CHAPTER IX
SUMMARY AND CONCLUSIONS

The need for a micro-study, rather than a macro-study of crop-pattern has been spelt out in the introductory chapter. The macro-studies have mainly stressed price as the factor affecting crop-pattern and have arrived at conflicting findings—some putting forth that the Indian farmer is highly responsive to price, while the others revealing just the opposite. The role of price as a factor, can be better examined at the micro-level by studying how it affects the individual cultivator's crop-decisions, or selections and hence the rotations. This alone would bring out more explicitly the importance or the lack of the price factor. The present study is an attempt in this field to see as to what factors influence the individual cultivator's crop-decisions.

The study is essentially a short-term analysis of individual cropping-pattern, with the time limitation of a rotation cycle of three to four years and the actual data of cropping-pattern collected for four years. In such a short-period, the fluctuations of crop acreages in relation to their prices is least plausible and feasible. The minute changes that occur in the crop-acreages, need not necessarily be on account of prices alone; but can be a resultant of various factors. The study has dealt with such factors affecting the individual crop-pattern, while always keeping in mind that price is an essential
factor, though not observed as leading to fluctuations of crop areas from year to year, but having its bearing at the time of initial selection of crops and rotations.

The individual cultivator is required to take two kinds of decisions: first, about the long-term cropping programme; and second, about implementing the long-term decisions into annual cropping. In the long-term cropping programme, he has to decide upon the selection of crops for rotations, which will give him maximum returns over years. Once the rotations are chosen the short-term programme becomes simple. It is to implement the accepted rotation-plan into annual cropping, looking to the climatic conditions and the resource position in the individual year. The short-term decisions, therefore, are taken to fit in the individual year, in the long-term cropping.

Before going into the logic of the rotation-plan and the actual areas allotted to crops, it is essential to understand as to what the cultivator is trying to achieve through the rotations and the area allocation to individual crops. For, unless we look into what he is trying to achieve, it will not be possible to understand why he does, what he does. Effectively, what he does and what can be observed from his rotations and annual cropping are almost a reflection of what he is trying to achieve.

The aim of the individual cultivator is to get the stable maximum income over years. He tries to achieve this objective by making the selection of crop-rotations in a judicious manner, so that he can secure a regular flow of the stable maximum income over a period. He never aims at the highest production and
profits for a year or for a short-term. The cropping programme which is likely to give the highest income for a few years, to the permanent detriment of the soil fertility and future income are considered economically unsound and are never practised. The cultivator always prefers to have such a long-term cropping programme which gives him the maximum income and also keeps his land at a profitable level of productivity over years.

The aim—maximum income from land—which the cultivator tries to attain, has a peculiar interpretation, particularly in the subsistence economy. As spelt earlier in Chapter V, the approach of the individual cultivator to maximization of income is very peculiar. He essentially goes to combine his food requirement with cash-income. He never aims purely in terms of high production and high profits, but at that level of production and high profits which yield him the necessary food requirement and the maximum cash. This type of attitude suggests that the individual cultivator is a 'security expectant' operating within a field of 'bounded rationality', and is not willing to forgo the meeting of his own food requirement for high cash-income. In the light of this approach his 'judicious' selection of crop-rotations assumes great importance and it appears that his rotations are broadly an appraisal of his resources and what these can yield to him.

The peculiarity in the individual cultivator's approach necessarily puts a major constraint on the choice of rotations, making it obligatory to choose a rotation or rotations with jowar—the main food-crop, as an essential component. The expectation of minimum security for food, to an extent, decides
the area that needs to be allotted to growing jowar, but still does not tell anything about the rotations with jowar. This can be decided only after knowing the soil-composition of the cultivator's land-holding. The other factors such as supply of home-collected manure, availability of irrigation, do have a play, but these largely go to decide the area allocation to cash-crops. These factors are more relevant for growing cash-crops mainly because of the ability of such crops to yield a better return even after meeting the additional costs incurred on their account. After considering all the factors enumerated it is quite likely that jowar gets associated in various crop-rotations. It is more commonly associated with G-J, a two-year rotation; G-C-J or G-J-C, a three-year rotation; and G-C-C-J, a four-year rotation. The selection of rotations with jowar is done in such a way that adequate area is allotted to jowar every year to meet the annual food needs of the family.

The area allocation to jowar generally follows the argument as above, but is not wholly independent of the allocation of areas to cash-crops. The basis of growing jowar is mainly the food requirement, unless other constraints such as soil-type or shortage of manure are operative making it inevitable to grow more jowar. The cash-crops are essentially for the market and to yield the maximum cash-income. The two important cash-crops in the area being groundnut and cotton, it is convenient to consider these only. Besides these two, banana is a third important cash-crop, but is wholly dependent on availability of irrigation, and can be considered later. The area allocation to cotton and groundnut can be argued almost on the same lines
as jowar except for the difference of the best utilization of manure and the relative profitability of one crop over another. Even here the soil factor cannot be left out of the picture, especially because groundnut can be profitably grown on light soil and is quite well suited for medium-black soil also, but cannot be grown on deep-black soil with profit; whereas in respect of cotton the soil restraint is operative in a quite opposite direction. Cotton can be most profitably grown on deep-black soils and is well suited to medium-black soils, but cannot be grown on light soils at all. Considering jowar which is grown on all the three soils along with soil restraint operative in respect of the above two crops it appears that medium-black is the most adaptive soil and that is why all sorts of rotations are practised on it. The peculiarities of the three soils, hence weigh heavily in crop selection and rotations on a holding.

In the final choice of rotations, the soil constraint, more or less, limits the G-J rotation to light soils only. The result of this on the rest of the holding which might be composed of medium and deep-black soils happens to be a competition for the best utilization of manure to achieve the end result that the cultivator has in his mind. Both cotton and groundnut being the two major cash-crops in the area, the actual allocation of area, specifically to cotton, a comparatively better manured crop, have to be reached not only by taking into consideration the availability of manure but as well the relative profitability of the two crops. As stated earlier, of the two cash-crops, cotton is comparatively more profitable than groundnut. The
cultivator, therefore, tries to put, to the extent possible, larger area of his medium and deep-black land under cotton, if sufficient quantity of manure is available. He selects such rotations that cotton gets a predominant place in his cropping. On the other hand, if there are some restraints operative in the form of soil-composition of land-holding and/or manure supply, the cultivator tends to devote proportionately larger areas to groundnut. Thus, looking to all the factors, the cultivator selects the crop-rotations in such a manner that he could put his land under the crops most suited to it, could utilize the available quantity of home-collected manure in the best possible way and could secure the stable maximum income over years.

With the introduction of irrigation into the resource position of the cultivator the process of selection of crops, rotations and area allocation gets a bit more complicated, specially because three cash-crops have to be considered in terms of relative profitability and resources in place of the two dry-crops. Additional complication arises out of the time-span that occurs between the planting and harvesting of banana. Banana is a crop of one and a half years and if cotton and groundnut are to be compared with it, it will have to be borne in mind that within the cultivation-period of banana, two crops of cotton or groundnut can be raised. The result of this is that when banana is to be chosen in place of cotton or groundnut, the profitability of taking banana will have to be decided against the income that possibly can accrue to him by forgoing banana and raising cotton and groundnut or a third crop that gets
associated with cotton or groundnut in the crop-rotation. The situation is almost analogous to leasing-out of land specifically for banana cultivation. A cultivator having no irrigation facility of his own, occasionally leases-out his land specifically for banana cultivation and in such cases practises duality of rotations on that particular fragment. The basic rotation practised on this fragment is essentially of dry crops. Whenever he leases-out his land for banana cultivation, the comparison between incomes that can accrue has necessarily to be between the income from banana and income from two years of dry cultivation.

The use of irrigation being specifically made for banana alone, necessarily underlines the fact that it alone can achieve the best results. The essential restraint for the allotment of area to banana is the extent of irrigation facility available. The irrigation restraint is observable in the time span of the rotations of banana. Normally, the three-year rotations such as NB-JB-C and NB-JB-J are practised. The four-year rotations like NB-JB-C-J and NB-JB-C-C are generally practised by those who have limited irrigation potential. The four-year rotations, however, are practised, not necessarily because of restraints of irrigation, but may be a resultant of the other factors as well, such as manure supply and financial requirements. Whether banana gets associated in a crop-rotation with cotton or jowar depends on the food need and the soil-type. Even if jowar does not get associated with banana in a crop-rotation, that does not necessarily mean that a cultivator with irrigation facility is unmindful of the food requirement and aims at high production
and high incomes. At the most he could be less mindful in meeting the food needs. This can be observed by looking to the peculiar practice of taking jowar as a mixed crop along with cotton.

Thus, the major factors, which the individual cultivator has to take into account while deciding upon the long-term cropping programme, are: (1) food requirement of family; (2) soil-composition of land-holding; (3) supply of home-collected manure; (4) availability of irrigation; and (5) relative profitability of different cash-crops. The cultivator takes a composite view of all these factors and selects such crop-rotations and allocates his land to food and cash-crops in such a way that he could secure the stable maximum income over years. In some cases, one of the factors may be overwhelming, but none of them can operate independent of others and decide the whole rotation-plan. All these factors are interwoven and have a composite effect on the cropping programme. The cultivator has to take a total view of these and decide upon the rotation-plan. He does the final area allotments of different fragments or plots of his land-holding in such a way that over the whole rotation cycle of all the fragments or plots, the need to deviate will be minimised. Only when such need to minimise the deviations which occur not as a result of changes in the natural factors, but as a result of disturbance in the best utilization of resources both in respect of land and manure, is met, would it be possible for the cultivator to achieve stable maximum income over time.

Once the long-term cropping programme is determined, the cultivator tries to adhere to it, to the extent possible, in the
annual cropping. The short-term crop decisions, therefore, are taken simply to implement the long-term cropping programme, looking to the climatic conditions and the resource position in the individual year. The climate and the resource position do not change every year and hence the cultivator can have his annual cropping largely according to the rotation-plan in most of the years. In certain years, however, situations may and do arise that the cultivator cannot adhere to the cropping as per the rotation-plan and is required to deviate. Such situations arise because of many and varied factors over which the individual cultivator may or may not have any control. The factors causing deviations may be broadly classified into two groups: (1) factors inherent in the rotation-plan itself; and (2) factors external to the rotation-plan.

The rotation-plan necessitates deviations either by developing an area imbalance between different crops or by a preferential treatment in area, given to one of the crops included in the crop-rotation. The external factors causing deviations are of varied types, concerning climate, resources and requirements. Of these the major external factors causing deviations are rainfall, changes in the resources like land, manure and water supply and changes in the requirements like food and cash. The deviations occurring as a result of the inherent factors in the rotation-plan are different from the deviations caused by the external factors. The difference lies in respect of the resource position of the cultivator. When the deviations caused by the inherent factors occur, the resource
position of the cultivator does not change. The deviations are necessitated to correct the area imbalance in the cropping developed by the rotation-plan itself. On the other hand, when deviations are caused by the external factors, the resource position itself changes and the deviations are undertaken to set a new balance between the resources and thereby to attain the maximum income on a different level.

In the formulation of the long-term cropping programme, along with the deviations that occur as a result of rotations and the cultivator’s own ideas about adequate use of resources, an income equilibrium and also a resource use equilibrium is attained. The income equilibrium so attained is a range of income that rules out high peaks and low troughs and is comparatively a stable maximum income within certain limits. This income equilibrium is attainable by taking into consideration the existing prices of crops, reflecting in their relative profitability. The income equilibrium is not necessarily a static phenomenon. It is amenable to changes allowing the cultivator to attain higher income equilibrium, depending upon the nature of changes in the resources at his command. Price changes as well may change the income equilibrium either way. However, the changes in the resource position may ask of him to re-cast the whole rotation-plan and hence the cropping. The changes in prices, on the other hand, may not affect the rotation-plan as such in the immediate, but may change the income equilibrium to higher or lower level, depending on the extent of the rise or fall in prices and the changes in the cost of cultivation.
Comparatively meagre benefits accruing by way of additional income, may not be a sufficient incentive to re-cast the whole rotation-plan. Under such circumstances any changes in crop areas that could be the result of prices are likely to be very marginal. Such a marginal extension of crop area may continue for some period and when he feels assured of the continuity of the price rise or the stabilization of price at the higher level, only then does he think of the realignment of the resources, and re-casting of the rotation-plan. So, if the cultivator is really responsive to the changes in prices, what needs to be studied along with the changes in prices and crop areas is the realignment of resources that eventually must take place in the course of time.

An introduction of a new crop is done on similar lines, in the sense that it is first grown on smaller areas by deviating from the existing rotation-plan. In fact, the cultivation of a new crop is first done and continued for a time on an experimental basis and the area changes that occur on account of such experiments are very marginal. Only when the cultivator feels assured that the existing resource position can meet the necessary requirement of raising a new crop or the additional resources that are required are within his reach, does he fit it, into his rotation-plan. During all this period of experiment, as he has checked upon the resource requirement and the ability to meet it, he has also found out that higher benefits do accrue from the cultivation of that crop. So whether an existing crop becomes more profitable on account of the price rise or a new
crop happens to be more profitable than the existing one, the essential condition in both these cases happens to be that a reconsideration of the resources and their possible supplementation has to be thought out. Only when all these conditions are met, can he think of reallocation of area commensurate with the existing resources or after the supplementation of those resources. This means a mere change in resource position or a mere rise or fall in prices need not necessarily be conducive to attain a higher level of income. What effects such changes will have on his overall approach to the stable maximum income will have to be looked into. The essential condition even for a long-term cropping study seems to be that a mere single factor such as prices alone may not cause a rise or fall in the acreages, but such a rise or fall could be a resultant of very many factors. The need, therefore, is not only of studying the fluctuations in acreages in relation to the prices, but studying them along with the other changes that might have occurred during that process.

During a short-term the cultivator is more or less rotation-bound and the area fluctuations are necessarily a result of the crop-rotations. The net additions to the fluctuations of the crop acreages on account of deviations are quite meagre. However, the actual area deviations are not necessarily that low. In the aggregate the areas that deviate-in and deviate-out of a given crop almost cancel each other and the aggregate crop areas show only a marginal variation. In a majority of the cases these deviations do not occur on account of prices but are a result of various factors and can be broadly classified as
complementary to rotation-plans and changes in the resource position. If, therefore, a long-term analysis of cropping pattern is to be tried, what seems to be essential is not only as to how the area fluctuations occurred during the short-term; but as well at what point of time the cultivator tries to re-set the whole rotation-plan resulting either from a price rise of a given crop or as a result of supplementation of his resource position.

Thus, in a short-period, the individual cultivator generally prefers to adhere to the rotations in his annual cropping. The sanctity of rotation, lies in making the adequate use of the available resources, while at the same time trying to conserve the basic resource—land. Earlier the rotation-plan, allocation of areas to different crops etc. have been looked into only in terms of resource use. Along with the resource use, the conservation measures as well, will have to be looked into, to give a complete picture. The lack of any conservation measures may not show any effects in the short-period, but these will certainly have bad effects in the long-term. So, a crop-plan that could be conducive to higher level of income in the short-term need not necessarily prove to be so in the long-term. The idea of conservation of resource, therefore, puts a constraint on the crop-plan at all stages. However, some individual cultivators may prefer to go against the dictates of conservation in certain years, particularly when there is a high price rise of a crop.

Agronomically the idea of rotation of crops is based upon the utilization of food nutrients in a balanced manner. The
alternation of crops belonging to different families helps to retain the fertility of land, as different nutrients are absorbed during the period of crop growth and the possible deficiencies of food nutrients by a continuous single cropping are avoided. Moreover the crops belonging to different families have essentially different root systems which tap the different layers of the soil for their food nutrients. This again helps to maintain the balance of food nutrients in the soil. The idea of growing exhausting and restorative crops in alternation is based on these facts only. However, in some crop-rotations, such as G-C-J, G-J-C and C-G-C-J etc. the balance of exhausting and restorative crops is not maintained. But in such cases, one of the exhausting crops is necessarily manured. Manuring helps to retain the fertility of the soil to quite an extent and two continuous exhausting crops can be grown with least detrimental effects.

The cultivator's idea of the stable maximum income, therefore, does not relate only to the utilization of available resources but to the conservation of them as well. The allocation of resources such as manure, irrigation etc. can maximise his income for some time but the cultivator's failure to give due attention to the conservation will ultimately lower down his income from land. This only means that even without any measures to conserve, the cultivator may get higher income in the initial period but this will not last for long. As it is not possible to replenish the lost fertility in soil, the income will certainly decline in the long-period. However, with due measures for
conservation, right from the start, the fertility of the soil can be retained at its level for a very long-period. So, the adequate use of resources along with the presence of conservation measures can assure the individual cultivator the stable maximum income over time. The practice of rotation is based on all these considerations. Even the deviations that occur as a result of rotation-plans and other factors are carried out in such a way that there is the least detrimental use of the land resource. Therefore, in the ultimate analysis, cropping-pattern appears to be essentially a problem in resource use and conservation.