CHAPTER VI
SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION
FINDINGS AND CONCLUSION

MAJOR FINDINGS

The study reveals that Karaikudi taluk with an extent of 4,836 ha under forest is the highest among taluks in their contribution to the forest area of the District. This works out to 25.25 % of the district’s total forest area. This is followed by Thiruppattur taluk with 4,817 ha (25.15%), Sivagangai with 3,612 ha (18.86%), Devakottai District with 2,543 (13.27%) and Manamadurai taluk with 1,036 (5.40%).

It was found that Sivagangai taluk occupies the first position (25.3 %) with respect to growth of net irrigated area during the study period as it increased from 17,695 hectares to 23,026.94 hectares. Its growth level shows 0.23 percent fluctuation in the period of analysis. Manamadurai taluk comes next with 20.21%) in its growth rate on net irrigated area during the study period. The net irrigated area of Manamadurai taluk was 15,535.76 hectares in 2003-04 and it rose to 17,766.58 hectares in 2011-2012, indicating 20.5 percent fluctuation in its increasing trend. It is due to a shortfall in net irrigated area compared to the remaining years of the study period.

It is observed that Devakottai taluk takes the third position (15.8%) with respect to growth of net irrigated area during the study period. Its net irrigated area rose from 12,301.43 hectares to 15,328.27 hectares, indicating 0.19 percent fluctuation in its growth rate.
In Thirupuvanam the Net irrigated area is almost nil in the above two years. In Ilayangudi and Manamadurai taluks the Net irrigated is almost decreasing, not because of the excavation of the ground water below a certain level but because of the availability of funds for the maintenance of the irrigational canals. The analysis shows that Devakottai and Karaikudi the Net irrigated area have decreased because of the concept of urbanization. These are the nearest urban towns which provide employment to several of the people who come from rural area.

It is found that the area under barren and uncultivable waste is almost constant in all taluks except Karaikudi and Manamadurai. The area under this category has decreased from 129 hectare to 81.72 hectare during the study period. This is due to development of housing colonies and increasing trend in industrial and commercial purpose of land use in these taluks.

It is found that Thiruppather taluk with an extent of 3,425.96 Hectare under Barren is the highest among Taluks in their contribution to the forest area of the District. This works out to be, 1.92 percentage of the Districts’ total barren area. This is followed by Ilayangudi with 623.015 (.16) and Sivagangai with 390 Hec (.10) Karaikudi with 87 Hec (.02) and Devakottai with 54 Hec (.0001)

It is observed that the area in Sivagangai taluk put to non-agricultural use was 33,175.453 hectare rising to 33,259.303 and similarly in Manamadurai rises from 20,252 to 20,279.51 and in Devakottai rises from 19,718.715 to 19,786.905 and in Karaikudi 17,696.486 to 18,352.025 hectares.
It is found that Thirupuvanam taluk receives the highest level of rainfall all over the 10 years from 2003 to 2013, with the co-efficient of variation 0.15. The growth rate of rainfall in all taluks shows a tremendous variation with Negative value, and positive value in all taluks. Ilayangudi taluk receives lowest level of rainfall from 2003 to 2010 with the co-efficient of variation 0.35. The highest level of rainfall is due to the aspect of global warming and more over deforestation decrease the tropical rainfall.

Regarding the Gross Irrigated Area, in Sivagangai taluk, the area under Gross Irrigated area increased consecutively during the period of 2003 – 2013.. In Manamadurai taluk the gross Irrigated area deviates alternatively year after year.. In Thirupuvanam, since the area Irrigated is same for the two year the growth rate of co-efficient of variation is equal to 1. In Karaikudi, Devakottai and Thirupathur taluk there is a greater deviation in the area of Irrigation under different crops. The growth rate of Karaikudi and Devakottai is positive with the value of .13 and .11 with the co-efficient of variation 0.4 and 0.07. The Gross Irrigated area under various value increases due to the adoption of suitable cropping pattern with suitable Technology.

In the case of growth of cultivable waste, The growth of cultivable waste land in Ilayangudi and Thirupuvanam taluk is almost constant for the past 10 years (1461.48 and 875.74) with the Co-efficient of variation 0.011 respectively. There is a greater variation of cultivable waste land in other taluks such as Manamadurai, Sivagangai, Devakottai, Thirupathur etc. There is also negative as well as positive trend of taluks wise growth of cultivable waste land in Sivagangai District.
It is further observed that the growth of Medicinal plant is only limited in various taluks of Sivagangai District. Medicinal plant Cultivation is only meager in Manamadurai and Ilayangudi taluk. The area under Medicinal Cultivation is also getting reduced in Manamadurai taluk, with the standard deviation of 5.4. The growth rate of Medicinal plant cultivation is almost negative in all taluks of Sivagangai District. In Thirupuvanam the area of Medicinal plant cultivation is almost constant.

With regard to the area irrigated under Bore well in Manamadurai, the area covered under irrigated well increased from 290.12 hec to 2,027 hec up to 2011 in Manamadurai taluk and it started to decrease because of the above said reason and fall in the rainfall level in the Sivagangai District for the last three years with the co-efficient of 1.09. In Manamadurai the area covered under the irrigated well was Nil up to 2008 – 09. The Number of acreage started to rise only after 2010 – 11. In Thirupuvanam the area under coverage is almost constant.

The analysis reveals that the area under miscellaneous tree crops is more in Karaikudi taluk and more over the area included under this category is increased over 10 year from 2003 – 2013, with the co-efficient of variation 0.08. The area is very meager in Ilayangudi and Thirupuvanam. The Area under this group in the Sivagangai taluk is decreasing from 2003 to 2013 with the co-effcient of variation 0.04. The area under Devakottai is increasing with the growth rate of -.64 with the co-efficient of correlation 0.3.

With regard to other fallow land, the area under other fallow land has declined in Sivagangai taluk, Manamadurai taluk and in Ilayangudi taluk. There is a greater
variation (decline) in other fallow land. More over this area is constant in Thirupuvanam taluk. The area under fallow land has increased in Karaikudi, Thirupathur and Devakottai taluk.

Regarding the growth of current fallow land, Sivagangai District has a total area of fallow land 14,359 hectare in 2003 and it has increased to 24,804 hectares in 2013. It shows a tremendous increase in the area of current fallow land. There is a greater deviation in the area of current fallow land according to taluk wise. Under this category in Sivagangai District, Devakottai taluk has quite very low value in 2003 such as 625.3 hec to 1,153.982 hec in 2013 with the co – efficient of variation 0.27. There is greater variation of current fallow is other taluks too.

It could be seen from the analysis that Sivagangai taluks rank first position with 20 percent under Net cultivated area. Net cultivated area of this taluk was 18,205.77 hectare in 2003-2004. And it rose to 20,981.75 hectare in 2012-2013 showing 86.7 percent of increasing trend. It is found that almost all taluks in Sivagangai district had maintained the declining trend.

With regard to the growth of area under cultivation, the growth rate of area under cultivation is almost negative under two taluks (i.e.) Manamadurai and Devakottai with -1.3 and -0.04 respectively with the co – efficient of variation 0.5 and 0.2. The growth rate is almost Nil in Thirupuvanam. The growth rate of other taluks Ilayangudi, Karaikudi, Sivagangai, and Thirupathur is positive (i.e.) 0.1, 0.1, 0.2 and 0.2 with the co – efficient of variation 0.12, 0.18, 0.25 and 0.28 respectively.
It could be seen in the analysis that there is fall in the area under paddy cultivation and this is highest in Manamadurai. However, the increase in the area under paddy cultivation is quite remarkable in Karaikudi and Thirupathur and mild increase is observed in Devakottai taluk.

One way ANOVA test is carried out to examine the variation in paddy cultivation. This indicates that during the study period the cultivation of paddy is less fluctuated in the study area.

Correlation analysis was carried out to find out if there is any significance between Production and cost of chilly. It is found that there is a significant correlation between Chilly production and cost of production in the data set. The following linear chart explains the fact.

With regard to growth of area of cultivation under Ragi, the area under ragi cultivation was 121.12 hectares in 2003-04 in Sivagangai District, and it declined to 40.58 hectare in 2012-13, showing 2.9 percent shortfall in the area under study. The co-efficient of variation analysis explains 9.78 percent of variation in the declining trend of area under Ragi cultivation. It could be seen from the above discussion that, at the overall level there is nearly 60 percent of declining in the area under ragi cultivation in Sivagangai district in the study period.

Regarding the growth rate of area under cumbu, Devakottai and Karaikudi taluks is positive (i.e.) 3 and 2 with standard deviation of 3 and .05. The area under the cumbu cultivation decreased with the growth rate of -139.8 and with the co-efficient of variation 18.07 in Thiruppathur. The increase in the area of cumbu is because of
rearing animals in the area requires fodder for the cow which could fetch revenue for them by increasing milk production.

With regard to the growth rate of black gram, the area under cultivation of black gram started to decrease in all taluks except Thirupathur. The growth rate of Sivagangai taluk shows a negative trend -1.18 with the co-efficient of variation .6. In Manamadurai taluk and Ilayangudi taluk the growth rate is negative (i.e) -3.2 and -10 with the co-efficient of variation .9 and 2.3 respectively. In Thirupuvanam the area under black gram is 5.03 hec in 2012 - 13 with the growth rate of 1. In Devakottai and Karaikudi the area under cultivation of black gram is decreasing by -14.9 and -3.7.

It could be seen clearly from the analysis that 419.782 hectares were cropped under black gram in 2003 – 04 in Sivagangai District and it increased to 681.52 hectares, showing 0.04%. Thirupathur and Manamadurai recorded a massive level of increase in area under black gram cultivation. A mild increase in area under the black gram is noticed in Karaikudi and Manamadurai. Remarkably the area under black gram has decreased in Sivagangai, Ilayangudi taluk in Sivagangai District.

It is found that the growth rate of Groundnut cultivation in various Taluks is decreasing, all over the years. In Sivagangai taluk, the growth rate of Groundnut is -0.4 with the co-efficient of variation .25. In Manamadurai and Ilayangudi, the growth rate of ground nut is decreasing with -18.8 and -2.2 with the co-efficient of variation 9.6 and 1.0. Since the division of Thiruppuvanam taluk was made recently, the growth rate of all crops is almost Nil. The growth rate of Devakottai, Karaikudi and Thirupathur is almost negative with -3.3 and -4.0 and -0.2 with the co-efficient of variation 2.6, 0.84 and 0.13.
It could be seen from the above analysis that Sivagangai District recorded 3830 hectares in 2003 – 04, and it mildly declined to 3673.35 hectares of area under chilli cultivation, indicating -11.4 % short fall in the area of Chilli cultivation.

It is found that, there is no cultivation of green gram in Thirupuvanam. The growth rate of Green gram in Sivagangai taluk is -2.8 with the co-efficient of variation 0.5. The growth rate of Green gram in Manamadurai is -3.3 with the standard Deviation of 0.2. The growth rate of Green gram in Ilayangudi is -8.5 with the Standard Deviation of 1.4. The growth rate of Green gram in Devakottai, Thirupathur and Karaikudi is -2.6, -9.04 and -1.57 with the co-efficient of variation 2.42, 1.39, 19.7 respectively.

It could be understood clearly from the analysis that Thirupathur taluk ranks first among the taluks in Sivagangai District in the area under cotton cultivation. The area under cotton cultivation in 2003 – 04 is 2.12 hectares and it increased to 6.08 hectares in 2012 – 13, showing 34.9 Percent increase in the cultivation of cotton in Thirupathur taluk. It is due to the reasons that Cotton is used as basic raw material for the cotton textile Industries located in and around Thirupathur taluk.

It could be seen clearly from the analysis that there is a massive level of increase in area under Casuarinas cultivation is observed in Sivagangai, Manamadurai, Ilayangudi and Thirupathur. The decline is considerable in Devakottai taluk as it was declining from 0.41 hectares in 2003 – 04 to 0.17 hectares. It is due to the unscientific approach of the farmers and lack of knowledge about soil health. The increase in the area of cultivation is that it is the suitable for all soil, salt tolerance and draught resistant.
It is evident from the analysis that turmeric cultivation was reported only in the first few years in Devakottai, and Karaikudi taluks in Sivagangai District. Thirupathur Taluk records a very fast growth rate under the area of turmeric cultivation, indicating the changing scenarios of crop diversification. Turmeric cultivation was not carried out in Manamadurai, Ilayangudi, and Thirupuvanam taluk in Sivagangai District throughout the period under study.

Regarding onion cultivation, Sivagangai taluk occupies the first position with respect to area under Onion cultivation. Thirupathur taluk ranks second in the area under onion cultivation. Onion cultivation is found in Karaikudi and Devakottai Taluk and it is reported, only 0.4 hectares of area. As compared to other taluks the current year onion cultivation is not satisfactory in five taluks. {i.e.} Manamadurai, Ilayangudi, Thirupuvanam, Devakottai, and Karaikudi. It indicates monsoon failure, climate change, untimely rain, warm temperature etc.

It is observed from the analysis that almost Thirupathur taluk ranks first (44.3 %) in the area under cultivation of coconut followed by, Manamadurai 32.4%, Sivagangai 10.49% and Karaikudi 6.3%.

With regard to coconut cultivation, it is recorded 2004.67 hectares In Thirupuvanam taluk in 2012-13. In the beginning of the study area of the first five years, it did not register the area under coconut cultivation. The substantial increase of coconut area in Ilayangudi taluk occurred due to substitution of paddy by coconut. Manamadurai taluk is placed last (-8.9%) in its growth rate of area under coconut cultivation.
This study found that there is decrease and increase in the area of cultivation of gingili in various taluks of Sivagangai District during 2003-04 and 2012-13. The area under gingili cultivation was 101.99 hectare in 2003-04 and it increased to 261.76 hectare in 2012-13, indicating 38.96% increase in area under the study period. The co-efficient of variation analysis explains 16.8 percent variation in increasing trend of area under gingili cultivation.

Regarding gingili cultivation, Ililayangudi taluk ranks first position (52.4%) in its decline in area under gingili cultivation as it declined from 63.23 hectare in 2003-04 to 152.64 hectare in 2012-2013. Its declining trend shows .53 percent of co-efficient of variation and it is due to a sudden short fall in area under cultivation in 2010-11. Manamadurai comes next (-243.75%) in its decline trend in area under gingelly cultivation in the period of assessment. Its decline trend shows -44.15 percent of co efficient of variation, Devakottai comes next (-8.6%) in its declining trend in area under gingili cultivation as its declined from 3.175 hectares of cropped area in 2003-04 to 02 hectare in 2012-13.TThe area under gingili cultivation was 63.235 hectare in Ililayangudi Taluk in 2003-04 and rose to 152.64 hectare in 2012-13 indicating (3.8%) growth rates in area cultivation in this taluk. Gingili cultivation was reported one year ie 2011-12 in Ililayangudi taluk. It was due to drought, monsoon failure and global warming.

It is observed that the growth rate of sugarcane is 1, .3, .03 and 0.8 in Thirupuvanam, Devakottai, Karaikudi and Thirupathur with co-efficient of variation 0, 0.16, .09 and .26 respectively.
As per the table, maximum numbers of respondents from the small farming group consisting of 96 persons and minimum numbers of respondents are from the large farmers’ group say 33 persons. Nearly 18.5 per cent of land holdings are from large farmers and 45.9 per cent of land holdings are from medium farmers of the study area.

With regard to the Distribution of the sample households, the maximum number of respondents are from small farming group i.e., 108 persons. The minimum number of respondents are from the large farmers i.e., 39 persons are holding 39.3 per cent of maximum and the small farmers have the minimum of 12.3 percent of holding in the study area.

Regarding the age-wise classification of the sample households, the enthusiastic farmers who are interested in changing cropping pattern are young educated farmers. The aged farmers are few who are traditional farmers carrying on the agricultural activities without any change in the cropping pattern. The result also presents 18 (6 percent) farmers are above with 60 holdings i.e., minimum number of farmers among the sample in Ilayangudi taluk. In this taluk the maximum 98 (32.66 percent) farmers are in the age group of 30-40 and 79 farmers are identified in 40-50 holdings. Only 59 (19.66) farmers are found in 50-60 holdings and 46 (15.3) farmers are found in age group of 18 to 30 years.

The average cost of coconut cultivation is Rs.25,746. The expenditure is of two types. One is seed, manure, fertilizer, pesticides, micronutrients cost. Next is for maintenance, watering and other labour cost.
Regarding paddy cultivation in Ilayangudi taluk, during the study period the mean is 28,384 in tones. The standard deviation is 47,888.86. The F-change with .303 is seen that standard deviation value (47888.86) and F-change value .303 which are less when compared to its Mean. This indicates that during the study period the cultivation of paddy is less fluctuated in the study area.

It is found that the level of education was like below 10th, 10th, higher secondary and college level. In the case of Manamadurai taluk almost all the farmers are literate. Most of the households studied up to Higher Secondary level. There are some farmers with graduate education.

It is found that in the marginal farmers family group and small farmers family groups, the family members are actively engaged in agriculture operations which result in increasing the cropping intensity of land. Followed by 11 (3.66 percent) marginal farmers, 12 (4 percent) simultaneously small farmers and medium farmers, 7 (2.33 percent) large farmers have below 3 members in the family to actively engage in agriculture. Followed by 35 (11.66 percent) marginal farmers, 45(15 percent) small farmer, 39 (13 percent) medium farmers and 9 (3 percent) large farmers have 3 to 5 members in the family to engage in agriculture. Followed by 27 (9 percent) marginal farmers, 35 (11.66 percent) small farmer, 37 (12.33 percent) medium farmers and 14 (4.66 percent) large farmers have 6 to 8 members in the family and 5 (1.66 percent) marginal farmers, 4 (1.33 percent) small farmer, 5 (1.66 percent) medium farmers and 3 (1 percent) large farmers have above 8 members in the family to engage in agriculture.
The analysis shows that the Family size of the sample households is largest in Ilayangudi Taluk. Followed by 9 (3 percent) marginal farmers, 7 (2.33 percent) small farmers, 3 (1 percent) simultaneously medium farmers and large farmer have below 3 members in the family. Followed by 35 (11.66 percent) marginal farmers, 43 (14.33 percent) small farmer, 41 (13.66 percent) medium farmers and 9 (3 percent) large farmers have 3 to 5 members in the family. Followed by 25 (8.33 percent) marginal farmers, 34 (11.33 percent) small farmer, 31 (10.33 percent) medium farmers and 12 (4 percent) large farmers have 6 to 8 members in the family and 15 (5 percent) marginal farmers, 18 (6 percent) small farmer, 12 (4 percent) medium farmers and 3 (1 percent) large level farmers have above 8 members in the family.

This study records that Family size of the sample households in Devakottai taluk. Followed by 34 (11.33 percent) marginal farmers, 25 (8.33 percent) small farmers, 16 (5.33 percent) simultaneously medium farmers and large farmer have based on below 3 members of the family. Followed by 26 (8.66 percent) marginal farmers, 43 (14.33 percent) small farmer, 21 (7 percent) medium farmers and 15 (5 percent) large farmers have based on 3 to 5 members of the family. Followed by 22 (7.33 percent) marginal farmers, 36 (12 percent) small farmer, 19 (6.33 percent) medium farmers and 11 (3.66 percent) large farmers have based on 6 to 8 members of the family and 5 (1.66 percent) marginal farmers, 4 (1.33 percent) simultaneously small farmer and medium farmers and 3 (1 percent) large level farmers have based on above 8 members of the family.

SUGGESTIONS

The in-depth analysis on Shifts in Cropping Pattern in Sivagangai District prompted to deduce/ derives following broad suggestions so as to provide a beneficial and bright future to the agricultural scenario. The suggestions are turned and tuned with
indomitable will, courage and made practicable by the administrators. Some problems crusting in this sector can be solved to a greater extend. In this connection the following suggestions can provide a guideline in making and shaping proper policies related to this sector.

1. The first and foremost panacea to be administered in addressing the problem of the sharp deterioration of the land use pattern, especially with regard to paddy cultivation is the administration and strict enforcement of laws relating to the land use. The revenue authorities and the Department of Agriculture authorities should be very keen in administering the legislations enacted so as to save the land use pattern.

2. A rejuvenating effect can be exercised by the paddy cultivation sector, if it is supported by a prompt and remunerative price. The price fixation should be made by an appropriate agency like Agriculture Price Commission taking into account the regional production cost structure. For this it is highly imperative to constitute a separate agency consisting of the experts in related fields like Agriculture Price Commission and Central Statistical Organization.

3. To evacuate the existing problem of non-remunerative price to the agricultural output an agency of the type like Rubber Mark should be constituted to procure the product especially, during the reaping season, and also strict monitoring of the activities of these agencies on a time bound basis.

4. Setting up of a steering committee to identify and locate places suitable for appropriate crop cultivation to suit to the existing and emerging trends visibly associated with agriculture field.

5. For revamping the present agricultural practices, a time bound action plan is to be sort especially for the provision of seeds, fertilizers, pesticides and manure at appropriate hours.
6. At present the role of Primary Credit Societies are solely limited to the provision of short-term credit requirements of the farmers. So the need of the present hour is the reactivisation of the present role in a way as to help the farmers at the reaping season through the provision of thresher.

7. To promote and create confidence among the farmers it is highly essential to constitute an agency either at the Governmental level or on a co-operative level for procuring paddy from farmers immediately after reaping.

8. More regulated marketing centre of government agency should be opened in many places in the district.

9. Government should provide subsidized loans to farmers to dig wells and to install pump set to overcome the problem of water supply.

7. Government should popularize the various finance schemes among the farmers, so that, they can avail themselves of the benefit of those schemes without resorting to the private financiers.

8. Details regarding crop insurance, soil testing centre, use of modern methods of cultivation are to be informed to the farmers by conducting group meetings at various places within the taluk.

9. Educate the farmers through conducting training programmes to inform of the need for modernization.

10. Paddy cultivation under rainfed conditions is always a gamble with weather factors especially rainfall. Excessive or deficit rainfall, uneven distribution and untimely rainfall usually lead to high risks and uncertainties. Owing to more risks, farmers are discouraged to use more purchased inputs since returns to inputs applied are quite uncertain. Thus, drought resistant, submergent / flood tolerant varieties and late planting varieties that stand are needed to reduce risks to some extent. Utilization of ground water sources for establishing early crop is another means of averting the uncertainties of planting time.
11. Banking assistance may be provided to the farmers at a reasonable rate of interest so as to enable them to buy the machinery and agricultural instruments.

12. Co-operative farming can be undertaken, where ever possible. This will enable the growers to minimize the fixed cost of cultivation like cost of machine power, depreciation of fixed investment etc. If the fixed cost of cultivation is reduced, it will reduce the input cost. This will increase the average profit per acre.

13. Permitting outside traders to take part in the commission at the open Market will pave the way for competitive bidding and consequently increase the prices offered to the farmer.

14. Provision of community bore wells, community paddy nursery and good paddy seed at proper time to the marginal and small farmers will also enable them to get higher prices by earlier harvesting. Presently, because of the lack of these facilities, small and marginal farmers get lower price than the large farmers group.

15. Some of the farmers from lower size groups reported that the immediate cash requirement is the reason for immediate sale of the product after the harvest. So, the Government should formulate schemes like hypothecation loans against stock to the needy farmers. This will help in fetching higher price.

16. It has been observed that the most productive manual labour of the rural population that is youth are getting attracted towards urban life. This has made a big negative impact on the agricultural productivity. The so called educated rural youth find one or the other job in the informal sectors of urban area. This has made them to migrate to cities neglecting their agricultural activities. Though they are earning better and feel that their standard of living has improved; because of this, they are stopping the production of food crops and shifting over to commercial crops. This will become a threat to food security in the long run. Hence, rural migration should be regulated.
17. There is an utter need to encourage the farmers to continue with the food crop production so that there will not be any threat to food security in the future.

CONCLUSION

Despite the fact that rice were found to acquire the highest in terms of growth of performance area of cultivation, production and yield among other crops, it cannot serve the purpose of livelihood of the majority of the people in Sivagangai district. Hence, the importance had to be given to the other food crops cultivation too. Besides the study suggests that the farmers can also cultivate maize and cumbu for the money making purpose that can also be cultivated in Sivagangai district that suit the climatic conditions of the district. The existing traditional cropping pattern may not be viable in the coming years because of the continuous ground water depletion, the deterioration in soil health, changes in rainfall pattern, high cost of cultivation, implication of WTO etc., hence it is the time to save the farmers from the increasing cultivation cost. The need of the hours is to encourage the farmers, and their cultivation practice by means of uninterrupted power supply, credit facility and stable price to their produce. The minimum support price should be fixed on the basis of cost of production.

SUGGESTIONS FOR FURTHER RESEARCH

The following are the areas of further research in Cropping Pattern

1. Urbanization and Cropping Pattern.

2. Prices and Cropping Pattern.

3. Projections of Shifts in Cropping Pattern.

4. Cropping Pattern in Relation to Irrigation.

5. Changing Cropping Pattern and Food Economy of Sivagangai District.

6. The impact of changing cropping pattern on food security.