CHAPTER VII

SUMMARY AND CONCLUSIONS

The prosperity of agriculture facilitates the growth of almost all other sectors of the economy. Goa, the smallest state of India even though has limited requirements for food items owing to its small size, needs to depend on neighbouring states for the supply of food grains, pulses, vegetables and fruits. Being a favoured destination for large number of domestic and foreign tourists, there is increasing demand for food products. To utilize this opportunity, there is a need to increase the production and productivity of agriculture sector. This would enable Goa to reduce its dependence on neighbouring states for supply of food products. In this effort, every aspect associated with agricultural productivity and production needs to be studied in detail to take appropriate action. From this point of view, the present study attempts to analyse the relationship between the level of education of farmers and the agricultural practices followed by them along with other aspects related to development of agriculture.

The focal objective of this study was to analyse the impact of level of education of farmers on the adoption of agricultural practices. Other specific objectives include, to compare the socio-economic status of farmers as per their levels of education and size of landholdings, to study the extent of change in the pattern of cultivation of crops over a period of time, assess the reasons for shifting cultivation from low value crops to high value crops, estimate the cost and productivity of food grain crops and non-food grain crops and to comprehend the views and ideas of farmers regarding practicing agriculture as their occupation.

The present chapter is divided into three sections. First section summarises the main findings of the study, the second section provides suggestions to improve agriculture
sector in Goa based on the study, and the third section highlights the limitations of the study and scope for further research.

This study is based on both primary and secondary (published and unpublished official) sources of data. The study collected required information by selecting a sample of over 5 per cent of the farmers from across village panchayats and municipal area of Ponda taluka of Goa by following stratified random sampling technique. Collected information is analysed and the hypotheses of the study are tested by using appropriate statistical techniques such as mean, correlation coefficient, regression analysis and chi square.

7.1 Main Findings

The following are the main findings of the study:

- The total cultivated area in Goa increased considerably from 111373 hectors in 1960-61 to 157302 hectors in 1997-98. However, the area under crops decreased to 152958 hectors in 2001-02 and further to 147750 hectors in 2013-14. The following are the major examples of increased production and productivity of main crops in Goa.

Cashew is one of the main crops grown in Goa. There has been a continuous increase in the percentage share of area under cultivation of cashew and has emerged as the major crop of Goa overtaking paddy. The percentage share of land under coconut cultivation has slightly increased during the period from 1960-61 (16.61%) to 2013-14 (17.43%) while, the productivity per hector of land has increased from 378,440 nuts in 1960-61 to 497,670 nuts in 2013-14. The percentage share of areca nut in the total area under cultivation has decreased marginally between 1960-61 (1.55%) and 2009-10 (1.18%), while the productivity per hector of areca nut has increased from 100.81 tons in 1960-
Paddy is the major cereal crop cultivated in Goa. Other crops under this category are ragi, sugarcane, and groundnut. Paddy which was the major crop of Goa has been losing its importance as evident from its decreasing percentage share of total area under cultivation from 45 per cent in 1960-61 to 29 per cent in 2013-14. However, the productivity per hectar of paddy registered almost three fold increase from 159 tons to 443 tons during the same period.

There has been a remarkable increase in the area under cultivation of vegetables and their productivity in Goa. The main vegetables grown in Goa are Brinjal, Lady Finger, Chilies, Cucumber, Pumpkin, Gourds, Radish, Bottle gourd and Long beans. The percentage share of area under cultivation of vegetables increased from a negligible 0.07 per cent to 4.74 per cent and productivity increased from 813 tons to 1141 tons per hectar during the period from 1960-61 to 2013-14.

- There were 5422 operational holdings in Ponda taluka of Goa owned by large, medium, small and marginal farmers. The taluka witnesses the cultivation of various food grain and non-food grain crops. It is also progressing as an agro-tourism taluka having six major spice plantations. Owners of these farmers have combined farming with tourism promoting agro-eco-tourism. It has been found that they are getting sizeable income from these activities.

- There is positive association between the size of farm holding and the level of education of farmers. Highest proportion of marginal farmers (29.58) was illiterate, while in the case of small farmers 8 per cent were illiterate. However, no medium and large farmers belonged to illiterate category.
• In the study area overall 24 per cent of the farmers were illiterate, which is double than the overall percentage of illiteracy at the state level. As illiterate farmers do not know to read and write they do not come to know about the new techniques of production and hence continue to use traditional techniques of production.

• A great inequality is observed in the distribution of cultivable land since a larger proportion of farmers (76%) belonged to marginal size of landholdings. The small size land holding is uneconomical as it is unsuitable for the use of modern implements forcing the farmers to stick to the use of traditional techniques of cultivation. Hence, agricultural production gets adversely affected.

• The mean and median family size in the study area was five. Even though the level of education has not shown any specific effect on the family size of the farmers, family planning measures have been quite effective in all the parts of the state of Goa including the study area.

• The proportion of nucleate farming families among the sample farmers was higher with exception of large farmers.

• Farmers with higher levels of education and larger size holdings knew more number of languages. This enables farmers to acquire knowledge about improved agricultural practices carried out in other areas of the State or outside the state, which helps in reducing the cost of production and increasing returns from cultivation.

• Higher proportion of younger generation with higher levels of education is also taking up agriculture as one of their preferred occupation.

• Illiterate sample farmers did not attend any training or workshops on farming while, relatively larger proportion of farmers with higher levels of education
excluding small farmers with secondary and all type of farmers with higher secondary education participated in the farm training and workshops. The overall proportion of farmers’ participation varied directly with the farm size. All the large farmers, irrespective of their levels of education had participated in the farm workshops and training programs.

- The type of ownership of land directly varied with the level of education, which is evident from the fact that 80 per cent of the farmers with graduation and above levels of education owned land by inheritance while it was only 24 per cent in the case of illiterate farmers.

- Positive relationship is observed between the level of education and average size of land holdings for small and medium farmers. No such relation can be seen between the two in the case of marginal farmers while, there was inverse relationship between the level of education of the large farmers and average size of landholdings.

- There was no link between the level of education and the number of crops grown on the same land while the proportion of farmers growing more than one crop, decreased with increase in the farm size.

- The number of years in farming activity is seen having inverse relation with the level of education. Over 75 per cent illiterate farmers have been into farming for over 40 years and over 27 per cent of illiterate and primary educated farmers were into farming for over 50 years in the study area.

- Even though, large proportion of graduate farmers have taken up agriculture by choice no specific relation can be established between the level of education and the way they are involved in farming activity. However, proportion of
farmers, undertaking farming activity with passion is seen directly associated with the size of land holdings.

- Farmers seeking alternative job varied positively with the level of education while it varied inversely with the size of land holdings. However, with an exception of a small proportion of marginal farmers all farmers who were interested to join alternative jobs, intended to continue with farming even after getting alternative job.

- Monthly income of the farmers earned through farming activity increased with the increasing level of education. With an exception of farmers from primary level of education the proportion of farmers earning below Rs. 2000 decreased with increasing level of education on the other hand the proportion of farmers earning Rs. 5000 and above increased with increasing level of education.

- The size of land holding influenced the type of crop cultivated by the farmers. The proportion of farmers cultivating exclusively food grain crops decreased with increase in the size of land holdings. Large farmers were not cultivating exclusively food grain crops while a large proportion of marginal farmers (60.42%) cultivated only food grains. With an exception of marginal farmers, in all other categories, the proportion of farmers cultivating non-food grain crops was higher than cultivating food grain crops. Majority of the large farmers (81.82%) cultivated only non-food grain crops. As compared to small and medium farmers, the proportion of farmers cultivating both the crops was less for marginal and large farmers. This is because marginal farmers own small size of land and they do not want to give up the cultivation of paddy since it is their staple food. The large farmers are already into cultivation of non-food grain crops and they are satisfied with their income that they receive from their farms.
The proportion of farmers growing food grains decreased with increase in the size of holdings. It decreased from 80 per cent in the case of marginal size holdings to nearly 18 per cent for the large size land holdings. However, the study did not find any specific relationship between the level of education and the cultivation of food grain crops. The main reasons cited for non-cultivation of food grain crops were lack of availability of sufficient land to cultivate (33% of illiterate farmers), fencing problem (38% of middle school educated farmers) and low profitability (farmers with other levels of education).

A positive relation between the level of education and the cultivation of non-food grain crops is observed. With an exception of farmers at graduate and above level, the proportion of farmers cultivating non-food grain crops increased with increasing level of education. Most of the farmers with higher secondary and below levels of education stated that the non-availability of adequate and perennial supply of water for not cultivating non-food grain crops, while majority of farmers from graduate and above levels of education (67%) were not cultivating non-food grains due to lack of sufficient land.

The sample farmers were of the view that proper fencing, improvement in irrigation facility, control of pollution, appropriate support prices, easy availability of labour and lower wages would help in improving agricultural productivity in their area.

Farmers with higher levels of education allocated higher proportion of land area for the cultivation of non-food grain crops. The proportion of farmers cultivating non-food grain crops taken together also varied positively with the level of education, excluding graduate farmers.
All types of farmers taken together, farmers with higher levels of education brought very less proportion of land under double cropping. Graduate farmers, professionals, I.T.I., and diploma holders didn’t adopt double cropping. Farmers with primary education brought highest proportion of land under double cropping (39%), while farmers with post graduate education brought only one per cent of land under double cropping.

The net average income earned by cultivating non-food grain crops by all farmers taken together was higher than the income generated from cultivating food grain crops. This implies that cultivation of non-food grain crops is quite profitable than the cultivation of food grain crops. At each level of education the net income earned by cultivating non-food grains by all the types of farmers taken together was higher than the income earned from food grain crops with an exception of post graduate marginal farmers and graduate large farmers. The net average per hectar income was the highest from Spice cultivation (Rs. 189733) followed by Areca nut (Rs. 104183), while it was the lowest from Pulses Kharif (Rs.21581), followed by Paddy Rabi (Rs. 24612).

The costs incurred on seeds were observed to have positive relation with the levels of education in the cultivation of paddy, cashew, coconut and mango while it was negative for areca nut, banana and vegetables. This is because HYV seeds are perceived as not suitable for the prevailing climatic conditions in the study area. Hence, educated farmers are also sometimes averse to the use of HYV seeds. The relation of cost incurred on irrigation with the levels of education was positive for all the crops except for mango cultivation. The cost incurred on fertilizer was positively related with educational level of farmers in the cultivation of paddy, coconut, areca nut and vegetables while it was negative
for the cultivation of banana and mango. Negative correlation is observed between the level of education and the cost incurred on manure for all the crops except vegetables; cost incurred on labour as well as traditional equipment for all the crops except for paddy. Coefficient of correlation between the cost incurred on modern equipment and the level of education is found to be positive for all the crops with an exception of vegetables. In the case of pesticides and insecticides, a positive correlation was observed for all the crops.

- Correlation of coefficient between the total cost incurred on cultivation and the level of education was positively significant for kharif paddy while, it was positively insignificant for cashew, coconut, vegetables and mango. It was negatively insignificant for the cultivation of rabi paddy, areca nut, banana and spices.

- The correlation between the total yield and the level of education was positive but insignificant from the cultivation of cashew, coconut, banana, vegetables and mango while, it was negatively insignificant for kharif paddy, rabi paddy, areca nut and spices.

- The net income derived and the level of education are found to have positive but insignificant correlation in the cultivation of kharif paddy, rabi paddy, cashew, coconut, areca nut and vegetables while, the relation was negatively insignificant for banana, mango and spices.

- The level of education has a positive influence on farmers’ involvement in other activities.

- A larger proportion of farmers with bigger size land holdings and with higher levels of education were of the view that, there is increase in the cost of production along with the increase in the returns in farming activity. On the
other hand larger proportion of farmers with lower size of land holding were expressed of facing increasing cost with decreasing returns from farming activity.

- Use of HYV seeds, insecticides, pesticides, modern implements, and plantation of new crops varied positively with the levels of education. Other changes including rotation of crops, use of irrigation facilities and use of labour have not shown any significant change. Since small and medium farmers hold relatively larger area of land it was possible for them to cultivate new crops especially non-food grain crops.

- The awareness of different aspects of agricultural finance was seen to have a positive link with the level of education of the farmers. A larger proportion of more educated farmers obtained agricultural finance from commercial banks while a larger percentage of illiterate farmers borrowed from co-operative credit societies. Maximum proportion of all the farmers, had to borrow agricultural finance at an interest rate of 7 per cent. Majority of the marginal farmers repaid their loans only after harvest while, majority of the farmers who repaid their loans through monthly instalments either possessed bigger size of land holdings or they belonged to higher levels of education. These farmers had alternative sources of income, hence could repay their loan through monthly instalments.

- A larger proportion of farmers with all size of land holdings sold their produce to the co-operative societies except for the farmers with higher secondary education (30%), while a significant proportion of illiterate farmers (43%) sold their produce to the local shops.

- Irrespective of the level of education and size of land holdings, farmers were found to be satisfied with the price received for their agricultural product in the market.
• All the farmers, excluding a sizeable proportion of the marginal farmers produced agricultural output not only for self-consumption but also for commercial purposes. Among the marginal farmers, cultivating exclusively for self-consumption decreased with increasing levels of education.

• The proportion of farmers taking benefits of the agricultural schemes had a positive relation with levels of education.

• Only a few farmers with secondary and above levels of education used internet to obtain information pertaining to the agricultural production.

• Farming is viewed as a profitable occupation by a larger proportion of farmers from higher levels of education and with bigger size land holdings and were quite satisfied with farming as their occupation.

• The sample farmers were of the view that proper fencing, improvement in irrigation facility, control of pollution, appropriate support prices, easy availability of labour and lower wages would help in improving agricultural productivity in their area.

Validation of Hypotheses

All the hypotheses postulated in the beginning of the study through rigorous review of literature and ground familiarity were tested and found valid as evident from the empirical investigation.

The study had hypothesised that, (i) there was positive relationship between the education of farmers and the cultivation of high value crops, (ii) Farmers prefer to undertake cultivation of non-food grain crops than that of food grain crops and (iii) the net return from the cultivation of non-food grain crops is more than that of food grain crops.
7.2 Conclusion

The education of farmers is an important determinant of agricultural development of a region as evident from the present study. It influences selection of crops, use and cost of inputs, yield and net income. However, there are various other factors such as the size of land holdings, training, awareness as well as demonstration effects which influence agricultural production and productivity by influencing agricultural practices.

7.3 Suggestions and implications

Based on the empirical investigation, the study suggests following measures to improve agricultural productivity and development, especially in the study area.

- Introduction of Farming in the Co-Curriculum: Education has externalities as it enables the family members, neighbours, relatives of the educated person to get the benefit of information and knowledge of the educated person. Therefore, it is advisable to introduce farming in the curriculum /co-curriculum at the secondary and higher secondary schools in line with NCC, NSS, Physical Education, JRC and Scouts and Guides as an option. This would motivate the students to learn the dignity of farming and inculcate a sense of pride in involving in farming related activities.

- Trainings on the proper use of pesticides and insecticides: Proper use of pesticides and insecticides is a must for increasing production and productivity of agriculture sector. In the study area, it was found that many farmers do not make proper use of pesticides and insecticides in terms of quantity and / or timing. If the farmers are trained in the use of pesticides and insecticides then it could help in reducing the cost incurred on pesticides and insecticides and protecting the crops and thereby improving agriculture productivity.
- Encouraging research and development: A recent change in weather condition has resulted in untimely rains. Encouraging research and development of seeds, especially paddy which can be suitable for the changing climatic condition could help in solving the problem faced by the farmers in cultivating paddy.

- Developing Organic Farming: In the study area there is enormous and incredible scope for developing organic farming. Large and medium farmers practicing agro tourism have developed organic farms. They produce organic agro products either on their own or purchase it from nearby centres and sell it in their outlets located in their farms. Even though the prices of organic products are higher, tourists prefer to buy organic products, such as organic cashew, spices like black pepper, turmeric, nutmeg, chilies and banana. Efforts should be made to create awareness among local people about the importance of organic products. The small and marginal farmers also should be encouraged to practice organic farming in their farms. Workshops should also be organized at the panchayat and local levels on organic farming to have larger and effective participation.

- Encouraging Agro-tourism: Tourism has a wide scope in the study area. Combining agriculture with tourism activity could help in increasing the productivity of agriculture sector. There is increasing demand for high value crops like fruits, vegetables and flowers from the domestic as well as foreign tourists. Besides this, the natural flora and fauna can be effectively used for developing agro tourism. Some of the large farmers have already started combining agricultural activity with tourism. Efforts could be made to encourage such activities among medium and small farmers as well.

- Providing permanent fencing: Fencing is one of the major problems faced by majority of the farmers in the study area. Permanent fencing should be provided at
a subsidized rate so that the farmers do not have to waste their time, money and energy on fencing their land every year. Especially, farmers cultivating paddy are reluctant to undertake cultivation because of lack of fencing. So the efforts should be made to solve the problem of fencing so that it could lead to increase in production and productivity of agricultural sector.

- Perennial supply of water: Large number of farmers do not cultivate two crops because of lack of irrigation facility, especially during rabi and summer season. Providing irrigation facilities for such farmers could help in solving the problem to some extent. Creation of awareness on the existing subsidy schemes for construction of wells and installing modern machines like sprinklers might help farmers to utilize these schemes for improving irrigation facility on their lands and would enable to cultivate more than one crop.

- Control on Pollution: In the study area, a large proportion of farmers faced the problem of pollution caused by industrial wastes, mine rejects and household wastes discarded in river water. Besides this, khazan lands existing in the low lying areas used for the cultivation of rice face the problem of saline water entering into the fields during high tides, thus creating a problem for the sustainable development of agriculture. Proper steps should be taken which could lead to complete ban on discarding the wastes in rivers as well as on the banks of the rivers. Recycling of mine rejects or developing such plants and seeds, which can be cultivated by using the mine rejects could be an important measure in this direction. To solve the problem of saline water entering into the low lying fields, construction of concrete wall and planting of mangrove trees could help in reliving the problem. Research and development should be encouraged to develop seeds which can withstand the salinity of the sea water.
Mechanization of Agriculture: The problem pertaining to labour could be solved by resorting to mechanisation of cultivation. There has been very limited use of machines for cultivation by the sample farmers in the study area. According to the sample farmers, they are not able to use machines because of inappropriate type and size of land, problems associated with the availability of spare parts and servicing facility for the repairs of machines. Besides these, lack of skill and knowledge to operate modern machines by the farmers is another impediment in the process of mechanization of agriculture. This problem could be solved by training farmers in the use of modern appliances and making available required facilities/machines on co-operative basis. Cheaper and special machines should be developed especially to use in hilly areas and on small holdings to encourage mechanization as well as to bring fallow land under cultivation.

Developing Floriculture: In Goa, there is high demand for flowers which is mostly met by importing from neighbouring states like Maharashtra and Karnataka. Efforts could be made to develop floriculture on commercial lines by identifying the flowers which can be grown on a large scale suitable to the soil and climatic condition of Goa and the study area.

To augment and implement the above measures, a huge sum of finance is required in addition to the wholehearted co-operation from the farmers and the local people. The financial requirements could be met by involving various development agencies of the state and the central government. In addition, NGOs and corporate sectors should also extend their helping hand. Crop insurance measures needs to be strengthened in the study region.

There is a lot of potential in the study area to develop scientific and organic farming; enthusiasm also appears among a larger section of educated farmers. Hence, the
agriculture development initiatives should get immediate patronage for a sustainable development of agriculture in the study area.

Most importantly, the formal and informal cooperation among the farmers, especially among marginal and small farmers is required to have mutually beneficial agricultural farming. This would help the farmers to overcome the limitations of uneconomical landholdings and shortage and expensive labour supply.

7.4 Limitations of the Study

The present study has the following limitations and scope for further research.

- For an intensive study of agriculture, the present study focuses only on one taluka of Goa due to the constraints of time and resources.

- The findings of the research can be applicable only in such areas where similar type of physical and human conditions prevail, viz. geographical location and features and agro-climatic conditions and socio-economic profile of the farmers and existence of welfare oriented administration like that of Govt. of Goa.

- The information given by the farmers may have limitations of accuracy as the farmers might not have maintained proper account of various details pertaining to the quantity and cost of inputs used, income generated, etc. Hence, the information provided by the farmers may not be cent percent accurate. Moreover, there are possibilities of reporting errors by the sample respondents.

- The data on different aspects of agricultural practices relate only to Ponda taluka and specifically for the year, 2013-14. Hence, the validity is area and time specific and subjected to changes over time and space.
The present study has considered the level of education of the farmers’ only while, the level of education of other family members also might influence the agricultural practices followed by the farmers.

7.5 Scope for Further Research

The above discussion indicates that, there is still a wide scope for undertaking further research related to agriculture development at micro, meso and/or macro level. The horizon of the study area and the field of study can be extended for further research. There is a scope for further research relating to the analysis of the contribution of education for agricultural development by extending the study to cover some other regions in the state of Goa and/or in any other part of the country. An intensive study of specific crop and/or group of crops can also be undertaken to facilitate policy formulation for impressive agricultural development. Similar studies can also be undertaken to establish relationship of agriculture with specific level and type of education for different areas/segments. It can also be applied for any physical divisions like watershed.