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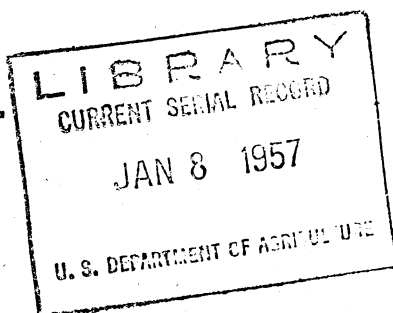
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THE INDIAN JOURNAL OF AGRICULTURAL ECONOMICS



(Organ of the Indian Society of Agricultural Economics)

Vol. XI	JULY—SEPTEMBER 1956	No. 3
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X CROP VARIATIONS—1943-54

A STUDY IN CROP PATTERN CHANGES FOR FARMERS IN DIFFERENT SIZE-GROUPS OF HOLDINGS *

By

C. H. Shah

INTRODUCTION

Purpose

Of late, the problem of production responses to price variations is being actively discussed. India has launched two Five-Year Plans in succession and planning implies at some stage or the other active intervention by the State in the free play of economic forces including prices. When the State interferes it is interested in knowing the likely result of such intervention. At the same time, it may use relative prices as one of the policy variables to fulfil the production targets.

The structure of Indian agriculture is assumed to make farm production price inelastic. Especially in a subsistence economy the crop pattern is believed to be rather rigid in its response to prices. Food and fodder, the two major components of crop patterns, are less susceptible to changes since farm families' requirements of these crops are more or less fixed. If this reasoning is true, it would also imply that the smaller the farm holding, the greater would be the rigidity of the crop pattern. This paper examines this hypothesis.

We study the changes between 1943-44 and 1953-54, a period of eleven years, in crop patterns of farmers in three size-groups (i) big, (ii) medium and (iii) small. Whereas the assessment of overall changes in crop pattern for the country or a region is easy to make from the published official data, it is not easy to ascertain the same with reference to size-groups of holding.

Period

The period of eleven years may be considered sufficiently long for a qualitative analysis of comparability in crop variations for three size-groups. It may however be considered short for measuring the changes in crop pattern in response to price variations. A much larger period should be selected for this purpose. However, village records are not available usually for more than a decade and it was therefore difficult to extend the period of study substantially. During 1943-54 there were wide variations in the proportions of the area under different crops, and in that this period provides a fairly good testing ground.

* Mr. K. D. Shah collected data from village records. Mr. V. S. Vyas assisted in tabulation. Both were for sometime Investigators in Agricultural Economics Section, Department of Economics. Mr. B. S. Joshi helped in statistical matters.

Sample

The field survey was confined to the Kodinar taluka of the Amreli district of Gujarat. The physical background of the taluka has wide variations. Hence the taluka was subdivided into four natural regions: the Nagher, the Eastern, the Coastal, and the Gir. From these four relatively homogeneous regions, in all 16 villages were selected. The family sample was drawn on the basis of stratified random sample, with size-groups as strata.

The size-groups were demarcated on the basis of economic holding. The size of economic holding was determined in consultation with a number of knowledgeable official and non-official agencies. The size of economic holding for the four sub-regions was taken as follows:—

Table No. 1

Region	Economic Holding—Acres
Coastal	15
Eastern	15
Gir	20
Nagher	6

Families with more than one "economic" holding were marked as big, those with less than economic holding but more than half of it were marked as medium and those with less than half the economic holding were marked as small.

For the purpose of the analysis it was necessary that the size of holding of the sample family did not change during the period under observation. It was however not possible to get sufficient number of families with absolutely constant size. The variations in the size of holding within the limits of the size-groups were therefore ignored for selecting families for the study. The following table compares the number of sample families before and after sifting.

Table No. 2

Size Group	Sample Families	
	All	Within the same size-group
Big	77	51
Medium	168	69
Small	232	104

Exclusion of families who did not remain in the same size-group of holdings over the period under our study may perhaps be expected to vitiate the analysis of crop-pattern changes in as much as the ascendancy of such families to higher groups or the descendancy to lower groups was brought about by price variations. But on further examination, it appears that acquisition or dispossession of land was mainly due to the factors other than price variations such as family partitions and changes in land taken on lease and hence the exclusion of these families could not vitiate very much our conclusions regarding crop variations.

Reliability of Data

For this study, data regarding area are drawn entirely from village records. Though better data for the last one or two years could be obtained if farmers were approached, it would not have been possible to obtain from them a reliable series of data over eleven years. The village records are known to be defective but it was not possible to remove these defects from the data used for this study. However there is one encouraging feature, the defects in the village records were not probably confined predominantly to any one size-group.

One of the major defects of the data was regarding the fallow land. Fallow land was found to have expanded for some years to unprecedented size.¹ This phenomenon was observed in all the three size-groups.

Table No. 3

Fallow Land

Year	Percentage to total land personally operated		
	Big	Medium	Small
1943-44	14.0	10.9	6.4
1944-45	14.0	7.8	11.6
1945-46	22.5	10.4	16.1
1946-47	26.8	19.2	26.1
1947-48	25.0	29.4	30.6
1948-49	26.2	16.0	21.7
1949-50	20.9	10.9	21.7
1950-51	22.5	14.7	14.1
1951-52	12.4	8.0	9.4
1952-53	8.6	5.1	7.9
1953-54	8.8	4.4	2.8

The annual variations in the proportions of fallow land to total operated land varied from size-group to size-group. Whereas for big farmers the increase and decline in fallow land were least pronounced, they were largest for the small farmer.

Farm prices series was not available locally either from official or non-official sources. Hence price indices published by the Government of India are used instead. The base year is shifted to 1943-44 to correspond to the first year of the period under study.

Factors Affecting Crop Pattern

The changes in crop pattern may result from a variety of factors such as changes in production technique including extension of irrigation, variations in

¹ A close analysis of the crop pattern and fallow land variations suggests much greater concealment of area under food crops during the middle six years. For full discussions refer to 'A Note on Crop Statistics, 1953-54', *Indian Economic Journal*, June 1956.

season, price variations and price expectations, the government regulations of crop acreages and the more enduring factor like population growth and change in tastes.

It is assumed that these factors excluding prices and government regulations would operate with uniform significance for different size-groups. This assumption may be considered too bold in the matter of changes in the technique of production. The rate of adoption of various changes in the technique of production is generally expected to vary for farmers in different size-groups. However, for the period under study, the farmers in various size-groups selected for this study did not evince any marked difference in that respect. Figures of area under irrigation for three different size-groups of farmers corroborate this.

Table No. 4

Irrigation

Size-group	Percentage of irrigated area to total cropped area	
	1943-44	1953-54
Big	16.8	19.6
Medium	23.1	22.2
Small	26.0	27.2

There might be a few other factors, internal to the economy of the farmer, that might inhibit the response of crop patterns of farmers in different size-groups to forces causing crop-shifts. The difference in production capacity of land cultivated by farmers in different size-groups may affect decisions regarding the changes in crop pattern. On comparatively inferior lands, the choice of crops, for instance, is limited. However, if we take the land assessment as an indicator, soil fertility differences for farmers in the final sample were not found to be significant.

Table No. 5

Land Assessment

Size Group	Per Acre						Percent			
	Below 8 as.		9 as. to 24 as.		25 as. to 40 as.		41 as. & above		Total Cultivated Land	
	1943-1944	1953-1954	1943-1944	1953-1954	1943-1944	1953-1954	1943-1944	1953-1954	1943-1944	1953-1954
Big	7.5	9.1	34.5	36.0	53.5	49.9	4.5	5.0	100	100
Medium	5.8	5.1	48.2	50.1	39.2	39.3	6.8	4.8	100	100
Small	7.9	8.1	44.1	43.2	36.4	36.6	11.6	12.1	100	100

Other factor which may affect the changes in crop pattern may be the change in the size of holding of the farmer. Expansion or contraction of the holding would change the basis on which the shifts among crops might take place. The influence of this factor was minimised, as already indicated by including in the final selection only those families the changes in whose size of holding were within the limits of the size-group to which they belonged.

Since long-term factors such as population growth etc., would operate slowly and without any marked bias for any of the size-groups, only two factors may be taken to have influenced the crop pattern predominantly : (i) price changes, and (ii) the restrictions imposed by the Government on areas under food and non-food crops. We shall examine the comparability of the crop variations for three size-groups in response to the combined influence of those factors. The relative significance of these two factors will be discussed thereafter.

CROP VARIATIONS

As already indicated in the beginning, the purpose of this study is to assess the relative significance of the responses of crop patterns of farmers in different size-groups during 1943-54. In other words, we intend to examine whether the crop variations on the holdings of farmers in the three size-groups of farmers were identical or different and if they differed whether the difference was significant.

Again we may try to ascertain which of the two major influencing forces (i) price changes, and (ii) the Government restrictions on proportions of areas to be allocated to food and non-food crops had a greater influence on crop patterns of the three size-groups. Let us first examine whether the crop variations were identical or different for the three size-groups.

Annual Crop Variations

The variations in the proportions of all important crops from year to year for 1943-44 to 1953-54 for the three size-groups are given at the end. The table gives proportions also for important crop-groups such as food crops, non-food crops, major and minor cereals and pulses. Food crops comprise of cereals and pulses. Major cereals comprise of paddy and wheat and all the other cereals are termed minor cereals. Non-food crops include all other crops except food and fodder. Under oilseeds are included groundnut and sesamum.

From these data an inference may be drawn that the variations in crops were quite similar for three size-groups. Food crops, for instance, showed an increase in their percentage to total cropped area from 1943-44 to 1948-49 and a decline thereafter. This movement can be seen in all the three size-groups with the same break in the period. A similar movement, but in reverse direction, obtained regarding non-food crops and was observed again in all the three size-groups. As for the individual crops bajri showed variations very much identical to food crops and cotton and sesamum, comparable to those of non-food crops. Area under bajri gradually increased upto 1948-49 and declined thereafter. The opposite trend obtained in cotton and sesamum. These trends too were similar for all the three size-groups. These three crops had under them, on an average,

nearly two-third of the total cropped area. For other crops, all the annual variations had comparable pattern of movement for three size-groups.

To show comparability of crop variations in three size-groups it is necessary to show that they not only moved in the same directions as shown above but also that their movements had the same magnitudes. Relatively, more rigid crop patterns may show smaller fluctuations and not complete absence of fluctuations.

In order to give an idea of the amplitude of fluctuations the table 6 below gives the standard deviations and means for all important individual crops and crop-groups for the three size-groups. In addition, the table gives the maximum and minimum levels reached by different crops and crop-groups and the years when they were reached for the three size-groups.

The magnitude of fluctuations may be influenced by the basic characteristic of the crop pattern. As the mean of percentages of food and non-food crops to total cropped area indicates, of the three size-groups the small farmer had the largest proportion of cropped area under food crops and the smallest proportion under non-food crops. The medium farmer was in the mid-way. The big farmer had relatively smaller proportion of cropped area under food-crops, and larger proportion of cropped area under non-food crops. Thus, the proportion of food crop increased and that of non-food crops declined with the decrease in the size of holding. Taking individual crops, this relationship between proportions of area under different food and non-food crops and the size of holding obtained in the case of all important non-food crops and only for bajri from among food crops. All other important food crops jowar, paddy, wheat and pulses had either almost uniform proportions of cropped area under them for three size-groups or had reverse variations like non-food crops. Bajri is the staple food of the region, other food crops are used only partly for domestic consumption, a major portion of their production is sold. Probably this combination of domestic use and sale and predominance of the latter imparted a different pattern to them.

Though the proportions of principal food and non-food crops varies as the size of holding varied, the amplitude of the annual variations in the crop-patterns of the three size-groups during 1943-54 was more or less of same magnitude, as shown by the standard deviations from the mean. For food crops the standard deviations for three size-groups were between 5.96 and 6.19.

For other crop-groups and individual crops, the amplitudes of fluctuations were less comparable for three size-groups. The standard deviations for bajri varied between 4.06 and 6.31 and for cotton between 3.62 and 4.59 for the three size-groups. For other crops the standard deviations were small but they differed markedly for three size-groups. Among them wheat, jowar and groundnut had relatively wider differences. However compared to individual crops, differences in standard deviations between size-groups were less for other crop-groups like minor cereals, major cereals and oilseeds.

It is important to note that the years when minimum and maximum levels were reached were almost the same for the three size-groups for most of the crops and crop-groups. This indicates that besides the same direction and comparable

TABLE No. 6

AMPLITUDE OF CROP VARIATIONS—1943-54¹

	Big				Medium				Small			
	Minimum	Maximum	Mean	Stand- ard De- viation	Minimum	Maximum	Mean	Stand- ard De- viation	Minimum	Maximum	Mean	Stand- ard De- viation
Bajri	43.5(51-52)	56.7(48-49)	48.9	4.09	42.5(53-54)	61.9(48-49)	51.4	6.31	51.6(53-54)	65.5(48-49)	58.3	4.06
Jowar	7.4(52-53)	13.3(45-46)	10.4	2.43	9.2(53-54)	12.0(46-47)	10.3	0.97	7.5(44-45)	11.7(46-47)	9.0	1.54
Paddy	a (44-45)	3.2(49-50)	2.4	0.61	1.5(44-45)	3.8(47-48)	2.8	0.53	1.5(52-53)	4.8(46-47)	2.0	1.26
Wheat	0.3(43-44)	2.4(47-48)	1.6	0.97	0.3(43-44)	3.2(49-50)	2.3	1.18	0.6(44-45)	3.3(52-53)	1.9	0.85
Groundnut	6.1(43-44)	14.8(47-48)	9.3	2.23	5.7(43-44)	8.8(47-48)	7.2	1.55	2.8(43-44)	7.9(47-48)	6.1	1.85
Cotton	2.0(48-49)	20.7(43-44)	9.8	4.59	1.9(48-49)	13.7(43-44)	7.6	3.62	0.4(48-49)	13.7(43-44)	5.7	3.78
Sesamum	3.6(47-48)	11.2(43-44)	7.9	2.69	5.1(48-49)	12.0(43-44)	8.7	2.30	3.9(48-49)	10.1(43-44)	6.8	1.93
Food Crops	58.4(53-54)	79.1(48-49)	67.1	5.99	63.4(53-54)	83.6(48-49)	72.2	6.19	67.4(43-44)	87.2(48-49)	79.9	5.97
Non-food crops	19.6(48-49)	39.5(43-44)	31.1	5.96	13.3(48-49)	34.6(53-54)	25.9	6.56	11.1(47-48)	30.3(53-54)	21.0	5.55
Minor Cereals	53.5(51-52)	68.6(48-49)	59.6	5.26	52.3(52-53)	73.3(48-49)	62.0	6.25	60.9(53-54)	77.3(48-49)	67.8	4.79
Major Cereals	0.7(44-45)	5.8(52-53)	3.8	1.65	2.1(43-44)	6.1(47-48)	5.0	1.36	1.7(44-45)	6.8(46-47)	4.4	1.41
Pulses	1.3(43-44)	6.0(47-48)	3.6	1.44	1.3(43-44)	6.5(46-47)	4.7	1.81	1.6(43-44)	5.9(47-48)	3.6	1.43
Oilseeds	14.7(45-46 & 48-49)	20.1(53-54)	17.5	2.27	11.4(48-49)	19.3(49-50)	16.0	2.87	9.9(48-49)	18.3(53-54)	13.1	2.56

N.B. : The figures in the brackets indicate the year.
 1 In terms of percentage to total cropped area.
 a=Below 0.1

CROP VARIATIONS

amplitude of crop variations, their terminal points coincided in time. For instance the percentage of food crops to total cropped area reached the maximum in 1948-49 for all the three size-groups. The year when the minimum level was reached was the same for the big and the medium, 1953-54, but different for the small farmers, 1943-44. However, for the small farmer the year when the level immediately above the minimum was reached was 1953-54 same as the year when minimum percentage of food crops was obtained for the big and the medium farmer. Exactly the similar situation obtained regarding non-food crops ; but for this crop-group the big had the different year for maximum level.

Taking individual crops, the years when minimum and maximum levels were reached were the same for three size-groups in regard to all the three principal non-food crops viz., cotton, groundnut and sesamum, the year of minimum level for big being only one year previous to that for the other two groups, in the case of sesamum. Wheat and paddy had different years of minimum and maximum levels for the three size-groups. Both of them occupied relatively very small area in the total cropped area or even total area under food crops. Thus, the annual variations in proportions of different crops to total cropped area for three size-groups moved in the same direction with almost comparable amplitude of fluctuations and the years of their minimum and maximum levels almost coincided. In other words, if these movements were plotted on the graph their curves would have almost identical appearance for three size-groups.

Graphs I and II depict movements of food crops and bajri for the three size-groups. The curves are drawn on the basis of index numbers which are prepared on chain base method. The perusal of these two graphs would show that for the most part the curves for three different size-groups moved together. Before the comparability of the movement in crop variations for three size-groups can be finally established, it is necessary to show that the crop variations for three size-groups were closely related to each other.

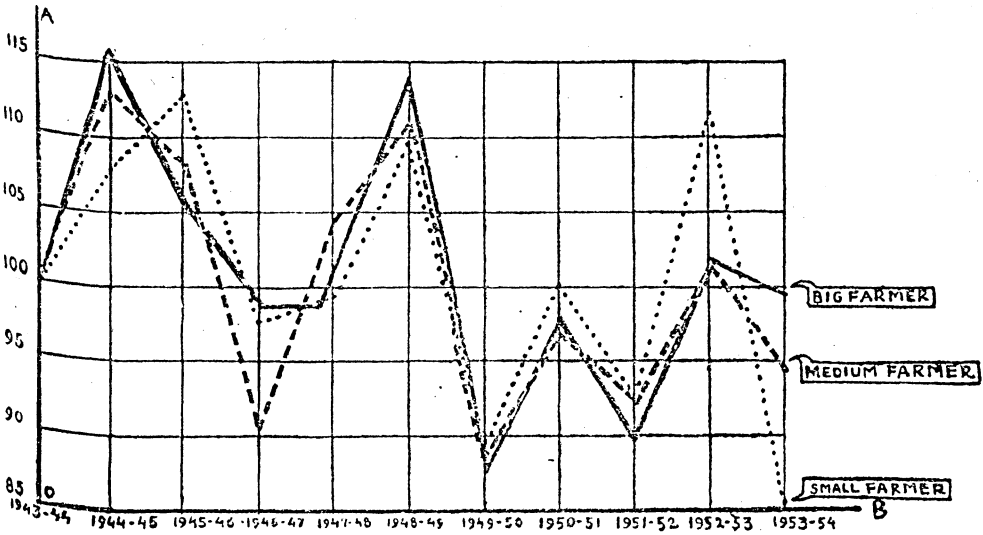
The coefficients of correlation were worked out for these variations between the three size-groups. They would show whether the crop variations moved together from year to year or they tended to move independently. The table below gives the relevant data.

Table No. 7

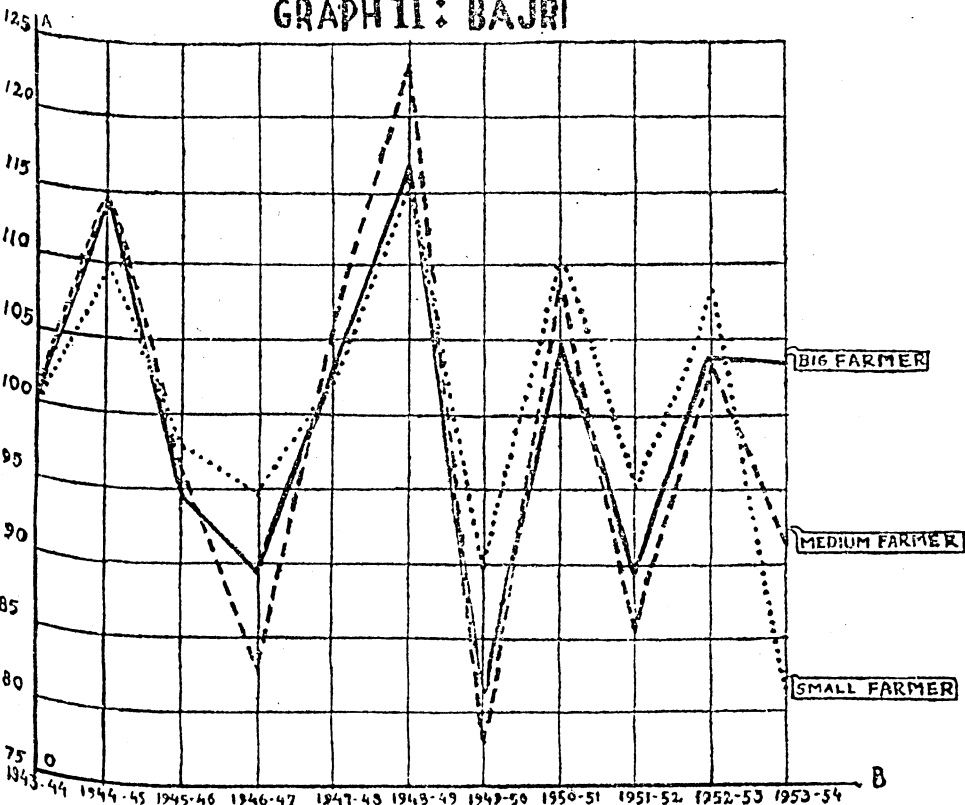
Coefficients of Correlation

Crop			*Big-Medium	*Medium-Small	*Big-Small
Bajri	..	..	0.9392	0.5687	0.4372
Jowar	..	..	0.7903	0.7624	0.6875
Wheat	..	..	0.8148	0.7573	0.7362
Paddy	..	..	0.3627	0.2744	0.0518
Cotton	..	..	0.8243	0.8207	0.8860
Sesamum	..	..	0.7911	0.7787	0.5063
Groundnut	..	..	0.5977	0.4548	0.6446

GRAPH I : FOOD CROPS



GRAPH II : BAJRI



A O = INDEX NUMBERS ON THE BASIS OF CHAIN BASE METHOD

B O = YEAR

Crop			Big-Medium	Medium-Small	Big-Small
Foodcrops .. ..	..	..	0.9481	0.8042	0.8388
Non-foodcrops .. ..	..	..	0.9641	0.8310	0.8715
Minor Cereals .. ..	..	..	0.9374	0.7594	0.7046
Major Cereals .. ..	..	..	0.7329	0.4458	0.6704
Pulses .. ..	..	..	0.8816	0.7138	0.7759
Oilseeds .. ..	..	..	0.7781	0.8236	0.4788

* Coefficient of correlation.

The ideal correlation would be +1 when the curves of crop movements would lie on each other for three size-groups if they are drawn with the same base. However, for our purposes correlation above +0.7 may be considered fairly significant, that between + 0.7 and + 0.5 may be considered just significant but one below + 0.5 would be considered very weak.

The above table shows mainly three trends. Firstly, the coefficients of correlations for crop variations between any two of the three size-groups were very significant for crop-groups, food and non-food crops, minor cereals and pulses. For oilseeds and major cereals they were high for two out of three comparisons. From among individual crops the coefficients of correlations were high for wheat, jowar, cotton and sesamum. No doubt, coefficients of correlations for variations in either crop-groups or individual crops were higher between big and medium farmers than between either big and small or medium and small farmers. For instance, in regard to food-crops coefficients of correlations between big and medium was 0.9481 against 0.8042 between medium and small and 0.8388 between big and small farmers. However, the difference between the coefficients of correlation between the big and the medium farmers and the medium and the small farmers, or even big and small farmers was not very large. This would emphasize more the similarity than the dissimilarity between the crop patterns of three size-groups.

Secondly, the coefficients of correlations for crop variations between any two size-groups were higher for crop-groups than for any individual crop within the respective crop-group. For instance, food crops as a whole had the coefficient of correlation 0.9481 between the big and medium farmers. Against this between the same two size-groups, the coefficient of correlation for bajri was 0.9392 even though bajri had the highest correlation of all food crops for these two size-groups. This corroborates the earlier observation on standard deviations from mean which showed more similar amplitudes of annual fluctuations in crop-groups for three size-groups than that of any individual crop within those crop-groups.

In the otherwise very flexible crop patterns, two crops introduced some element of rigidity. They were bajri and paddy. Correlation for paddy between any two groups was below 0.37. The weak correlation for paddy is explained by the fact that it is an irrigated crop in the Kodinar taluka. Since the small farmer used only *Kos* (leather bucket) for lifting water and most of the big farmers had oil engines and pumps, their water lifting capacity in the case of the latter would not be affected as much as in the case of the former due to variations in rainfall. Irrigation would be therefore steadier in the case of the big farmer.

A somewhat, weak correlation for bajri was found between big and small and between medium and small farmers ; being 0.4372 and 0.5687 respectively, but that between big and medium farmers was high, 0.9392. This was due to the inability of the small farmer to reduce the bajri crop below a particular minimum which was very high compared to other two size-groups. This inability of small farmers to reduce the area under bajri below a particular level limited the amplitude of fluctuations in their case.

The coefficient of correlation for groundnut ranged below 0.65 between any two size-groups and was thus less significant, if not weak. Groundnut is relatively a new crop in the region and encouraged by wartime high prices each size-group made an attempt at some time or the other to adopt it in the crop pattern to the highest extent possible. For instance, the small farmer raised the percentage of area under groundnut from as low as 2.8 to 9.3. This high level was attained for one year only. Later it stabilized at a lower level. Even big farmer raised groundnut percentage to 14.8 in 1947-48 but for all other years during 1943-44 to 1953-54 the percentage of area under groundnut remained around 8.0. Fluctuations were least wide in the case of the medium farmer. He was very cautious regarding the new crop. The shifts in his case were mostly between bajri on one hand and cotton and sesamum on the other. By 1953-54 in the case of the medium farmer cotton regained the 1943-44 level, unlike both the big and the small farmer.

That element of rigidity introduced by paddy was not significant since paddy occupied a very small portion of total cropped land. Groundnut too did not inhibit crop pattern adjustments to any significant extent. The only important crop that did matter somewhat was bajri. However, the element of rigidity introduced by it was not so big, since crop-patterns as a whole or crop-groups including minor cereals (which among other crops included bajri) had shifts which were closely related for three size-groups.

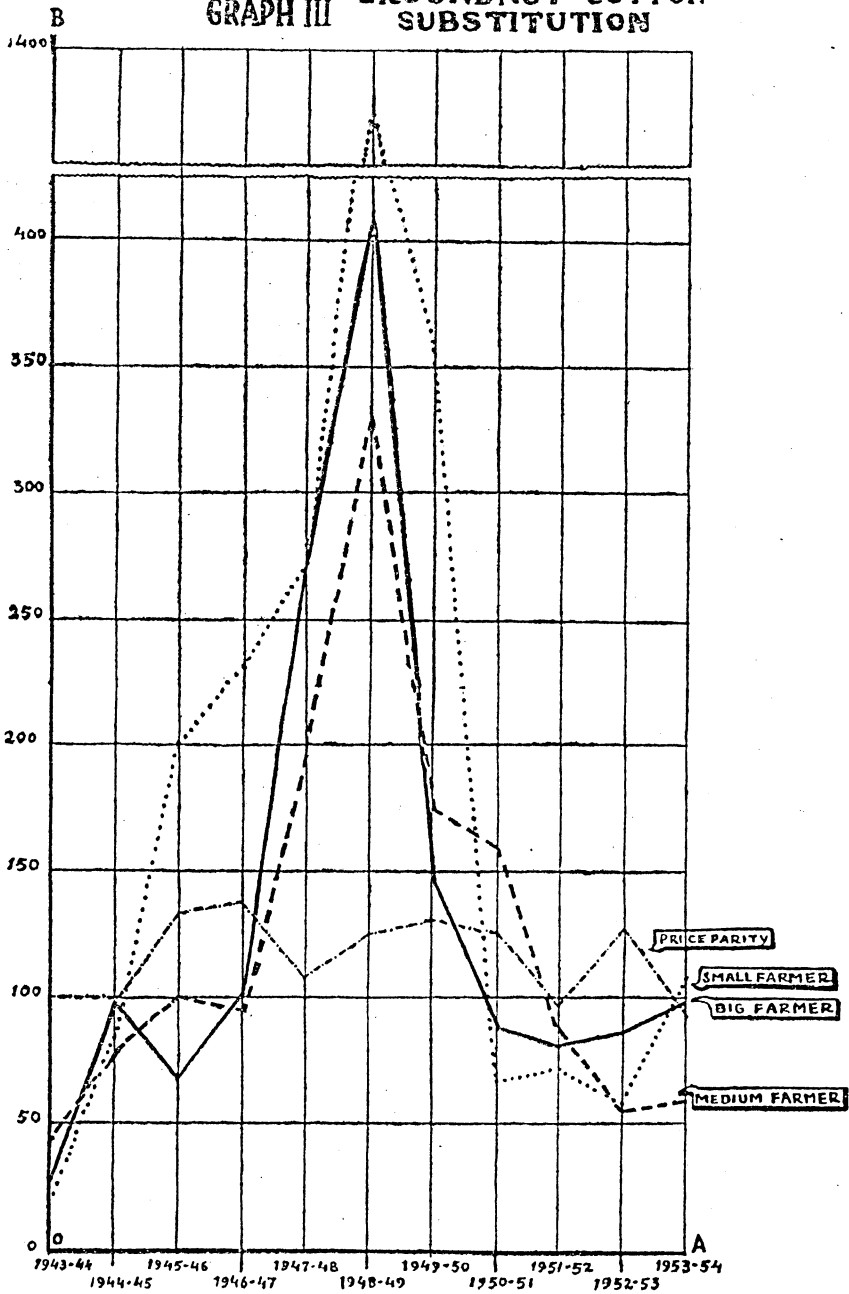
RESPONSE TO PRICE VARIATIONS

The variations in crops during 1943-54 for the three size-groups were very closely comparable on the whole. Variation in the proportion of crop-groups had, on the whole, high comparability for three size-groups. Among individual crops too, variation in a majority of them showed equally high comparability for three size-groups. Was this comparability of crop variations the outcome of the government restrictions or did it obtain under the relatively free operation of economic forces ?

At first the Government restrictions would seem to have predominant influence. Area under food crops was on the increase upto 1948-49 and on the decline thereafter and that under non-food crops had variations in the opposite directions. These periods—1943-48 and 1949-54—coincided broadly with the stringency and relaxation of government restrictions in the matter of crop acreage. A little more probing would however show that these restrictions had only secondary influence.

Though during 1943-48 government restrictions on growing non-food crops were somewhat stringent, the relaxation had started as early as 1945. The Govern-

GRAPH III GROUNDNUT-COTTON SUBSTITUTION



A0=YEARS

B0=PRICE RATIOS AND AREA RATIOS IN TERMS OF
 $\frac{\text{GROUNDNUT}}{\text{COTTON}}$ COTTON BEING 100

ment of Bombay, for instance, in the first instance prescribed in 1944 as high a proportion as 66 to 100 per cent of total acreage for growing food crops. In 1945 this was relaxed for some regions to 50 to 80 per cent. By 1947-48 especially in cotton tracts the Government relaxed the restriction for food crops, reducing compulsory minimum to 50 per cent of total cropped area. The Baroda State to which Kodinar belonged prior to its merger with the Bombay State in 1947, followed mostly the regulations of the Bombay State in this matter. Besides, the enforcement of these regulations was much less severe in the Baroda State.

The examination of the areas under food and non-food crops for the sample families shows that the proportion of area under food crops was very much above the legal minimum in all the three size-groups almost throughout 1943-54 period. Again, it reached the maximum for all the three size-groups in 1948-49 when the price-control was lifted, area control was only in name and prices of food grains had a tremendous rise within one year. During one year the All-India index number of harvest prices for all crops increased by 69 points as against an increase of 40 to 42 points in oilseeds and cotton. These observations would indicate greater influence of prices than that of government restrictions.

To establish any direct correlation between price changes and crop variations is difficult. There are mainly two difficulties. In the first place, the proper price data are not available. To the farmer, harvest prices locally obtained are important. These could not be collected. All-India wholesale prices would not be much relevant to the farmer in Kodinar. Even All-India index numbers of the harvest prices are available upto 1948-49 only.

Secondly, there are multi-directional shifts in crop pattern. For such an elaborate analysis which may also take into account the possibility of existence of serial correlation, the period under Study would not yield any reliable conclusion. There were hardly any two crops which were closely substitutable in the sense that the shifts in area would take place between them only. Reduction in area under cotton and sesamum was accompanied by the increase in areas under bajri, jowar, paddy, wheat and groundnut too; and the increase in the former two crops during the subsequent period resulted into part reduction of area under bajri and jowar only, paddy, wheat and groundnut maintained the proportions.

Some impact of prices on crop shifts can be seen from the changes in the relative positions of cotton and groundnut. Barring bajri (to avoid the effects of the government regulations on area allocations and also of strict price regulation for food crops) to which some of the areas under cotton were transferred, cotton and groundnut were more closely substitutable than any other two crops. Soil requirements for the two were similar and they did not command a restricted market like sesamum. The comparison of the variations in the ratios of their prices on one hand and the variations in the ratios of their area on the other for the three size-groups would indicate the influence of price variations, if any. Graph III indicates the trends. If we exclude the year 1948-49 during which price restrictions on food grains were lifted and prices moved in favour of food crops including bajri with a powerful pull, we find that the remaining variations in the groundnut-cotton area ratio reveal a powerful impact of price variations on them. On

the same basis i.e., excluding 1948-49, the coefficients of correlations between variations in the ratios of prices of groundnut and cotton on one hand and the variations in the ratio of their area on the other for three size-groups worked out as under :

Table No. 8

Size-groups	Coefficient of correlation between variations in price ratio and area ratio for groundnut and cotton							
Big	0.4641
Medium	0.6074
Small	0.5499

The coefficient of correlation between prices and areas of groundnut and cotton worked out as above was marked for medium and small farmers being above 0.5 but somewhat weak for big farmers being below it. This result has some obvious limitations. They measure only direct shifts between two crops, groundnut and cotton, though in fact there were simultaneous shifts among more than these two crops. The price data used are wholesale prices for All-India and not the local harvest prices. Especially cotton grown in Kodinar—'pratap' an improved variety of mathia—is a short staple variety, the prices of which remained depressed for a long period in the beginning and went up rather rapidly during the latter part of 1943-54, as against consistent rise in All-India index number of cotton prices.

CONCLUSION

It emerges from the above analysis that the annual crop shifts for varying sizes of holdings are closely related. The shifts in crop patterns of different size-groups are more closely related for crop-groups like food crops and non-food crops, major and minor cereals and pulses and oil seeds than for individual crops within each of these crop-groups, probably because individual size-group require adjustments to be made within the crop-groups more independently to suit their individual conditions. Such crops as bajri, the staple food, and paddy the irrigated crop introduced some amount of rigidity in the crop pattern of lower size-groups. It had however no perceptible impact on major crop shifts. The medium farmer was found more cautious in regard to groundnut, a relatively newly introduced crop. He preferred to maintain the original cotton-groundnut ratio to a shift in the favour of the latter. The period 1943-54 had two major forces working simultaneously, the government restrictions on allocation of areas to food and non-food crops and rapid price rises, with the relative prices of crops often changing. Of these two forces the price fluctuations had no mean share in the impact on crop variations.

Though comparable flexibility between different size-groups was observed during the period when the area changes were first in the favour of food crops and then in the reverse direction, the comparability of crop pattern changes was not restricted to broad components but was fairly high for many individual crops too.

STATEMENT No. 1

Economic Advisor's Index Number of Wholesale Prices
Base shifted to 1943-44=100

Year	Rice	Wheat	Jowar	Bajra	Cotton	Gur	Groundnut
1943-44	100	100	100	100	100	100	100
1944-45	85	99	101	95	95	105	95
1945-46	82	96	101	95	102	124	134
1946-47	85	99	110	118	141	158	192
1947-48	115	163	117	159	205	147	225
1948-49	127	188	163	141	213	185	266
1949-50	130	139	192	130	226	324	298
1950-51	141	148	197	129	258	227	325
1951-52	137	140	137	129	248	148	242
1952-53	133	150	129	146	237	193	300
1953-54	124	136	117	128	238	199	226

Substitution of Cotton by Groundnut

(Percent)

Year	Groundnut prices to Cotton Prices	Groundnut area to cotton area for farmers in size-groups		
		Big	Medium	Small
1943-44	100	29	42	20
1944-45	100	97	77	84
1945-46	131	66	100	200
1946-47	136	102	96	233
1947-48	110	255	200	272
1948-49	125	420	332	137
1949-50	132	145	174	358
1950-51	126	86	160	67
1951-52	97	81	89	72
1952-53	126	86	55	58
1953-54	95	99	59	108

STATEMENT No. 2

56

PROPORTION OF AREA UNDER INDIVIDUAL CROPS TO TOTAL CROPPED AREA

Year	<i>Big Cultivators</i>										(Per cent)										
	<i>Minor Cereals</i>					<i>Major Cereals</i>					<i>Non-food Crops</i>					Total Food Crops	Total Non- Food crops ²	Major Cere- als ³	Minor Cere- als ⁴	Pulses ⁵	Total Oil seeds
	Total Cropped Area (Acres)	Bajri	Jowar	Paddy	Wheat	Cot- ton	Grou- nd- nut	Sesa- mum	Su- gar- cane	Mis- cellan- eous ¹	Total Food Crops	Total Non- Food crops ²	Major Cere- als ³	Minor Cere- als ⁴	Pulses ⁵							Total Oil seeds
1943-44	1088	48.1	7.9	1.1	0.3	20.7	6.1	11.2	1.5	2.1	58.4	39.5	1.1	56.0	1.3	17.3					
1944-45	1099	55.0	10.2	—	0.7	9.3	9.0	5.1	3.4	3.2	67.6	30.5	0.7	65.2	2.4	15.1					
1945-46	998	52.2	13.3	1.8	0.6	10.7	7.1	7.6	1.3	1.7	71.6	26.7	2.4	66.0	3.2	14.7					
1946-47	884	46.9	13.2	2.7	2.1	9.5	9.7	5.5	1.7	3.1	70.5	27.4	4.8	61.2	4.5	15.2					
1947-48	952	48.5	9.6	2.7	2.4	5.8	14.8	3.6	2.9	4.1	69.7	27.7	5.1	58.1	6.0	18.4					
1948-49	846	56.7	11.9	2.8	1.4	2.0	8.4	5.5	1.9	2.3	79.1	19.6	4.2	68.6	5.8	14.7					
1949-50	948	46.4	12.5	3.2	1.5	6.8	9.9	9.8	1.0	3.2	69.3	29.5	4.7	59.7	4.4	19.7					
1950-51	915	48.7	11.1	2.6	1.1	10.2	8.8	7.9	1.6	2.9	67.8	30.6	3.7	60.3	3.8	17.5					
1951-52	1010	43.5	9.3	2.8	1.7	11.5	9.3	10.7	1.5	6.2	60.8	37.0	4.5	53.5	2.8	20.0					
1952-53	1067	45.2	7.4	2.2	3.6	10.3	8.9	11.1	2.1	5.6	62.0	36.6	5.8	53.4	2.8	20.0					
1953-54	1030	46.7	7.5	2.1	2.5	10.9	10.8	9.3	1.7	5.6	61.7	37.5	4.6	54.2	2.9	20.1					

1. Include fodder, fruits and vegetables and other crops.
2. Include cotton, groundnut, sesamum, sugar-cane and castor seeds.
3. Include paddy and wheat.
4. Include bajri, jowar and banti.
5. Include gram, urid and math.

4. Include bajri, jowar and banti.
5. Include gram, urid and math.

STATEMENT No. 3

PROPORTION OF AREA UNDER INDIVIDUAL CROPS TO TOTAL CROPPED AREA

Medium Cultivators

(Per cent)

Year	Minor Cereals					Major Cereals					Non-food Crops					Total Oil seeds
	Total Cropped Area (Acres)	Bajri	Jowar	Paddy	Wheat	Cotton	Groundnut	Sesamum	Sugar-cane	Miscellaneous ¹	Total Food Crops	Total Non-food crops ²	Major Cereals ³	Minor Cereals ⁴	Pulses ⁵	
1943-44	615	52.5	9.6	2.1	0.3	13.7	5.7	12.0	1.2	1.9	65.5	32.6	2.1	62.1	1.3	17.1
1944-45	664	60.1	9.3	1.5	1.1	8.0	6.2	6.6	1.4	2.4	74.3	23.3	4.6	67.3	2.4	13.8
1945-46	554	57.7	10.6	3.1	1.3	4.9	4.9	6.7	1.8	2.6	79.6	18.9	4.4	69.3	5.4	11.6
1946-47	588	47.6	12.0	2.4	2.9	7.1	6.8	9.0	1.0	3.5	72.4	25.1	5.3	60.6	6.5	15.8
1947-48	524	50.2	10.9	3.8	2.3	4.4	8.8	6.1	1.9	4.0	75.4	21.8	6.1	61.1	7.6	14.9
1948-49	592	61.9	11.4	2.2	2.4	1.9	6.3	5.1	—	3.1	83.6	13.3	4.6	73.3	5.7	11.4
1949-50	663	48.3	11.3	2.9	3.2	5.4	9.4	9.2	—	2.2	74.1	24.7	6.1	61.1	5.9	19.3
1950-51	605	52.7	10.0	3.0	1.6	5.7	9.1	9.7	—	3.6	71.9	26.1	4.6	63.2	4.1	18.8
1951-52	693	45.0	9.7	3.3	2.6	9.6	8.6	9.9	0.6	5.3	66.5	31.9	5.9	54.7	4.6	18.5
1952-53	706	46.5	9.5	2.4	3.4	10.7	5.9	9.9	1.4	4.9	67.2	32.0	5.8	56.6	4.2	15.8
1953-54	723	42.5	9.2	2.8	4.4	12.3	7.3	11.8	1.0	4.2	63.4	34.8	7.2	52.3	3.9	19.1

1. Include fodder, fruits and vegetables and other crops.
2. Include cotton, groundnut, sesamum, sugar-cane and castor seeds.
3. Include paddy and wheat.
4. Include bajri, jowar and banti.
5. Include gram, urid and math.

CROP VARIATIONS

STATEMENT No. 4

58

PROPORTION OF AREA UNDER INDIVIDUAL CROPS TO TOTAL CROPPED AREA

Small Cultivators

(Per cent)

Year	Minor Cereals			Major Cereals			Non-food Crops						Total Food Crops	Total Non-food crops ²	Major Cereals ³	Minor Cereals ⁴	Pulses ⁵	Oil-seeds
	Total Cropped Area (Acres)	Bajri	Jowar	Paddy	Wheat	Cotton	Groundnut	Sesamum	Sugar-cane	Miscellaneous ¹								
1943-44	386	54.7	8.5	1.6	1.0	13.7	2.8	10.1	1.3	3.7	67.4	28.9	2.6	63.2	1.6	13.9		
1944-45	236	59.9	7.5	1.7	0.6	7.5	6.3	7.2	1.7	4.7	72.6	22.7	1.7	67.4	3.5	13.5		
1945-46	355	58.5	11.5	4.5	1.1	3.1	6.2	5.4	1.7	1.8	81.8	17.8	5.6	72.3	2.5	11.6		
1946-47	333	55.5	11.7	4.8	2.0	2.7	6.3	6.0	1.0	4.0	80.0	17.0	6.8	67.2	4.2	12.0		
1947-48	305	56.7	9.2	3.6	1.6	2.9	7.9	6.2	0.7	3.0	79.5	18.2	5.2	66.4	5.9	14.6		
1948-49	328	65.5	9.4	1.8	2.4	0.4	5.5	3.9	—	3.9	87.2	11.1	4.2	77.3	4.7	9.9		
1949-50	344	55.6	9.8	2.3	2.2	2.6	9.3	7.2	0.5	2.3	78.1	20.7	4.5	68.0	4.9	16.5		
1950-51	332	61.4	6.9	1.5	2.7	8.2	5.5	5.7	—	2.0	78.1	20.8	4.2	69.3	3.9	11.7		
1951-52	381	58.5	8.3	1.8	1.7	8.1	5.8	6.5	—	3.2	72.3	25.8	3.5	62.3	4.9	12.3		
1952-53	390	63.3	7.8	1.5	3.3	6.2	3.6	6.7	—	3.5	80.6	18.3	4.8	71.7	2.3	10.3		
1953-54	446	51.6	8.3	2.2	2.9	7.2	7.8	10.5	—	5.6	68.9	30.0	5.1	60.9	1.8	18.3		

1. Include fodder, fruits and vegetables and other crops.
2. Include cotton, groundnut, sesamum, sugar-cane and castor seeds.
3. Include paddy and wheat.
4. Include bajri, jowar and banti.
5. Include gram, udid and math.