A, V, J, PU, B, P
B = A, PU, J, V, B, P
C = A, V, PU, J, B, P
D = A, J, PU, B, V, P
E = A, J, V, PU, S, B
F = A, V, BO, PU, S, O
G = A, BO, V, PU, B, S
H = A, BO, PU, V, F, B
V A = A, PU, V, J, O
B = A, BO, PU, V, B
II A, PU
I A
N
ABBREVIATION
A = AMAN, AU = AUS, BO = BORO, J = JUTE, W = WHEAT, F = FLOWER
PU = PULSES, S = SUGARCANE, P = POTATO, V = VEGETABLE, O = OILSEED
B = BETEL, FO = FODDER

Fig - 2


HAORA DISTRICT
CROP COMBINATION REGIONS
(ATHAWALE'S METHOD)
1934-39
District Average
A, PU
1944-45
District Average
A, PU
1954-57
District Average
A
1975-78
District Average:
A, BO, PU, V, O
1985-88
District Average:
A, BO, PU, V
N
Index
IX A, BO, O, W, P, V, J, AU, PU
VIII A, BO, PU, P, O, V, J, W
V A A, BO, V, PU, B
B A, V, B, BO, PU
III A A, V, J
B A, PU, V
C A, PU, AU
D A, V, PU
E A, J, PU
F A, BO, V
IV A A, BO, V, PU
B A, V, BO, J
C A, PU, V, B
D A, PU, V, BO
E A, V, BO, PU
F A, BO, PU, V
II A A, PU
B A, J
C A, BO
D A, V
I A
0 8 16 KMS
SCALE
ABBREVIATION
A = AMAN, AU = AUS, BO = BORO, J = JUTE, W = WHEAT, F = FLOWER
PU = PULSES, S = SUGARCANE, P = POTATO, V = VEGETABLE, O = OILSEED
B = BETEL, FO = FODDER

spatial cut-offs between crop-regions as contrary to the Weaverian method which differentiates space more sharply into a larger number of compartments. In 1975-78, Athawale's method helps us to identify 1-crop, 2-crop, 3-crop, 4-crop, 5-crop and 9-crop levels, meaning that over a large area there is a smooth change from 1 to 5-crop levels and that the second mode with a 9-crop level provides for the only discontinuity in the surface. In 1985-88, also only one smooth surface stretches between 2-crop, 3-crop, 4-crop and 5-crop combinatorial levels and the only discontinuity prevails between this surface on the one hand and the 8-crop combination on the other. In the Weaverian map of 1975-78, we have two discontinuities, one between 1-crop and 5-crop combinations, the second between 5-crop and 7, 8, 9, 10, 11-crop combinations. In 1985-88, although there is a single discontinuity between 5-6 and 8-9 crop combinations of Weaverian type, the polarization appears to be very sharp since the distribution within each compartment has become fairly compact.

All methodological differences between Athawale and Weaver cannot be discussed at length within this short campus. But it can be concluded very safely that the range of variations projected through Weaver is generally larger than through Athawale. But this is not a very extraordinary finding. More important is the fact that Weaver is capable of showing more prominently the disconnections or discontinuties in a changing pattern in comparison to Athawale. Still more significant is the finding that in the Weaverian analytical method there is a hidden tendency to identify compactness within each single surface and thereby to project a sense of increasing spatial differentiation and polarization. Statistically, the Weaverian subdivision of space is based on the principle of comparison between variance within and variance between.

Since the key-word of geographical analysis is "increasing spatial differentiation," it seems that Weaver's combinatorial technique is a tool, quite adept to help such analyses.

5. FACTS DERIVED FROM WEAVERIAN ANALYSIS

Described below in brief are certain facts that deem to be important from the examination of the Weaverian method applied in the district of Haora.

The graphical profile showing the passage of the district through time helps us to identify one major fact that the period 1954-57 appears as a great divide in the sense that from 1934-39 to 1954-57 the district loses its diversity in crop combination from 7-crop level to 1 but from 1954-57 to 1975-78 and 1985-88 it increases from 1 to 10 (Fig. 4). The individual tract profiles can be classified into four groups. Amta-Udaynarayanpur, Sankrail and Panchla broadly represent the district character. Haora-Suburban and Domjur from the second group which has always experienced a high level of diversity and is distinctly separate from the rest in the sense that the 1954-57 slump did not affect the group. Bagnan & Jagatballavpur from the third group which is characterized by very low diversity upon 1954-57 but rises to moderate-high levels subsequently. The fourth group comprising Shampur & Uluberia-Bawria continues with stagnating low diversity still 1975-78 and then improves only moderately.

On the map (Fig. 2) all groups, with the exception of Jagat-ballavpur-Bagnan,

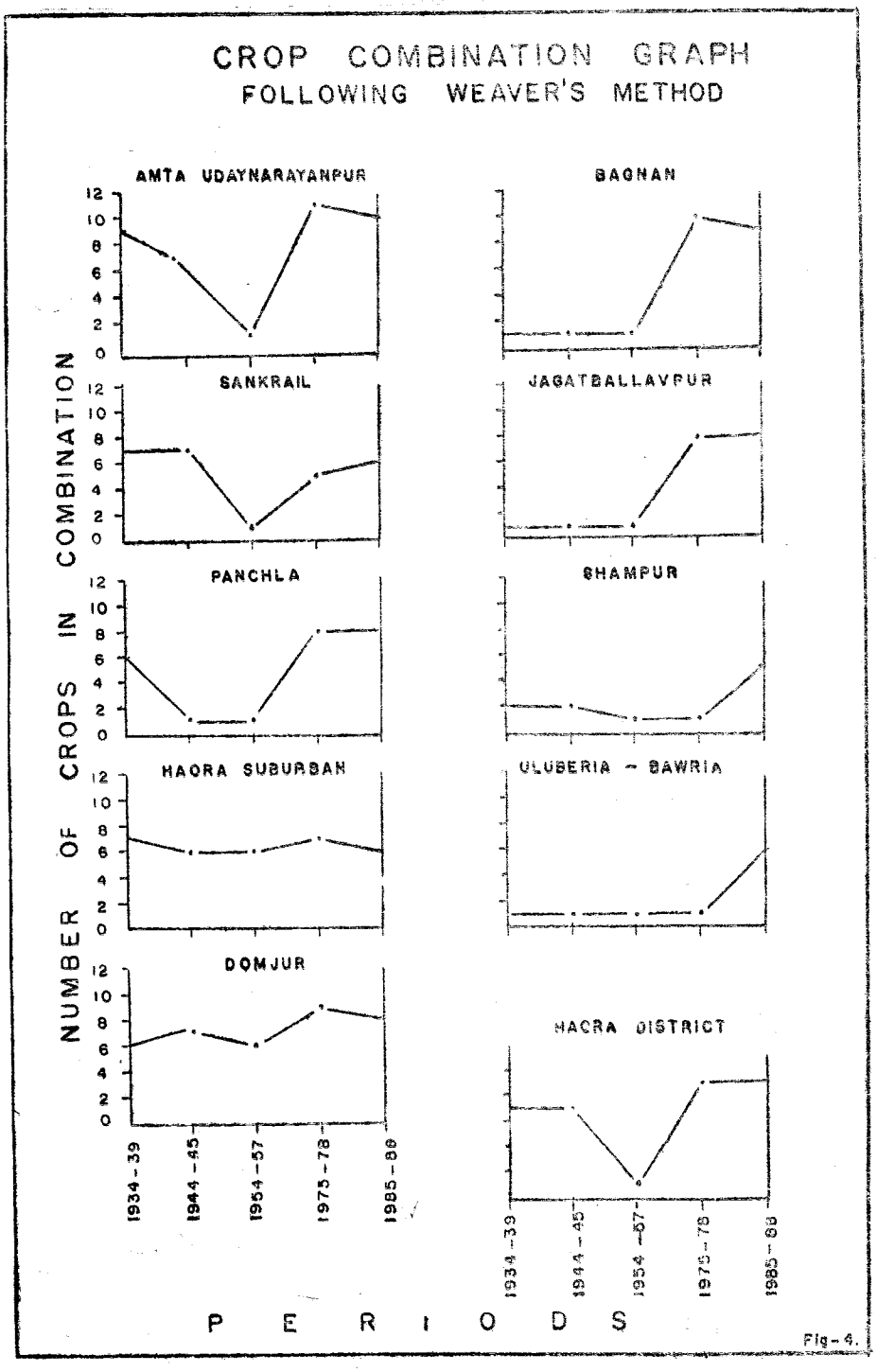

CROP COMBINATION GRAPH
FOLLOWING WEAVER'S METHOD
AMTA UDAYNARAYANPUR
BAGNAN
SANKRAIL
JAGATBALLAVPUR
PANCHLA
SHAMPUR
HAORA SUBURBAN
ULUBERIA – BAWRIA
DOMJUR
HAORA DISTRICT
NUMBER OF CROPS IN COMBINATION
0 2 4 6 8 10 12
1934-39
1944-45
1954-57
1975-78
1985-86
P E R I O D S

Fig-4.

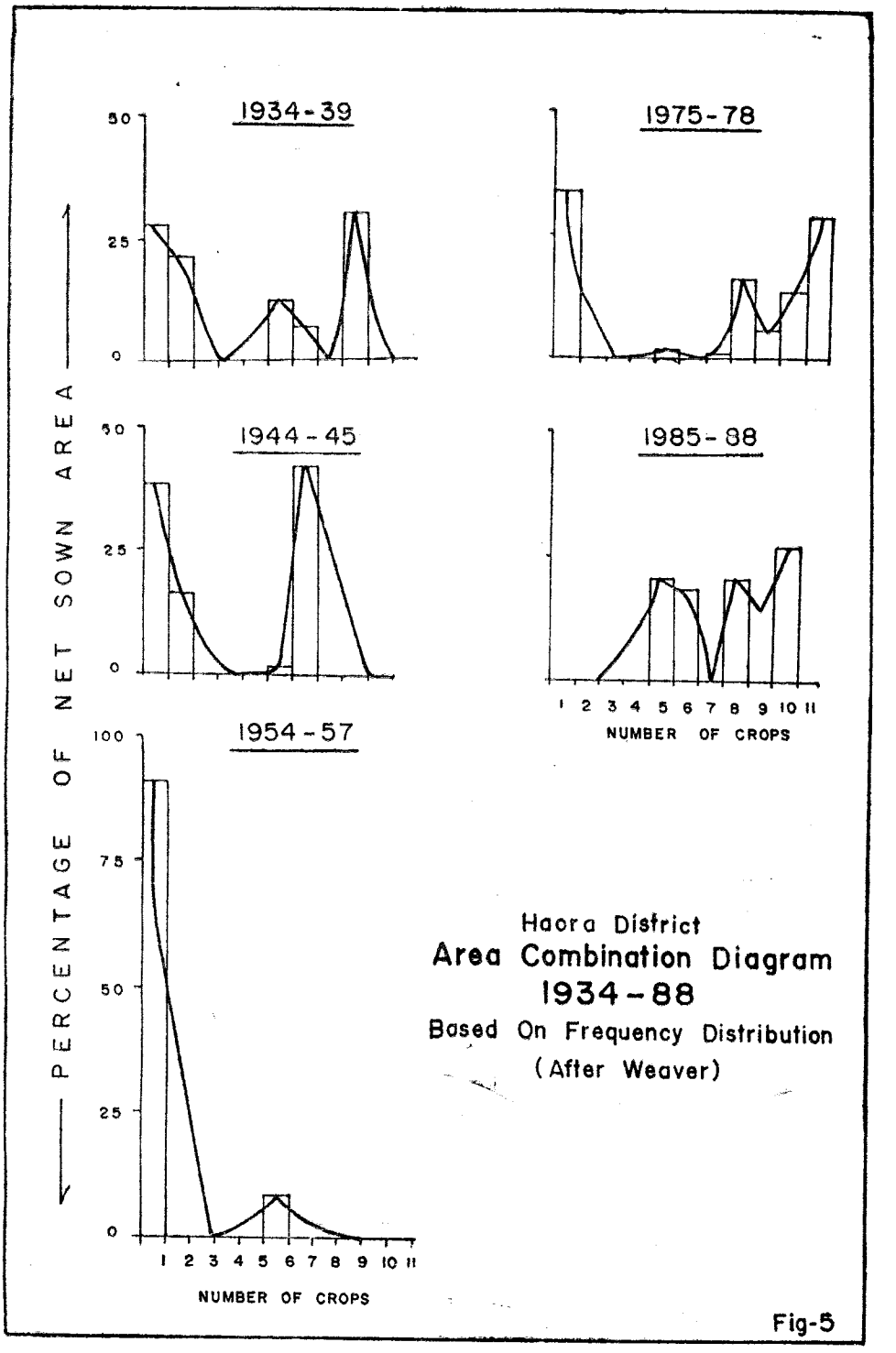

1934-39
1975-78
1944-45
1985-88
1954-57
50
25
0
100
75
1 2 3 4 5 6 7 8 9 10 11
NUMBER OF CROPS
PERCENTAGE OF NET SOWN AREA
Haora District
Area Combination Diagram
1934-88
Based On Frequency Distribution
(After Weaver)

Fig-5

appear as contiguous territories. The discontiguity between Jagatballavpur and Bagnan, however, is not real. It is only because the administrative boundaries are such that the spatial contiguity is disturbed. This discontiguity could not have been there if the map were prepared on the basis of isolines.

Apart from the variations in crop combinations over time, it will also be interesting if we consider the areas under different combinations in different times. For this have been prepared area-combination diagrams in which the net sown areas falling within each combinatorial levels have been shown (Fig. 5).

The graph for 1934-39 shows that during this period the 9-crop level occupies the largest net sown area followed by ,1, 2, 6 & 7-crop-combinations respectively.

In 1944-45 there is a noticeable change in the pattern. The 7-crop-level occupies the largest area closely followed by the 1-crop-level. The 2-crop-level occupies a distinctly distant third position and the 6-crop-level has a very negligible area to its credit.

In 1954-57 there is a drastic change in the pattern in which the 1-crop-level gains overwhelming importance over all others. During this period practically the entire area experiences a mono-crop culture of **aman** paddy.

The period of 1975-78 witnesses more diverse levels of crop combination. But

Table — 2 :

1934-39		1944-45		1954-57	
Surface	N.S.A. as % of total	Surface	N.S.A. as % of total	Surface	N.S.A. as % of total
1-2	49.66	1-2	55.79	1	91.13
6-7	19.77	6-7	44.21	6	8.87
9	30.57				

1975-78		1985-88	
Surface	N.S.A. as % of total	Surface	N.S.A. as % of total
1	34.11	5-6	38.66
5	1.57	8-9	24.97
7-8-7	19.89	9-10	36.37
9-10-11	44.43		

still the 1-crop level prevails over others. This is closely followed by 11, 8, 10 and 9-crop levels. Area under 5 and 7-crop-combinations are far from considerable.

The picture for 1985-88 seems to be more progressive in which no tract has less than a 5-crop level. The area under 10-crop-combination is highest followed closely by 5, 8, 6 & 9-crop-combinations in order of importance.

The area-combination diagrams give us the modes as well as the different surfaces. The surfaces are discernible by identifying the troughs separating the modes. In 1934-39 we find three distinct surfaces, the first between 1 crop and 2 crop levels covering 49.66 per cent of the net sown area, the second between 6 and 7 crop levels covering 19.77 per cent and the third at 9 crop level covering 30.57 per cent of the net sown area. In 1944-45 help such analyses.

the first surface between 1 and 2 crops covers 55.79 per cent and the second surface between 6 and 7 crops covers 44.21 per cent of the net sown. In 1954-57 there is virtually only a single crop surface spreading over 91.13 per cent of the net sown area of the district while the second surface at the 6-crop-level controls not more than an insignificant area of 8.87 per cent. From 1954-57 we find a steady increment in the number of crops growing in the district. In 1975-78 there are as many as four surfaces at 1-crop, 5-crop, 7-8-9-crop and 9-10–11-crop-levels having respectively 34.11, 1.57, 19.89 and 44.43 per cent of the net sown area. This is for the first time that we find higher level modes dominating over the lower level ones. In 1985-88 although one of the surfaces disappears the other three lie at considerable higher levels of diversity, the first surface at 5-6 crop, the second at 8-9 and the third at 9-10 crop level explaining respectively 38.66 per cent, 24.97 per cent and 36.37 per cent of the net sown area of the district (Table-2). These surfaces actually point to the existence of different systems of cultivation evolved as a result of the interactions of various economic forces acting upon local ecology.

6. CAUSES OF DISPARITY IN CROP COMBINATIONS

In the above discussion a number of observations have been made about variations in the level of diversity and crop combination. We shall now try to explore the causes of these variations. Despite the fact that the district of Haora does not have much of a variation in its physical characteristics, it shows a wide variation in crop combinations over time and space. Such variations are related more to variations in economic facilities than in natural conditions. It should be noted here that in the district of Haora the seasonal rainfall distribution allows the cultivation of **aman** as the universal crop and jute, **aus, kharif** vegetables and **kharif** pulses as other rainfed crops. Other crops are cultivated during the dry winter depending principally on irrigation. Fertilizer, better variety of seeds, market, transportation and labour supply are the other secondary requirements. The tracts having most of such facilities have higher combinatorial levels.

The tracts with large number of crops are mostly located in the northern half of the district and these tracts happen to be better irrigated. The Amta-Udaynarayanpur tract is the principal example in this respect. Domjur and Sankrail are situated very close to the Calcutta Conurbation and the cultivators are more inclined to produce as much a variety of crops as

possible. The cultivators of the Haora-Suburban tract have a conspicuous urban orientation and produce vegetables and other crops which can fetch ready cash from the urban markets. Even in the period of 1954-57 in which all other tracts had only mono-culture of **aman** the two tracts of Domjur and Haora-Suburban record 6-crop combinations (Fig. 2).

During 1934-39, except the incidence of drought in 1935 and flood in 1937, there was no event of special significance but 1944-45 was influenced by the famine and epidemics of 1943-44. These were probably responsible for the smaller number of crops during this period than during the period of 1934-39.

The single crop combination during 1954-57 in most of the tracts (Fig. 2 and 3) was the result of a number of natural, social, economic and political factors. The communal riots of 1950, the flood havoc of 1956 and the drought of 1954 and 1955 may be largely responsible for the mono-cultural pattern. Moreover, due to the abolition of the **zamindary** system in 1956 a large number of cultivators under different **zamindars** were granted titular ownership of land. The new title holders who previously used to get financial support from the **ex-zamindars** for the cultivation of irrigated crops suddenly lost this facility. They had to remain satisfied by cultivating only rain-fed **aman** as their main source of livelihood. So in this period (exception from other periods) one of the most important rain-fed cash crop i.e., jute drastically enters the district's cropping system as a second rank crop. Besides, because of the low priority of agriculture during the Second Five Year Plan non-agricultural activities were stimulated by the great industrial activities in the metropolis of Calcutta and Haora along the river bank as far south as Uluberia. Numerous mills and other industrial concerns attracted a large number of labourers from other parts of India, and the local inhabitants benefited by the trade they brought (Census, 1961).

After 1954-57, the D. V. C. had resuscitated some river channels like the Saraswati and the **Maja** Damodar and re-excavated some of the branch canals and distributaries. The drainage schemes of Haora, Barajol, and Rajapur made ballavpur less unhealthy. The total area the police stations of Domjur and Jagat-commanded by the D. V. C. canal network in the district comprised 22,819 hectares falling within Amta, Jagatballavpur and Domjur police stations. Of course it had not yet been possible to supply irrigation water throughout the entire area but the excavation of canals and ancillary works have made sufficient progress. Since 1963-64 both **kharif** and **rabi** crops had been receiving irrigation water from the D. V. C. canals and during 1965-66 a total of 1,577 hectares in the district were irrigated during the **kharif** and 719 hectares during the **rabi** seasons. However, the embankment in the Uluberia sub-division had prevented disastrous floods and facilitated the extension of cultivated area (District Gazetteer, 1972).

Limitations in the supply of irrigation water seem to be the principal constraints in mono-cropped areas. The situation improved only after 1954-57 when a large number of small irrigation projects were launched in these tracts, thereby increasing the number of crops.

Moreover, the percentage of agricultural workers to total workers increased

from 23.80 to 32.52 between 1961 and '71 and decreased again to 25.00 during 1981. Moreover, the density of rural population rapidly increased from 1,276 persons/Km^2 in 1971 to 1,517 persons/Km^2 in 1981. The increased agricultural workers and rural population gave a fillip to cultivate large number of crops on the decreasing cultivated land in recent years.

7. CONCLUSION

Geography has often been defined as the study of increasing spatial differentiation. This differentiation takes place through transformation of space over-time by changing patterns of interaction between physical as well as socio-economic forces. Geographers interested in the process of differentiation are required to set their objectives of study accordingly and select their information base and techniques in a manner so as to fit in with the objectives. The district of Haora inspite of being without much physical-geographical variations presents a picture of a highly varied cross-section with regard to crop associations. The emergence of this highly differentiated agricultural landscape can only be studied when adequate information pertaining to different periods of time aree taken into account. The crop combination technique of Weaver which can successfully bring out the character of a differentiated space, when applied to Haora, paves the way to formulate the objective questions such as why there was a growing tendency towards mono-culture from 1934-39 to 1954-57; why there was a tendency towards increasing diversity from 1954-57 to 1985-88; why Domjur and Haora-Suburban were not affected by the 1954-57 slump; why Uluberia-Bawria and Shampur stagnated upto 1975-78 and why the northern areas could improve their positions at a faster rate than the southern ones. Such formulations guide the investigations in the proper directions to end up with such conclusions as that the abolition of **zamindary** was followed immediately by an adverse effect on agricultural enterprise creating the 1954-57 slump; irrigation, drainage improvement, industrialization led to increasing diversity in the post-1957 period; Donjur and Haora-Suburban had the facility of urban markets throughout the entire period explaining why they have always shown higher diversity; Uluberia-Bawria and Shampur because of their southern locations and greater problems of salinity and floods could not make any breakthrough until very recently when drainage improvements and urbanization came in vigorously; and the northern areas have been able to improve their positions faster because land improvement measures could be taken up with greater ease in the sections.

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