CHAPTER-I

INTRODUCTION

1.1 Introduction

Agriculture is the largest sector in the Indian economy and the textile sector is the next largest. In India, agriculture sector accounts for 28 per cent of the Gross Domestic Product (GDP) and serves two-third of the livelihood of the population. Historically, India is considered the native of cotton and center of finest textile industry in the world. Cotton, known as the king of textiles thus occupies a very important place in the economy of the country. Cotton, being the principal cash crop of the country, accounts for about 2.5 per cent of the agricultural output. Cotton industry provides the means of livelihood for an estimated population of 60 million, through its cultivation, trade and industries in India. Cotton sector provides seven million jobs on farms, at least one million jobs in mills, and many more jobs in trade, ginning, power looms, Garments and other sectors.

As an Industrial Raw Material, cotton provides 68 per cent of the raw material of the Indian textile industry. The textile industry uses cotton as well as synthetic fibers in staple length not exceeding fifty-one millimeter. It does not use wool and continuous filament yarns. Cotton's dominance in the Indian textile industry is as much as 44.7 per cent. In absolute value, cotton consumption is still growing in India. The trend is expected to continue because of the growth of cotton textiles exports.
Indian cotton textile commands a significant share in export earnings. While the exports of cotton in the form of fiber are small, about 36 per cent of total production of cotton in the country is exported in the form of yarn, cloth and garments. Cotton based textiles account for 73 per cent of the total textile exports. Seeds removed from cotton at the gin are crushed in order to extract oil from the meal, and hulls are used in the preparation of fish and poultry feed and fertilizer. Cottonseed oil is also used in cooking. India is the second largest producer of cottonseed meal next to China. The cottonseed meal is primarily used as animal feed.

The advent of new technology in agriculture has not only lifted India from a position of importer of food grain to that of a net exporter of food grain. The new technology has also marked, in Indian history, the transformation of the Indian farmer from that of a subsistent, food-oriented producer to that of a commercial producer faced with a wide variety of cropping choices which cater to each of his food, fodder and liquidity needs. The new technology has also moved the farmer from a low-input, low-output farming to that of a high-input, high-output cultivation equation. This transformation has also engendered considerable investment in irrigational infrastructure both at the micro and macro levels, compelling the farmer to generate more and more of commercial surpluses in the course of his farming.

By description, commercial crops are those, which are cultivated for cash considerations while a food crop is often cultivated keeping in consideration the private needs of the farmer such as his food and fodder.
considerations. Most of the commercial crops in the Indian context are fiber and oilseed crops. The distinction between food crops and commercial crops varies depending on the crop and the variety. Staple food crops like jowar, wheat, paddy; pulses like tur, green gram etc could be both food crops as well as commercial crops depending on extent of the self-consumption and cash needs of the cultivator. Marketable surplus, i.e. the quantity of produce available for marketing to the farmer, normally, in case of food crops would be that quantity of produce available for sale, over and above the requirements for himself and his family. The marketed surplus i.e. the quantity of produce actually sold at the market would be the balance of the total produce less the actual quantity sold at the market to meet the cash and similar needs of the farmer. In extreme cases of cash requirements, all of the produce may be sold at the market thus transforming the food crop into a commercial crop. In commercial crops most of the produce is sold and only a small proportion is retained with the farmer for self-consumption depending on the type and variety of the crop. In case of commercial crops like dry chilli, sugarcane, tobacco, short staple cotton; oilseeds like groundnut, castor only a small proportion of the produce is retained, if at all, by the farmer for his self consumption needs and a major portion is marketed surplus. In the case of other commercial crops such as sunflower and long staple cotton, the marketed surplus is equal to the produce and thus they are commercial crops in the purest sense. Incidentally, most of the food crops are those, which require heavy investment in terms of crop inputs and labour besides in terms of irrigation and processing
infrastructure. It also sharply brings into focus the costs and returns involved in the cultivation in these crops.

Currently, there are more than 550 regulated markets in India through which 80 per cent of cotton is traded. Cotton trade in India is carried out through three major agencies: private sector, cooperative sector and public sector represented by Cotton Corporation of India (CCI). The private sector markets constitute about 70 to 75 per cent of the produce. It consists of traders, owners of ginneries operated as individual proprietors, partnership firms and private limited companies. On the other hand, around one-fifth of the cotton crop in India is marketed by the cooperative sector. There are mainly three kinds of operations in vogue in this sector viz., pooling system, commercial purchases and monopoly procurement. The Cotton Corporation of India, Mumbai, a public sector marketing agency, came into existence in July 1970. It is a regulated company fully owned by the Government of India. Approximately, 6 to 8 per cent of the total crop is now handled by CCI. There are fifteen centers of CCI operating across the country. CCI's activities cover Price support operations as directed by The Government from time to time in the interest of farmers. The operations also include commercial purchases based on its own judgment to meet the requirements of the state sector/private sector mills to the extent necessary; and Export/Imports as per quotas allotted by the Government from time to time.
Cotton is being grown worldwide. More than 90 varieties of cotton are being grown in India alone. Recent advances include evolving of naturally colored cotton varieties, genetically modified, pest resistant Bt varieties. Generally, cotton is categorized into five groups based on its staple length namely short staple (19 mm and below), medium staple (20 mm to 21.5 mm), superior medium staple (22 mm to 24 mm), long staple (24.5 mm to 26 mm) and extra long staple (27 mm and above).

India is the third largest producer and the second largest consumer in the world. Cotton has a large share in the Indian agricultural output to the tune of about 2.5 per cent, valued at more than Rs. 20,000 crores. The area under cotton was estimated at 8.48 million hectares for year 1999-00, which is about one-fourth (26.7 per cent) of world's acreage.

India's efficiency in cotton production is reflected by the performance in the nine major cotton growing states falling under three National level Agro-climatic Zones namely, the Northern zone comprising of Punjab, Haryana and Rajasthan; Central zone comprising of Gujurat, Maharashtra and Madhya Pradesh; and the Southern zone covering Andhara Pradesh, Karnataka and Tamil Nadu states. According to the Report of Food and Agriculture Organization, the Northern zone accounted for 19.68 per cent of the total production in the country, while the Central and South zones accounted, respectively, for 51.61 and 22.58 per cent. On the other hand, cotton production in the other parts of the country was a mere 5.16 per cent of the total production in the country.
Cotton productivity in India is however, very low as compared to those in other countries. The average yield of cotton in India is just 400kg per hectare as against the world average productivity of 800 kg per hectare. Cotton productivity is low particularly in the states of Maharastra, Karnataka and Madhya Pradesh where rainfed cotton predominates. Yield levels are comparatively high in the states of Punjab and Haryana, where most of the cotton is cultivated under irrigation. Even in these states, the average yields are below the world average. Karnataka ranks third in area (0.64 million ha.) and fifth in production (0.95 million bales) of cotton with the productivity of 251 kg lint per hectare.

There are various factors responsible for low productivity of cotton in India. One of the most crucial factors is the incidence of insect pests and diseases for the crop. With the invention of high yielding varieties and hybrids, the problems of incidence of insect pests and diseases have increased severely over the years. Cotton crop is attacked by 1326 species of insects and mites, of which, 166 species damage the crop in India, and of which only a dozen species are of economic importance in the country.

1.2 Review of Literature

Numerous researchers at country, state and district levels have conducted investigations on growth and instability of crops, farm level economics of cotton cultivation, production and yields. Nevertheless, information on growth performance and instability of cotton production
in Karnataka needs to be periodically updated and analyzed to make policy initiatives meaningful. In this chapter, an attempt has been made to present the literature pertaining to earlier research work having relevance to the objectives of the current study.

1.3.1 Growth Rate studies

Bansil (1972) estimated the compound growth rates for important crops for the country from 1964-65 to 1970-71 and found that the area under cotton had shown a declining trend. This was mainly due to erratic rainfall and low cotton prices and incidence of pests and diseases.

Tyagi and Saxena (1974) concluded that production of cotton was decreasing in Uttar Pradesh due to decrease in area, despite the hike in the cotton productivity. The improvement in the cotton productivity is attributable to the introduction of the high yielding varieties and adoption of improved package of practices.

Pereira (1976) analyzed growth rates of crop output in Karnataka during the period 1955-56 to 1972-73. Three types of growth functions were used namely linear, geometric and quadratic separately for the three sub periods. The analysis concluded that over the aggregate period, with the exception of sorghum, caster, cotton and tobacco, the rest of the crops recorded growth rates in their acreage. The negative growth in the case of sorghum, caster, cotton and tobacco was due to soil problems and diseases. In case of productivity, it was observed that the Green Revolution period was more favorable for most of the crops in the state due to the improved technical packages evolved during this period.
However, the study revealed that the growth rates of area under groundnut during the green revolution period was marginally decelerating at 0.61 per cent but productivity was increasing at the rate of 1.81 per cent.

Sirohi et al (1983) observed that the trend in production and productivity of wheat per hectare had risen significantly over the period 1976-77 to 1981-82. The productivity of bajra, pulses and gram had been stagnant or decreased significantly. Rice and cotton had showed mild rising trends. The productivity of total food grains per hectare had also increased due to the introduction of high yielding varieties among most of the cereals.

Waghmore (1983) studied the growth rate of area, yield and output of cotton in Maharashtra. The study period ranged from 1960-61 to 1977-78. Though part of the area under this crop in the state was rainfed, it was found that the state ranked first in area among cotton growing states of the country. The introduction of hybrids and use of various recommended package of practices have boosted both the cotton productivity and production in Maharastra state.

Mander and Sharma (1992) examined the growth performance of cotton output in India for the period 1966-67 to 1988-89. It was evident from the result that cotton production registered a significant growth rate of 2.39 per cent per annum during the Green Revolution period. They also reported that increase in production of cotton occurred as a result of
increase in yield (2.74 %) while the area under this crop decreased significantly.

Singh et al. (1993), in their study, 'Cotton Development and Export Potential in India reported that cotton area and production increased by 49 and 315 per cent during the last four decades. They also suggested that this increase in cotton production was more on account of increased yield rather than an increase in cotton acreage.

Sawant (1997) studied the performance of Indian agriculture, using time series data for the period from 1967-68 to 1995-96. The data was analyzed by compound growth rate after fitting log-linear function. It was found that, of the two cash crops, namely, cotton and sugarcane, the former moved to high growth range compound growth rates of its output exceeding 4 per cent during 1981-82 to 1994-95, mainly due to significant advances in its seed technology and resultant high growth in the yield per hectare.

Singh et al. (1997) studied regional variation in agricultural performance in India using secondary data for the period from 1960-61 to 1992-93. The data was analyzed with compound growth rate by fitting log-linear function. The result revealed that the national growth rate in cotton increased to 3.20 per cent in period II (1969-81) from 0.02 per cent in period I (1966-68) and finally sliding down to 2.47 per cent in period III (1982-93) due to decrease in acreage growth. The decrease in the area during period III was attributed to the competition for area from
other commercial crops and hybrid cotton was prone to the high incidence of pests and diseases.

Gaddi et al. (1998) studied growth rates in area, production and productivity of cotton for the major cotton producing countries and the state of Karnataka, in India for the period from 1982-83 to 1996-97 in the former case and from 1970-71 to 1996-97 in the later using exponential function. The results showed that World cotton area declined at 0.33 per cent per annum due to the improvement in productivity. Similar results were reported at all India level, Karnataka state and some of the traditional cotton growing districts. Production of cotton registered significant growth in all the cases mainly due to the substantial growth in productivity. This study considered only one period growth analysis that made it incredible by taking sub periods.

Girima Aboma Ariti (2002) studied the growth and instability of cotton production in Karnataka. He observed that production of cotton increased by 2.54 per cent per annum (for the period 1970 -1971 to 1998-1999) during the entire period as against 2.9 per cent and 4.55 per cent in the first period (1970-1971 to 1986-1987) and the second period (1987-1988 to 1998-1999) respectively. He also observed that there was a significant expansion of cotton production in the districts of Mysore, Belgaum, Bellary, Shimoga, Chitradurga and Dharwad during the entire study period. Similar trend was noticed in the first period of the study except Chitradurga district. In the second period, all the districts showed significant increase in cotton production except Bellary district. The area
under cotton for the state as a whole showed a growth rate of 1.32 percent per annum during the entire period as against 0.93 per cent per annum in the first period and 0.96 per cent in the second period. Generally the creation of irrigation facilities and attractive prices stimulated the area under cotton in the state while sudden fall in the prices due to increased supply of cotton, increases in costs of cultivation due to higher pest incidences and high wage rates discouraged the area under cotton. The continuous cultivation without adding sufficient nutrients to the soil, the loss of hybrid vigour of cotton varieties both reduced the yarn characteristics of the cotton of such areas and as such the prices received for such cotton was low. The resultant lowering of profits also resulted in the contraction of cotton area.

1.3.2 Production studies.

Saoji (1965) studied the economics of cultivation and marketing of cotton in Nagpur, Maharashtra. He estimated that the marketing costs paid by the producer in the market were at Rs.7.43 per cartload of cotton. The producer's share in the mill owners rupee was 88 per cent.

Ramaswamy (1970) analyzed the fluctuations in area, production and productivity in cotton in India for period 1950-51 to 1968-69 and concluded that the period of the First Plan and the earlier years of the Second Plan saw rapid increase in area under cotton. Thus cotton production during these periods was largely area-oriented due to the lack of high yielding varieties.
Raut (1970) studied the economics of H-4 cotton variety under irrigated and un-irrigated condition in Narkhed block of Nagpur district, Maharashtra. The per-acre cost of production was Rs.1,355 and Rs.1,195 for irrigated and un-irrigated conditions respectively. Labour, manures and fertilizers accounted for the major proportion of the total cost.

Marothia (1974) attempted to study the comparative economics of cotton with *kharif* crops like groundnut and jowar, both local and High Yielding Varieties in Khargaon district of Madhya Pradesh. The cost per hectare of High Yielding Varieties was found to be higher than the cost of local cotton variety and other competing crops. The net returns from high yielding varieties was found to be higher than that of local varieties due to increased yields and higher gross returns.

Vyas and Kalla (1974) studied the economics of commercial crops in the arid zones of Rajasthan and compared them to wheat cultivation in the area. It was observed that commercial crops required more investment, but they also had higher returns as compared to the wheat crop.

Singh *et al* (1976) studied the economics of commercial crops in Anand taluk of Gujarath. They observed that the cost per hectare of cotton was Rs.5,623 and the net returns were Rs.777.

Gadre and Mahale (1978) worked out the per-hectare returns from cotton and its competing crops in Vidharbha region of Maharashtra. The net returns for hybrid cotton and *desi* improved cotton were worked out to be Rs.1,062 and Rs.888 respectively.
Rao et al (1979) in their study on economics of cotton cultivation in Yeotmal district of Maharashtra reported that the margin over the expenses incurred by the cultivator was poor due to the un-remunerative prices offered for the produce.

Singh and Gill (1981) in their study of production pattern of the cotton farmers in Punjab district that the large category farmers in the state devoted more acreage to commercial crops in their holdings compared to small farmers due to the sound financial condition of the large farmers and high risk bearing ability.

Hiremath et al (1984) estimated the gross returns, costs and profits per acre of major crops in Malaprabha Command Area. The total cost of hybrid Varalaxmi cotton cultivation per acre worked out to Rs.1,706 and gross returns to Rs.3,757. The net return was Rs.2,051 per acre.

Narasimha Reddy (1986) observed that, in the case of DCH-32 variety cotton cultivation, the cost of production per quintal of cotton was Rs.504.73 for small farmers in Raichur district and the net returns was Rs.100.90. In the case of large farmers, the cost and net returns were Rs.458.71 and Rs.129.54 respectively. Thus, there existed slight economies of scale. However, the returns were diminishing for the medium and large farmers due to high cost of cotton cultivation. In the case of Laxmi variety, which was cultivated under rainfed conditions, the net returns were negative. Commission agents, village merchants and cooperative marketing societies were the three channels available for the
farmer for the marketing of his cotton produce. The cost of marketing was Rs.27.58 per quintal. Both Laxmi and DCH-32 varieties incurred the same cost of marketing. Thus there was difference in inoututilisation.

Rao et al (1987) in their study on economics of cotton cultivation in Yeotmal district of Maharashtra reported that the profit margin was poor but with a very significant Benefit Cost Ratio in cotton cultivation. The reason for such poor margin was the low and un-remunerative prices offered for the produce.

Subramanian (1987) studied the economics of two varieties of cotton, namely, LRA – 5166 and MLU-5 in Madhurai district of Tamil Nadu. He concluded that the economics of raising LRA – 5166 variety emerged more beneficial and profitable than MLU-5 variety. Under the both varieties, large farm group earned more profits. This was mainly due to the better yield of LRA – 5166 variety.

Kamadar et al (1991) studied the relationship between farm size and cotton yield in Tharparkar district. Results of the study based on 90 cotton growers showed that there was no correlation between farm size, physical productivity and cost of production. This was due to the varying levels of fertility of cotton growing land under different farm size groups.

Mane (1991) in his study on hybrid cotton seed production and marketing in Maharashtra found that the amount spent on human labour alone accounted for about 70 per cent of the total spending. The total expenditure incurred by the farmers growing NHH-44 cotton amounted to Rs. 56178 per hectare as against Rs.53374 per hectare for
PKVHY-2 hybrid cotton. The per hectare net income calculated at cost D was found to be higher for NHH-44 (Rs.30458 / ha) than PKVHY-2 hybrid cotton (Rs.28148/ha). This was due to the slightly higher yield of the NHH – 44 variety.

Govinda and Ranganathan (1993) studied the cost of cultivation, gross returns and net returns and Benefit Cost Ratio for Cotton under different densities of planting and different fertilizer level. They concluded that, towards estimating the cost of cultivation, additional cost of fertilizer alone added to the actual cost of cultivation during the experimental stage and they observed that it increased seed cotton yield by 3.4 quintals per hectare and net returns of Rs. 2680 was obtained under high plant density compared to the normal population. Plant density gave more yield and net returns under highest level of fertilizer application.

Koppad (1993) studied the economics of cotton and its competing crops in Malaprabha Command area. He observed that cotton was the most profitable crop of the region than maize-wheat sequence and the Benefit Cost ratio was the highest in cotton. This was due to the low prices of maize and wheat compared to cotton.

Basavaraja (1999) in a study of yield gaps of different crops in the Northern Dry Agro-climatic Zone of Karnataka, which included Bagalkot district, observed that the potential yield for irrigated cotton was 36.5 quintals per hectare, while for dry cotton it was 18.5 quintals. The actual yield in the case of dry farming for small farmers was 8.84 quintals and
for medium and large farmers, it was 10 quintals and 9.84 quintals per hectare. In the case of irrigated cotton, the actual yield per hectare was 19.97 quintals for small farmers 23.88 quintals for medium farmers and 21.04 quintals for large farmers. The seed rate in the case of irrigated cotton and dryland cotton was almost same (around 2.34 Kgs/hectare). The level of remaining inputs was higher for irrigated cotton.

Veerapur (1999) in a study on the economics of integrated pest management technology (IPM) in cotton production in Raichur district of Karnataka, observed that, the total cost of cultivation per hectare in IPM farmers was less by 21 per cent than non IPM farmers mainly due to savings in cost of plant protection chemicals. He also observed that the per hectare net returns in the case of IPM farmers (Rs.29783) was significantly higher than non IPM (Integrated Pest Management) farmers (Rs.16803). It was mainly due to increase in the yield on IPM farmers on one hand and decrease in the total cost of cultivation on the other.

Kunnal (2001) while studying the impact of technical change in Karnataka, observed that the incremental contribution of High Yielding Varieties to the total output was 121 per cent over local varieties in which the New Technology component accounted for only 21.72 per cent and the input use levels contributed for the remaining 99.28 per cent. Among the different inputs used, seed accounted for the highest contribution (24.38%) followed by farmyard manure (21.21%) and working capital (19.77%).
1.3.3 Marketing studies

Jasdanwalla (1966) conducted a study on the marketing of cotton. The study showed that 27.8 per cent of cultivators sold their crop even before harvest to the pre-harvest contractor. This was due to the high costs incurred in cotton cultivation and the poor financial condition of the farmers.

Kataria and Mehta (1969) conducted a study on cotton marketing at Katakpura market in Bhatinda district. The study showed that the cotton producers were able to increase their share in consumers' rupee when they sold their produce through the cooperative society (96.25%). They got only 91 per cent when they sold the produce through the commission agent. This was due to the more number of middlemen in the channel involving commission agents and high marketing costs incurred.

Garg and Singh (1970) in their study on economics of production and marketing of cotton showed that the producers share in the mill owners' price was 85.42 per cent. The retailers margin was 10.67 per cent in the mill owners price.

Pavaskar and Radhakrishan (1970) evaluated the performance of the present marketing system for raw cotton on the basis of marketing cotton in Dhulia and Jalgaon districts of Maharasthra. They found that farmers shares in the final prices of raw cotton and seed was high as 90 per cent and the rest accounted for marketing costs. Gross returns to cotton merchants averaged by 3 to 4 per cent of the aggregate sales and
net returns were very low. This was due to the competition from cooperatives institutions involved in marketing in the region.

Patel (1972) in his study of processing of cotton by the cooperatives in south Gujarat indicated that more than 70 per cent of the cotton was handled by the cotton cooperatives. He concluded that the cotton marketing by cooperatives helped the cotton growers in increasing their incomes.

Rashid et al (1972) analyzed the cost and contribution of different market intermediaries in Jhang, Bhalwal and Sarghoda districts of Punjab province in West Pakistan and found that the aggregate marketing costs incurred by the producer in the sale of cotton were the lowest at the wage level. The profit of the village merchant was only Rs.0.85 per maund when the product was sold to Kacha arthiya and Rs.1.00 when sold to Pakka arthiya. The profit of Kacha arthiya was Rs.0.48 per mound. Four channels of marketing were identified and the producers share in growers rupee in three channels was found to vary between 92.60 per cent and 95.00 per cent.

Natarajan (1973) in his study of cotton marketing observed a positive correlation between arrivals and prices, in Hubli and Gadag markets, which could be attributed to the inflationary trends in the economy.

Gill and Sidhu (1974) analyzed the trends in production and prices of cotton in Punjab and found an increasing trend in prices. This was partly due to the inflationary condition prevailing in the Indian economy
and partly due to an increase in the demand for cotton. They observed positive relationship between arrivals and prices of cotton.

Rao and Rao (1975) in their case study of Hubli market for cotton found that small farmers received lower prices compared to their larger counterparts. The differences were found to be statistically significant. They suggested the strengthening of cooperative marketing societies coupled with public storage facilities to help the small farmers.

Shingargop (1982) in his study of impact of grading of cotton on prices at Gadag market found that with the increase in the size of lots offered for sale, the price also responded favorably thus indicating a positive relation between the two variables.

Satish et al (1985) in their study on the marketing of cotton in Karnataka found that the majority of the farmers disposed off their produce at the regulated markets. However, majority of the small farmers marketed their commodity through traditional channels, owing to the smaller quantities produced by them and their lack of organization and holding capacity. This in turn resulted in lower producers share and lead to increased profits realized by various market intermediaries.

The studies on marketing indicated that the marketing margins increased with the number of intermediaries involved in the channel. Marketing costs were lower when sold to the village merchant but the prices received were also lower.
1.3 STATEMENT OF THE RESEARCH PROBLEM

The status of production as well as the pattern of consumption of cotton shows that India has made major strides since independence from a net importer to self-sufficient and even a marginal exporter of raw cotton. With the advent of globalization, liberalization and marketization, new challenges have raised that have immense implications for the national economy with respect to cotton. However, today, the country has a dubious distinction of having the lowest cotton productivity in spite of having the largest area under cultivation. In addition, violent fluctuations in the annual production especially in the rainfed areas have been noticed. As a result, problems in maintaining regular supply of lint for domestic consumption as well as export have emerged.

The present study relates to the Bagalkot district of Karnataka state, which is one of the major long staple cotton-producing districts in the state cultivated under irrigation. The Karnataka state accounted for 32.61 per cent of the total area and 22.86 per cent of the total long staple cotton production in the zone.

Among the major problems faced by the producers of cotton in Bagalkot district incidence of pests and diseases, labour problem, shortage of electricity, inadequate availability of irrigation water and lack of technical knowledge were the major production problems. In marketing of cotton, farmers faced problems like lack of scientific grading of cotton, lack of proper transportation and storage facility and delayed payment for cotton produce marketed.
One of the reasons for decrease in output of cotton is hypothesized to be the decrease in the cotton area, which is caused by the decrease in profitability of the crop at the field level. The decrease in profitability from cotton cultivation was due to high costs of chemical pesticides, chemical fertilizers and requirement of more labour coupled with high wage rate during peak harvesting time. It is therefore also vital to generate and document information regarding the farm level economics of cotton production, which influences macro-level acreage allocation. Knowledge of this information, as it is hoped, might be necessary for formulating cotton production strategy.

Documentation of such estimates proves useful for policy makers in formulating policy instruments to design investigative research activity for promoting sustainable cotton production systems at the state as well as national level and for the betterment of cotton farming in the state.

Though the documentation of the above issues requires comprehensive study on cotton crop, till recently, no adequate study has been taken up in Bagalkot district. Updated growth rates will also serve to supplement the study for policy formulation.

The present study is designed to achieve the specific objectives listed
1.4 OBJECTIVES:

In this regard, an attempt has been made in the present study to evaluate economics of irrigated cotton in Bagalkot district of Northern Karnataka with the following specific objectives

1. To study the pattern of area, production and productivity of irrigated cotton in Karnataka

2. To estimate the cost of production, returns and constraints faced by the farmers in irrigated cotton cultivation

3. To estimate the family and hired labour employment in irrigated cotton production.

4. To study the marketing channels available to the farmers and to estimate the marketing costs incurred in irrigated cotton cultivation.

5. To suggest appropriate policy measures to increase production and productivity and net returns from irrigated cotton cultivation.

1.5 HYPOTHESES:

Following hypotheses are going to be tested in the present study

1. The area and production of cotton in Karnataka state shows a decline over the years while the productivity has been increasing

2. The net returns from cultivation of cotton are positive with higher net returns for large farmers and lower net returns for smaller farmers.
3. The proportion of family labour utilisation decreases with the increase in the holding size of the cotton cultivating farmers.

4. The costs incurred in the marketing of cotton by the small farmer is lower than that of large farmers.

1.6 METHODOLOGY

This section deals with the description of study area, nature and source of data, details of sampling technique, method of survey, analytical tools employed in fulfilling the objectives of the study. Some terms and concepts used in this study have also been presented at the end of the section.

This section has been presented under the following major heads

1.6.1 Nature and sources of data

1.6.2 Sampling technique

1.6.3 Method of survey

1.6.4 Analytical techniques

1.6.5 Definition of terms and concepts used in the study

1.6.1 Nature and sources of data:

Both secondary and primary sources are employed in the study.

The secondary sources were used for the gathering of authentic aggregate and macro data, which have a bearing with the research problem and are published by valid institutions. The sources of secondary data are District Statistical Offices of Bagalkot district; the
Offices of the Joint Director of Agriculture, Bagalkot; Offices of the Assistant Director of Agriculture of the taluks, Mudhol and Jamakhandi; the Agricultural Assistants (Gram Sevaks) the Village level revenue officials such as village accountants (tALTHIS), irrigation department officials. Technical information was also obtained from the University of Agricultural Sciences, Dharwad and its Regional Research Stations.

Primary data was collected from the cotton cultivators of the district and it pertained to the inputs, costs, returns and marketing aspects of cotton cultivation. The cotton cultivators who were selected as indicated in the sampling technique paragraph below.

1.6.2 Sampling technique

Long staple cotton is grown in assured moisture conditions such as lift irrigation holdings, command areas of irrigation projects etc. while the short staple cotton is grown in the rainfed areas of the district in the rabi season. Appendix No-I.

1.6.2.1 Selection of the study district:

Bagalkot district is representative of the largest agro-climatic zone of Karnataka namely the Northern Dry Zone of Karnataka. This Zone extensively cultivates cotton in the state. Long staple irrigated cotton dominates cotton cultivation in the district. As such, the district was purposively selected for the study.
1.6.2.2 Selection of the study taluks:

The criterion of dominance in area was applied in the selection of taluks for the study. The taluks, which had the highest area under irrigated cotton in Bagalkot district, were selected for the study. As per the statistics released by the District Statistical Office, Bagalkot, the total cotton area, composed of both dryland and irrigated cotton was of the order of 11,979 hectares, in which Hungund, Mudhol and Jamakhandi, were the top three cotton growing taluks of the districts accounting for nearly 73 per cent of the cotton area in the district. The cotton area in Hungund taluk was largely rainfed, short staple cotton while in the other two taluks it was mostly irrigated, long staple cotton. The taluks of Mudhol and Jamakhandi taluks with 22.20 per cent and 21.73 percent of total cotton area of the district were selected for the study since the cotton was cultivated under irrigation in these taluks. Jamakhandi taluk was mainly sourced from the Krishna command and Mudhol taluk was sourced under the Ghataprabha command. Both these taluks accounted for 61 per cent of the irrigated area of Bagalkot district. Incidentally, The selection of these two taluks also represented the cotton-cultivating environment of the two major river commands.

1.6.2.3 Selection of the villages:

The list of villages which had cultivated irrigated long staple cotton were obtained from the Offices of the Assistant Director of Agriculture of the selected taluks and the top five villages having the highest cotton area were selected from this list. Totally 10 villages were selected from
the two taluks. The villages of Algur, Kumbar halla, Shiraguppi, Hunnur and Madarakhandi villages were selected from Jamakhandi taluk and Gulgal jambagi, Varchkal, Ranna Belgali, Halaki, and Chikkur villages from Mudhol taluk were selected.

1.6.2.4 Selection of farmers:

The assistance of the Agriculture Assistants from the Departments of Agriculture and the Village Accountant were taken in drawing up a list of cotton farmers from the land holding categories of ‘small’ (upto 5 hectares), ‘medium’ (greater than 5 hectares and less than 10 hectares) and ‘large’ (greater than 10 hectares), who had cultivated cotton during the agricultural year July 2001 to June 2002 in the selected villages. From each village different categories of farmers were selected in the number proportionate to their overall strength under that category in the village for collection of data pertaining to the objectives of the study. The total farmers sample strength of the farmers for the study was 250 farmers.

1.6.3 Method of survey

The secondary data required for the study was collected in the form available. The primary data was collected using structured schedules which elicited the information on costs of cultivation, labour, inputs, seeds, fertilizers, plant protection chemicals, production and method of marketing. The schedule was first pre-tested in the study area and primary data was subsequently collected for the study for the agricultural year July 2000 to June 2001. Informed consent was obtained from the
selected farmer-respondents about the purpose of the study before personally obtaining the cotton cultivation information from them.

1.6.4 Analytical Techniques

For assessing the objectives of the study, following analytical tools were used in this study

1.6.4.1 Tabular Analysis

Tabular analysis indicating the arithmetic means, percentages about the socio-economic characteristics of the sample cotton cultivators, the costs and returns from cotton cultivation, marketing costs incurred for cotton etc. was employed for the study.

1.6.4.2 Functional Analysis

Measurement of growth of agricultural production involves postulation of some hypothetical trend equations and selection of one among them based on some statistical criteria and estimation of the growth parameters in this equation by ordinary least square or other methods. Undoubtedly, the aforementioned procedure of growth analysis encompasses three important issues like choice of trend equation, avoidance of volatile fluctuations in the data and estimation of sub-period's growth rates. Growth rate for cotton was calculated for Karnataka state for the period 1970-71 to 1999-2000.

The entire period was plotted on a graph depicting cotton area and production. Trend equations were used to select cut-off points or break points, if any, in cotton area and production for each of the district of the
state and finally, for the state as a whole. Growth rates in area, production and productivity of cotton, in present study, were analyzed by fitting functions using Ordinary Least Squares (OLS) method. Every necessary transformation was made for the non-linear forms to fulfill the assumptions of OLS method. To measure growth rates of area/production/productivity, compound growth rate model was used. Exponential function, compound growth rate was computed for the selected districts and the state as a whole. The exponential functional fitted to the data on area, production and productivity of cotton was of the form:

\[ Y = AB^t \]

Where,

\[ Y = \text{area/production/yield as the case may be} \]
\[ t = \text{time period stated as years, and} \]
\[ A, B = \text{parameters to be estimated.} \]

The function was converted into logarithmic form as follows:

\[ \log Y_t = (\log A) + t (\log B) \]

OLS method was used for estimation of parameters from which the compound growth rates were then computed using this relationship. Time series data on area, production and productivity of cotton in major cotton growing districts and the state as a whole.
1.6.5 **Definition of terms and concepts used in the study**

**Classification of farmers according to holding size:**

The farmers were categorized into “Small” if their holding was 2 hectares or less and into “Medium” if their holding was greater than 2 hectares, but less than 5 hectares. The farmers were categorized into “Large” if their holding size exceeded 5 hectares.

**Operational holding:**

This refers to the land actually cultivated by the farmer during the study year. It is arrived at by deducting the leased out land from the owned land if any and adding leased in land. The remuneration for operational land holding in the study is valued at the land lease rents as prevailing in the area of cultivation.

**Human labour**

It is measured in man days. A man day is the labour contributed by a man for a period of eight hours in a day. In the case of women workers, their work contribution is standardized to mandays by taking one women worker equivalent to 0.75 mandays on the basis of wage rate equivalence. The actual wage rates prevailing in the study area were used to evaluate the labour. Both family and hired labour were valued at prevailing rates.
**Bullock labour**

It is a labour contributed by a pair of bullocks working for a period of six hours in a day. Both hired and family bullock labour was valued at prevailing hire rates for bullocks in the study area.

**Machine labour**

Machine labour such as Tractor services, sprayers etc., whether owned or hired, were valued at the prevailing hire rates for those machines in the study area.

**Repairs and maintenance**

These costs were calculated at actual rates incurred while cultivating cotton. These costs were calculated in the case of owned implements, irrigation pump sets, and tools and etc. It also included electricity charges, diesel fuel charges and other incidental charges.

**Seeds**

Seeds of cotton were valued at the actual rates at which they were purchased. Self grown seeds were valued at the prices prevailing in the market at the time of sowing.

**Farm yard manure**

It was measured in cartloads. Both self-produced and purchased manure was valued at the prevailing market prices.
Fertilizers

Inorganic fertilizers such as urea, super phosphate, Murrieta of potash, complete and partial complexes etc., were valued at the prices at which they were purchased plus transport cost.

Plant protection chemicals

Irrigated cotton is prone to a variety of pests and diseases and hence requires considerable expenditure in plant protection. The plant protection chemicals used for the cotton were valued at actual cost.

Marketing cost

These were the cost incurred by the farmers in selling his cotton. These were the actual cost incurred in cleaning, sorting, packing, transporting, loading and unloading the cotton and incidental charges incurred till, the cotton sale proceeds were realized by the farmers.

Marketing Channel

The marketing channel in the context of this study was the agency to which the cotton is sold by the farmers.

Depreciation:

It was the value of loss undergone by those implements and equipment during the course of their usage in cultivation. It was arrived at by obtaining the actual value of the implement/equipment (less junk value) from the farmer and dividing it by the life of implement/equipment. The annual depreciation so obtained was
apportioned among the various crops grown during the study year and
the share of depreciation in the case of cotton was taken into account.

**Interest on Fixed Capital:**

It was calculated on all implement/equipment that were used in
the cultivation of irrigated cotton. It was arrived at obtaining the
valuation of the implement/equipment as during the cultivation year and
calculating the interest on that value as per bank rate of 10.5 per cent
per annum across all categories.

**Interest on Variable Capital:**

This included the interest on expenses incurred on the items like
seeds, fertilizers, maintenance etc. The interest was calculated at a
common rate of 11.5 per cent per annum for all categories of farmers.

**Cost of Cultivation:**

Includes all costs, both fixed and variable, incurred in the
cultivation of cotton upto and including its harvesting, but excluding the
cost of marketing.

**Cost of Production:**

It includes all the costs incurred in the cost of producing cotton
upto the point of its marketing. This cost includes the costs incurred in
the cultivation as well as those incurred in packing, transport, marketing
etc until the actual realization of the sale.
**Benefit Cost Ratio:**

This simple financial measure was used to know the financial viability of the cotton production. It was arrived at by dividing the gross returns from the gross costs of cotton production. Higher the ratio, greater the profitability.

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