7.1 INTRODUCTION

The new agriculture technology adopted has helped in revolutionizing Indian agriculture. The new agricultural strategy has been characterized by the adoption of High Yielding Variety (HYV) of seeds, fertilizers, pesticides, irrigation, machinery, improved implements and soil conservation. In order to feed the increasing population there arises a need to increase food grain production in general and agricultural production per unit of land in particular. The green revolution which heralded the transition of agriculture from the traditional to a modern technology, promised increased agricultural output. The different natural and physical resource endowments, standards of use efficiency, prices, constraints and pace and levels of adoption of the new technology would lead to the choice of different factor proportions. This warrants an analysis of impact of new technology on cost, return, net return distribution, yield determination, yield gap, input demand, supply responsiveness and labour absorption of small and large farmers adopting new technology and traditional farmers.
Hence, in the present study an attempt has been made to examine the impact of new technology on paddy cultivation in Thoothukudi District. The specific objectives of the study are:

1. To study the impact of new agricultural technology on cost and returns structure of farms cultivating paddy in the study area.

2. To scrutinize and compare the net return distribution and extent of inequality in the net return distribution of New Technology and Traditional farms in the region under the study.

3. To analyse and compare the yield determinants, yield gaps and yield constraints of paddy cultivation in the New Technology and Traditional farms.

4. To estimate and analyze the input demand elasticities and supply responsiveness of New Technology and Traditional farms in the study area.

5. To investigate the labour absorption capacity of New Technology and Traditional farms in the study area.

6. To find out returns to scale of New Technology and Traditional farms in the study area.
The multi-stage random sampling technique has been adopted for the present study, with Thoothukudi District as universe. Thoothukudi District comprises twelve blocks. Five blocks which accounts for more than 60 per cent of area of paddy under New farm Technology were selected for the present study. The revenue villages of these five blocks were assigned in an ascending order according to the area under cultivation in each village. Out of the total number of villages listed, the first five villages were selected from each block namely Thoothukudi, Tiruchandur, Kovilpatti, Srivaikuntam and Sattankulam for the purpose of this study thus making the total number of selected villages 25. In all, 500 farmers 250 each from New farm Technology and traditional farm were randomly selected from the 25 villages of five blocks in the Thoothukudi district for the purpose of primary data collection.

The homogeneity test with respect to net return per acre of these two farms namely New Technology and Traditional farms was examined by using the Analysis of Variance Technique (ANOVA). It was found that there existed significant difference between them, and they were treated as separate units for further analysis.
7.2 SUMMARY OF MAJOR FINDINGS

It is inferred from the analysis that more than 80 per cent of the selected paddy cultivators in the study area are 30 to 50 years of age. Family size of the farmers in both groups was found to be high and a large number of family members was found to participate in agricultural activities, particularly in paddy cultivation.

The size of operational holdings ranged from 0.5 acres to 4.6 acres with a mean 2.43 acres per farm in the case of small farmers, whereas in the case of large farmers it ranged from 5.20 to 9.78 acres with a mean of 6.72 acres.

The farmers with an experience of more than 5 years in the cultivation of paddy were found to constitute 67.66 per cent. Hence, this long term association of farmers with the cultivation of paddy led to better productivity and maximum profit in paddy cultivation.

Cost and Return structure

The cost and return structure of New Technology and Traditional paddy cultivation revealed that New Technology farm yielded higher per acre returns, amounting to Rs.15087.54 compared to Rs14098.30 in the case of Traditional farm. As the New Technology farm yielded higher return in physical and
monetary terms it is found to be more profitable than the Traditional farm in the study area.

It may be concluded that in the case of New Technology farm yield per acre, returns per acre and net income per acre are higher, while the expenditure on irrigation and human labour are lower, when compared to Traditional farm. Therefore, Paddy cultivation of New Technology farm is more profitable and beneficial than Traditional farm.

From the nature and the extent of per acre net income distribution, it is found that the concentration of frequencies in the distribution of per acre net income effected is negatively skewed in the case of New Technology farm and it is positively skewed in the case of Traditional farm. It indicates that the given per acre net income distribution has a greater variation towards the lower values in the case of New Technology farm, whereas for Traditional farm it has a greater variation towards higher values.

The per acre net income shares of New Technology farm and Traditional farm measured with disparity ratios, and Lorenz curves indicated that inequality in the distribution of per acre net income was higher for Traditional farm compared to New Technology farm. The logarithms of
variance test showed that there is a significant difference in the degree of inequality of per acre net income between New Technology and Traditional farm cultivating paddy.

**Determinants of Yield, Yield gap and Yield constraints**

In order to identify the determinants of yield a Cobb-Douglas form of multiple regression model was fitted with six factors including (i) human labour in Mandays (ii) bullock labour in pairs (iii) fertilizer in Rs. (iv) pesticides in Rs. (v) cost of irrigation in Rs. and (vi) capital flows in Rs. for New Technology and Traditional farms.

In the case of New Technology farms, all six independent variables jointly explained about 78.62 per cent variation in yield. Human labour is the most important determinant of yield. It is followed by fertilizer and capital flow. The regression model fitted is highly significant as per F-test.

To examine whether structural difference existed between small and large farmers under New Technology farms, Chow’s test was used. The results revealed that there is a structural difference between the two groups of farmers. The analysis based on dummy variables revealed the existence of structural
differences between the two groups of farmers of the slope level. At the slope level variable, capital flow is responsible for the differences in their yields. At intercept level the co-efficient of dummy variable is not statistically significant. It implies that there is no difference in technology adopted for both groups of farmers (small and large).

The regression analysis for Traditional farm revealed that 79.61 per cent of the variation in yield is attributed to the six explanatory variables. Among the significant variables, human labour had a greater influence on the determinants of yield.

Chow’s test revealed that there existed structural differences between the two groups of farmers. Further, it is observed that there is a neutral technical change between the two farmer groups as there is no significant difference in intercept terms. At slope level, variable capital flows was responsible for the difference in their yield.

The analysis of yield gap revealed the existence of a gap between the potential and actual yield per acre for both farmer groups. The yield gap was found higher in the case of large farmers than in the case of small farmers in both New Technology and Traditional farms.
The Garrett’s ranking technique was applied to identify the major constraints to the attainment of potential yield and it was found that severity of disease, pest attacks, water shortage and credit were identified as major constraints for both small and large farmers cultivating under New Technology and Traditional farms.

**Analysis of Input Demand Elasticities and Supply Responsiveness**

The analysis of labour demand revealed that labour demand was highly sensitive to changes in rice price. The demand for labour with regard to real wage rate was elastic in both cases. It is observed from the analysis that increase in farm wage had a relatively serious negative effect on the demand for labour. In other words, 10 per cent reduction in wage rate could increase labour employment by more than 10 per cent. Increase in area under rice of both farms had favourable effects on labour demand while the impact of changes in capital flows was low.

The analysis on the demand for variable inputs in response to changes in their own prices for both groups in each farms revealed that demand for variable inputs was elastic and sensitive to changes in their own price. The
cross-price elasticities of the inputs were negative and low for both farmer groups in each variable. It indicates that these variables were complements rather than substitutes.

Regarding the supply responsiveness, supply elasticities were highly sensitive to price changes in rice for both farmer groups. The demand for variable inputs was found to be negative and greater than one in response to increase in its own price, for both New Technology and Traditional farm. There is negative and low responsiveness of output supply to increase in prices of variable inputs namely human labour, fertilizer and pesticides. Fixed factors produce a favourable impact all the same for both farmer groups. Capital flows had a higher impact on large farmers than on small farmers in New Technology and Traditional farms in the study area.

The indirect estimates for new Technology and Traditional farms revealed that the constant returns to scale operated in both New Technology and Traditional farms in the study area.
7.3 CONCLUSION

Thus, it is concluded from the analysis that New Technology farms are economically more feasible and benefited more than Traditional farms irrespective of the size of farms in the study area. Size-wise, it is found that in both New Technology and Traditional farms, small size farms benefited more than large sizes farms. This could be due to the better supervision and more efficient farm management favoured by the smaller size of operational holdings. This indicated that apart from New Technology, efficient allocation of inputs, direct supervision and farm management are crucial determinants of economic viability and benefits of paddy cultivation in the study area.

7.4 POLICY RECOMMENDATIONS

The Government should encourage the farmers to go for adoption of New Technology farming instead of Traditional farming by removing all constraints and inhibitions in this respect.

On the basis of observations in the study area and findings, it is believed that extension service officials may improve technical efficiency by advising the farmers on input application at the proper time as recommended.
The government should find ways and means to reduce the yield gap in the study area.

The farmers in the study area were of the opinion that they could not achieve the maximum yield due to severity of diseases and pest attacks irrespective of mechanization. It is believed that the farmers should be educated properly to apply the pesticides at the prescribed level and this may be done through intensified extension services.

Non-availability of credit was the other constraint. It is recommended that financial institutions should revitalize and revamp the existing credit facilities in the study area so that the farmers could get timely credit for undertaking improved cultivation practices.