CHAPTER - 7

SUMMARY AND CONCLUSION

7.1 SUMMARY OF FINDINGS.

7.2 RECOMMENDATIONS.

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Dynamic changes have taken place in Indian Economy with the introduction of new strategy in mid-sixties. These changes are one of the most important forces which have altered the structure of the agricultural production process. Both the physical and value productivities have changed due to the adoption of modern practices. Technological change in agriculture can be classified into two - labour augmenting changes and land augmenting changes. Labour augmenting changes result in an increase in the marginal physical productivity of labour by the introduction of machines in farm operations and land augmenting changes consist of introduction of improved inputs which increase the marginal yield of cultivated areas.

The adoption of new or modern innovations is a complex process which is governed by many socio economic factors related with the adopters. The essential components of such techniques include use of improved variety of seeds, fertilisers, assured irrigation water, pesticides and improved implements.

Agriculture occupies a significant position in the Indian economy as well as in the state economy. Total food grain production in the country showed a sharp increase over the last three decades as a result of new strategy adopted in mid-sixties. But in the state economy, food grain production showed a marked negative growth. This is due to the drastic decline in the area under rice which is the most important food crop in our state since 1975-76. But the productivity of rice has been considerably increased from 1243 kg/hectare in 1965-66 to 1942 kg/ha in 1990-91. So it can be argued that the increase in productivity was the result of adoption of improved practices in farm operation. The indigenous use of modern inputs and adoption of new farm practices result in agricultural growth within the land constraint.

Thus the questions arise at this point are: “whether the farmers have used a right composition of the complimentary inputs with HYV seeds to utilise effectively the potentials of the new technology?” and “If not, what are the factors that have been restricting farmers from doing so?” The question such as “What is the efficiency of resources used in the production process in
determining the total output? is also relevant in this context. A deep attempt has not been made so far in Kerala Agriculture regarding these questions.

So, with a view to answering these questions we set certain specific objectives such as: (1) to discuss the extent and magnitude of HYV technology that has been adopted in agriculture (2) To measure the intensity of adoption of various improved farm practices and their combinations based on sample (3) To analyse the impact of socio-economic factors on the level of technological adoption and (4) To examine the impact of modern technology on resource-use efficiency.

The first objective has been fulfilled with the help of secondary data. The extent and magnitude of HYV technology in agriculture have been examined using simple analytical tools like ratio, Index, coefficient of variation and compound growth rate. The other four objectives have been analysed on the basis of primary data collected from Thrissur District which is specially featured by its Kole lands. Also there is existing triple cropping farms in the district. The sample is collected from ten panchayats in five blocks (two panchayats from each block) by multistage random sampling method and the study is concentrated on two important crops in the district paddy and coconut.

The intensity of adoption of various improved farm practices has been measured by calculating the Adoption Index (AI) of area and acceptance. Regarding the third objective, in our sample, since HYVs are widely accepted only in paddy cultivation, the present study is concentrating on the socioeconomic factors which determine the adoption of HYVs of paddy by the farmers. This is analysed by fitting Linear probability Model (LPM) in which the dependent variable is treated as qualitative. Also weighted least square (WLS) procedure in LPM has been used to obtain more reliable results. For examining the Resource-use efficiency in agriculture, cobb Douglas Production function has been fitted. This model has helped to estimate the elasticity of output with respect to each input and thus the Marginal value products (MVP) of each resource.

7.1. Summary of findings

The discussion on the extent and magnitude of different components of HYV technology in Indian and State agriculture has provided the following results.

The HYV seeds have played a vital role in the development of Indian agriculture. The percentage of HYV area of paddy to total paddy area has increased from 2.52 in 1966-67 to 67.94
In 1993-94. But in the state, area under HYV has increased from 136.13 thousand hectares in 1969-70 to 282.21 thousand hectares in 1979-80. However, the area has declined since then to 174.45 thousand hectares by 1994-95. HYVs of paddy area accounted for only 15.57 percent of total area in 1969-70 increased to 35.58 percent by 1979-80. But it declined to 26.68 percent by 1989-90. Since then, it showed an accelerating trend. The Productivity of HYV paddy has increased from 1798-02 Kg per hectare in 1969-70 to 2019.13 Kg per hectare in 1994-95. While Thrissur District showed a negative compound growth rate in HYV area during 1973-74 to 1982-83, its productivity showed positive growth rate. During the succeeding period, both area and productivity showed positive growth rates.

In India, minor irrigation schemes have a major thrust on the irrigation potential and its utilization. In the state, the chief sources of irrigation are canals, tanks, wells and lift irrigation. The thrust upon canal irrigation has decreased by 47.61 percent over the period from 1969-70 to 1992-93. At the same time, the net irrigated area under tanks and wells has increased from 77.5 thousand hectares to 114.1 thousand hectares. The total net irrigated area in the state has increased marginally from 315.9 thousand hectares to 334.5 thousand hectares during 1969-70 to 1992-93. The growth rate of gross irrigated area in Thrissur District during 1977-78 to 1994-95 was 0.62 percent per annum, which was lower than that for state (0.79 percent).

Consumption of fertilisers in India showed positive growth rates. In the state, fertiliser consumption showed an upward trend and faced annual fluctuations in the succeeding periods. An increase in annual rate of growth in consumption of potash during the recent years is a welcome change. But in the district, percentage of fertiliser consumption to state consumption has decreased during the last two decades.

The pace of mechanisation gathered momentum as is evident from the increase in the number of oil engines with pump sets for irrigation, tractors, operated tube wells, harvesters, threshers etc. But in Kerala, mechanisation in agriculture has been slow. Tractors have become more popular in ploughing the farms. Now it could be seen that the use of other machineries like harvesters and threshers has been increasing in the state. The same pattern of growth in the use of machineries could be seen in the district.

In India, the consumption of pesticides has increased by 20 percent over the last decade. State's share of pesticide consumption has declined from 1.68 percent in 1985-86 to 0.87 percent in 1994-95. However, the state government has initiated different schemes for the development of crops.
The notable increase in production and productivity of food grains since mid sixties have been attained through the modern scientific farm practices. The growth of the selected indices of scientific agriculture in the country indicates the favourable movement of agricultural sector towards the modern practices.

Paddy, coconut, arecanut, tapioca, rubber, banana, cashew nut and pulses are the main crops cultivated in Thrissur District. The most important crop in the district is paddy. Three crops namely Vrrippu, Mundakan and Punja are raised in certain areas of the district in a year. Coconut is an important cash crop which can be considered as a dryland crop. However, paddy and coconut are the main crops cultivated in the sample area (selected blocks) and also by the sample households. Paddy is cultivated among Vrrippu, Mundakan and Punja in which the proportion of gross area in Punja season is higher than that in other two seasons. Also the productivity of paddy in Punja crop is relatively higher and it is the highest among small farms. 33.57 percent of the sample farms have incurred loss in paddy cultivation and majority of the loss incurring farms come under the Mundakan crop. In the case of coconut, density of cultivation is in the range of 25 to 150 palms per acre in which the majority of the farms come under the density range of 50 to 100 palms per acre. Annual productivity of coconut in 77 percent of the farms is between 70 to 130 nuts per palm. Compared to paddy cultivation, profitability of coconut is high and thus most of the sample cultivators compensate their loss or low profit in paddy cultivation through coconut cultivation.

It could be noticed that even though the small holdings and meagre resources are common features of Kerala agriculture, increase in yield during a short period can be brought about by HYV seeds. In the present study, 85 percentage of the paddy cultivators have adopted HYVs which covered 86.04 percent of the gross area under cultivation. Sizewise indices show that the adoption is higher in large holdings while seasonwise indices give the result that it is higher under Punja crop. Regarding fertilisers, most of the sample cultivators have adopted the dual strategy of using both organic and inorganic manures. The adoption index of area for fertilisers is 96.48 percentage. Among three crops, only Punja crop comes under the irrigation practice. In our sample, only 36.43 percent of farms belong to this category which constitute 38.79 percent of the total area. Also it is found that tractors and tillers are being widely spread among the farmers. 96.43 percent of the farms have used tractors or tillers for ploughing, out of which 7.06 percentage have used harvester while 34.12 percentage have used threshers. The other commonly used machineries are electric or
diesel pumps for irrigation and hand pumps for spraying insecticides. It could be found that 92.62 percent of gross area have come under the use of insecticides. None of the farmers has adopted biological methods to control the insects because of the higher cost of its execution.

Adoption of different combination of modern inputs give the following results. Most of the HYV adopters have used fertilisers (96.56%). A few of the HYV adopters (4.23%) haven't used any of the machineries for farm operations. Also it is revealed that 8.45 percentage of the HYV adopters have not used insecticides. The entire package of modern practices including HYV, irrigation, fertilisers, machineries and insecticides is adopted in only 33.83 percentage of the total farm area under study. Since the adoption of irrigation practices is confined only to Punja cultivation, the intensity of adoption of other inputs could not be assessed along with irrigation. So the adoption index of area is calculated by considering all other inputs except irrigation which is equal to 77.33 percentage.

The adoption level in coconut cultivation is assessed by considering exclusively the adult palms. High Yielding Varieties of coconut are adopted by only 23 percentage of the sample cultivators. At the same time, irrigation practice is adopted by 86 percentage of the farmers and 58 percentage of the farmers have used fertilisers. Adoption level is the least for machineries (12 %) and 30 percent of the farmers have used insecticides. Adoption Index for combined practices reveal that 8 percentage of the HYV adopters have not used fertilisers and 14 percent of the cultivators have accepted the input package of HYV, irrigation and fertilisers. Also a few of the HYV adopters (6 %) have used insecticides.

Weighted Least Square procedure in LPM gives more significant results in the analysis of the impact of socioeconomic factors on HYV adoption. Educational status of farmer, farm size, per capita income of the farm household and farm income are more or less significant and positively related to the adoption level.

In an attempt to identify the problems faced by farmers, it is found that their main problem which hinders the cultivation process in Mundakan and Punja season is the non-availability of irrigation. The most severe problem in paddy cultivation is the non-availability of efficient labourers at various stages. Another problem faced by the farmers is the lack of proper guidance for using the inputs.
Analysis of the costs and returns from paddy cultivation brings out the following results - Average cost per hectare of HYVs of paddy (Rs.17,486.66) is greater than that of LVs (Rs.10,501.91). Also the gross returns per hectare from HYVs is greater than that from local varieties because of the higher yield of HYVs. But average net returns per hectare of HYVs is less than that of LVs implies that the cost for HYVs is higher compared to that for LVs. Sizewise analysis of HYVs reveals that the average cost per hectare of small holdings is the largest and that of large holding is the smallest. As a result, the net returns from large holdings is the largest and that from small holdings is the smallest. This supports the average yield level of these size categories. Also It is found that the net returns per hectare from Punja crop is the highest corresponding to its higher yield level.

Cobb-Douglas Production function fitted for analysing Resource-use Efficiency provides the following results. The resources like land, labour, biochemical inputs and machineries are significant in determining the gross value of HYV output. But in the case of local varieties, biochemical Input is not statistically significant. All of the Inputs except machineries show positive relationship with the value of output for high yielding as well as local varieties. This is because, a smaller rental cost of machineries can provide an Increase In the gross value of output. It is noted that returns to scale for HYV (0.997) is slightly less than that for LV (1.095). It supports the lower net returns per hectare from HYVs. The elasticity of output with respect to land is higher for HYVs where as that with respect to labour is higher for LVs. Sizewise analysis of HYVs reveals that returns to scale from large holdings is comparatively higher (1.22) and it is the lowest In medium holdings (0.763). The validity of the result obtained for medium holdings is comparatively lower due to the reason that the coefficient of determination of the corresponding model is only 0.41. Unlike other size categories, in large holdings, output bears a negative relationship with the Input, land which shows an inverse relationship between these variables. Seasonwise analysis for HYVs reveals that the returns to scale from Vrrippu and Mundakan crops is higher than that from Punja season. It is against the result of higher net returns from Punja cultivation. This result could be explained on the basis of comparatively lower coefficient of determination of the model fitted for Punja crop.

The marginal value products worked out for land and biochemical Inputs favour HYVs while that for labour is higher for LVs. Sizewise figures of MVPs show that the MVP of biochemical Inputs is greater in small holdings while that of labour and land are higher in medium and large
holdings respectively. Also the MVP of land is higher in Mundakan season. In Virippu and Punja seasons, the MVPs of labour and biochemical inputs respectively are the highest.

In coconut cultivation, number of palms is highly significant in determining the value of gross output of both HYVs and LVs. The other two inputs, labour and biochemical inputs are not significant in the case of LVs. Under the existing farm management practices, coconut production is not amenable to the economies of scale (returns to scale for HYV = 0.91 and that for LV = 0.99). The marginal value products of all inputs are higher for local varieties of coconut.

7.2 Recommendations

In certain regions of the district, Virippu crop is not cultivated due to severe flood. Mundakan cultivation is risky because it exclusively depends upon rain which is uncertain during the season. However, Punja season is more suitable for paddy cultivation if adequate irrigation facilities could be provided. According to the farmers, the attack of pests and insects is comparatively smaller during punja season. So the productivity of Punja crop is high and its operation cost is low. So by spreading Punja cultivation in the district, the productivity of paddy in the district could be increased.

Measures should be taken to adopt effective machineries at various stages of farm operations so that total cost could be reduced and thus the labour problem could be solved to a certain extent.

Even though all resources like labour, land, biochemical inputs and machineries are significant in determining the gross output, the marginal value products of these inputs are comparatively unfavourable. This may be due to two reasons. First, the gross value of output is lower compared to the cost of inputs. Second, excessive use of biochemical inputs like fertilisers and insecticides reduces the productive efficiency of plants. So effective management of available resources is very much needed and suitable measures should be taken by the Government in favour of cultivators in order to increase production and to make it profitable.

Since the marginal value product of land is relatively higher, land should be utilised at its maximum level so as to increase the production. So effective measures should be taken to sustain the cultivable paddy land and to prevent the conversion of land for other purposes rather than cultivation. And adequate measures should be adopted to make use of the fallow lands.
Most of the farmers are unaware of using inputs in the proper manner. So intensive training and proper guidance should be given to promote the effective utilisation of resources.

With the introduction of Panchayati Raj System in the country, the GramaPanchayats have been given adequate powers to formulate and implement development plans for the areas they represent. So the Panchayasts should plan their development activities on scientific lines by linking the state agricultural policies and activities of Agricultural Universities.

Thus by the adoption of afore cited measures and also by the joined venture of the Government Institutions and the farmers, we can improve the agricultural production and productivity levels in the district.