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TABLE VII

Size group of holdings (in acres)					Percentage area under Oranges and Vegetables
1 — 5	..	..	..	..	..	83.45
5 — 10	..	..	..	..	..	58.25
10 — 20	..	..	..	..	..	81.22
20 and above.	..	..	..	..	..	22.84

It is interesting to note that barring the case of the class interval 10 to 20 which covers only one case, the broad tendency of larger proportion of land being devoted to the growing of high income crops such as oranges and vegetables by the lowest size holders and a gradually descending order in the percentage of land put under these crops on the larger sized holdings is apparent. This indicates how specialization of crops may be practised by small holders for making their farms pay, given the necessary facility of irrigation. The one crop pattern holding in the case of a crop requiring intensive labour may thus offer the best financial prospect. With the unfavourable man-land ratio the agricultural income levels may be improved by supplying the requirements for agriculture of the above nature.

URBANISATION AND CROPPING PATTERN

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The factors that influence the cropping pattern of any particular region are legion. The physical features such as soil and climate, the technical limitations such as drainage and irrigation, the economic influences by way of market mechanism, land tenure, etc., and even the sociological complexities such as any caste taboos, etc., not only affect the cropping pattern but by their interactions with each other, cause variations in cropping pattern. These are the macro-factors; but in a framework of homogeneous extraneous factors, great variations exist from holding to holding and the basis of crop planning on individual holdings is a field for primary research.

This study is a by-product of an *ad hoc* enquiry into the factors influencing cropping pattern in the North and South Arcot Districts of Madras State. The Agricultural Economics Research Centre, University of Madras, conducted this sample survey, as a part of its research programme.

It is attempted to discuss here briefly, the variation in cropping pattern asso-
ciated with (a) urbanisation; (b) the distance to market centres from the villages;
and (c) some other economic factors that may influence the crop planning of
individual farmers.

Thus, it is an analysis of cropping pattern at three levels—the first, is com-
parison between two groups of villages, the second is between villages within each
group and lastly inter-holding variations within each village will be studied by
attempting regression analysis.[1] The influence of price trends and price intelli-
gence on crop planning falls beyond the scope of this paper.

DESIGN OF STUDY

In Madras State, the North and South Arcot districts form a contiguous geo-
graphical region, offering homogeneous characteristics with regard to the soil
type, climate and cropping pattern. The region can be classified as of having
'groundnut-millets' combination of crops as a predominant feature. About
45 per cent of the cropped area is utilised for these crops. About a third of the
gross cropped area is under paddy; sugarcane, pulses, gingelly and other mis-
cellaneous cereal, pulses and non-food crops make up for the rest.[2]

The climate is fairly dry with an annual rainfall between 40–55 inches. The
mean temperature ranges from 70° to 90° F. There is a network of irrigation
canals but this is inadequate and the wet lands are also irrigated by rainfed tanks
and wells. Two major soil types are the red sandy soil found in most part of the
region and the black clayey soil which is not uncommon. A few tracts of black
loam and red loam are also present. With this background of the physical envi-
ronment of the region, the crop planning study has been designed.

A multi-stage stratified random sample is selected as briefly outlined below:
The taluks of these two districts were classified according to degree of urbanisa-
tion, forming two groups 'urban' and 'non-urban', the latter group consisting
taluks having least urbanisation. The proportion of urban population (Census
1951) in the taluk to total has been taken as the indicator of 'urbanisation'. This
provides a fairly reliable guide for distinguishing taluks where urban concentra-
tion is high as against the 'non-urban' taluks.

From each of these groups two taluks were selected at random, the proba-
bility of selection being proportional to the cultivated area in each taluk. From
these groups of two taluks each, six villages were randomly selected, again with
probability proportional to the area cultivated in the villages. Twenty, or 15
per cent of the total cultivators (whichever is greater) were selected from each of
the villages, after stratifying the farms into 'big', 'medium' and 'small' categories
in each of the three groups of owner, owner-cum-tenant and tenant cultivators.
The final sample size is 382. The following analysis pertains to the sample of 382
cultivators and the data are culled out from the 'Intensive Enquiry Schedules'
of the survey, conducted by the Agricultural Economics Research Centre, Madras.
The figures relate to the agricultural year 1960-61.

CROPPING PATTERN IN 'URBAN' AND 'NON-URBAN' GROUPS

The cropping pattern of the farmers in the selected villages has been aggregated for each group and the percentage distribution of area under different crops in the two 'urban' and 'non-urban' groups of villages differ significantly as can be noticed from Table I.

TABLE I—CROPPING PATTERN

(Percentage of area under each crop to gross cropped area)

Crop	Urban Group Per cent	Non-Urban Group Per cent	Both Per cent
Paddy	36.7	44.7	40.2
Cholam	8.6	12.5	10.3
Ragi	2.9	0.8	2.0
Other Millets	5.2	9.6	7.1
Redgram	5.0	1.8	3.6
Groundnut	30.4	27.9	29.3
Sugarcane	6.7	1.9	4.6
Other crops	4.5	0.8	2.9
Total	100.0	100.0	100.0

The percentage of area under cash crops in urban group is higher than the corresponding figure of non-urban group. Paddy and millets occupy a predominant position in the latter group. "Other crops" in 'urban' group include chillies, vegetables, flowers, *korai* (grass weed for mat weaving), plantains, mangoes, lime and other fruit trees, cocoanut and tamarind. In non-urban group, gingelly and turmeric are the only crops in this category. Thus a greater degree of crop diversification is noticed in the urban group. The nearness to towns exerts some influence in the pattern of crops inasmuch as the growing of fruits, flowers and vegetables is taken up by a few cultivators.

The villages in urban group are situated in the well developed taluks of Gudiyatham and Tiruppattur of North Arcot district. Kallakurichi and Gingee taluks, forming the non-urban group are backward by comparison. The former taluk has hilly and forest area and is not served by good roads or railway lines. The distance to market centres isanimportant factor, considered in land allocation, as is seen in the next section.

Using X^2 test for association, it is found that there is a highly significant association between urbanisation and cropping pattern.[3] Not only is the proportion of area under cash crops more, but the pattern of crops include a wide range of different types of crops.

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3. $X^2 = 81.277$ a d X^2_7 from tables at 1 per cent probability point $= 18.475$
(7 d.f.)

INFLUENCE OF MARKET PROXIMITY ON CROP PATTERNS

To examine whether the availability of marketing facilities has any influence on the cropping pattern, the villages in each of the 'urban' and 'non-urban' group are ranged in order of the extent of marketing facility available to the village as indicated by (i) the distance to the nearest market centre (other than weekly fairs), (ii) the conditions of the main and approach roads from the village to these market-towns and (iii) transport available. Where the road is only *kachcha* (non-metalled mud cart-track) and impassable during rainy season and transport is not efficient or the charges higher than average, the distance is deemed to be double, though this is only an arbitrary weighting. Only one village (Pallipattu) where the road is almost non-existent, the narrow cart-track winds along the banks of a large tank and accidental toppling of carts and resulting loss of goods quite a frequent occurrence, had to be given the last rank, in spite of its physical nearness (three miles) to a market centre (Vaniyambadi).

Given the normal weather conditions, in an area of cash and food crops, it can be expected that the proportion of area under food crops diminishes if there is a good market for the cash crops, other factors remaining constant. This has been the trend in sugarcane crop, and to some extent with regard to groundnut crop in the South and North Arcot districts. These two crops are more or less traditionally established in this region, so any shift from food to cash crop in land allocation will neither be a drastic nor experimental change for the farmers. Recently with the opening of a new co-operative sugar factory in Pachakuppam (North Arcot district), acreage under sugarcane in the neighbouring villages has registered a perceptible increase. The villages are ranked in ascending order of magnitude of the percentage area under food crops and the resulting ranks are matched against the ranks obtained with regard to market facilities. Table II gives the relevant details for the twelve villages in the two groups.

TABLE II—NEARNESS TO MARKETS AND PROPORTION OF AREA UNDER FOOD CROPS

	Urban Group				Non-Urban Group		
Name of Village	Percentage of area under food crops	Rank	Market proximity ranks	Name of Village	Percentage of area under food crops	Rank	Market proximity ranks
Sathugad	30.1	1	2	Panapakkam	49.9	1	4
Rajakkal	45.7	2	1	Melsevalambadi	60.2	2	2
Murukkambattu	52.5	3	5	Thandalai	60.4	3	1
Thattaparai	61.6	4	3	Agarakottam	62.8	4	3
Vishamangalam	68.7	5	4	Thenpudupattu	64.7	5	5
Pallipattu	89.5	6	6	Siruvathur	86.5	6	6
Rank correlation coefficient	=	0.7714				=	0.6000

The correlation is significant and positive. The nearness to a market centre, good roads and efficient transport facilities, do seem to exert some influence on the farmers to suitably and profitably modify their cropping pattern. The 'urban' group has better facilities (with the exception of Pallipattu) than the 'non-urban' group, and this is reflected in the lower percentage of area under food crops in the 'urban' group. About 60 per cent in 'urban' and 65 per cent in 'non-urban' group, of the area cropped, is under food crops, pooling all the sample villages. But as noticed in Table II, inter-village differences are also significant.

In the 'urban' group, Rajakkal village registers the least (with the exception of Sathugad) percentage area under food crops. There is a sugar factory just located within one mile from the village with an excellent metalled all-weather road connecting it with the village. There is an irrigation canal and farmers grow two crops of paddy. Sugarcane is of prime importance. In dry lands, mostly groundnut is grown either as a single crop or as a mixed crop, with millets. Millets do not form an important crop. A steep rise in the conversion of paddy lands into sugarcane fields is noticed.

Sathugad forms a hamlet to Pernambut village which is almost a town (major Panchayat). There is not much of wet cultivation; the cultivators grow mainly groundnut, tamarind, mango, lime trees and vegetables, Pernambut forming a ready market. For the other villages in the 'urban' group, with the exception of Pallipattu, Gudiyatham and Tirupattur (taluk headquarters) form the primary market centres, with efficient regulated markets.

'Non-urban' group has comparatively fewer markets. The approach roads from the villages are not in good repair. In spite of the regulated markets at Kallakurichi and Tindivanam, groundnut is also sold at the village site to commission agents of licensed dealers. Kallakurichi is not one of the major regulated markets, the arrivals there being are of the lowest in the region, the prices offered are also less at these two regulated markets when compared with the corresponding prices at Gudiyatham and Tirupattur.[4] Development of good roads and efficient, *i.e.*, adequate and timely transport seems to be a primary need of these villages.

SIZE OF HOLDING, INDEBTEDNESS AND CROPPING PATTERN

It is claimed that the food and fodder requirements of the farmers to a certain extent introduce rigidity in cropping pattern by fixing a limit to the area that can be 'spared' for cash crops. On the other hand, the cash requirements, specially the repayable cash loans and outstanding debt, act as incentives for allotting more area for cash crops. Within a village, where urban influences and nearness to markets are common for all cultivators, where there is a reasonable degree of physical homogeneity, we can test a hypothesis that the percentage of area under food crops is inversely proportional to the area operated per adult unit in the family. It is also possible that with increasing units of cattle maintained in the holding, the area under food and fodder crops will proportionately increase. On the other hand, the percentage of area under food crops will be inversely related to amount of outstanding debt (cash) per acre. Thus the multiple regression equation of the type $Y = K + ax_1 + bx_2 + cx_3$ is fitted for each village in order to

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4. Reports of the Regulated Market Committee for Groundnut, Madras State, 1958-59.

carry out an inter-holding analysis of factors that may be associated with the variations in cropping pattern.

In the above equation Y=percentage of area under food crops to gross cropped area in the holding; x_1 = extent of operational holding per adult unit. Adults are persons above the age of twelve years. Children below two are zero units and between three and twelve years (inclusive) are taken to be equivalent to half adult unit.

Operational holding=owned and self-cultivated land+land taken on lease.

x_2 = number of cattle units per acre of operational holding. One cattle unit = one bullock or cow or buffaloe : young stock (below 3 years) are considered as half a cattle unit. Sheep and goat are not included since they are left for grazing in the forests and pastures.

x_3 = amount of outstanding debt (in Rs.) per acre held.

Debt payable in grain has not been included. Outstanding debt is but a partial indicator of cash requirement but it is one of the most pressing one, and can be taken as an index of the cash obligations to be met by the cultivator.

Multiple correlation coefficients are computed for each of the twelve villages and the result is tabulated below :

TABLE III—MULTIPLE CORRELATION COEFFICIENTS

Urban Group			Non-Urban Group		
Name of village	Ry(x_1 x_2 x_3)	$100R^2$	Name of village	Ry(x_1 x_2 x_3)	$100R^2$
Sathugad	0.490	24%	Panapakkam	0.283	8%
Rajakkal	0.410	17%	Melsevalambadi	0.481	23%
Murukkambattu	0.318	10%	Thandalai	0.265	7%
Thattaparai	0.314	10%	Agarakottam	0.147	2%
Vishamangalam	0.331	11%	Thenpudupattu	0.404	16%
Pallipattu	0.462	21%	Siruvathur	0.245	6%

None of the twelve multiple correlations are statistically significant at 5 per cent probability level. This result throws up an interesting inference that these so-called restraints in fact do not explain fully—or even to a significant extent, the variation in the proportion of area under food crops. The percentage of variation explained by these variables ranges from 2 per cent in Agarakottam to 24 per cent in Sathugad.

The reasons for this low correlation cannot be conclusively stated; however, knowledge of the local practices helps clarify the position to some extent. In bigger holdings it is customary to have one or more permanent farm servants, who are fed in the masters' households. Besides, their wages are paid in kind. Traditional mode of wage payment is quite common in the case of artisans and craftsmen, barbers and dhobies. With this mode of grain obligations to be met by a big cultivator, in spite of higher operated land per adult unit, the scope for increasing area under cash crops is restrained. Secondly, it is likely that the big

cultivator may find it difficult to market his produce of cash crops if he expands his scale of operation. This is only a plausible hypothesis since no supporting and conclusive evidence is available.

Further as said earlier, in this region, where groundnut is established stably as a cash crop even the small cultivators allocate a little of their land for this crop. This results in the size of holding and cropping pattern being not proportionately related.

If the 5 per cent probability acceptance level is waived, it may be of some interest to note that barring a few exceptions, the amount of variation explained (100R^2) increases with the proportion of area under cash crops in the village. Whether this is only a 'coincidence-correlation' or that with a greater emphasis on cash crops, there is more conscious planning (i.e., when an individual farmer is faced with the choice between cash and food crops and has to consciously decide on his crop pattern, it is likely that the food, fodder and cash needs will enter into his calculations) can only be proved by further testing.

However, a host of factors interact and influence the decisions of each individual farmer, resulting in inter-holding, inter-village and inter-regional variations in the cropping pattern. Taken in isolation food, fodder and cash requirements do not explain much of the variation.

CONCLUSIONS

In a region of homogeneous soil and climatic features, urbanisation introduces diversification in the cropping pattern, introducing more cash crops such as fruits, vegetables and flowers. A good market centre, in the vicinity, with well connected road and facilities of cheap transport system, exerts its influence on the cropping pattern of a village such that the shift in cropping pattern tries to balance the demand created by these market centres. Well-developed regulated market centres and sub-centres keep the acreage under groundnut significantly high. Proximity of sugar factory tips the balance in favour of sugarcane cultivation. In the South and North Arcot region, the cropping pattern favours cash crops with increasing urbanisation, as revealed by the sample survey.

Inter-holding variations in a village are very high with regard to individual cropping pattern. The food, fodder and cash needs explain only a small amount of the variation in percentage area allotted for food crops. The crop pattern in villages within this region is lop-sided, in the sense that the backward and interior villages grow paddy and millets and stand to profit less as compared to the 'urban' group of villages. Even crop planning may be said to be a more conscious process in these villages which are exposed to urban influences—this is at best a conjecture, a hypothesis that needs further testing.

There is no doubt about the urgent need of villages in the matter of metalled roads and efficient transport, for a well adjusted, profitable and balanced cropping pattern on individual holdings.