CHAPTER II
REVIEW OF LITERATURE

An attempt is made in this chapter to review some of the leading and important literature relating to the topic of the study with a view to get an insight on the topic and to prepare a framework for the present study. The first section reviews the link between education and economic development; second section deals with the literature relating to the relationship between education and agricultural productivity, the third one reviews the studies pertaining to the impact of education on agricultural practices and the fourth section presents the main findings revealed from the review of literature.

2.1 Education and Economic Development

The eminent economists like Adam Smith, Karl Marx, Alfred Marshall and others had emphasised the importance of education in economic development (Kavari, 2000); this has been further strengthened by the empirical studies conducted worldwide over a period of time. Studies explaining the relation between education and economic development are subdivided under two heads as (i) those undertaken at the international level and (ii) those which pertain to the studies at the national level.

(i) Studies undertaken at the international level

Razin (1977) estimated the relationship between the rate of increase in Productivity of labour measured in terms of growth of real per capita GNP and education, measured in terms of the enrolment ratio at the secondary level of education with the help of production function for 11 developed countries over a period of 12 years (1953-65). The study revealed positive and highly significant association between education and the growth of per capita GNP.
Tilak (1986) using linear regression model analysed the relationship between education and economic development in 75 countries of the world classifying the countries into very poor, poor, rich and very rich countries. It was observed that in very poor and rich countries, economic development had a positive and significant relationship with education. On the other hand, in poor and very rich countries the relationship between the two was found to be positive but statistically not significant. While primary and secondary education significantly influenced economic development in very poor countries, it was secondary and higher education which had significant impact on economic development in rich countries. In both poor and very rich countries only secondary education was found to have some impact on economic development.

Tilak (1988) in another cross-country analysis estimated the relationship between education and economic development by using data for 100 countries for vocational secondary education with the help of semi-log regression model. Classifying the countries into low income, middle income and high income countries and 1 year, 10 year and 15 year time lag on enrolments, he found that vocational education contributed positively to economic growth only in case of middle income countries. In low and high income countries the contribution of vocational education turned out to be negative and statistically insignificant. It was concluded that vocational education could contribute positively and significantly to economic growth of those countries having GNP per capita more than $400 and less than $ 5000.

Barros (1991) analysed the relationship between education and economic growth by taking data from sources like Summer and Heston, United Nations and World Bank for 98 countries for the period from 1960 to 1985. Barros model of growth was dependent on initial level of income and on initial level of human capital, proxied by enrolment at
primary and secondary levels. The regression results confirmed that high initial levels of education resulted in high economic growth.

**England and Gruny (1994)** with analytical bank data on school enrolment rates investigated the determinants of productivity growth both over time and at a point of time for 19 countries of Organisation for Economic Co-operation and Development (OECD). They found a significant positive correlation between secondary school enrolment rate and labour productivity. An increase in average enrolment rates by 70 per cent to 95 per cent in OECD countries resulted in about 0.6 per cent growth in annual productivity over the period from 1960 to 1965.

**Hill and King (1995)** derived the data from United Nations Statistical sources and World Bank documents for 152 countries incorporating only those countries which reported consistent data. The analysis included 42 countries of Sub Saharan Africa, seven from East Asia and seven from the Pacific, 17 from South and South East Asia, 31 from Latin America and Caribbean, 20 from the Middle East and Africa (excluding Israel), and 35 other countries. Their income regression results showed that, the level of female education have a strong and positive effect on GNP. Their GNP equation for gender disparities in education indicates that in those countries where the female to male school enrolment ratio is less than 0.75 their GNP is roughly 25 per cent lower than the countries with smaller gender gap indicating inverse relationship between gender disparities in educational attainment and growth of GNP. Their findings showed that, female education and gender gap in school enrolment are important determinants of both family well-being and economic growth.

**Kalsen (1999)** by using ordinary least square (OLS) and two Stage Least Square (2-SLS) estimation, for 108 developed and developing countries for the period between 1960 and 1992, found that both the initial lower gender gap and expansion of the
female-male ratio have a significant positive impact on economic growth. The gender inequality in education does impede economic growth directly through distorting incentives and indirectly through its impact on investment and population growth. According to the study, the annual economic growth of South Africa and Sub-Saharan Africa could have been up to 0.9 per cent faster than the actual growth during that period provided there were more balanced educational achievements, and with better promotion of gender–balanced growth in education in 1960s.

**Gylfason and Zoega (2001)** explored the possible relationship among inequality, education and economic growth with a sample of 87 industrial and developing countries during the period from 1965 to 1996. They analysed different measures of education such as Gross Secondary School Enrolment, public expenditure on education in relation to National Income and expected years of schooling of girls. Using cross-country regression method, it was found that all these three measures of education were directly related to income inequality across countries. The study revealed that an increase of about 3.5 percentage points in public expenditure on education was associated with an increase in per capita GNP growth by one percentage point. The corresponding relationship for males was similar to that of females. An increase in secondary school enrolment by 25-30 percentage point was associated with an increase in annual economic growth by one percentage point. Thus, the study revealed that economic growth varied directly with all the measures of education.

**Petrakis and Stamatakis (2002)** using a cross country regression model with a relatively small sample size tried to analyse the relationship between education and growth by grouping the countries into advanced, developed and less developed. The empirical results suggested that the link of education and growth varied with respect to
a country’s level of development. Primary education is more important in less developed countries, while higher education seems dominant in advanced countries.

**Matusha, Siddique and Gils (2006)** using data from 1969 to 2003 studied the relative contribution of education to economic growth measured by Per Capita Real Gross Domestic Product in Australia by decomposing annual economic growth into components associated with the change in factor inputs and Total Factor Productivity (TFP). Their study revealed that an increase in higher education enrolment by 1 per cent leads to an increase in real GDP per capita by 0.04 per cent. According to them, human and physical capital growth appeared to contribute about 47 per cent of growth in Real GDP per capita; labour growth less than 7 per cent and TFP 46 per cent during the reference period (1969-2003).

(ii) National Level Studies

**Schultz (1961)** estimated the contribution of education to economic growth with the help of rate of return to human capital vis-à-vis that to physical capital. It was observed that, education alone accounted for 21 to 40 per cent of growth in the national income in United State of America over the period from 1926 to 1956. An increase in education per member of the employed labour force accounted for 13% to 17% of income growth over the same period.

**Psacharopoulos (1972)** measured the marginal contribution of each educational level to economic growth in the state of Hawaii. Using the growth accounting equation he found that, with improvement in the quality of labour their contribution to economic growth increased and the contribution of secondary education was found to be the highest.
Tilak (1980) used growth accounting equation models of Schultz and estimated the contribution of all levels of education to the income of the state of Andhra Pradesh and found that, the contribution of education to state income was significant. Difference in contribution of education to the state income between men and women was quite large. The contribution of primary education was higher than that of other levels of education in all the cases except in urban areas where the contribution of secondary education was the highest. A considerable difference in the contribution of education to state income was also observed between backward and non-backward class population.

Sadeghi (1995) investigated into the role of gender gap in literacy levels and enrolment rates on growth of GNP between 1950 and 1989 in Nepal. He found that, narrowing the gender gap in education will result in greater income growth. In a model where growth depends only on educational gender gaps he found that, reducing the gap between male and female literacy levels or between male and female primary and secondary enrolment rates will have a positive and significant effect on growth.

Dandekar (2000) in her doctoral thesis titled “Returns to Education in Sugar Cooperatives in Sangli district: An Economic Analysis” highlights the importance of elementary education and justifies even on economic grounds the Government’s policy of universalisation of elementary education. She finds that, investment in continuation of education is beneficial.

2.2 Education and Agricultural Productivity

The foregoing review reveals that education plays an important role in economic development. In this light, an effort is made here to review the literature pertaining to the contribution of education to agricultural productivity. A great deal of work has been done both in India and outside on measuring the contribution of education to
agricultural productivity. Most of the studies, reviewed here concentrated on the impact of formal education. A few studies reflected on the impact of exposure to extension services and agricultural research on agricultural productivity. Studies reviewed here are divided into two categories as those undertaken outside India and those undertaken within India.

(i) Studies Undertaken Outside India

Dey (1978) analysed the relationship between education and agricultural development in 39 countries of the world and 19 states of India. He considered education below primary literate and above primary literate and other variables like per capita income, fertilizers, use of tractors, and irrigated area under cereal to total area under cereal production, rainfall and agricultural yield per hectare. He found that, there was very negligible correlation between education and agricultural yield. Education and use of fertilizers were also not significantly correlated. But in cross country analysis, education was found to have a significant relationship with agricultural development and use of fertilizer.

Moock (1981) measured the technical effect of education on the production of maize in Vihiga division of Kenya for the year 1971 with the help of a sample survey of 101 male farm managers. Educational background of the managers was measured by years of formal schooling completed, work experience and extension service contact. Fitting a double log Cob-Douglas production function, the author found that, schooling of more than 4 years produced a higher yield than schooling below 4 years. But when less schooling (below 4 years) was combined with extension contact, its effect on output became positive.
Jamison and Lau (1982) examined the effects of education and extension services on agricultural productivity in Korea, Malaysia and Thailand for the year 1972-73 through a sample survey of individual farms of the above countries with the help of a Cobb-Douglas production function of double log type. A Cobb-Douglas form of profit function was also used (only in Thailand) to examine allocative and market efficiency. The study revealed that education and exposure to extension services influenced use of chemical fertilizers and agricultural productivity to a considerable extent. The profit function used in Thailand indicated that profit tends to increase with increase in level of education.

Azhar (1991) analysed the effect of education on technical efficiency in Pakistan during the green revolution by using data for 1976-77 and a modified Cobb-Douglas production function, in which variables having zero value were included as shift variables. The author measured the impact of education on technical efficiency in case of both new crops (introduced by green revolution) and traditional crop. The result showed that education had a more pronounced effect on technical efficiency in the case of new crop varieties.

Weir and Knight (2000) investigated into the direct role of education at the household and community levels in facilitating the adoption and diffusion of fertilizer use in Ethiopia. Evidences showed that, education encourages initial adoption of innovations and less educated households copied more educated household in a process of social learning. Household level of education was important to the timing of adoption, but less crucial to the extent of adoption. By contrast, site level education appeared not to affect the timing of introduction of innovation to the site, but does influence the eventual extent of diffusion. Thus, there were two externality effects: educated farmers are early innovators, setting examples which might be copied by less educated farmers and
educated farmers were better able to copy those who innovated first, enhancing diffusion of the new technology more widely.

Knight, Weir and Woldehanna (2003) investigated into the impact of education on farmers attitudes on technology adoption in Ethiopia. Data for this study were drawn from related surveys like the Ethiopia Rural Household Survey (ERHS) 1994, Second round of survey (Dercon and Krishnan,1994) for information on education, the education sub-sample Survey (ES-SS) for information on farmers attitudes towards risk and their opinion on new technologies. The variables used by them were average years of schooling using Probit Model. They found that, education had a statistically significant effect on farmers willingness to take risk i.e., one more year of education reduces the probability of being risk-averse by 2.6 per cent. Their study showed that neither age nor sex of the household head had any effect upon risk aversion.

Zavalc, Mabaya and Cristy (2005) investigated the factors influencing adoption of improved maize seeds by small farmers in Mozambique. The data used in the study were obtained from national random sample of 4,908 small farmers conducted by the ministry of Agricultural and Rural Development in 2002. The main factors influencing adoption of improved seeds were identified by using Probit and Logit models. The variables which affected positively with the decision of adopting improved maize seeds were household size, years of formal schooling, off farm employment, location, access to extension service, experience, seed stores, electricity, use of pesticides, fertilizers and irrigation while the factors which affected negatively were age of the head of household, geographical location, access to extension service and credit and farming of traditional cash crops on the decision to adopt improved maize seeds.

Gullacher (2008) tried to find out the linkage between human capital & input choice in agricultural firms in Argentina by using agricultural census data of 1992. His
hypothesis for the study was that, the ratio between the use of non-land inputs like fertilizers, machinery services, herbicides, animal stocks and others to the land inputs increase with an increase in the level of education. His study revealed that increases in managerial human capital are positively associated with the demand for non-land inputs.

A.C. Egun (2009) in his article titled “Focusing Agricultural Education for better productivity in Nigeria in the 21st Century” feels that, there is a need for refocusing on education to increase agriculture productivity in Nigeria. It is predicted that, providing effective agricultural education to the population, especially to the youth and women in rural areas would help in improving agriculture productivity.

(ii) Studies undertaken within India

Tilak (1979) analysed the impact of literacy and education on agricultural productivity per hectar as well as per worker by using cross section data of the 16 states in India. Enrolment per one thousand rural populations, number of teachers per one lakh rural population and public investment in education in rural areas were considered as the indicators of educational development. Using double log production function of Cob-Douglas type, the author found that, all the educational variables, except enrolment were positively related with agricultural productivity per hectar as well as per worker. Enrolment was found to have positive but statistically insignificant relation in the case of agricultural productivity per worker.

Randhawa (1983) investigated the impact of level of education of the decision maker on per acre yield and per worker yield in Amritsar district of Punjab with the multi-stage stratified random sampling by using micro data collected from 150 farmers. Fitting a linear regression model, the author found that, educational level of the decision
maker had positive and significant impact on both per acre yield and per worker yield, except for experience and area irrigated, all other variables (area cultivated, fertilizer, finance and mode of farming operation) were also found to be positively and significantly related with per acre yield and per worker yield.

Debi (1984) examined the effect of level of education of farm workers on agricultural productivity in Orissa for the year 1971. The author classified the farm workers into educated and uneducated workers. Using multiple regression technique, the author found that agricultural productivity was significantly related to the level of education. The impact of other variables like land, irrigation and chemical fertilizers were also found to be significant. The relationship between chemical fertilizers and level of education of the farm workers was also estimated with the help of a simple linear regression equation, in which educated and uneducated workers were independent variables and use of fertilizers was a dependent variable. The result indicated the level of education influenced use of chemical fertilizers positively.

Duraisamy (1990) examined the effect of education on technical and allocative efficiency between educated and uneducated farmers by using Cobb-Douglas form of the normalized restricted profit function. The data used in the study were collected through a primary survey covering 461 farm households of 12 villages in two districts of Tamil Nadu. The author found that, education of the farmers and there extension contact increased profit by 12 per cent and 13 per cent respectively. Other variables like farmers age, average education of family members and viability of credit did not seem to have much impact on profit. Using SURE technique, it was found that educated farmers were found to be relatively more efficient than the uneducated ones both from technical and allocative point of view.
Muggur (2004) selected 200 samples from dry and irrigated parts of Belgaum district in Karnataka. In his studies he pointed out that, educated labourers were more productive and efficient. But the level of literacy among agricultural labourers was very low in the study area. Out of 200 sample agricultural labourers in dry and irrigated areas, 75 per cent of them were found to be illiterate and others had only primary or at the most secondary level of education. The rate of illiteracy was found more in dry areas as compared to the irrigated areas. Again, the rate of literacy was very much higher among the members of the agricultural families as compared to the heads of the families. This indicates that the heads of the families have realised the significance of education.

Bisale (2007) made a case study on dry farming in Jath taluka from Sangali district in Maharashtra. He found that, the number of illiterate farmers is more in all farm size land holdings. As far as primary education is concerned, the number of marginal farmers is more than the other farm sizes. Thus the study showed that the size of land holdings varied directly with the level of literacy i.e. higher the level of literacy higher the size of land holders and vice versa.

2.3 Impact of Education on Agricultural Practices.

This section is pertaining to the reviews explaining how the level of education determines the type of agricultural practices undertaken by the farmers. Section is divided into two parts as (i) studies explaining the influence of education on agricultural practices at the international level and (ii) studies explaining the relationship between the level of education and agricultural practice within India.
i. Studies Explaining the Influence of Education on Agricultural Practices at the International Level.

Schultz (1964) in his book “Transforming traditional agriculture”, showed the importance of human capital in developing agriculture in dealing with the situation of disequilibrium which results from the introduction of new technology. He surveyed a number of empirical studies, which examined the ability to deal with disequilibrium. Many of the studies found that education plays a strong role in determining rates of adoption of new technology in developing agriculture. Studies found a significant relationship between education indicators and farming practices. The education (and extension) is found to be an important factor affecting adoption behaviour of the farmers.

Greshon et al. (2003) published a paper titled “Adoption of agricultural innovation in Developing Countries - A survey”. In dealing with agriculture in the United States, they made a distinction between worker ability and allocative ability. Allocative ability is the ability to adjust to changes. Theoretically and empirically the farmers with higher education possess higher allocative ability and adjust faster to reduction in nitrogen prices by adopting nitrogen intensive technologies. He further noted that education is particularly important when extension activities are less intense. So according to them farmers with higher education level are quick in adapting to new technologies.

Glauben et al. (2005) in their article “Farm succession pattern in Northern Germany and Austria: A survey comparison” finds large differences in education within the samples. Higher levels of agricultural education in Schleswig-Holstein support the specialization pattern observed there, while the higher level of non-agricultural education in Austria goes along with less crop specializations.
Kumaret et al. (2008) attempted to account agricultural growth and total factor productivity in South Asia. According to them, growth in agriculture productivity is essential for the development of the sector. Their study has reviewed the development in agricultural productivity related to South Asian countries. They have stated that, the level of literacy rate is the major factor influencing the total factor productivity. The study revealed that level of literacy determines the productivity of agricultural sector.

ii. Studies Explaining the Relationship Between the Level of Education and Agricultural Practices Within India

These studies are further divided into two groups such as:

(a) Studies explaining the impact of education on adoption of technology and

(b) Studies explaining the relation between education and the cultivation of particular crop.

a. Studies Explaining the Impact of Education on Adoption of Technology.

Singh (1974) from his study in Haryana proved that, the level of farm production is significantly higher on farms where decision-maker is literate than where the decision-maker is illiterate. He found that the impact of the level of education on farm production is relatively strong with secondary education and weak though positive, with both primary and middle education. The increase in farm production at geometric mean level of other inputs due to the literacy was found to be 19.1 per cent. It was 15, 20, and 50 per cent with primary, middle and secondary level education of farmers, respectively. Thus the study underlines the importance of sustained formal education up to a minimum of secondary level for a wide scale change in the farmers’ production behaviour.
Milton and Wallace (1982) feel that informal non-compulsory education programs for adult farmers can have a significant impact on agricultural production. Continuous learning is essential for all managers as there are constant technological innovations. Extensive education may take the form of group of farmers meetings, methods and result demonstrations, presentation and analysis of management purposes. It was also found that majority of the tribes of Kosbad village in Palghar district of Maharashtra are not in a position to adopt innovations introduced to them by the volunteer organizations due to lack of education and knowledge about modern agriculture practices, and due to the prevalence of poverty and subsistence economy. The study reported that the authorities of the Block Development Office tried to induce people to take chemical fertilizers and new seed varieties, but a few of them accepted and most of them thought the chemical fertilizers may be harmful to crops. The study concluded that, innovations introduced by the volunteer organizations such as farm tours, exhibitions and fairs have brought a tremendous change in the field of agriculture as well as socio-economic conditions. A good extension worker is one who makes the farmer aware of new ways to do things on the farm as well as relating the nonfarm economy to the farm economy.

N. R. Ravi Prakash (1989) studied the impact of new paddy production technology in Shimoga district of Karnataka state. He found that, in the case of farmers growing high yielding varieties of paddy, nearly 66 per cent of the large farmers were educated above seventh standard while the corresponding figures for medium and small farmers were 36 per cent and 17 per cent respectively. The proportion of small farmers who did not had education was over 30 per cent, while in the case of medium and large farmers the same were as low as 16 per cent and 3 per cent respectively.
In the case of farmers growing local varieties, 5 per cent of small, 20 per cent of medium and 28 per cent of large farmers were educated above seventh standard. A Considerable number of small farmers did not have education (40.54%) and the corresponding figures were nearly 26 per cent for medium and 14 per cent for large farmers.

On the whole, nearly 43 per cent of the farmers growing high yielding varieties of paddy and 17 per cent of the farmers growing local varieties of paddy had education above the seventh standard. Only 15 per cent of farmers in the high yielding varieties category were illiterate, while 28 per cent of the farmers growing local varieties of paddy were illiterate.

Chi-square test was used to determine the significance of difference in the levels of education between farmers growing local varieties of paddy and those growing high yielding varieties of paddy. His conclusion was that, higher the level of education, higher is the use of high yielding varieties of seeds and lower the level of education, higher was the use of local varieties of seeds.

Singh and K. H. Narendra (1995) studied the agricultural innovations that have been introduced in Kosbad village from Dahanu taluka in Maharashtra. The study indicated that establishment of various agricultural institutions and training centres in the Kosbad area by the Ghokhale Education Society have brought many changes among the tribes in their agricultural practices. The tribal farmers are found to have started, to use tractors instead of wooden ploughs, new verities of seeds, electric pump sets for irrigation purpose and chemical fertilizers.

Atibudhi and Sahoo (2000) made an attempt to analyse the effects of formal education on productivity of High Yielding Varieties (HYVs) of rice in Sambalpur district of Orissa during the year 1999-2000. The results of the study indicated that the highest
average yield of 44.72 quintals of rice per hectare was obtained by farm operators who had more than 10 years of formal education, followed by farm operators with 5 to 10 years of formal education. The lowest yield of 38 q/ha was realized by illiterate farm operators. In terms of additional benefit-cost analysis, the farm operators with 5 to 10 years of school education got 7.8 times more additional benefits over the additional cost for literate farm operators (up to 5 years of school education). The level of adoption of technology also indicated similar trend with higher level of technology adoption for 5 to 10 years of formal educated farm operators and more than 10 years of formal educated farm operators than the literate and illiterate farm operators. The results also imply that above 5 years of formal school education for farm operators is needed so as to have significant impact on farm productivity. But was found that, more than 10 years of formal education of farm operators has neutral technical effect on farm productions.

**Gaonkar (2000)** attempted to study the extent of technology adoption by the farmers and the factors affecting the use of technology based on primary data collected from 90 farmers from two villages, Agonda and Maxem, in Canacona taluka of South Goa district in Goa. The study found that, there was a direct relationship between education and technology adoption by the farmers. All the 69 literate farmers (76.67 per cent) were in favour of adoption of new technology. This shows that, receptivity of new technology depends upon the education of the farmers. Other factors which affected the process of technology adoption by the farmers were effective extension services, credit facilities, and ownership right of the cultivators on land, attitude of the people towards agriculture and size of the holding. The study thus shows that, besides other factors, education and extension services play an important role in the adoption of technology.

**Kar (2000)** tried to investigate the relationship between agricultural development and rural poverty in West Bengal during the period from 1980-81 to 1997-98 and identified
the casual factors for the remarkable agricultural development in the state. Literacy, irrigation, wage and fertilizer use were taken as key factors which were responsible for adoption of new technology. It was found with the help of linear regression analysis that, education did not have significant effect on fertilizer use for the year 1981 but this became significant in 1991. It was found that the districts with higher literacy rate had higher productivity level.

Malk et al. (2000) stated that the adoption of improved technology comes through the educational process, the purpose of which is to bring about the desired changes in farmers knowledge of agricultural technology, skills and attitudes, which they develop towards the development of agrarian society. The study confines to the Hisar district of Haryana state and is based on the primary data collected from 90 farmers randomly selected from two villages. The study concluded that, the higher amount of expenditure was incurred by the farmers with matriculate and above level of education on acquiring information that improves agricultural practices, such as improved varieties of seeds, information related to sowing times and quality seeds of different crops. Thus, it is implied that, level of education of the farmers determines the expenditure incurred on gathering information about improved agricultural practices.

Mishra and Hossain (2000) made an attempt to assess the effectiveness of Krishi Vigyan Kendra, Kalahandi of Orissa on diffusion of farm and allied technologies among the trained farm families in the adopted villages. The Kendra, since its inception in 1994 conducted training programmes for farm families on crop production, horticulture, plant protection, agricultural engineering, animal, science, fishery, extension education and home science. Besides these, it held front-line demonstrations on other crops and allied activities and on-farm testing for farmers and farm women. Out of the total number of trained farmers in the year 1994-95, 100 farmers were randomly selected
from five adopted villages for survey purpose. From the study, it was found that in terms of adoption of new technology, introduction of HYV paddy ranked first with 32 per cent increase during the five-year period (1994-95 to 2000) followed by improved cotton cultivation and hybrid tomato cultivation. Further it was found that 41 per cent more farm families became self-employed through farming during the five year period. About 37 per cent of the respondents could change their educational status to middle school level, 29 per cent more trainees used improved implements and 28 per cent of the respondents moved to 20,000 annual income bracket. From this, it is clear that informal education played important role in educating farmers about different agricultural practices.

Pandey (2000) attempted to find out the extent of adoption of modern technology among the farm households with varying levels of education and examine the factors affecting the adoption of modern technology in farming in two agriculturally developed villages having uniform agro-climatic and infrastructural conditions in Pipli block of Puri district, Orissa. The data on different aspects of adoption related to only paddy crop and for the year 1998-99. The findings of the study revealed significant difference in the adoption of modern technology (HYV seeds, chemical fertilizers, machinery and implements) between the farm households with varying levels of education. The regression analysis indicated that, in the case of farmers having education at primary level, the amount of institutional support and hours spent on extension education explained the extent of adoption. In the case of farmers between primary and secondary education, the ratio of non-farm income to total income, years of education, amount of institutional support and hours spent on extension education were found to have significant impact on the amount spent on modern technology. For the farmers with secondary education and above, the ratio of non-farm income to total family income,
years of formal education and hours spent on extension education showed significant relationship with amount spent on modern technology. Above study clearly indicated that there is direct relationship between education level of farmers and adoption of new technology. Hence, the study suggested that, efforts should be undertaken to provide regular extension education through the agricultural officials of the block to the less educated farmers for higher adoption of technology so as to increase the agricultural productivity.

Saha (2000) stated that in backward agricultural regions, formal education creates awareness about the new technological opportunities. Researcher used household level cost of cultivation data for *aman* rice cultivation in West Bengal relating to the year 1989-90 to examine (a) the factors influencing the educational achievements of rural households and (b) the relationship between the educational status and use of selected modern inputs (viz., HYV seeds, fertilizer and plant protection chemicals). Using various limited dependent variable techniques, researcher found that, educational achievements were strongly influenced by its economic endowments such as land and value of capital. However, in respect of the adoption of new technological package, the effect of formal education was mainly operative through eradicating illiteracy. Households with at least one literate member were found to apply greater fertilizer and had greater probability in using plant protection chemicals. However, the effect of literacy on farmers’ decision to cultivate HYV seeds and the degree of adoption (i.e. proportion of HYV coverage) was not found to be statistically significant despite having expected directions. The actual level of educational achievement, however, did not have any major impact, except in the use of plant protection chemicals. This study revealed that, rather than the content of formal education, as measured by the level of
educational achievement, its role in creating farmers’ awareness is more important in adopting technological changes in backward agricultural regions.

Sarawgi et al. (2000) made an attempt to know the extent of knowledge and adoption of tomato production technology and association among the different attributes of tomato growers with knowledge, adoption and economics of tomato crop. The study is based on data collected from a sample of 50 tomato growers selected randomly from five villages of Maihar block of Satna district, Madhya Pradesh for the year 1998-99. The findings of the study regarding the extent of knowledge, adoption and economic performance of the tomato growers indicated that, a larger number of tomato growers had high knowledge but low extent of adoption, while extent of economic performance found to be high. It was also found that, there was significant association between different attributes, namely education, economic motivation, scientific orientation, innovativeness, contact with extension personnel and sources of information with the extent of knowledge of recommended tomato technology. The study showed that, the awareness of farmers towards technological recommendations is very poor in the study area. Therefore it is suggested that, proper extension education should be organised to make them aware of the recommended technology in the study area.

Sharma et al. (2000) stated that, training to rabbitry entrepreneurs increased the knowledge level which in turn enhanced per unit productivity and income on rabbit farms. The rabbitry has been taken up as a subsidiary occupation by a majority of the farmers. The level of education of trained entrepreneurs was comparatively higher than that of untrained entrepreneurs. The rabbitry units established by trained entrepreneurs were comparatively recent and smaller than rabbitry units of untrained entrepreneurs. The wool yield and income per rabbit was higher by 12 and 8 per cent respectively on farms of trained entrepreneurs than on untrained entrepreneurs. The number of trained
entrepreneurs facing different problems was lower than that of untrained entrepreneurs. Thus formal training has a definite role to play not only in enhancing the productivity and income but also improving efficiency.

Ramanamurthy et al. (2003) analysed the factors influencing decision making behaviour of farmers in the case of vegetable seeds in Andhra Pradesh. The study was undertaken in Rangareddy and Medak districts of Andhra Pradesh. A total of 89 respondents were selected from six villages by following proportionate random sampling technique. The study revealed that, literate farmers preferred to purchase HYV seeds of vegetables. Literate farmers even preferred to go and purchase the seeds by visiting the nearby town or city when the preferred variety was not available while illiterate would purchase the local variety or other variety recommended by dealers. The study revealed that, level of literacy determines the variety of seeds by farmers. The study suggested providing training and education about the use of HYV seeds to the farmers.

Laxmi and Mishra (2007) stated that, the level of education of the respondent has positive impact on the new technology adaption. They also stated that, education level of the rest of the family members also affects the decision making process. Hence they calculated Education Index (EINDEX) i.e. average education level of all the adult members of the family to reflect the education of the entire family. The study revealed that, the influence of education index on the probability of technology adoption was positive but not significant in Haryana. However, it turns out to be negative and significant in the case of Bihar. This may be due to the unobserved socio-economic variables such as least involvement of educated persons in farming. Hence, they feel that not only the education level of farmer but also the education level of other members in family affects the decision making process.


**Pawde et al. (2011)** stated that, socio-cultural factors like the educational status and value orientation of the farmers affect adoption of improved practices. Their study revealed that, farmers who are highly educated tend to adopt a large number of agricultural practices than those who are poorly educated. They concluded that, the level of education of a farm family has a positive relation with the adaptation to new technology.

**Makwana (2013)** Stated that, main aim of agricultural education is to prepare human resources for agriculture sector. The global food demand is expected to be doubled by 2050 while at the same time the availability of natural resources are continuously reducing and deteriorating. Inadequate attention to agriculture has led to increase in food prices making it inaccessible to poor people. In India, approximately 75 per cent of the poor people reside in villages who mostly are small and marginal farmers and landless labourers. This leads to overcrowding of agriculture for livelihood with lower marginal productivity. Moreover, they overexploit natural resources for their subsistence. Harmonizing science and technology inputs is the only solution to nurture rural livelihood without degrading natural resources. Hence, proper agricultural education is the only solution for the country like India to meet the increasing demand from agricultural sector. More efforts are required to transform Indian agricultural education system to make it more sensitive and responsive to the need of the country.

**b. Studies Explaining the Relation between Education and the Cultivation of Particular Crop.**

**Saini (1963)** studied cropping pattern for two periods 1936-37 and 1956-57 choosing two districts, viz. Muzzaffanagar and Meerut of Uttar Pradesh. He found that, there is a shift in favour of cash crops and superior cereals as against inferior cereals and pulses. Increased irrigation facilities, related profitability of crops and socio-economic factor
like literacy level are the three main reasons for these changes. The most important shift in the cropping pattern over the period has been in favour of sugarcanes. Increased availability of irrigation, setting up of sugar mills in the area and increase in the level of literacy during the period and support policy of the government seemed to have contributed to the big increase in the sugarcane cultivation in these districts.

**Hiremath (1989)** in his thesis stated that, within any size of holdings, the proportion of people acquiring higher levels of education declined when moved from the primary education to the pre-university level. A good majority (about 70 per cent) of farmers growing bidi tobacco were literate with a minimum of primary level education. The farmers in all the size grew all varieties of crops; the level of education did not seem to influence the choice of bidi tobacco varieties.

**Narayanamoorthy (2000)** analysed the role of farmers’ education in the productivity of crops using two seasons’ data of 200 sample farm households collected from one of the highly irrigated regions of Tamil Nadu. The study estimated five alternative specifications of production function (both the Cobb-Douglas and linear forms). The bivariate analysis indicated that the use of yield increasing inputs is significantly higher among the higher educated (above 5 years of schooling) group of farmers when compared to the less educated group of farmers (up to 5 years of schooling). The estimates of production function relating to the Samba paddy indicate that the coefficient of education is positive but not significant in influencing the productivity of paddy. In the Thaladi season, the coefficient of education is negative in four out of five alternative specifications, but none of them is significant. The result of the study shows that, the role of farmers’ education is limited or insignificant in the productivity of crops when farmers cultivate uniform variety of crop in a modern dynamic agricultural set-up.
Awasthi et al. (2000) made an attempt to examine the extent of transfer and adoption of farm technology together with cost-benefit ratio and to evaluate the training programmes under Krishi Vigyan Kendra (KVK) at four villages of Majhagawan block of Satna district, Madhya Pradesh in the year 1998-99. Only crop production and home science technology were transferred by KVK in these villages. The study brought out that, during the Kharif season paddy, jowar wheat and gram crops were included in the programme for purposes of demonstrations of improved cultivation practices. Among the components of crop production technology, the highest adoption in both the seasons were reported for seedbed preparation and sowing method. Fertilizer use, plant protection measures, seed treatment and irrigation were least adopted which happen to be the purchased inputs representing a major portion of the total cost. Adoption of complete package of practices was higher on crops grown in Rabi than that in the Kharif season.

Surabhi and Praduman (2000) have estimated the cost for cultivation of rice and wheat. The data was collected from different states by dividing them into four regions i.e. (a) Eastern region comprising of Bihar, Orissa, Assam, and West Bengal states (b) Western region comprising of Rajasthan, Madhya Pradesh, Maharashtra, and Gujarat states. (c) Northern region comprising of Uttar Pradesh, Haryana, Punjab, and Himachal Pradesh states, (d) Southern region comprising of Andhra Pradesh, Tamil Nadu, Karnataka, and Kerala states. The simultaneous recursive model (in double log linear form) for rice and wheat was undertaken by using a three-least squares (3SLS) and seemingly unrelated regression estimates (SURE) for estimation procedure. The study covered the period from 1973 to 1995. The averages at state level were derived from the farm level cost of cultivation data under the “Comprehensive Scheme for the Study of Cost of Cultivation of Principal Crops”, Directorate of Economics and
Statistics, Ministry of Agriculture, Government of India. The model for rice and wheat was estimated by using 3-SLS and SURE estimation procedure.

The results of the study showed that, the decision on the adoption of HYVs is influenced significantly by rural literacy, electrification, crop irrigated area. The elasticity of HYVs with respect to literacy was higher for wheat (0.60) as compared to rice (0.38). Higher use of inputs was induced through HYVs as a result of higher rural literacy rate. The share of literacy adoption of HYVs increased from 22 per cent during 1973-90 to 74 per cent during 1990-95 for rice. In the case of wheat, literacy contribution in technology adoption increased from 42 per cent in 1973-90 to 90 per cent in 1990-95. Use of fertilizers and adoption of HYVs under rice in the eastern region is at a low level as compared to the northern and southern regions of India. Literacy is also low in this part.

The study showed that literacy has a positive and significant relation with crop productivity and a strong link between literacy and farm modernisation. Level of literacy emerges as an important source of growth in the adoption of technology, use of modern inputs like machine, fertilizers, and yield.

Bhosale (2002) examined factors responsible for agricultural diversification in Karnataka. According to him, among all other factors responsible for agricultural diversification, education is one of the most important factors. Out of 38 per cent of the farmers who opted for crop diversification towards high value crops, 36 per cent farmers had completed at least 4 years of education in formal schools and only 2 percent of illiterate farmers opted for crop diversification towards high value crops. This indicates that, higher the level of education higher the rate of crop diversification towards high value crops.
2.4 Concluding Observations

There is a great deal of literature available in the forms of articles in the Journals, proceedings of seminars and conferences, edited volumes of publications, chapters of doctoral thesis submitted to the Universities, books, on line publications and resource materials, which are directly and indirectly related to the present study. The present study attempted to incorporate few of them to provide the framework for the study. The above review of literature (Schultz, 1961; Psacharopoulos, 1972; Razin, 1977; Barros, 1991; Hill and King 1995; Dandekar and Rath, 2000; Gyfason and Zoega, 2001; Matusha, Siddique and Gils, 2006) found that there is positive relation between education and economic development of the countries. Studies relating to the development of specific countries have revealed that, primary and secondary education play an important role in the process of economic development in less developed countries, while the higher education plays an important role in developed and rich countries (Tilak 1986; Petrakis and Stamatakis, 2002). Similarly, primary education plays an important role in rural parts of the country while secondary and above level of education plays an important role in the urban areas of the country (Tilak 1980). Education also influences agricultural development (Dey, 1978; Tilak, 1979; Mook, 1981; Azhar, 1981; Jamison and Lau, 1982; Weir and Knight, 2000; Zavalc, Mabaya and Cristy, 2005; Gullacher, 2008; Kumar, 2008; A. C. Egun, 2009) with an impact on agricultural practices (Schultz, 1964; Gres hon Feder, Richard E. Just and David Zilberman, 2003; Glauben Thomas, Tiete j Hendrik and Vogel Stefen,2005; Milton and Wallace, 1982; N. R. Raviprakash, 1989; Singh, K. H. and Narendra, 1995; Atibudhi and Sahoo, 2000; Gaonkar, 2000; Kar, 2000; Malk et al.2000; Mishra and Hossain, 2000; Pandey, 2000; Saha, 2000; Ramanmurthy et al. 2003; Laxmi and Mishra, 2007; Pawde et al. 2011; Makwana, 2013). Some studies have found the influence of
education on the type of crop cultivated by farmers (Saini, 1963; Hiremath, 1989; A. Narayanmoorthy, 2000; Awasthi et al., 2000; Surabhi and Praduman, 2000; Bhosale, 2000). Thus the studies reviewed above revealed that, there is significant impact of education on economic development. However, apart from education, many other factors such as size of landholdings, demonstration effect also influence agricultural productivity and agricultural practices. In this direction efforts are made in the present study to know the extent of effect of education on agricultural practices in Ponda taluka of Goa.
References


