

# **PRODUCTION AND MARKETING OF PINEAPPLE IN SHIMOGA DISTRICT – AN ECONOMIC ANALYSIS**

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# 1. INTRODUCTION

India has been a predominantly agrarian economy since time immemorial. The development efforts over the last few decades have doubtlessly strengthened our industrial base. However, agriculture continues to be the mainstay of our economy and even today as more than 67 per cent of population depends on it.

The production of fruits and vegetables has vital importance as it provides three to four times more cash income than cereals per unit of land. Fruits and vegetables are the prime sources of vitamins and minerals without which human body cannot maintain proper health to resist diseases. Indian Council of Medical Research has recommended the consumption of atleast 92 grams of fruits per head per day and as much variety as the season permits. On the contrary the per capita consumption of fruits in India is only 46 grams per day. India is the second largest producer of fruits (41.50 million tonnes) after China (45.46 million tonnes) and ranks first in production of mango, banana, limes and lemon. India has made a fairly good progress in production of fruits and vegetables with a total production of 418 million tonnes in the year 2003-04 against 87.10 million tonnes during 1991-92.

The average productivity of fruits in India has increased from 6.99 million tonnes per hectare to 12.36 million tonnes per hectare. Cultivation of fruits contributes to the health happiness and prosperity of the people. The standard of living of the people can be judged by production and consumption of fruits per capita. In spite of the fact that India is climatically favourable for production of a variety of a tropical, subtropical and temperate fruits, the fruits in India occupy only 3.23 million hectare area. There is a good scope to increase the area under fruit crop with growing urbanization, requirements for fruits in the cities is increasing tremendously and there is a need to boost fruit production. Presently, the fruits are available at very high cost in the markets and are not within the reach of common people. The production has to be increased till the country becomes self sufficient in the fruits and the price of fruit falls to a level at which all people rich and poor can afford to buy it. This can be only achieved by increasing the area under fruits and by rejuvenating the existing orchards.

Realizing the importance of fruit cultivation many farmers are diverting their resources towards plantation of fruit crops. Important fruits grown in India are mango, banana, citrus, guava, apple, pineapple, grape, pomegranate and ber.

Pineapple (*Ananas comosus*) belongs to the family of Bromeliaceae. Pineapple is popularly known as "queen of fruits" because of excellent flavour, taste and shape of fruit, it is very delicious tropical crop. It is one of the most important commercial fruit crop of the world and also available throughout the year. Pineapple is one of the important dessert fruit of millions of people.

Pineapple is believed to have originated in Brazil. It has spread to other tropical parts of the world from Brazil. The generic name *Ananas* is derived from the Indian 'nana'. The wild Brazilian pineapple (*Ananas microstachys*) is considered to be its ancestor. Pineapple had spread to the other parts of the tropical America by the time of Columbus, who took it to Europe in 1548 and also it reached India.

In India it is successfully grown in West Bengal, Assam, Karnataka, Meghalaya, Manipur, Bihar, Goa and Kerala. It is one of the most common fruits in India and has become popular because of its availability almost throughout the year at moderate prices. It occupies important place immediately after mango and banana.

Cultivation of pineapple is confined to high rainfall and humid coastal regions in the peninsular India and hilly areas of north-eastern region of the country. It can also be grown commercially in the interior plains with medium rainfall and supplementary protective irrigations.

The pineapple is the crop of humid tropics. The fruit grows well near the sea coast as well as in the interior, so long as the temperatures are not extreme. The optimum temperature for successful cultivation is 22° - 32°C. A light temperature at night is deleterious and a difference of at least 4°C between day and night temperature is desirable. It can be grown upto 1,100 m. above mean sea level, if the area is frost free. Although optimum annual rainfall for its commercial cultivation is 100-150 cm, it grows remarkably well under a wide range of rainfall.

The plant comes up well in any type of soil except on very heavy clay soil. Sandy loam soils are ideal. The soil should be 45-60 cm in depth without hard pan or stores. Low lying areas with high water table should be avoided. The plants prefer a soil pH of 5.0-6.0.

Pineapple is a shallow feeder with high N and K requirement since these nutrients are prone to heavy losses in soils, practices relating to time of application and form of fertilizer determine their efficient use. Application of 12 g N per plant for kew pineapple is ideal to obtain high yield. It is thus advisable to apply N and  $K_2O$  each at 12 g per plant. There is no need of P application. However, if the soils are poor in P, 4 g  $P_2O_5$  per plant can be applied. The N should be applied in 6 split doses. The first does of N can be given 2 months after planting and the last one 12 months after planting. The K should be given in 2 split doses. Entire P and half of K can be given at the time of planting and the remaining K six months after planting. Application of fertilizer under rainfed conditions should be done when moisture is available.

Earthing up is an essential operation in pineapple cultivation aimed at good anchorage to the plants. It involves pushing the soil into the trench from the ridge where trench planting is a common practice.

Weeds could be effectively and economically controlled by application of Diuron (3 kg/ha) or combination of bromacil + Diuron @ 2 kg per ha each at pre-emergent spray.

Mulching is essential to conserve soil moisture and use of dry leaves or straw is in practice in south India.

In scanty rainfall area and during hot weather irrigating pineapple once in 20-25 days is advisable.

Application of NAA and NAA based compounds such as planofix and celemone @ 10-20 ppm induces flowering in pineapple.

The performance of the plant depends on vigour growth rate, time taken for bearing, fruit size and quality of planting material. In suckers and slips, larger planting material result in more vigorous plants. Slips and suckers weighing about 350 and 450 g respectively are ideal for higher yield for Coorg (Karnataka) and Jorhat (Assam) suckers and slips weighing 501-750 g and 301-400 g are ideal planting material. In Karnataka, the best time of planting is April-June. Delaying in planting as late as September delays crop at least by 7-9 months. The peak flowering under these conditions comes during January-March. The ideal time for planting in north West Bengal is October-November and June-July for other parts.

Pineapple plants flower 10-12 months after planting and fruits become ready 15-18 month after planting. Irregular flowering results in the harvesting spread over a long period under natural condition. Pineapple comes to harvest during May-August. Fruits which mature in winter are acidic.

With a slight colour change the base of developing fruits, it could be harvested for canning purpose. But for table purpose, the fruits could be retained till they develop golden yellow colour. The fruits with the crown can be kept without damage for 10-15 days after harvesting.

Pineapple is good source of vitamins A and B, pineapple is fairly rich in vitamin C, calcium, magnesium, potassium and iron. It is also a source of bromelin, a digestive enzyme. Pineapple is mainly used as dessert fruit and also in processing industry to make jam, jelly, squash, canning purpose, tit bits, fruit waste after extraction of pulp used as cattle feed, fruit core is used for preparing candy, leaves yields silky fibre which is used for making a fine fabric popularly known as pina cloth in Philippines and Taiwan.

Pineapple grown in Thailand, Brazil, Malaysia, Mexican countries is used in the processing industry either as canned or converted into juice and most of it is exported to Europe and north America. The major markets for fresh as well as processed Indian pineapple are Nepal, Norway, Saudi Arabia, UAE, Qatar, Kuwait, UK, Ukraine, Liberia, Tanzania, Oman etc. In the world, India's total export value of fresh pineapple fruits was Rs. 159.97 lakhs during 2002. A number of varieties of pineapple are cultivated in India. Giant Kew, Queen kew, Mauritius and Jaldheep are cultivated more in Assam and West Bengal. In Maharashtra, Tamil Nadu, Kerala and Karnataka, Mauritius Desi, Giant kew and Local Coorg

are grown more widely. The giant kew and kew are big size fruits weighing about 2-3 kg per piece. They are sweet and have good flavour and are used in canning. The queen kew variety is a small piny plant which yields fruits weighing about 1.0 – 1.5 kg. Its fruits are very sweet and juicy and preferred for fresh consumption.

The total global production of pineapple is estimated 15010000 million tonnes during 2002. India ranks fifth in area and production of pineapple in the world with an area of 80000 hectares and production of 11 lakh million tonnes during 2001. At present total area under pineapple is only 1.70 per cent of total area under fruit and the production is 2.78 per cent of total fruit production in India. Thailand stood first in production and area followed by Philippines, Brazil and China.

In India West Bengal is the leading state in production of pineapple followed by Assam, Meghalaya, Bihar, Manipur, Nagaland, Kerala, Karnataka. These states contribute more than 70 per cent of total pineapple production in the country.

In Karnataka, pineapple crop occupied an area of 2142 ha during 2002-03 and was cultivated in 10 districts. Shimoga, Uttara Kannada, Dakshina Kannada, Udupi, Chikkamagalur were the most predominant pineapple growing districts.

In Shimoga district, where the study was conducted, pineapple has been grown on a commercial scale. The area under pineapple in this district was 1430 hectares during 2004-05. The important pineapple varieties grown were kew, Raja, Kundlur and local.

In the process of production of pineapple, marketing plays a vital role. Marketing is a part and parcel of production. It is an important stage where the producer converts his labour and other inputs used into cash and at this stage that he will be in a position to find out whether his investment on the enterprise is rewarding or not. In the process of marketing the producer has to incur various marketing costs. These costs are determined by the producer's performance and efficiency of different marketing functionaries which inturn influence the returns to the growers. It is in this context that the study of marketing acquires added significance. Such studies are useful to producers-sellers and consumers. Since the farmers are interested in getting higher price while the consumers are interested in getting desirable products at reasonable prices. Besides, marketing studies shows whether service rendered are reasonable or not. This can be used as a yardstick to fix the marketing charges for some intermediaries. During marketing stage, the pineapple producers may be faced with manifold problems which have direct bearing upon the prosperity of producers. The main marketing problems are market finance, price fluctuation etc. Even if the production technology is advanced, unless marketing is improved simultaneously, efforts to increase the yield and production may go waste. It is learnt that , efforts have been made to improve the marketing through enforcement of laws. However, these efforts were directed towards non-perishable goods like cereals and very limited efforts have been made in case of marketing of fruits.

The economics of pineapple production is indispensable since there is no proper farm business data on its cost of production. The accurate figure on establishment cost, operating cost and input requirement of pineapple orchard would be greatly helpful to the pineapple producers in general. This information will be of immense use to farm financing institutions.

Area under pineapple is gradually expanding in Shimoga district. The present study is an attempt to analyse the feasibility of investment in pineapple gardens and to find out the profitability of pineapple crop. The marketing aspects of pineapple fruits will be studied in detail. The problems encountered by the pineapple producers in production and marketing of pineapple fruits will also be documented. So that needed efforts can be made to solve them. This type of study has not been carried out in the study area, so present study was taken up with overall objective of enquiring into economics of production and marketing of pineapple in Shimoga district with the following specific objectives.

1. To analyse growth in area, production and productivity of pineapple in the study area.
2. To analyse the economics of production of pineapple in the district
3. To study the financial feasibility of investment in pineapple gardens in the district.
4. To identify marketing channels and estimate their price spreads.
5. To study the problems associated with production and marketing of pineapple.

### **Presentation of the study**

The study has been presented in seven chapters as indicated below.

Chapter I deals with the nature, importance and specific objectives of the study. Chapter II describes comprehensively a review of the relevant research work done in the part related to the present study. Chapter III outlines the features of the study area. Sampling design followed, collection of relevant data and analytical tools used in the study. Chapter IV is devoted to present the main findings of the study through tables. Chapter – V discusses the results of the study. Chapter – VI provides summary and also supports the policy implications based on the findings of the study. At the end in chapter – VII important references have been listed relating to the present study.

### **Limitations of the study**

1. Constraints on time and resources of the researcher forced to select only two taluks for the study. Hence results are largely applicable to those areas where similar conditions prevail.
2. The personal interview, method of data collection requires the respondents to recall from their memories about cultural operations of pineapple cultivation. Hence, the findings may be subject to memory lapses of the respondents.
3. The average price realized during the study year was calculated and used in converting production figures from quantities to value terms, although the prices realized differ from farmer to farmer every year.

## 2. REVIEW OF LITERATURE

A review of the research work done in the past relating to the present study has been presented in this chapter. The number of studies conducted on pineapple are very few and hence the studies on economic analysis of other fruit crops have been reviewed. The review of literature is presented under the following sub-heads.

- 2.1 The growth in area, production and productivity of pineapple
- 2.2 The economics of production of pineapple
- 2.3 Financial feasibility of investment in pineapple gardens
- 2.4 The marketing channels and their price spreads
- 2.5 Constraints in production and marketing of pineapple.

### 2.1 THE GROWTH IN AREA, PRODUCTION AND PRODUCTIVITY OF PINEAPPLE

Patil *et al.* (1987) studied trends and growth rates in area, production and productivity and the factor responsible for change in acreage under banana crop in Jalagaon district from 1950-51 to 1979-80. The area under banana increased tremendously from 6600 hectares to 33400 hectares and the production of banana has increased by 689 per cent in the same period. Net irrigated area and one year lagged price of banana have jointly explained nearly 97 per cent of the variation in the acreage under banana.

Raju *et al.* (1987) estimated compound growth rates of area (1967-83) and production (1970-83) for fruit crops by fitting the semilog function in Andhra Pradesh. The year to year fluctuations in area and production of fruit crops were studied with the help of index numbers and their percentage changes from the previous years. The production of grapes had showed a phenomenal increase in (32.9%) 1973-74, the index stood at 511 in 1982-83. From 1973-74 to 1977-78 there was a continuous fall in production by 27.00, 24.00, 39.00, 3.88 and 8.64 per cent, respectively. Early 1980s witnessed an increasing trend in grape production. Though the area under grapes which was concentrated only in two districts (RangaReddy and Ananthpur) increased in absolute term, its growth rate was negative and significant (-2.44). The compound growth rate of grape production was 12.09 per cent per annum and statistically significant.

Venkateswarlu *et al.* (1988) studied growth rate and productivity of banana in Andhra Pradesh using exponential trend equation of the following type.

$$Y = AB^t$$

Where,

Y = Index number of area/production/productivity

A = Intercept

B = (1 + r) where 'r' was the annual growth rate expressed as per cent per year. In the study period (1967-68 to 1982-83) the area in the state had shown constant level in the first two years viz., 1967-68 and 1968-69. though there was an increase in 1969-70, started declining more or less gradually from 1970-71 and continued upto 1975-76. It started increasing during 1977-78 and reached peak during 1980-83.

Indradevi *et al.* (1980) computed the trends in area, production and yield of banana in Kerala state quadratic function was fitted to explain the trend in a period of 17 years (1970-87). The study revealed that banana production in the state showed an increasing trend (94.57%) because of the intensive cultivation practices and favourable price factors for banana. The study also indicated that the main determinant of production of banana in Kerala during seventies was area (extensive cultivation). While it was yield (intensive cultivation) in the eighties realizing the fact that banana cultivation had become productivity oriented in the recent years.

Susheel Sharma and Parihar (1994) conducted a study on marketing of apricot in Jammu and Kashmir. They reported that compound growth rate (CGR) of the production

(3.30) is significantly higher than the CGR of area (2.23) in case of fresh apricot whereas there is not much difference in the CGR of area and production of dried apricot CGR of yield is not increasing significantly as compared to area both in fresh and dried apricot.

Handiganur (1995) studied the growth rates of area, production and productivity of grapes in Bijapur district from 1978-79 to 1992-93. Growth rate analysis had showed an increase of 7.12 per cent of area in Bijapur district and an increase of 0.6 per cent in area, 2.80 per cent in production and 2.0 per cent in productivity of grapes was observed in Karnataka state. The increase in production and productivity was due to the use of improved cultural practices, increased use of manures, fertilizers and plant protection chemicals.

Saraswat (1997) conducted a study on organisation of production and marketing of apple in Himachal Pradesh. A case study of Kirari village. The study found that, in Himachal Pradesh the area under apple has increased at a compound growth rate of 4.71 per cent per annum while the production increased at 8.34 per cent per annum during 1966-67 to 1990-91. The study revealed that the average productivity per hectare of apple orchards was 1,285 standard boxes of each 18 kg.

More (1999) studied the growth rate in area, production and productivity of banana in Nanded district, Parbhani district and Maharashtra state as a whole in Nanded district, production growth rate had shown higher growth rate (21.04%). The higher growth in production was contributed mainly by significant increase in area coupled with productivity. The growth rate of productivity was high (1.43%) in Maharashtra state as a whole as compared to Nanded (1.40%) and Parbhani (0.90%) district. It was due to the use of improved cultural practices higher use of manures and fertilizers, more use of other inputs and also increased yield level in other district of the state.

Gangal (2002) studied the growth rate in area, production and productivity of banana in north Karnataka and Karnataka state as a whole. The growth rates in area (6.69%) in Karnataka state between 1980 and 2000 was substantially higher than all the other major banana growing states and all India average.

Shivanand (2002) studied the growth rate in area, production and productivity of banana in north Karnataka and Karnataka state as a whole. The growth rates in area (6.69%) in Karnataka state between 1980 and 2000 were substantially higher than all other major banana growing states and all India average.

Varghese (2004) conducted a study on trend analysis in area production and productivity and price behaviour of cardamom in Kerala. He reported that the percentage annual trend growth rate of area production and productivity of cardamom are -1.216, 414 and 5.512 respectively.

Saraswat and Rane (2006) conducted a study on production and marketing of peach fruit : a case study of Rajgarh area of district Sirimour in Himachal Pradesh 50 farmers were randomly selected for the detailed study. The compound growth rate with respect to area and production shows that the area under peach increased at the rate of 4.31 per cent per annum. The highest area under peach was recorded in Sirmous district, whereas district Mandi registered the highest rate of production growth in the state i.e., 9.32 per cent per annum. The district wise production scenario indicate that there are variations out of 12 district only 4 district have registered a positive growth in production i.e., solan (22.55%) followed by Una Bilarpur and Mandi.

Kareemulla *et al.* (2007) conducted a study on production and marketing of Indian Gooseberry – AONLA (*Emblis officinalis* Gaertn.) in Pratapgarh district of Uttar Pradesh. He reported that the area occupied by amla based farming system grew at a growth rate of 4.02 per cent during the period 1995-2005. The production of aonla has increased from 47329 to 82690 tonnes in the reference period at a growth rate of 5.2 per cent and the average productivity increased from 5.7 to 6.5 t per ha.

## 2.2 THE ECONOMICS OF PRODUCTION OF PINEAPPLE

Koujalagi (1990) studied the pattern of investment in pomegranate orchards in Bijapur district, Karnataka. The establishment cost (Rs. 24229.53) consisted of material cost in the initial year (85.65) and maintenance cost (49.35%) upto bearing three years. The per hectare

total establishment cost worked out to be (Rs. 24,224.53) and returns per orchard was Rs. 45,429.96.

Raikar (1990) studied production and marketing of cashew in Karnataka. The study revealed that the per hectare annual maintenance cost of cashew plantation was higher on small sizes (Rs. 1,674.17) plantation compared to large size plantation (Rs. 1303.65). The per hectare gross returns over maintenance cost was the highest (Rs. 3787.61). The gross returns were Rs. 3234.32 for the overall size group of plantation. The net return over total cost was found to be Rs. 1487.42, Rs. 800.77 and Rs. 1049.61 on small, large and overall size groups of plantations respectively.

Hiremath (1993) in his study on economics of production and marketing of lime Bijapur district, Karnataka revealed that the per ha cost of establishment for the four year gestation period was Rs. 56424.58 in small, Rs. 49179.62 in medium and Rs. 47143.09 in large orchards. Te intercrops reduced the establishment cost by 588253.90 and 46.68 per cent in three size group of orchards respectively. The per hectare cost of cultivation (8<sup>th</sup> to 30<sup>th</sup> year) was high in medium (Rs. 12454.34) followed by large (Rs. 1203.76) and (Rs. 11399.60) small orchards. The average yield of lime was 340.59, 366.98 bags in small, medium and large orchards, respectively.

Batra *et al.* (1994) observed that the banana yield ranged between 358 q per ha and 464.0 q per ha and those of expenditure between Rs. 4995 per ha and Rs. 5518 per ha according to the prevailing labour rates and material inputs in Gujarat state, India. Input cost was Rs. 18.76 per ha for Barheri variety and Rs. 25.75 per q for Shinduri variety as compared to Bacheri variety.

Sinthilnathan and Srinivasan (1994) estimated the costs and returns of poovan cultivar banana production in study area over a period of three years. With eh per hectare total cost of cultivation of Rs. 124668.11. The gross income obtained was Rs. 286913.80 with the net income of Rs. 162235.69. The study clearly showed that the high profitability of poovan variety banana with a high return cost ratio 2:3:1 in the study area.

Deepak Shah (1996) studied the production and marketing pattern of grapes in Maharashtra. The study showed sharp increase in per acre annual gross maintenance cost as well as returns of rupee orchards. In general about 67 per cent of ross maintenance cost of grape production was spent on various production related operations and the remaining 33 per cent owed it to investment on various marketing functions. The profitability in grape cultivation was considerably high in the state of Maharashtra.

Maurya (1996) studied the profitability of banana production in Wajipur district of Bihar state, India, during 1993-94. The study revealed that banana production was the most profitable crop production activity in this area, as it provided a net income of Rs. 29748.05 per ha with a total expenditure of Rs. 2160.70 and gross income of Rs. 49958.75.

Chitra *et al.* (1997) in the study on economics of ber production in and around Hyderabad city of Andhra Pradesh found that, the total costs of establishment in the first year were 7.913 per hectare. The total cost incurred during the maintenance was Rs. 3,483 per hectare. The total cost of production worked out to Rs. 16,737 per hectare. The results of the study indicated profits were relatively higher in ber cultivation.

Chinnappa and Ramanna (1997) in their study on economic analysis of guava production revealed that per acre cost of establishment for the three year gestation period was Rs. 4236.83. The per acre cost of cultivation (4<sup>th</sup> to 25<sup>th</sup> year) was Rs. 5695.80. The main items of costs were labour costs (5%0 fencing and plant protection chemical. The net returns was worked out at Rs. 2,474.08 per year. This indicated returns to management and overall profitability of guava enterprise.

Krishna Rao *et al.* (1997) conducted study on profitability of mango cultivation in drought prone areas. A case study of Annatpur district of Andhra Pradesh. The result of economic analysis indicated that the investment on mango garden in the region was profitable proposition. The establishment cost per hectare of mango garden during first four years were Rs. 3,748, Rs. 2,029, Rs. 2,012, Rs. 2,452 respectively. The annual maintenance cost i.e., from fourth years onwards worked out to be Rs. 5,169 per hectare. The cost of production per hectare of mango garden was Rs. 17,828 and the gross returns realized from the output of

mango worked out to Rs. 22,083 per hectare. The net returns obtained from the output were Rs. 16,194 per hectare.

Singh and Singh (1997) in the study profitability of ber cultivation in arid region of Haryana indicated that, the net returns per hectare from ber orchards were Rs. 4,816 and the average cost of production of ber was found to be Rs. 114 per quintal and Rs. 6,746 per hectare. The net returns per rupee of investment in ber orchard were Rs. 1.99. Finding of the study lead to conclusion that the ber cultivation has much potential as an economically viable alternative to existing crop cultivation.

Sudarshan (1998) in the project conducted on an experimental farm in Bangalore reported that tissue culture banana had a world record of 6,900 plantlets per hectare. The tissue culture banana plantlets gave very higher yields compared to sucker based plants of the same variety compared to average national yields per plant of 9 to 10 kg (bunch weight) and average commercial banana produce yield per plant of 15 to 20 kg in Sucker based crop, the tissue cultured plantlets yield a bunch weight of 40 to 60 kg per plant. The plantlets yield 175 tonnes as against 45 tonnes of conventional commercial sucker based banana horticulture in India. The estimated revenue per crop of 11 months was Rs. 12.5 lakhs per hectare at a conservative price of Rs. 5 per kg of banana. The revenues were further augmented by selling stem cores, which may fetch a price of Rs. 5 per suckers.

More (1999) studied the economics of production and marketing of banana in marathwada region of Maharashtra state. The independent variables included in the function were land, labour, machine power farm yard manure, nitrogen, phosphorus, potash, capital, irrigation and bullock labour. The dependent variable was yield of banana. The coefficients of multiple determinations were 73.67 and 85.00 per cent, respectively for the three categories of farmers. Land and capital had significant influence on yield in all three categories of farmers and others were non-significant.

Qaim (1999) studied socio-economic impact of tissue culture technology in banana production in Kenya. The study revealed that, the cost of production of tissue culture banana was significantly higher (increase in cost was 130 per cent in small scale, 118 per cent in medium scale and 92 per cent in large scale growers) compared to banana production without tissue culture. This was higher labour intensity besides the use of more inputs. Accordingly yields and incomes obtained per hectare of banana were also higher (increase in yield was 150 per cent in small scale, 132 per cent in medium scale and 93 per cent in large scale growers. Increase in income was 156 per cent in small scale, 145 per cent in medium scale growers and 106 per cent in large scale growers) on these farms. The results also revealed that adoption of tissue culture could bring about substantial increase in yield for all the three types of farmers (small, medium and large). In relative terms the potential gains are most pronounced for small farmers.

Mishra *et al.* (2000) conducted a study on production and marketing of banana in Gorakhpur district of Uttar Pradesh. The researcher worked out the total per hectare cost of production of banana on small, medium and large farms at Rs. 36,281.50 Rs. 37,820.50 and Rs. 38,447.50 respectively with average cost of Rs. 37516.50 per hectare. Per hectare average gross returns were Rs. 71,133.33 which was higher on large farms (Rs. 73,400) followed by medium forms (Rs. 72,250) and small farms (Rs. 67,750). The average input output ratio was 1:1.89.

Mali *et al.* (2001) studies the economics of production and marketing of banana in Jalagaon district of Western Maharashtra found that the per hectare cost of cultivation banana worked out to Rs. 13347736. The gross returns per hectare of banana Rs. 21486724 and net return were Rs. 66761887.

Guledgudda *et al.* (2002) conducted study on economics of banana cultivation its marketing in Haveri district of Karnataka reported that the variable cost incurred by producer was Rs. 5450281 per hectare which was accounted to 65 per cent of total cost. Among variable costs the human labour was found to be the major item of cost, which accounted to 18 per cent. On an average, farmers got 175 quintals of banana yield as main product valued at Rs. 154375 and farmers have realized Rs. 30,000 by selling suckers gross returns from banana cultivation was Rs. 184375 per hectare. The net returns realized by farmers were Rs. 10054596 with a B:C ratio of 2.19.

Shivanand (2002) studied the cost and return structure in banana in North Karnataka and concluded that cultivation of banana in the study area is highly profitable and on an average banana growers obtained net returns of Rs. 85,260 per hectare per year which is about Rs. 261726 for cycle of three years period.

Stephen *et al.* (2002) compared the socio-economic impact of tissue culture banana with non tissue culture banana in Kenya. They found that, tissue culture banana production was relatively more capital intensive than sucker propagated banana production. However tissue culture banana production was found to be more profitable (yield from sucker propagated banana production was only 60% of that of yield from tissue culture banana production) compared to non-sucker banana production.

Sundaravardarajan and Ramanathan (2003) estimated the establishment cost of cashew plantation for the first year at Rs. 7690, Rs. 8664 and at Rs. 9491 for marginal, small and large farmers respectively. The maintenance cost of cashew plantation in the case of marginal farms were Rs. 4059, Rs. 4410, Rs. 4910, Rs. 5385, Rs. 841, Rs. 6332, Rs. 6771 AND Rs. 6990 for second, third, fourth, fifth, sixth, seventh, eighth, ninth year respectively and in case of large farms the maintenance cost were Rs. 5040, Rs. 5250, Rs. 6764, Rs. 6145, Rs. 6558, Rs. 7021, Rs. 7438 and Rs. 7745 for second, third, fourth, fifth, sixth, seventh, eighth and ninth year respectively. The input output ratio per ha were 1.43, 1.55 and 1.83 for respective farms.

Florence Wambugu (2004) in the study compared tissue culture and conventional banana. The study revealed that the average establishment cost per farm (0.2 hectares) was US\$200 in conventional banana and US\$ 600 in tissue culture banana. Average annual net profit per farm was US\$ 600 in conventional banana and US\$ 1800 in tissue culture banana. This meant that there were more benefits of adopting the tissue culture technology compared with staying with the conventional bananas.

Alagumani (2005) in the study on economic analysis of tissue cultured banana and sucker-propagated banana in Theni district of Tamil Nadu revealed that per hectare cost was high in case of tissue culture banana (Rs. 141040) compared to sucker propagated banana (Rs. 108294). The net income was also high in case of tissue culture banana (Rs. 112262) compared to sucker propagated banana (Rs. 78855) clearly indicating the higher profitability of tissue culture banana production compared to sucker propagated banana production.

Silva *et al.* (2005) carried out a study in Brazil to survey the potential of banana and apple cultivation in the region as well as to determine the technical and economic indicators of two production systems, both using micro propagated and conventional seedlings. The results of economic analysis turned out to be quite satisfactory in this region for both production systems however the net income obtained from the utilization of micropropagated seedlings was 34 per cent higher than the one obtained from the conventional system.

Umesh *et al.* (2005) observed that the establishment cost of cashew was Rs. 15631 per hectare in all the variety studied during the first three years. The maintenance cost per ha from fourth year onwards varied from Rs. 5881 to Rs. 7882. In Ullal-3 and Rs. 5821 to 7229 in Ullal at the net returns of cashew orchard per ha being fairly high were in the order of Rs. 61314, Rs. 62425, Rs. 49672 and Rs. 34231 in Chintamani-1, Ullal-4, Ullal-3 and Ullal-1.

Rane and Bagade (2006) studied economics of production and marketing of banana in Sindhudurg district of Maharashtra. The study revealed that the per hectare cost at cost C in Dadamarg and Sawantawadi tahsil were Rs. 1.52 lakhs and Rs. 1.53 lakh respectively. In Dadamarg tahsils banana was grown as a sole crop where per hectare cost of cultivation was Rs. 1.28 lakh and in Sawantawadi tahsil the per hectare cost was Rs. 1.15 lakh benefit cost ratio in Dadamarg tahsil and Sawantawadi tahsil were 2.20 and 2.33 respectively. The average benefit cost ratio of banana cultivation was 227.

## 2.3 FINANCIAL FEASIBILITY OF INVESTMENT IN PINEAPPLE GARDENS

Patil and Pramod Kumar (1986) studied the economic viability of investments in Alphonso mango plantations in Ratnagiri district of Maharashtra considering 72 orchards from six villages. The study revealed that the capital investment in Alphonso mango plantations

was economically viable proposition. The B:C ratio was 1.38, NPV was 21.78 the internal rate of return was higher than interest rate of bank (18%) and pay back period was 10 years.

Raikar (1990) in his findings of the study indicated that per ha NPV was found to be Rs. 28,440.58 in case of small orchard, Rs. 16780.84 in large orchard and Rs. 21034.59 in average orchard. The B:C ratio at 12 per cent discount rate was 2.87 in small orchard 12.25 in large orchard and 2.99 in an average orchard. The payback period was 8.90 years, 9.38 years and 9.18 years in small, large and overall orchard respectively. The internal rate of return was found to be 20.21788 and 18.88 per cent in small, large and average orchard respectively.

Azad and Sikka (1991) in their study on production and marketing of temperate fruits applied project evaluation measures to study the economic viability of fruits such as apples, peaches, pears and apricots. The net present value was Rs. 26357.00 for apple, Rs. 89222.00 for peaches Rs. 117837.00 for plums and Rs. 160541.00 for apricots. The internal rate of return were 22, 33 and 47 per cent respectively. The benefit cost ratios were 1.36, 3.87, 4.62 and 5.10 respectively.

Hugar *et al.* (1991) examined the economic potentiality and viability of guava cultivation under scientific management. The study revealed that the net present worth was Rs. 738042 per hectare. The benefit cost ratio, internal rate of return and payback period were found to be 388, 57.82 per cent and six years respectively.

Koujalagi and Kunnal (1992) evaluated financial feasibility of investment in pomegranate orchard in Bijapur district of Karnataka. The study showed that the per acre net present value for the entire life period of the project was found to be Rs. 8283.81. The discounted benefit cost ratio (at 12% discount rate) was 1.53. The payback period was 6.56 years and internal rate of return was 15.55 per cent.

Chitra *et al.* (1997) in the study of economics of ber production in and around Hyderabad city of Andhra Pradesh found that, the payback period in ber cultivation was 4.42 years and benefit cost ratio was 5.25 indicating the profitability of ber cultivation. The net present value worked out was Rs. 12.061. The IRR was 73.54 per cent which was higher than the lending rates of commercial banks. The results of the study indicated that even though ber cultivation required relatively higher initial capital investment compared to other fruit crops. The returns were higher during the bearing period and economic indicators clearly indicated that the production of ber was economically viable.

Krishna Rao *et al.* (1997) conducted study on profitability of mango cultivation in drought prone areas. A case study of Anantapur district of Andhra Pradesh. The capital productivity measures indicated that the investment on mango garden in the region was profitable proposition. The investment can be recovered by the farmers in 11.5 years and the benefit cost ratio was 1.46:1. The positive net present value indicated the soundness of investment made in the mango cultivation. The internal rate of return also indicated favourable nature of return.

Singh and Singh (1997) in the study profitability of ber cultivation in arid region of Haryana, the financial analysis indicated that investment on ber orchard is an economically viable activity. On an average, the internal rate of return was found as high as 40 per cent, with a pay back period of 5 years and benefit cost ratio of 3.53. Further the ber cultivation emerged as a better paying proposition than any other crop relation followed in region. Findings of the study lead to conclusion that the ber cultivation has much potential as an economically viable alternative to existing crop cultivation.

Pawan Dahiya *et al.* (2002) conducted a study on cost-benefit analysis of ber cultivation in Rohtak district Haryana. For a study they collected the data from thirty ber growers randomly. To examine the economic feasibility investments in ber cultivation four indicators like net present value, internal rate of return, benefit cost ratio and pay back period were used. The study indicates that ber cultivation it is intensive with an IRR of 22.5 per cent. The NPV and BCR at a discount rate of 14 per cent is RS. 26,346 and 1:1.22 respectively. The investment in ber orchard has a pay back period of 7 years. Liberal credit facilities adequate supply system on inputs particularly good quality of planting materials. Efficient making system etc. are a few measures required to be take to make ber cultivation a successful venture.

Sundaravardarajan and Ramanathan (2003) reported that B:C ratio and IRR for new cashew plantations were 1.42 and 34.36 per cent, while for old cashew plantations it was 1.06 and 17.17 per cent respectively. Further, they suggested that need to create an awareness to adopt improved varieties (HYV) which not only reduce the cost of cultivation but also to increase the net income among the different size of farmers.

## 2.4 THE MARKETING CHANNELS AND THEIR PRICE SPREADS

Rajgopal (1987) in his study on marketing of apple, guava and mango fruits reported that the producers share in consumer prices was highest in apple followed by mango and guava. The cost of marketing was higher in guava than in mango and apple. It revealed that apple cultivation was economically viable even to small growers. He recommended that direct sales and sales through cooperative should be promoted to provide more share to the producers in the consumers price of fruit crop.

Kulkarni (1989) in his study on economics of production and marketing of grapes in Bijapur district, Karnataka identified two marketing channels they were

a. Producer → commission agents cum wholesaler → consumers.

He revealed that selling through commission agent in the market was profitable compared to sale to pre-harvest contractors.

Patil (1989) in his study on marketing of Alphonso mangoes in Maharashtra identified four channels viz.,

- i. Producer → consumer (direct sale)
- ii. Producer → cooperative → consumer (cooperative sale)
- iii. Producer → commission agent → wholesaler → retailers → consumer (middle men sales)
- iv. Producer → pre-harvest contractor → commission agents → wholesalers → retailers → consumer (pre-harvest contract sale).

The study revealed that when the contract was made at the time of flowering stage the price received by the growers was the lowest (Rs. 28.50/crate) though the crate size was big. The average price of Alphonso mangoes received by the growers was only Rs. 29.40 per crate. Finally he concluded that the direct sale to consumer was the most profitable and sale through pre-harvest contractor was the least profitable.

Raikar (1990) in his study on investment in production and marketing of cashewnut in Karnataka identified six channels of trade namely,

1. Grower → itinerant trader → processor
2. Grower → pre-harvest contractor → itinerant trader → processor
3. Grower → village merchant → processor
4. Grower → trader → processor
5. Grower → processor
6. Grower → commission agent → trader → processor. The results further revealed that producers share in consumers price were more (52%) in channel-3. This share was reduced to 37.50 per cent when producer sold his crop to pre-harvest contractor.

Singh (1990) conducted study on marketing of pineapple in north Tripura. They identified different marketing channels in marketing of pineapple namely

1. Producer → village cooperative → TSIC (processing) wholesalers → retailers → consumers.
2. Producers → traders → retailers (pahiachherra market) → consumers.
3. Producers → local beopari → wholesaler (82-miles market) → retailers → consumers.

4. Producers → Traders → commission agents → wholesalers (Karimaganj market) → retailers → consumers.
5. Producers → traders → commission agents (Dharmanagar) → retailers → consumers.
6. Producers → local beoparies → wholesalers (Kailashalar) → retailers → consumers.

The producer's share varied in different markets being highest in village cooperative (80.54%) followed by Kailashalar (59.00%), Pahiacherra (56.59%), 82 miles (40.74%) and Dharmanagar and Karimnagar Ganj Market (40.00%) each.

Vintode and Bhargav (1991) made an attempt to study the cost incurred by farmers in marketing of Ambe Bahar and Mrig bahar crop of oranges in Nagpur district. Two channels of marketing were identified channel-I consisted of producers and retailers and the second channel producers and distant marketing centres viz., Delhi, Lucknow, Amritsar, Patna and Hawra. The study revealed that the total marketing cost per tonne was Rs. 240.24 and Rs. 270.84 for Ambe bahar and Mrig bahar oranges respectively. In both the crops the share of packing and storage costs were more. The net price received by the producer seller worked out to be 71.4 per cent and 78.68 per cent for the gross price obtained by the farmer in Ambe bahar and mrig.

Santhihal (1993) reported that a single marketing channel was observed in Bijapur district for ber crop. The per quintal marketing cost of producer seller was the highest in Bangalore market (Rs. 119.73) followed by Hubli market (Rs. 114.35) and Bijapur market (Rs. 379.25) followed by Bijapur market (Rs.356.61) and Bangalore market (Rs. 247) because of the price received by producer in Bangalore market was high as compared to other markets.

Senthilnathan and Srinivasan (1994) identified the following channels of banana marketing in Trichirapalli district of Tamil Nadu.

They were

Channel – I : Farmer → pre-harvest contractor → secondary wholesaler

Channel – II : Farmer → pre-harvest contractor → commission agent → wholesaler → retailer → consumer.

Channel – III : Farmer → Regulated market wholesaler → retailer → consumer.

Channel IV : Farmer → Regulated market → secondary wholesaler.

Among these, channel – I and channel – IV dropped for the study because of the involvement of secondary wholesaler in poovan marketing, which was very limited. It was found that Channel-II was relatively efficient than that of channel-III since the share of producer in consumer's rupee in channel-3 (71.60%) was higher than that of channel-II 61.27 per cent mainly due to distress sale to the pre-harvest contractors who were the usual financial for the farmers.

Singh (1996) studied the price spread of citrus fruit in mid hill of Jammu and Kashmir. An overall view of results revealed that producers share in consumer's rupee was 35.71 per cent in channel (producer → pre-harvest contractor → retailer → consumer) and 81.25 per cent in channel-II (Producer → retailer → consumer).

Saraswat (1997) conducted a study on organization of production and marketing of apple in Himachal Pradesh. A case study of Kirari village. The study found that in the study area on an average the farmer incurred Rs. 26.72 on packing. The channel used by the most of the growers was producer → forwarding agent → commission agent → wholesaler → retailer → consumer. The analysis reveals that the producers share in consumer's rupee was 42.28 per cent. The marketing cost borne by the producer was 31.64 per cent of consumer's rupee.

More (1999) in his study on economics of production and marketing of banana in Maharashtra state identified two important channels through which banana from the study area passed from the producer to the ultimate consumers. They were

Channel – I : Producer → commission agent cum wholesaler → retailer → consumer.

Channel – II : Producer → commission agent → distant market. Gangal (2002).

Gangal (2002) studied the performance of banana plantation in north Karnataka and identified two important marketing channels through which banana was transferred from producer to ultimate consumer.

Channel – I : Producer → commission agent → cum → wholesaler → retailers → consumers

Channel II : Producers → village traders → consumers.

Shivanand (2002) studied the performance of banana plantation in north Karnataka and identified two important marketing channels through which banana was transferred from producer to ultimate consumer.

Channel – I : Producer → commission agent cum wholesaler → retailers → consumers.

Channel – II : Producers → village traders → consumers.

Nearly 70 per cent of the farmers produce was sold through commission agent cum wholesale and remaining 30 per cent was sold through village level traders.

Sundaravaradarajan and Jagmohan (2002) studied the marketing cost, margin, price spread and marketing channels of cashew in Tamil Nadu observed following five different marketing channels of cashew.

1. Farmer → village trader → wholesaler → processor → trader
2. Farmer → cooperative marketing society
3. Farmer → Commission agent → wholesaler → processor
4. Farmer → processor.

A majority of the farmers (60%) adopted channel-1 followed by channel-2 (26.25%), channel 3 (10%) and channel-4 (3.75%).

Pawar and Pawar (2005) conducted a study on price spread of green chillies in watershed area of Maharashtra. They identified 3 channels for sale of green chillies namely

1. Channel – I : Sale through commission agent
2. Channel –II : Sale through direct retailer
3. Channel –III : Sale through direct sale.

Producer share in consumer rupee was higher in channel III as compared to channel II and I.

Talathi *et al.* (2005) conducted a study on economics of marketing of sapota in Konkan region. They reported that commodity passes through four different channels of trade namely producers → fruit merchants → commission agents – retailers – consumers (channel I), producer → commission agents → retailers → consumers (channel – II) producers → cooperative society → commission agents → retailers → consumers (Channel III) .Producers → fruit merchants → Hawkers → consumers (channel IV). The producer share in consumer rupee was highest (34.40%) in channel II and it was lowest (28.39%) in channel I 32.23 and 31.61 per cent in channel II and IV respectively.

## 2.5 CONSTRAINTS IN PRODUCTION AND MARKETING OF PINEAPPLE

Hiremath (1993) expressed that, the absence of processing facility, absence of cold storage facility, fluctuations in prices were the major problems expressed by the cent per cent farmers and other problems were absence of cooperative marketing of lime, non-availability of packing material at reasonable price and difficulty in transportation.

Gummagolmath (1994) identified the problems through the opinion survey revealed that the problem of alternative bearing was expressed by 100 per cent orchardists in all categories of farmers. Problem of non-availability of labour was expressed by most of the medium orchardists (66.67%) followed by small orchardists (40%) and large orchardists (33.37%). Among the marketing problems, the problem of price fluctuation was expressed by 44.44 per cent of small 36.80 per cent of medium and 50 per cent of large orchardists and

other problems were high commission and existence of mutual understanding between wholesaler and commission agents.

Deorukhakar *et al.* (1995) studied the constraints in technology adoption of cashewnut cultivation in the Sindhudurga district of Konkan region, Maharashtra. They found that two third of the growers opined that there was no need to use of fertilizers and plant protection chemicals, high cost of fertilizer (13%) and plant protection chemicals (27%) were other constraints expressed by the cashew growers. They further reported that the 41 and 32 per cent of the respondents expressed the high cost of improved planting material and irregular supply of this input respectively.

Gunjate (1997) reported problems of cashew plantation management at regional fruit research station, Vengurla, Maharashtra he observed that some problems in cashew plantation management that non-availability of right kind of inputs, inadequate funds non-availability of suitable form equipments and machinery non-availability of qualified and experienced personnel. It was necessary to make available the grafts of the choicest variation in all the region replanting the gaps should be done as early as possible and it should never be left beyond second year. The prophylactic sanitary measures recommended found to be quite effective against stem and root bases.

Senthilnathan and Srinivasan (1994) estimated the cost and returns of poovan cultivar banana production in Thrichirapalli district of Tamil Nadu. The study revealed that in Trichy taluk twenty per cent farmers expressed high initial investment, sixteen per cent farmers expressed that problem of heavy wind damage. Similarly twelve per cent price problem and ten per cent disease problems. In Lalgudi taluk seventeen per cent farmers expressed high initial investment, as problem eleven per cent price fluctuation, thirteen per cent disease incidence and nine per cent wind damage. In Kulikathi taluk two per cent farmers expressed disease incidence eighteen per cent wind damage and fourteen per cent price fluctuation.

Govinda Reddy *et al.* (1997) identified the problems of mango growers in Srinivasapur region of Karnataka. The major constraints faced by mango growers at the production level were lack of knowledge on the application of balanced fertilizers (88% of respondents) followed by lack of awareness on drip irrigation (84%) technology, heavy rain and wind during flowering and fruit development stage (82%), non availability of credit (80%), non availability of labour (78%), high cost of inputs (74%), lack of knowledge on technical guidance (43%), high incidence of pests and diseases (36%) and the availability of quality grafts (26%). The major constraints in mango exports were lack of near by processing units. Storage facilities, pre-cooling units, knowledge in chemical treatments of units, regulated markets and improved harvest, other problems were exploitation by middlemen, lack of grading etc.

More (1999) studied the economics of production and marketing of banana in Marathwada region of Maharashtra state. The study identified problems faced by the farmers that, all the farmers in the study area were facing the problem of *Musa sercospora* disease. The other major problems were high labour wages, non-availability of quality planting material at right time and non-availability of adequate technical assistance from experts on behalf of government. The problems in marketing were spatial variation in the prices creating uncertainty among cultivators in choosing the markets for sale of produce. The higher transportation cost was also one of the major marketing problems in marketing of banana in the study area. Inadequate availability of the loan at right time by the financial institutions was the main problem in the production of banana in the study area.

Qaim (1999) studied socio-economic impact of tissue culture technology in banana production in Keyna. The study revealed that due to high expenses for the technology itself and for complementary inputs, small farms are facing the most severe adoption constraints.

Kameswara Rao (2000) studied the problems of production and marketing of banana in Tungabhadra command area. The study revealed that, the major problems faced by the 85 per cent of the farmers was non-availability of sufficient irrigation water. 73 per cent of farmers were opined that higher prices of fertilizers, 68 per cent of the farmers were facing the problem of non-availability of quality planting material. The other major problems in production of banana in study area were labour shortage in peak time, hazards of soil salinity, ... storms of heavy winds. The major financing problems in the study area were available loan was inadequate, high procedural complication of loan and high rate of interest. The major

problems in marketing of banana in study area were high price fluctuations, high transportation cost, delayed payments on sale proceeds by the trader or businessman and high commission of intermediaries.

Mishra *et al.* (2000) in their study on production and marketing of banana in Gorakpur district of Uttar Pradesh identified problems faced by the farmers in the production and marketing of banana they were unavailability of quality suckers and high cost of seed suckers, high cost of transportation, lower ruling price for produce due to unavailability of sufficient storage facilities and weak finance structure. The problem of supply of electric power in critical period non-availability of fertilizers and insecticides at reasonable prices.

Khunt *et al.* (2001) studied economics of production and marketing of pomegranate and found that dying of young plant, problem of mite, inadequate irrigation water and its poor quality and short supply of electricity were major problems faced by pomegranate growers of Bahavnagar district.

Begum and Raha (2002) studied on marketing and banana in selected areas of Bangladesh. The existing marketing system for bananas in selected areas of Bogra district, Bangladesh was examined based on data from 40 market intermediaries. Also examined were the marketing costs and margins at different levels of banana marketing and the existing marketing constraints. Results revealed that banana marketing was profitable venture and major marketing problems are price instability, lack of capital, inadequate facilities and lack of adequate market information.

Guledagudda *et al.* (2000) conducted study on economics of banana cultivation and in marketing in Haveri district of Karnataka. The study identified production problems like lack of technical knowhow, scarcity of labour, pest and diseases, lack of adequate credit facility and scarcity of water. The farmers in the study area expressed also marketing problems like involvement of intermediaries, lack of storage facilities and inadequate transportation.

Shivanand (2002) studied the performance of banana plantation in northern Karnataka. The study revealed as perceived by the farmers the major problems in cultivation of banana were service incidence of *musa sercospora* disease in all the districts of northern Karnataka, the disease lead to heavy crop losses. Erratic onset of monsoon was another problem in Belgaum district affecting banana plantations. In Gulbarga district the non-availability of labour and high labour wages and non-availability of technical assistance for improved cultivation of banana pose severe problem in production of banana. In marketing of banana farmers were facing the problem of delayed payments of sale proceeds, high cost of transportation of produce, wide price fluctuational and high commission charges.

Stephen *et al.* (2002) studied the socio-economic impact of tissue culture banana in Kenya. The study revealed that the tissue culture banana producers appear to be constrained by capital for investment in irrigation facilities and acquisition of fertilizers or organic manures to produce good banana crop. Lack of organized marketing facilities makes exploitation of banana producers by traders/brokers fairly easily.

Nearly 70 per cent of the farmers as well as produce were sold through commission agents cum wholesale and remaining 30 per cent was sold through village level traders.

Alagumani (2005) in his study on economic analysis of tissue cultured banana and sucker propagated banana in Theni district of Tamil Nadu revealed that, the risk in cultivation of banana using tissue culture plantlets was lower than that of sucker propagated banana production. The constraints in tissue culture banana production were high cost of tissue culture plantlets and few farmers were also expressed problem of marketing of big size bunches obtained from tissue culture banana.

Brij Bala (2006) conducted a study on marketing system for apple in hills problems and prospects (A case study of Kullu district, Himachal Pradesh). They surveyed 120 apple growers. They identified many constraints faced by the growers such as lack of road facility unawareness inadequate storage facility delayed payment and lack of market intelligence.

Rane and Bagade (2006) studied economics of production and marketing of banana in Sindhudurg district of Maharashtra. The study revealed that farmers were facing the problem of bunchy top disease of banana and also aphids of banana in production and banana.

### 3. METHODOLOGY

This chapter outlines briefly the characteristics of the study area, the methods adopted in selection of the samples, the nature and sources of data and the various statistical tools and techniques employed in analyzing the data. These items are described under the following sub-heads.

- 3.1 Description of the study area
- 3.2 Sampling procedure
- 3.3 Nature and sources of data
- 3.4 Analytical technique
- 3.5 Definition of terms and concepts used.

#### 3.1 DESCRIPTION OF THE STUDY AREA

Karnataka is the eighth largest state in India with an area of 190 lakh ha. It is situated between 11.5° and 19.0° N latitude and between 74° and 78°E longitude in the southern plateau. The state receives the average annual rainfall of about 1139 mm both from south-west and north-east monsoons. The important crops grown in the state are jowar, ragi, maize, bajra and wheat among cereals; redgram, greengram, tur and bengalgram among pulses; groundnut, sunflower and safflower among oilseed crops and cotton, sugarcane and tobacco among commercial crops.

Karnataka comprises 29 districts of which 12 districts are located in northern part of the state and rest in southern part of state, Shimoga district in southern Karnataka was chosen for study purposively due to higher concentration of area and production of pineapple. District-wise area, production and productivity of pineapple in Karnataka state during 2004-05 are presented in Table 3.1.

##### 3.1.1 Shimoga district

Shimoga district, one of the twenty nine districts of the Karnataka state, is bounded on the east by the Chitradurga district, on the south by the Chikkamagalur district on the west by the Uttar Kannada district and on the north by the Haveri district. It is situated between 13°27' to 14° 39' N latitude and 74°37' to 75°52' E longitude and 4411 feet above mean sea level. The district with an area of 8465 sq.kms comprises of seven taluks. The highest and lowest temperature in Shimoga district is resolving around 39.2°C and 8.9°C respectively. In the district on an average there will be 89 rainy days in a year. The average annual rainfall of the district is 1813 mm.

As per agro-climatic regional classification, Shimoga district falls under Malnad region. The soils of the districts are predominantly red sandy loamy, red soils, laterite soils and black soils. Most of the area of the district is covered under black soils. According to the available records the total geographical area of the district is 8.5 lakh hectares, which is about 4.41 per cent of the state. The district has seven taluks viz., Bhadravati, Hosanagar, Sagar, Sorab, Shikaripura, Shimoga and Thirthahalli. Among seven taluks, Soraba and Sagar taluks were selected purposively based on highest area under pineapple in these taluks (Anon, 2006).

##### Description of study taluks

Demographic features of the sample taluks are narrated under the following sub-heads.

###### 3.1.1.1 Sorab taluk

The taluk belongs to Shimoga district, located in southern transition zone of Karnataka state. The geographical area of the taluk is 1148 sq. km with total population of 1.85 lakhs. The actual annual rainfall of the taluk is 1633.8 mm received from south-west monsoon. The taluka is largely covered with sandy loam soil. Arecanut, paddy, maize, banana, pineapple are the major crops of the taluk.

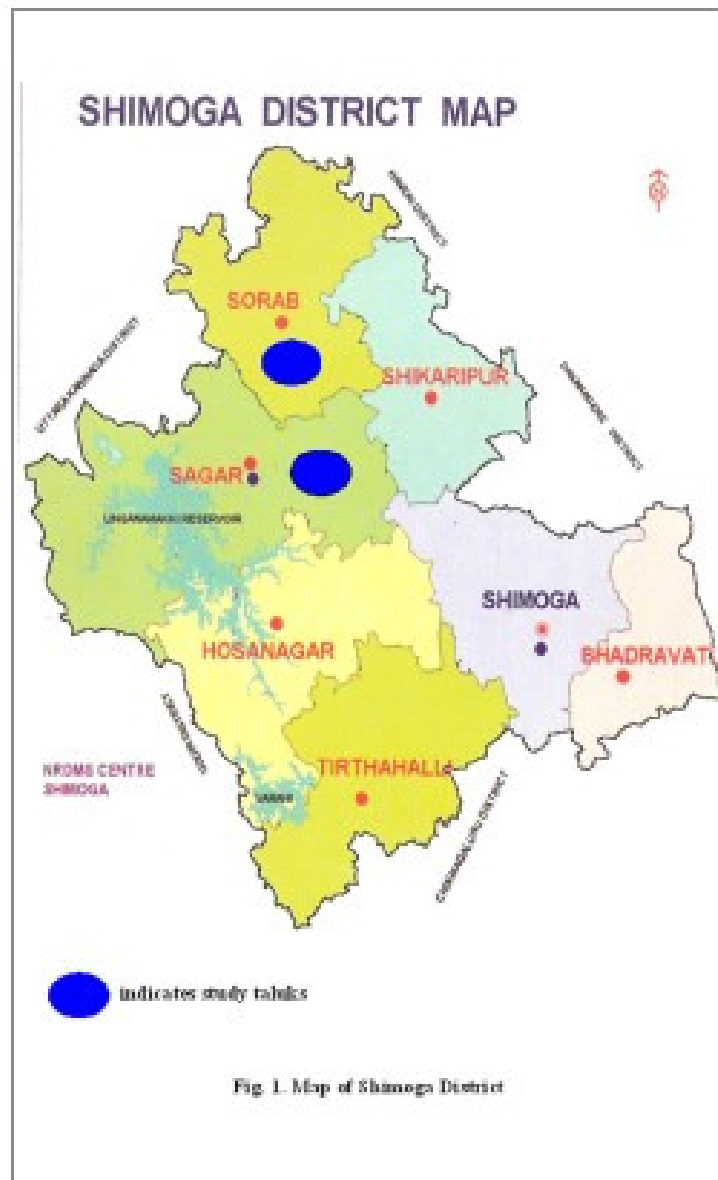


Fig. 1. Map of Shimoga District

**Table 3.1. District-wise area, production and productivity of pineapple in Karnataka state during 2004-05**

Sl. No.	Districts	Area (ha)	Percentage	Production (t)	Percentage	Productivity (t/ha)	Percentage
1.	Bangalore (urban)	2	0.072	23	0.018	11.5	3.361
2.	Chitradurga	12	0.431	78	0.060	6.5	1.900
3.	Shimoga	1430	51.328	71500	55.267	50.0	14.613
4.	Belgaum	6	0.215	300	0.232	50.0	14.613
5.	Dharwad	1	0.036	6	0.005	6.0	1.754
6.	Haveri	16	0.574	160	0.124	10.0	2.923
7.	Uttar Kannada	361	12.958	23415	18.099	64.86	18.956
8.	Chikkamagalur	310	11.127	16698	12.907	53.86	15.741
9.	Dakshina Kannada	366	13.137	10980	8.487	30.00	8.768
10.	Hassan	17	0.610	85	0.066	5.00	1.461
11.	Kodagu	41	1.472	1360	0.051	33.17	9.694
12.	Udupi	224	8.040	4766	3.684	21.27	6.216
	Total	2786	100.0	129371	100.00	342.16	100.00

### 3.1.1.2 Sagar taluk

The taluk is located in the eastern most part of Shimoga district, popularly known as gate of Malnad. The world famous Jog falls or Sharavati falls is in this taluk. The geographical area of the taluk is 1940 sq. kms with total population of 20.09 lakhs. The annual rainfall of the taluk is around 2173 mm, received from south-west monsoon. Taluk is majorly covered with red loamy soils. Paddy, arecanut, banana and pineapple are the major crops of the taluk.

## 3.2 SAMPLING PROCEDURE

Multistage purposive sampling procedure was adopted for selection of district and taluks and villages were selected randomly. The sampling procedure adopted for the study are detailed below.

### 3.2.1 Selection of the study area

Pineapple is being cultivated in few districts of Karnataka. Shimoga district is one of the major producers of pineapple in Karnataka. The area under pineapple in 2004-05 was 1430 hectares with production of 71500 tonnes, which comprises around 51 per cent of the area and 55 per cent of the production in the state. Therefore, Shimoga district was purposively selected for the study in the first stage (Table 3.1).

### 3.2.2 Selection of sample taluks

Pineapple is cultivated in five taluks of Shimoga district. However, large scale cultivation of pineapple is concentrated in Soraba and Sagar taluks which comprise 82.50 per cent, 16.70 per cent of the total area of the district respectively (Table 3.2). Hence these taluks were purposively selected for the study in the second stage.

### 3.2.3 Selection of the sample villages

From the selected sample taluks of Shimoga district, villages were selected randomly based on the number of pineapple growers in the third stage.

### 3.2.4 Selection of the sample respondents

In final stage, proportionate number of respondents were randomly selected to obtain primary data with regard to the economics of production of the crop. Thus the total sample size was about 60 pineapple growers from the two selected taluks put together.

### 3.2.5 Selection of market intermediaries

For studying the marketing aspects of pineapple crop 10 wholesalers and 20 retailers were selected randomly.

## 3.3 NATURE AND SOURCE OF DATA

### 3.3.1 Primary data

The data needed for the study were collected from the respondents by personal interview method using pre-tested schedule. Majority of the respondents did not maintain records of expenditure and income from pineapple cultivation. Hence, data collected was based on the memory of the respondents. At the time of interview, personal bias of the sample farmers was minimized by convincing them about the genuineness of the purpose for which the data were collected. The data collected from the selected respondents were to fulfill the objectives of the study. Data were based on the entire operations in establishing and maintaining the pineapple orchards and the consequent costs and returns including marketing. Similarly, the data on marketing aspects from producers and intermediaries were collected by personal interview method with help of structured pre-tested schedule. Similarly the problems in production and marketing were collected through opinion survey of the respective respondents during 2007.

### 3.3.2 Secondary data

The secondary data on area, production and productivity of pineapple for several years were collected from the records of Directorate of Horticulture, Lalbagh, Bangalore.

**Table 3.2. Taluk-wise area under pineapple in Shimoga district during 2005-06**

Sl. No.	Taluks	Area (ha)	%
1.	Hosanagar	6	0.37
2.	Sagar	271	16.70
3.	Shikaripura	5	0.31
4.	Shimoga	2	0.12
5.	Soraba	1339	82.50
	Total	1623	100.00

**Table 3.3. Land use pattern in the study area during 2004-05**

(Area in ha)

Sl. No.	Classification of land	Sample taluks	
		Soraba	Sagar
1.	Total geographical area	114767	194009
2.	Forest area	26667	66125
3.	Land not available for cultivation	9592	30416
4.	Other uncultivated area	2473	67652
5.	Fallow land	11025	5472
	Net area sown	42740	24344

### 3.4 ANALYTICAL TOOLS AND TECHNIQUES EMPLOYED

To fulfill the specific objectives of the study, based on the nature and extent of availability of data, the following analytical tools and techniques have been adopted.

1. Tabular analysis
2. Growth rate analysis
3. Financial analysis
4. Functional analysis

#### 3.4.1 Tabular analysis

Tabular presentation was adopted to compile the general characteristics of the sample farmers, determine the resource structure, cost structure, returns, profits and opinion of farmers regarding the problems in production and marketing. Simple statistical tools like averages and percentages were used to compare, contrast and interpret results properly.

#### 3.4.2 Growth rate analysis

For evaluating the trend in area, production and productivity under pineapple in Karnataka state and in the study district, the following growth model was employed.

$$Y_t = ab^t u_t \dots \dots \dots (1)$$

Where,

- $Y_t$  = Area / production / productivity in the year 't'
- a = intercept indicating Y in the base period (t = 0)
- b = (1 + g) regression coefficient
- t = time period in years
- $u_t$  = Disturbance term for the year 't'.

Equation (1) was converted into the logarithmic form in order to facilitate the use of linear regression. Taking logarithm on both sides of the equation (1).

$$\ln Y = \ln a + t \ln b + \ln u_t \dots \dots (2)$$

this equation is of the following form

$$Q_t = A + B_t + e_t$$

Where,

$$Q_t = \ln Y_t$$

Where,

- $Q_t = \ln Y_t$
- A = ln a
- B = ln b
- $e_t = \ln U_t$

The linear regression of the above farm was fitted separately for area, production and productivity of pineapple. The values of 'a' and 'b' were estimated by using ordinary least squares technique.

Later the original 'a' and 'b' parameters in equation (1) were obtained by taking antilogarithms of 'a' and 'b' values as

$$a = \text{Anti log } A$$

$$b = \text{Antilog } B.$$

Average annual compound growth rate was calculated as

$$b = 1 + g$$

$$g = b - 1.$$

To obtain percentage compound growth rate the values of 'g' was multiplied by 100.

To know the variation in area, production and productivity over the years coefficient of variation (CV) was worked out by employing the following formula.

$$CV = \frac{SD}{Mean} \times 100$$

$$SD = \sqrt{1/n \sum (X - \bar{X})^2}$$

$$Mean = \frac{\sum Xi}{n}$$

$\sum Xi$  = Sum of observations

n = Number of observations.

### 3.4.3 Financial analysis

The techniques used for the financial analyses were

1. Net present value / worth (NPV)
2. Benefit cost ratio (B:C ratio)
3. Internal rate of return (IRR) and
4. Pay back period (PBP)

#### 3.4.3.1 Net Present Value

The net present value represents the discounted value of the net cash inflows to the project. In the present study a discount factor of 9.0 per cent was used to discount the net cash inflows representing the opportunity cost of capital. It can be represented by

$$NPV = \sum_{i=1}^n Y_i (1 + r)^{-i} - I$$

Where,

$Y_i$  = refers to the net cash inflows in the year n

r = refers to the discount factor

I = Initial investment

i = Year of life period 1, 2,.....n.

#### 3.4.3.2 Benefit cost ratio

The benefit cost ratio (BCR) was worked out by using following formula.

$$\text{B:C ratio} = \frac{\text{Discounted net cash flows}}{\text{Initial investment}}$$

$$\text{NPV} = \sum_{i=1}^n Y_i (1+r)^{-i}$$

$$= \frac{\quad}{I}$$

### 3.4.3.3 Internal rate of return (IRR)

The rate at which the net present value of project is equal to zero is internal rate of return (IRR) to the project. The net cash inflows were discounted to determine the present worth by the following interpolation technique.

$$\text{IRR} = \text{discount rate} + \frac{\text{Lower Difference between the Present worth of cash flows at lower discount rate}}{\text{Absolute difference between present worth of cash flows stream at the two discount rates}}$$

### 3.4.3.4 Pay back period (PBP)

Pay back period represents the length of time required for the stream of cash proceeds produced by the investment to be equal to the original cash outlay i.e., the time required for project to pay for itself. In the present study pay back period was calculated by using the following formula.

$$\text{PBP} = \frac{\text{Initial investment}}{\text{Net returns (average)}}$$

### 3.4.4 Functional analysis

After a series of tests on the fitness of the type of production function, the Cobb-Douglas production function was fitted to evaluate the resource use efficiency in the production of pineapple.

The general form of the production function fitted was as follows.

$$Y = a, x_1 b_1, x_2 b_2, x_3 b_3, x_4 b_4, x_5 b_5 \dots U$$

Where,

Y = Production of pineapple (tonnes/ha)

a = Intercept

$x_1$  = Human labour (man days)

$x_2$  = Fertilizer (qtls)  
 $x_3$  = Weedicides (kgs)  
 $x_4$  = Growth regulator (ltr)  
 $x_5$  = Planting material (Nos.)  
 $U$  = Error term

$b_i$  = (i = 1 to 5) regression coefficient of factor inputs.

The function was translated into linear form by making logarithmic transformation on all the variables as follows.

$$\log Y = \log a + b_1 \log x_1 + b_2 \log x_2 + b_3 \log x_3 + b_4 \log x_4 + b_5 \log x_5 + \log U.$$

The results of the analysis were subjected to test by the coefficient of multiple determination and the relevant 't' test was carried out.

The regression coefficients ( $b_i$ ) were tested for their significance using 't' test at chosen level of significance.

$$t = \frac{b_i}{\text{Standard error of } b_i}$$

Marginal value of product of different factor inputs were worked out by using the following formula.

$$MVP = b_i \frac{\bar{Y}}{\bar{X}} PY$$

Where,  $\bar{Y}$  and  $\bar{X}_i$  are the mean values of output and inputs respectively.

PY = Price of output.

Marginal factor cost was also worked out by taking unit cost of input to produce additional unit of output. Resource use efficiency was studied by comparing the marginal value products of each resource with corresponding factor costs at which each resource could be procured. Wherever the ratio of MVP to MFC was found to be more, then the resource was assumed to be advantageously used.

## 3.5 DEFINITIONS OF TERMS AND CONCEPTS USED IN THE STUDY

### 3.5.1 Cost concepts

#### 3.5.1.1 Fixed cost

The various items viz., land preparation charges including pipeline cost, planting, fencing, land rent, land revenue, depreciation and also interest on equipment investment which were used in the pineapple production, comes under the fixed cost.

#### 3.5.1.2 Variable cost

Variable cost includes the expenditure on labour and material input cost. The interest on working capital was also included under variable cost.

### 3.5.2 Inputs and costs

Following were the various inputs used in the production of pineapple.

#### 3.5.2.1 Hired human labour cost

Hired human labour was estimated in terms of mandays where in 8 hours of work in a day was considered as one man day. The women labour days were converted into male equivalents for the purpose of analysis by multiplying total women labour days by 0.75, based on the prevailing wage rates in the study area. The man days were valued at Rs. 60 per man day.

#### 3.5.2.2 Bullock labour cost

It was measured on pair days. Here one pair means eight hours of work by a pair of bullocks and man required to operate this bullock pair. It was valued at the rate of Rs. 150 for one pair day.

#### 3.5.2.3 Machine labour cost

It was measured in terms of machine hours. One machine hour means one hour of work by machine and a man required to operate this machine. It was valued at the rate of Rs. 450 per hour.

#### 3.5.2.4 Planting material cost

Plantlets /slips purchased from other pineapple growers and cost was worked out at the rate of Rs. 1.00 per slips based on prevailing rate in study area.

#### 3.5.2.5 Fertilizer cost

The fertilizers cost was calculated at the actual price paid by farmers.

#### 3.5.2.6 Irrigation charge

Cost of labours used for irrigation purpose were treated as irrigation charges.

#### 3.5.2.7 Implement charges

The amount of depreciation for implements was calculated by the straight line method i.e., by dividing the original cost less junk value of implement by its expected life. This was apportioned to individual crop in proportion to the hectare under the crop.

#### 3.5.2.8 Land revenue

These were charged according to the actual payments incurred by the cultivators.

#### 3.5.2.9 Land rent

Land rent was calculated as per the rate prevailing for irrigated land in the study area.

#### 3.5.2.10 Interest on fixed capital

Interest on fixed capital was calculated at the rate of 9 per cent, based on the prevailing bank rate for medium term investments.

#### 3.5.2.11 Interest on working capital

Interest on working capital was charged at the rate of 7 per cent per annum, which was the rate at which the farmers used to get short term loans.

#### 3.5.2.12 Family labour

Family labour cost was calculated on the basis of charges paid to hired labour.

### 3.5.3 Price spread

The difference between the price paid by consumer and price received by the producers was the marketing margin or price spread.

### 3.5.4 Market intermediaries

#### 3.5.4.1 Wholesalers

Wholesalers played an important role in the marketing process. He is the first agency to receive the produce from farmers and sell to the wholesalers cum commission agents at distant market.

#### 3.5.4.2 Retailers

Retailers sell the pineapple directly to consumers in the market. They purchase the produce from both wholesaler cum commission agent and producers.

#### 3.5.5 Gross return

Total value of produced when it was marketed is referred as the gross return.

#### 3.5.6 Net returns

Return obtained by subtracting the total cost from gross return.

## 4. RESULTS

This study was conducted in Shimoga district of Karnataka. The necessary data were collected from the sample farmers spread over two taluks in above mentioned district. The data was subjected to various statistical tools to draw meaningful conclusions. The main results of the study are presented in this chapter under the following heads.

- 4.1 General characteristics of sample farmers
- 4.2 Growth in area, production and productivity of pineapple in study area
- 4.3 Cost and returns from pineapple garden
- 4.4 Financial feasibility of investments in pineapple garden
- 4.5 Resource use efficiency in pineapple cultivation
- 4.6 Marketing margins in different marketing channels of pineapple
- 4.7 Problems in production and marketing of pineapple

### 4.1 GENERAL CHARACTERISTICS OF SAMPLE FARMERS

An understanding of general characteristics of sample farmers is expected to provide a birds eye view of the general features prevailing in the study area. Therefore, an attempt has been made in the study to analyse some of the important characteristics of sample farmers. The general characteristics of the respondents are presented in Table 4.1.

From the table it could be seen that the average age of the pineapple growers was about 40 years and average size of family was about 10 members. It could be further observed that majority of farmers were literate (60%), having their education ranging from primary to college level. The remaining 40 per cent of growers were illiterates.

From the table it could also be seen that the average landholding was 9.52 ha of which 8.49 ha was irrigated and remaining 1.03 ha was rainfed land. And average area under pineapple cultivation in Shimoga district was 5.12 ha.

The number of pineapple plants per hectare were 50975. The popular varieties grown in the study area were Kew (40%), Kundlur (36.67%), Raja (21.67%) and the variety Rani was grown in very small area (1%).

### 4.2 GROWTH IN AREA, PRODUCTION AND PRODUCTIVITY OF PINEAPPLE IN STUDY AREA

The growth rates of area, production and productivity of pineapple from 1994 to 2004 for Shimoga district and from 1994 to 2004 for Karnataka state is presented in the Table 4.2. It could be seen from the table that the area, production and productivity of pineapple in Shimoga district as well as in Karnataka state has shown a positive growth. Growth rate analysis revealed an increase of 3.95 per cent in area, 5.29 per cent in production and 1.31 per cent in productivity of pineapple in Shimoga district. Whereas, in Karnataka state these were found to be 0.43 per cent, 17.76 per cent and 17.27 per cent respectively. Increase in area was found to be the highest in Shimoga district followed by Karnataka state as a whole. On the contrary, production and productivity growth was more in Karnataka state followed by Shimoga district.

Variation in area, production and productivity of Shimoga district over the years was 1.88, per cent, 1.83 per cent and 1.96 per cent respectively. Whereas in Karnataka state variation in area, production and productivity over the years was 41.11 per cent, 68.38 per cent and 48.71 per cent respectively. Variation in area, production and productivity of Shimoga district was less than the variation in area, production and productivity of Karnataka state as a whole.

**Table 4.1. General characteristics of sample farmers**

Sl. No.	Particulars	
1.	Sample size(no)	60.00
2.	Average size of family (no.)	10.00
3.	Age (years)	40.00
4.	Education	
	Illiterate	24.00 (40.00)
	Upto SSLC	30.00 (50.00)
	Above SSLC	6.00 (10.00)
5.	Size of farm (ha)	9.52
6.	Rainfed area (ha)	1.03
7.	Irrigated area (ha)	8.49
8.	Size of pineapple garden (ha)	5.12
9.	Plants/ha (no.)	50975
10.	Adoption of different pineapple varieties by farmers	
	Kew	24.00 (40.00)
	Kundlur	22.00 (36.67)
	Raja	13.00 (21.67)
	Rani	1.00 (1.67)

Note : Figures in parentheses indicate percentage to the total

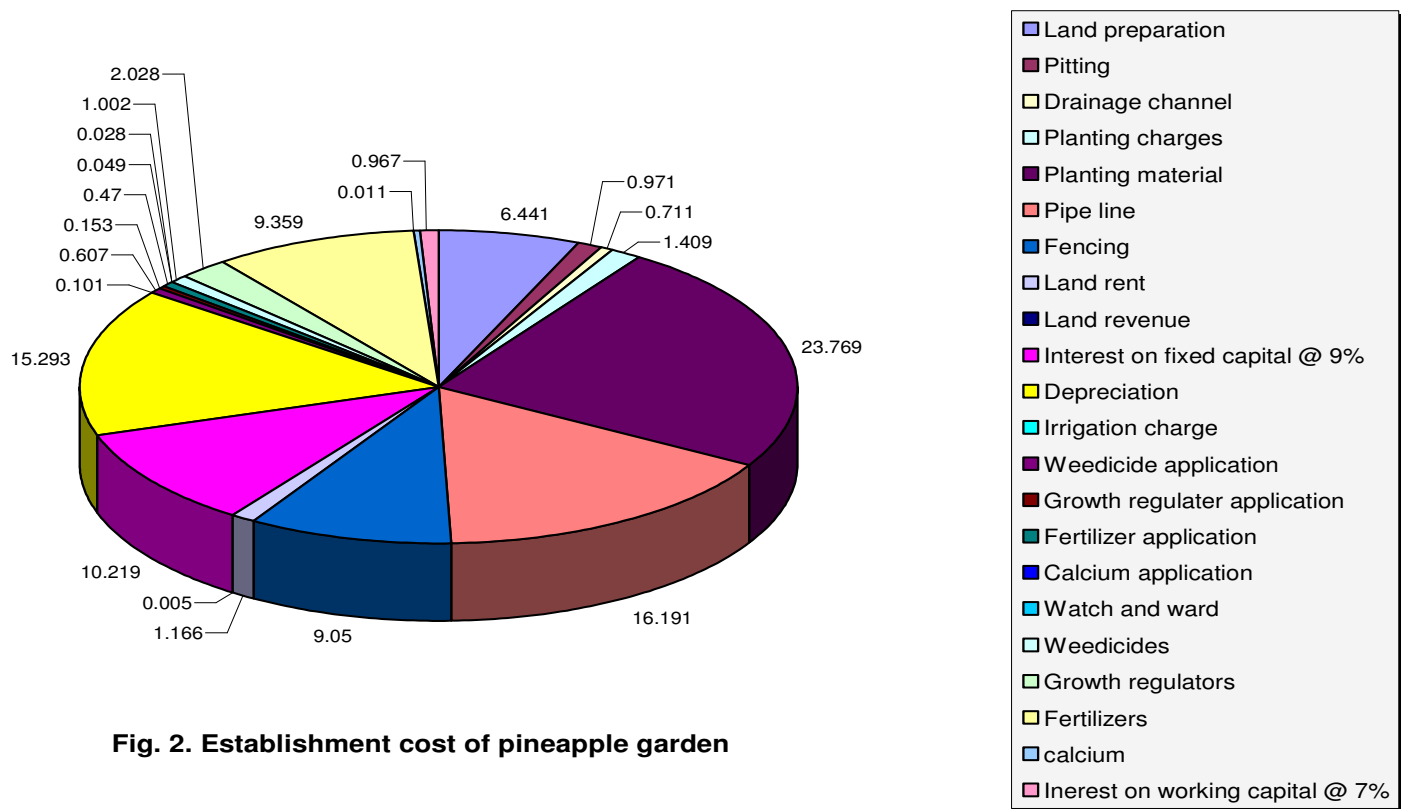
**Table 4.2. Growth rate of area, production and productivity of pineapple in the study area (1994-2004)**

(% per annum)

Sl. No.	Particulars	Compound growth rate			
		Shimoga district		Karnataka state	
		Growth	CV (%)	Growth	CV (%)
1.	Area (ha)	3.95	1.88	0.43	41.11
2.	Production (tonnes)	5.29	1.83	17.76	68.38
3.	Productivity (tonnes/ha)	1.31	1.96	17.27	46.71

**Table 4.3. Establishment cost of pineapple garden**

(Rs/ha)					
Sl No.	Particulars	Unit	Quantity	Value	%
I	FIXED COST				
1	Land preparation	ML(hrs)	30.69	13814.2	6.441
2	Pitting				
	Human labour	MD	2.44	146.40	0.068
	Machine labour	ML(hrs)	3.72	1674.32	0.781
	Bullock labour	PD	1.74	260.95	0.122
3	Drainage channel	MD	25.40	1524.00	0.711
4	Planting charges	MD	50.38	3022.80	1.409
5	Planting material	NO'S	50975	50975.00	23.769
6	Pipe line	-	-	34724.91	16.191
7	Fencing	-	-	19409.67	9.050
8	Land rent	-	-	2500.00	1.166
9	Land revenue	-	-	10.00	0.005
	Interest on fixed capital @ 9%	-	-	21916.67	10.219
10	Depreciation	-	-	32798.45	15.293
	Total fixed cost			182777.70	85.225
II	VARIABLE COST				
	Labour cost				
10	Irrigation charge	MD	3.6	216.00	0.101
11	Weedicide application	MD	21.69	1301.43	0.607
12	Growth regulator application	MD	5.45	328.49	0.153
13	Fertilizer application	MD	16.81	1008.61	0.470
14	Calcium application	MD	1.75	105.00	0.049
15	Watch and ward	MD	1	60.00	0.028
	Material cost				
16	Weedicides	Kgs	3.23	2149.57	1.002
17	Growth regulators	Ltrs	6.24	4350.00	2.028
18	Fertilizers	Qtls	25.19	20071.95	9.359
19	calcium	Qtls	0.11	22.60	0.011
	Interest on working capital @ 7%	-	-	2072.96	0.967
	Total variable cost	-	-	31686.69	14.775
	Total establishment cost (I+II)	-	-	214464.40	100



**Fig. 2. Establishment cost of pineapple garden**

**Fig. 2. Establishment cost of pineapple garden**

## 4.3 COST AND RETURNS FROM PINEAPPLE GARDEN

### 4.3.1 Establishment cost of pineapple garden

The establishment cost per hectare of pineapple garden was estimated by considering the quantity of inputs and labours used and their respective market price and wages prevailed in the study area.

The details of findings on the establishment cost are presented in Table 4.3. For the establishment of pineapple garden it needs one and half years and it was treated as zero year. The establishment cost in pineapple garden were classified into fixed cost and variable cost. Per hectare total cost of establishment was Rs. 214464.40, of which total fixed cost was Rs. 182777.70 (85.225%) and total variable cost was Rs. 31686.69 (14.775%).

Fixed cost includes various items like land preparation which accounted for about Rs. 13814.20 (6.441%), pitting Rs. 2081.67 (0.971%), drainage channel Rs. 1524.00 (0.711%), planting and planting material charges together accounted about Rs. 53997.80 (25.178%), pipe line Rs. 34724.91 (16.191%), fencing Rs. 19409.67 (9.050%), land rent Rs. 2500 (1.166%), land revenue Rs. 10.00 (0.005%) and depreciation on machineries and equipments accounted about Rs. 32798.45 (15.293%).

Variable cost includes various items like labour cost and material cost. Irrigation charge accounted about Rs. 216.00 (0.101%), weedicide application Rs. 301.43 (0.607%), growth regulator application Rs. 328.49 (0.153%), fertilizer application Rs. 1008.61 (0.470%), calcium application Rs. 105.00 (0.049%) and watch and ward Rs. 60.00 (0.028%). Among the material cost fertilizer contribution was more which accounted RS. 20071.95 (9.359%) followed by growth regulator cost Rs. 4350.00 (2.028%), weedicides cost Rs. 2149.57 (1.002%) and calcium cost accounted about Rs. 22.60 (0.011%).

### 4.3.2 Maintenance cost during bearing period

The pineapple plants start bearing the fruits after one and half year of planting. For maintaining the orchard during bearing period the farmers have to incur cost on various items. These costs can be classified as both variable as well as fixed costs. The annual cost incurred by the farmers in the study area is presented in Table 4.4.

The total average annual cost incurred by the farmer in maintaining one hectare of the orchard during the bearing period was Rs. 71876.89, of which variable cost was Rs. 40347.96 (56.13%) and total fixed cost was Rs. 31528.93 (43.87%).

The major component of variable cost was the fertilizer and its application cost was (Rs. 23707.66) constituting 32.98 per cent of total maintenance cost, followed by growth regulator and its application was Rs. 4703.76 (6.54%), weedicides and weeding charges accounted about Rs. 3443.90 (4.79%), earthing up charges Rs. 2965.05 (4.13%), harvesting cost Rs. 2625.28 (3.65%), irrigation charges Rs. 223.04 (0.31%), watch and ward Rs. 39.69 (0.06%) and interest on working capital at 7 per cent was about Rs. 2639.58 (3.67%). Among the fixed cost major one was depreciation on machinery and equipment, which constituted around 30.42 per cent (Rs. 21865.63/ha) of the total variable cost. While interest on fixed capital Rs. 7153.30 (9.95%), land rent Rs. 2500 (3.48%) and land revenue Rs. 10 (0.01%) were the other fixed costs in that order.

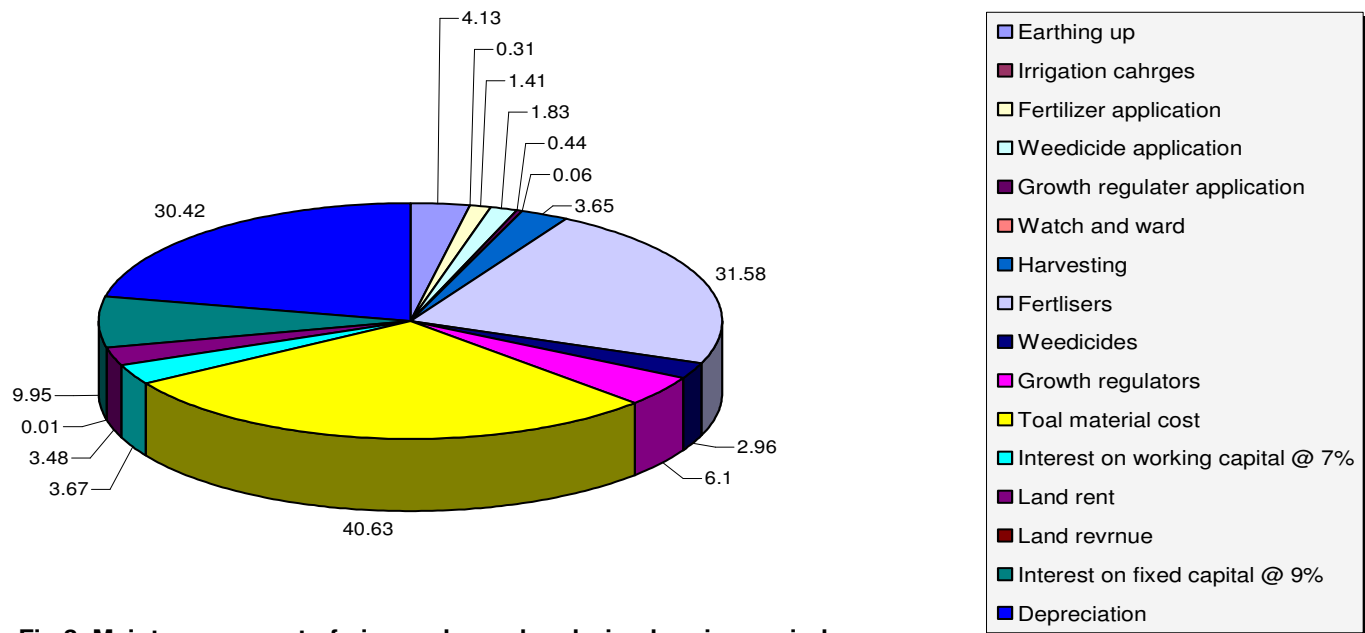
### 4.3.3 Yield and return structure of pineapple

It could be seen from the Table 4.5 that the average yield of pineapple obtained by the sample farmers in study area was around 66 tonnes per hectare which yielded an average gross return of Rs. 533155.26 per hectare. The pineapple orchard starts yielding from second year. The yield from the main crop was more (70 t/ha) and from ratoon crops (62 t/ha). The average net returns per hectare worked out to be Rs. 461278.50.

**Table 4.4. Maintenance cost of pineapple garden during bearing period**

(Rs/ha/year)

Sl No.	Particulars	Unit	Quantity	Value	%
I	Variable cost				
	Labour cost				
	Earthing up	MD	49.20	2965.05	4.13
2	Irrigation cahrges	MD	3.72	223.04	0.31
3	Fertilizer application	MD	16.83	1010.05	1.41
4	Weedicide application	MD	21.98	1318.47	1.83
5	Growth regulator application	MD	5.33	319.78	0.44
6	Watch and ward	MD	0.66	39.69	0.06
7	Harvesting	MD	43.76	2625.28	3.65
	Total labour cost	-	-	8501.36	11.83
	Material cost				
8	Fertilisers	Qtls	28.36	22697.61	31.58
9	Weedicides	Kgs	3.21	2125.43	2.96
10	Growth regulators	Ltrs	6.33	4383.98	6.10
	Toal material cost	-	-	29207.02	40.63
	Interest on working capital @ 7%			2639.58	3.67
	Total variable cost	-	-	40347.96	56.13
II	Fixed cost				
11	Land rent	-	-	2500.00	3.48
12	Land revrnue	-	-	10.00	0.01
	Interest on fixed capital @ 9%	-	-	7153.30	9.95
13	Depreciation	-	-	21865.63	30.42
	Total fixed cost	-	-	31528.93	43.87
	Total maintenance cost	-	-	71876.89	100



**Fig.3. Maintenance cost of pineapple garden during bearing period**

**Fig.3. Maintenance cost of pineapple garden during bearing period**

#### 4.3.4 Cash flow analysis of pineapple garden

Results of cash flow analysis from pineapple garden is presented in Table 4.6.

From the Table 4.6 it is evident that cost per hectare in pineapple garden during the bearing period was Rs. 71876.89 and it remained same in ratooning also. Establishment cost was treated as zero year cost. Entire cost of establishment (Rs.214464.40) was taken as cash outflow during zero year. Hence, net cashflow during the initial year was negative and was to the extent of Rs -214464.60.

The returns from the pineapple started flowing from second year and it flow up to three and half year. With the completion of one cycle the total cash inflow was Rs. 10,66,311 and the outflow was Rs. 358,218. The net cash flow at the end of the cycle was Rs.7,08,092.

### 4.4 FINANCIAL FEASIBILITY OF INVESTMENTS IN PINEAPPLE GARDEN

To evaluate the feasibility of investment in pineapple enterprise, the criteria such as net present value/worth, benefit cost ratio, pay back period and internal rate of return were employed and the results are presented in Table 4.7.

#### 4.4.1 Net present value (NPV)

Net present worth of an investment is the difference between the present value of series of inflows (returns) and outflows (costs) over the economic life period of the pineapple enterprises. Net present worth for the gardens in study area was Rs. 532221.51 per ha at 9 per cent discount rate.

#### 4.4.2 Benefit cost ratio (BCR)

This criterion indicates the rate of return per rupee invested in pineapple enterprise. The benefit cost ratio at 9 per cent discount rate was 3.48 for the orchards in study area.

#### 4.4.3 Pay back period (PBP)

It is the period required to recover the initial investment made in establishing the orchard. In the present study the payback period was 0.46 years after bearing for the orchards in study region. This clearly indicated that it would take 0.46 year after bearing to recover the entire investment.

#### 4.4.4 Internal rate of return (IRR)

This criterion measures the rate of return that can be realized by the investment in pineapple garden. Hence, the IRR indicates an important basis of investment and better than other criteria of evaluation, which do not consider the reinvestment opportunities. The value of IRR generally depends on the magnitude of returns realized in each year over the economic life period and more particularly in the initial years of pineapple enterprise. It could be noted here that, the IRR was found to be 84.07 per cent for the orchards in study region indicating that the investment in pineapple garden was highly profitable economically feasible and financially viable.

### 4.5 RESOURCE USE EFFICIENCY IN PINEAPPLE CULTIVATION

An attempt has been made in the study to examine the productivity of important resources used in pineapple cultivation.

Cobb-Douglas type of production function was fitted to estimate the resource productivity in pineapple cultivation. As explained earlier in methodology chapter the variable inputs used in the cultivation of pineapple by farmers were classified into five major groups viz., human labour, fertilizers, weedicides, growth regulators, planting material. The dependent variable was yield of pineapple per hectare.

The results of regression analysis in the production of pineapple by sample cultivators are presented in the Table 4.8. It could be seen from the table that regression coefficient of human labour was -0.0107 and was non-significant.

**Table 4.5. Yield and return structure of pineapple garden in study area**

Sl. No.	Period (years)	Yield (t/ha)	Total value (Rs.)
1	2	70	565467.70
2	3	62	500842.82
	Total	132	1066310.52
	Average return / year	66	533155.26
	Average net return / year	-	461278.50

**Table 4.6. Cash flow analysis of pineapple garden**

(in Rs)

Sl. No.	Year	Cash inflow	Cash outflow	Net cash flow
1	1	-	214464.40	-214464.40
2	2	565467.70	71876.89	493590.80
3	3	500842.82	71876.89	428965.93
	Total	1066311.00	358218.20	708092.30

**Table 4.7. Financial feasibility of investment in pineapple garden in study area**

Sl. No.	Particulars	Units	Value
1.	Net present value (@ 9% discount rate)	Rs./ha	532221.51
2.	Benefit cost ratio (@ 9% discount rate)	-	3.48
3.	Internal rate of return	Per cent	84.07
4.	Payback period after bearing	Years	0.46

**Table 4.8. Estimates of Cobb-Douglas Production function and ratios of MVP to MFC in pineapple garden**

Particulars	Regression coefficients						R <sup>2</sup>
	Intercept	Human labour (b1)	Fertilizer (b2)	Weedicides (b3)	Growth regulators (b4)	Planting material (b5)	
	-2.5585	-0.0107 (0.0219)	0.0021 (0.0156)	-0.0003 (0.0135)	-0.0075 (0.0091)	0.9722* (0.0329)	0.9435
MVP: MFC	-	-0.5173	0.0377	-0.0611	-0.7059	15.0927	-

Note : \* Significant at one per cent level.

Figures in parentheses indicated standard error.

The regression coefficient of fertilizer was positive and non-significant at both 1 per cent and 5 per cent levels of significance (0.0021). The regression coefficient of weedicides was negative and non-significant at both 1 per cent and 5 per cent levels of significance (-0.0003). The regression coefficient of growth regulator was also negative and non-significant at both 1 per cent and 5 per cent levels of significance (-0.0075). The regression coefficient of planting material was positive and significant at 1 per cent level of significance (0.9722).

The ratios of marginal value product (MVP) to marginal factor cost (MFC) for various resources worked out and presented in Table 4.8.

The ratios of MVP to MFC was positive and less than unity for fertilizer (0.0377) indicated that the resource was overutilized.

The ratio of MVP to MFC was negative for human labour (-0.5173), weedicides (-0.0611) and for growth regulator (-0.7059), which indicated that over utilization of the resource by farmers in pineapple cultivation.

The ratio of MVP to MFC was positive and more than unity for planting material (15.0927) indicated that the resource was underutilized.

The coefficient of multiple determination was 0.9435, which indicates that 94 per cent of variation in pineapple yield was explained by the five independent variable included in the model, remaining 6 per cent of variation in the yield of pineapple was explained by error term. The regression coefficients with negative sign for inputs like human labour, weedicides and growth regulators indicated that they have adverse impact on yield of pineapple with further application of these inputs.

Regression coefficients with positive sign for inputs like fertilizer planting material indicated that they will have an positive impact on the pineapple yield with further application of these two resource in the production process.

## 4.6 MARKETING MARGINS IN DIFFERENT MARKETING CHANNELS OF PINEAPPLE

In the effort to study marketing aspects of pineapple fruits, marketing channels were identified and marketing cost, price spread and margins have been worked out.

### 4.6.1 Marketing channels

Marketing channels through which pineapple in the study area was marketed from the producers to the ultimate consumers are presented in Table 4.9. The two channels identified in the marketing of pineapple were :

Channel – I : Producer → wholesaler → wholesaler cum commission agent at distant market → retailer → consumer.

Channel – II : Producer → retailer → consumer.

In the channel – I, wholesaler himself brought the produce to distant market and sold through wholesaler cum commission agents. For the service rendered by the wholesaler cum commission agent, he charged 6 per cent commission of total value of produce marketed. As per the information collected from the respondents 98 per cent of producers sold their produce through this channel, 129 tonnes of produce through this channel.

In the channel – II, retailer himself brought the produce to the market and sold directly to consumer at local market. There is only 2 per cent of produce sold through this channel, 3 tonnes of produce sold through this channel.

### 4.6.2 Marketing cost incurred by the intermediaries

The item wise marketing cost per tonne incurred by intermediaries in the channel-I and channel - II are presented in Table 4.10.

It could be seen from the table that in channel - I i.e. fruit sold at farm level on an average total marketing cost incurred by the wholesaler worked out to Rs. 4470 per tonne of pineapple. The significant item of cost was transportation cost which amounted to Rs. 2852

per tonne of pineapple constituting 63.79 per cent of total marketing cost. The next important item was commission charges (Rs. 627.10/tonne) followed by wastage charges (Rs. 578.08/tonne). The other expenses incurred were equipment and other cost (Rs. 213.52/tonne), loading cost (Rs. 100/tonne) and labour charges (Rs. 100/tonne).

Further, the table indicated that the retailers incurred a total marketing cost of Rs. 557.68 per tonne. The major items of costs was transportation cost, which amounted to Rs. 261.97 per tonne (46.97% of total marketing cost), followed by equipment and other cost (Rs. 129.10/tonne), loading charges (Rs. 98.16/tonne) and labour charges (Rs.68.45/tonne).

### 4.6.3 Price spread in marketing of pineapple

Pineapple fruits passed through various intermediaries from producer to reach ultimate consumers. The intermediaries involved rendered variety of services in the process of marketing of pineapple fruits with a view to earn some profit. The quantum of margin of the intermediaries serves as an indicator of the efficiency of the marketing system.

#### 4.6.3.1 Channel - I

Marketing cost and margin of the agencies involved in the marketing of pineapple are presented in the Table 4.11. The producer share in consumer rupee in Channel – I was 47.32 per cent. The total marketing cost incurred by the producer was nil. The net price received by the producer was Rs. 6270.94. The price spread in first channel was Rs. 6979.06 of which Rs. 4470.7 was the cost incurred by the wholesaler, Rs. 800 and Rs. 300 by wholesaler cum commission agent and retailer respectively. Profit of wholesaler registered highest amount that is Rs. 779.94, followed by that of retailer (Rs. 450) and wholesaler cum commission agent (Rs. 178.42).

#### 4.6.3.2 Channel II

In channel II the produce moved from producer to retailer and finally to consumers. The price spread in Channel – II is also given in Table 4.11. It shows that producer's share in consumer's rupee was more in this channel (49.25%) compared to first channel. Gross price received by producer in this channel was very high (Rs. 6389.67) compared to first channel. The price spread in second channel was Rs. 6582.16 of which Rs. 557.68 was the cost incurred by retailer and the remaining (Rs. 6024.48) was his profit.

## 4.7 PROBLEMS IN PRODUCTION AND MARKETING OF PINEAPPLE

Opinion survey was conducted to know the constraints in production and marketing of pineapple fruits and the results are presented in Table 4.12 and 4.13 respectively.

### 4.7.1 Problems in pineapple production

Opinion survey conducted to know problems in the production of pineapple are indicated in Table 4.12. Inadequate electricity for irrigation was the major problem experienced by most of the farmers (98.33%). The other problems were high cost of planting material (83.33%), non-availability of planting materials in time (95%), non-availability of adequate hired labour (58.33%), non-availability of fertilizers in time (50%), lack of technical know how (26.67%), non-availability of credit in time (20%), high cost of borrowing (13.33%) and 3.33 per cent of farmers were experienced the problem of heart rot disease.

### 4.7.2 Problems in marketing of pineapple fruits

From the Table 4.13 it could be seen that, 93.33 per cent of farmers opined absence of regulated market. The other problems faced by the farmers were lack of grading facilities (86.76%), non-availability of market information (86.67%), fluctuation in market price (28.33%), lack of cold storage facilities (75.00%) and 11.67 per cent of farmers opined about weighment problems.

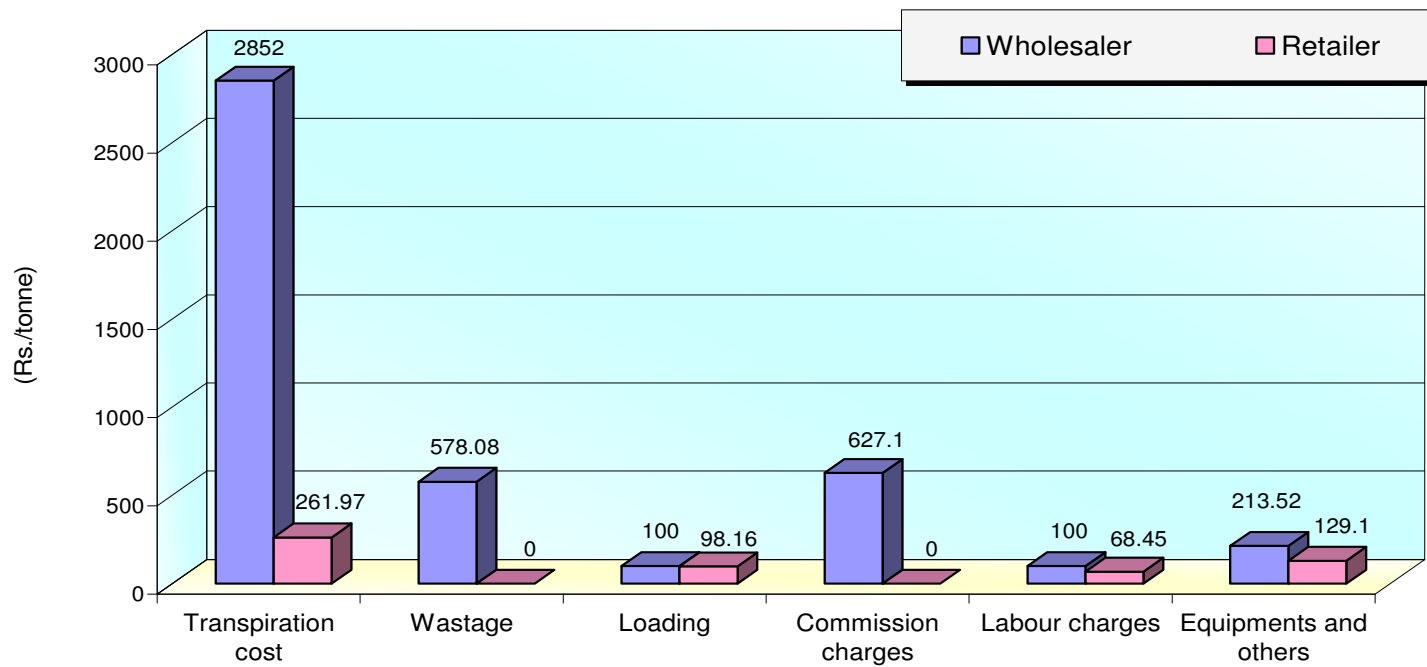
**Table 4.9. Marketing channels identified in pineapple marketing**

Sl. No.	Channel	Intermediaries involved	% of producers sold through the channel	Quantity (tonnes)
1.	I	Producer → Wholesaler → wholesaler cum commission agent at distant market → retailer → consumer	98	129
2.	II	Producer → retailer → consumer	2	3
Total			100	132

**Table 4.10. Marketing cost incurred by market intermediaries (Rs./tonne)**

Sl. No.	Particulars	Wholesaler	Retailer
1.	Transportation cost	2852.00 (63.79)	261.97 (46.97)
2.	Wastage	578.08 (12.93)	-
3.	Loading	100.00 (2.24)	98.16 (17.60)
4.	Commission charges	627.10 (14.03)	-
5.	Labour charges	100.00 (2.24)	68.45 (12.27)
6.	Equipments and others	213.52 (4.78)	129.10 (23.15)
	Total cost	4470.70	557.68

Note : Figures in the parentheses indicate percentages to the total.



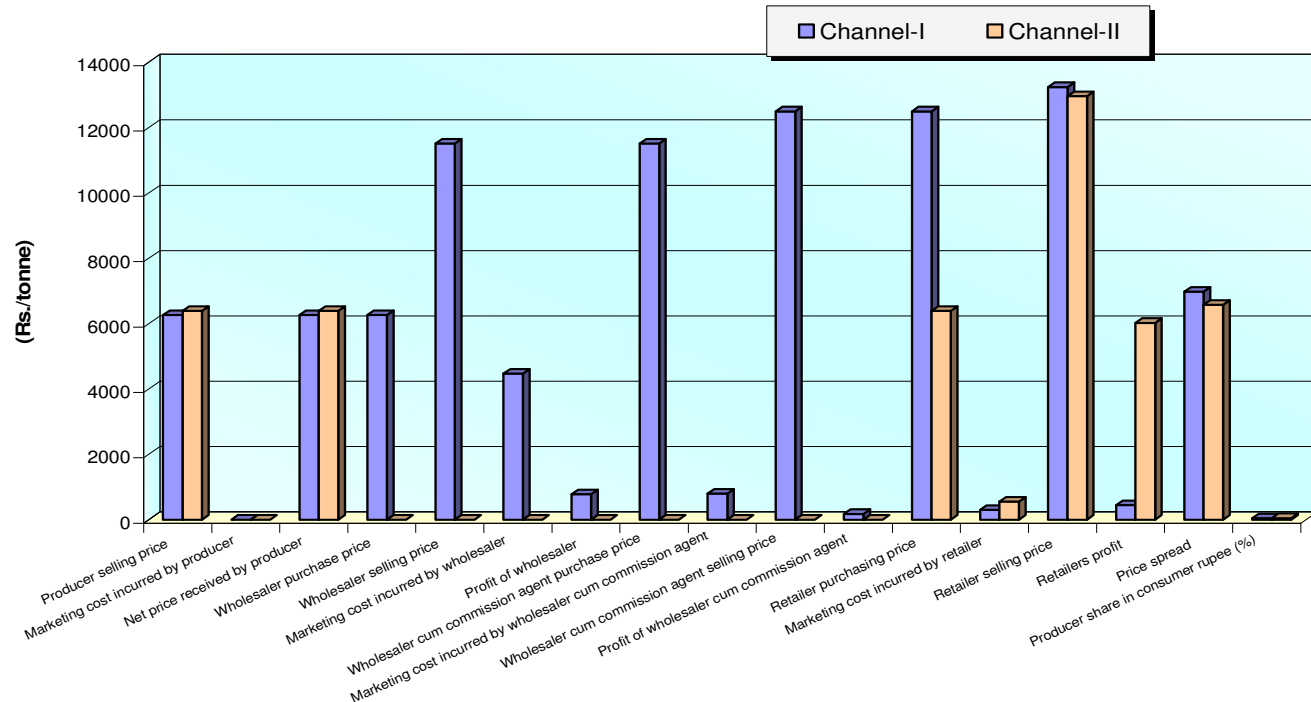
**Fig.4. Marketing cost incurred by market intermediaries (Rs./tonne)**

**Fig.4. Marketing cost incurred by market intermediaries (Rs./tonne)**

**Table 4.11. Price spread in marketing of pineapple in different channels**

(Rs./tonne)

Sl. No.	Particulars	Channel – I (Rs.)	Channel – II (Rs.)
1.	Producer selling price	6270.94	6389.67
2.	Marketing cost incurred by producer	-	-
3.	Net price received by producer	6270.94	6389.67
4.	Wholesaler purchase price	6270.94	-
5.	Wholesaler selling price	11521.58	-
6.	Marketing cost incurred by wholesaler	4470.70	-
7.	Profit of wholesaler	779.94	-
8.	Wholesaler cum commission agent purchase price	11521.58	-
9.	Marketing cost incurred by wholesaler cum commission agent	800.00	-
10.	Wholesaler cum commission agent selling price	12500.00	-
11.	Profit of wholesaler cum commission agent	178.42	-
12.	Retailer purchasing price	12500.00	6389.67
13.	Marketing cost incurred by retailer	300.00	557.68
14.	Retailer selling price	13250.00	12971.83
15.	Retailers profit	450.00	6024.48
16.	Price spread	6979.06	6582.16
17.	Producer share in consumer rupee (%)	47.32	49.25



**Fig. 5. Price spread in marketing of pineapple in different channels**

**Fig. 5. Price spread in marketing of pineapple in different channels**

**Table 4.12. Problems perceived by farmers in production of pineapple**

Sl. No.	Particulars	Number of farmers (60)
1.	Non-availability of planting materials in time	45.00 (75.00)
2.	Non-availability of fertilizers in time	30.00 (50.00)
3.	Inadequate electricity for irrigation	59.00 (98.33)
4.	Non-availability of adequate labour	35.00 (58.33)
5.	Lack of technical know how	16.00 (26.67)
6.	High cost of planting material	50.00 (83.33)
7.	Non-availability of credit in time	12.00 (20.00)
8.	High cost of borrowing	8.00 (13.33)
9.	Heart rot disease of pineapple	2.00 (3.33)

Note : Figures in the parentheses indicate percentages to the total.

**Table 4.13. Problems perceived by farmers in marketing of pineapple**

Sl. No.	Particulars	Number of farmers
1.	Absence of regulated markets	56.00 (93.33)
2.	Fluctuation in market price	17.00 (28.33)
3.	Lack of grading facilities	52.00 (86.67)
4.	Lack of cold storage facilities	45.00 (75.00)
5.	Delay in payments	3.00 (5.00)
6.	Weighment problems	7.00 (11.67)
7.	Non-availability of market information	52.00 (86.67)

Note : Figures in the parentheses indicate percentages to the total.

## 5. DISCUSSION

The results of the investigation presented in the preceding chapter are discussed in detail in this chapter. The main focus here is to throw light on some of the causes responsible for the major trends observed in findings. This kind of analysis is hoped to identify some of the policy measures and execute corrections that can be implemented to overcome the constraints encountered by pineapple growers. Keeping objectives of the study in view the results are discussed under the following heads :

- 5.1 General characteristics of sample farmers
- 5.2 Growth in area, production and productivity of pineapple in Shimoga district and Karnataka.
- 5.3 Cost and returns from pineapple orchard
- 5.4 Financial feasibility of investments in pineapple gardens
- 5.5 Resource use efficiency in pineapple cultivation
- 5.6 Marketing margins in different marketing channels of pineapple
- 5.7 Problems in production and marketing of pineapple.

### 5.1 GENERAL CHARACTERISTICS OF SAMPLE FARMERS

The general characteristics of the farmers in the study area are presented in Table 4.1. From the table it could be observed that the average age of pineapple growers was about 40 years.

So far as the literacy was concerned, it was observed that majority of respondents were literates (60%) having their education ranging from primary to college level. Pineapple is a high investment enterprise has been perceived by these respondents because its higher profitability. Because of their increased standard of living majority of the respondents could pursue better education. Therefore many respondent could attain higher level of education.

The average size of farm of respondents was 9.52 ha. Out of this maximum area was under irrigation. Availability of the better irrigation source might have encouraged the farmers to go for high value cash crops. Pineapple is one of such crops with assured maximum return sufficient irrigation coupled with higher returns might have prompted the farmers in these areas to go for pineapple cultivation. Hence, we could see more than 50 per cent of the area of the farmers was under pineapple. The farmers followed high density planting (50975 plants/ha) to obtain better yields to realize better income.

Kew (40%), Kundlur (36.67%) and Raja (21.67%) varieties of pineapple were grown in the study area by the growers. These varieties were preferred by growers due to easy availability of slips/suckers, better yield resistance to pests and disease and high demand in the terminal market. However, other variety Rani was also found growing by a small proportion (1.67%) of the farmers.

### 5.2 GROWTH IN AREA, PRODUCTION AND PRODUCTIVITY OF PINEAPPLE IN SHIMOGA DISTRICT AND KARNATAKA

The growth rate of area, production and productivity for the period 1980 to 2006 for Shimoga district and from 1994 to 2004 for Karnataka state as a whole are depicted in Table 4.2. Growth rate analysis has shown an increase of 3.50 per cent, 0.43 per cent of area annually in Shimoga district and Karnataka state as a whole respectively. The maximum increase in area was found in Shimoga district as compared to state as a whole, due to suitability of climate to cultivate pineapple and more awareness among farmers towards horticultural crops especially for pineapple due to highest profitability in Shimoga district.

Production and productivity of pineapple crop had higher growth rate for Karnataka state as compared to Shimoga district. The farmers in Shimoga district were using the known variety of crop with standardized cultural practices. Hence productivity was more or less

stabilized over the years. But in other parts of Karnataka where the crop was grown, the farmers might have gone for improved package of practices to achieve better yields.

Variation in area, production and productivity for Shimoga district was stabilized over the years. Variation in area, production and productivity for Karnataka state was more compared to Shimoga district because of high fluctuation in area, production and productivity of pineapple in other parts of the state over the years studied.

## 5.3 COST AND RETURNS FROM PINEAPPLE ORCHARD

### 5.3.1 Establishment cost of pineapple garden

The investment pattern in pineapple is similar to the one found in any other fruit crops. Heavy investment is needed for establishing a pineapple garden. The cost of establishing a pineapple garden upto bearing period was treated as establishment cost.

For establishing pineapple garden investment has to be made on land preparation, planting, planting material, fencing, land rent, land revenue, fertilizers, irrigation weeding growth regulators, etc.

The cost of establishing of pineapple garden was higher (Rs. 214464.4) compared to other fruit crops grown in the study area. It was mainly because of the high cost of planting material and more use of fertilizer and growth regulator and weedicides.

The cost incurred on planting material was the major component of the establishment cost which as eaten away around 25 per cent of the total establishment cost. Though the cost of planting material was cheap (Re 1/slip), the total requirement of slips due to high density planting had contributed substantially to the total establishment cost. Because of higher profitability in pineapple crop, many farmers shifted to pineapple cultivation. Hence, the availability of planting material was not sufficient to meet the demand of farmers. Therefore, pineapple slips were transported from distant places. Because of this the cost of planting material was more.

The cost incurred on land preparation was also very high because of the use of machine labour and human labour, pipeline cost was also higher because of adoption of improved irrigation methods like sprinkler irrigation.

Cost of fertilizer was around 10 per cent of total establishment cost. Pineapple is a shallow feeder with high N and K requirement. Since these nutrients are prone to heavy losses in soils, farmers in study area practiced high fertilizer doses. The recent fertilizer management techniques like tar coating of area before applying and application of fertilizer in ring basin method would reduce the loss of fertilizers and hence would bring down the cost of fertilizers. Such cultural practices may be explored and farmers may be guided properly through extension network to reduce the cost of cultivation by proper management of fertilizer application.

### 5.3.2 Maintenance cost of pineapple garden during bearing period

The maintenance cost of pineapple garden during bearing period, that is from second year onwards was assumed to be same in each year as mentioned in the Table 4.4. The total per year maintenance cost of pineapple garden was Rs. 71876.89 per hectare.

Cost of fertilizer was the major component of maintenance cost which comprise around 33 per cent of the total maintenance cost. It was seen in the study area that farmers of pineapple did not use FYM as the availability of FYM was very less and the requirement of FYM for pineapple was also very huge. Hence, pineapple growers in these area resorted to use higher doses of fertilizers to supplement the nutrient requirements, which led to increased fertilizer cost. The measures suggested in establishment cost section may also be considered to reduce the cost of maintenance.

Depreciation on machinery and equipments was another important maintenance cost item. Pineapple cultivation heavy machinery intensive enterprise in the study area. The investment capacity of the farmers enabled them to hire/purchase machinery to cultivate the crop.

Due to the use of large amount of growth regulators for synchronization at flowering, fruit setting, fruit developing, cost of growth regulator was also high compared to other items of cost.

### 5.3.3 Yield and return structure of pineapple garden

The average yield obtained per hectare in case of pineapple was 66 tonnes which was higher compared to other fruit crops growing study area. This was mainly due to the improvement in technology, more use of fertilizers, growth regulators etc. However, it varies considerably from locality to locality depending upon the cultural practices adopted by the cultivators.

The average returns obtained from pineapple garden was Rs. 533155.26. Due to fruit size, shape and taste of fruits, farmers got better price to their product. Though the pineapple cultivation confined to a limited area, demand for this fruit spread throughout the country. This is also one of the main reasons for better price in the study area.

Annual average net returns was Rs. 461278.50 because the gross returns obtained from the pineapple was very high compared to the cost incurred by the farmers.

### 5.3.4 Cash flow in pineapple garden

The average annual cost per hectare in pineapple garden from second year onwards during the bearing period was Rs. 71876.89 and it remained same until the crop was uprooted.

The returns from the pineapple started flowing from second year onwards upto the three and half year from planting. It takes very less time to bearing compared to other fruit crops like mango, sapota, guava etc. Quick turnover is also possible in this crop. This clearly indicates the reason why the large number of farmers preferred this crop in study area.

## 5.4 FINANCIAL FEASIBILITY OF INVESTMENTS IN PINEAPPLE GARDENS

Pineapple is a perennial fruit crop. Once established continues to bear upto three and half years. Returns are expected from second year onwards. Till then heavy investment is required. Once the resources are committed retrieval is impossible. Further, this needs vast resources and income is spread over a number of years. Therefore, costs and returns have to be analyzed carefully to test the worthiness of investment in pineapple enterprise. This analysis helps farmers in decision making. Hence the techniques of project evaluation such as net present value, benefit cost ratio, pay back period and internal rate of returns were employed in pineapple enterprise.

In analyzing investment feasibility, the establishment costs, maintenance costs and gross returns from the main crop and ratoon crop were considered at 9 per cent discount rate representing the opportunity cost of capital.

Net present value (NPV) criterion helps to evaluate the benefits accrued and costs incurred during the project life. One advantage of NPV is that it gives an idea about surplus money that would be generated by a project at a given discount rate. It is an absolute measure and varies with level of investment and discount rates. In this study NPV was calculated by discounting the net cash inflows. The NPV of pineapple per hectare at 9 per cent discount rate were Rs. 532221.51.

The formal selection criterion of NPV is to accept all projects with positive values. Applying this principle net present value of pineapple clearly indicated feasibility of investment in pineapple garden.

Benefit cost ratio is another tool for appraising the worthiness of investment and it helps to ascertain the profitability of an enterprise. Benefit cost ratio was calculated by taking the ratio of discounted net cash flow and initial investment.

The decision in B:C ratio framework is to select the projects where the ratio is more than one. The B:C ratio was 3.48 at 9 per cent discount rate which satisfies the rule indicating the worthiness of investment on pineapple garden. The B:C ratio indicates expected returns for each rupee of investment in pineapple enterprise.

IRR is suggested to be a very suitable measure for evaluating the profitability of investment on different projects. The IRR is the rate of discount at which the present worth of project is zero or the discounted costs are equal to the discount returns. It is superior over the other measures, since it takes into consideration the reinvestment opportunities of enterprises during the life span.

The formal selection criterion of IRR is to accept the projects with IRR more than the opportunity cost of capital. The internal rates of return were 84.07 per cent. The IRR represents the maximum rate of interest at which the growers can borrow from lending agencies and invest on pineapple garden. In other words, it is the average earning power of money invested on pineapple during its life span. Since IRR was more than the opportunity cost of capital it clearly indicated that investment on pineapple garden is a financially feasible.

The payback period refers to the time required for the net benefits to equal the cost of the project. In the present study it worked out to be 0.46 years.

Thus all the four criteria of investment feasibility analysis revealed that investment in pineapple garden is a feasible proposition.

## 5.5 RESOURCE USE EFFICIENCY IN PINEAPPLE CULTIVATION

The results depicted in Table 4.8 showed that the planting material had higher influence on production of pineapple in the study area. The regression coefficient for planting material was 0.9722. It indicated that one per cent increase in planting material would result in 0.97 per cent increase in the pineapple production (yield). Positive elasticity coefficient with respect to fertilizer was non significant and indicated that these resources were not contributing significantly to the production (yield) of the crop.

Negative production elasticities were found with respect to human labour (-0.0107), weedicides (-0.0003) and growth regulators (-0.0075) which indicated that these resources had negative impact on production of pineapple i.e., one per cent increase in human labour, weedicides and growth regulator resulted in 0.0107, 0.003 per cent and 0.0075 per cent decrease in pineapple production (yield). In other words these resources viz., human labour weedicides, growth regulators were already optimally used in the production process.

Coefficient of multiple determination was 0.9435 indicated that 94.35 per cent of variation in yield was explained by selected independent variables viz., human labour, fertilizer, weedicides, growth regulator and planting material, included in the model. Only remaining 5.65 per cent of variation in yield explained by error term.

The ratio of MVP to MFC were worked out for all the variables presented in Table 4.8. The ratio of MVP to MFC less than unity for human labour (-0.5173) fertilizer (0.0377), weedicides (-0.0611) and growth regulator (-0.7059) which indicated that these resources were used excessively in pineapple cultivation.

The ratio of MVP to MFC for planting material was more than unity indicated that this resource was underutilized in pineapple cultivation therefore there is scope to increase yield by increasing the use of this resource.

## 5.6 MARKETING MARGINS IN DIFFERENT MARKETING CHANNELS OF PINEAPPLE

### 5.6.1 Marketing channels

As indicated in the results, the two channels of marketing of pineapple were identified in the study area.

Channel - I : Producer → wholesaler → wholesaler cum commission agent at distant market → retailer → consumer.

In the channel – I wholesaler himself brought the commodity to distant market and sell through the wholesaler cum commission agent. There is no marketing cost incurred by the producer. About 98 per cent of producers sold their commodity through this channel.

Because wholesaler took the commodity directly to distant market where the commodity having large demand for large quantity of fruits.

Channel – II : Producer → retailer → consumer.

Channel - II consisted producer, retailer and consumer. Here also retailer himself brought the commodity to local market and sold in different places at different prices according to the demand for fruit. Only 2 per cent of producers sold their commodity through this channel because this fruit had no big local market for large quantity of fruits produced in study area. Hence channel – II is suitable only for small quantity of fruits.

Though the producers profit more in channel – II he preferred only the channel – I due to the reason mentioned in the above paragraphs.

### 5.6.2 Marketing cost incurred by the market intermediaries

Analysis of the marketing cost incurred by the market intermediaries are presented in Table 4.10.

Total marketing cost incurred by wholesaler per tonne was Rs. 4470.7 of which transportation cost (63.74%) contributed more to the total cost of marketing because he himself only took the commodity to distant market from the farmer field. Next major marketing cost was commission charges (14.03%). Which was to the service rendered by commission agent he charges 6 per cent of total value of commodity. Wastage cost (12.93%) was also high due to the wastage of commodity during transportation to distant market. Other cost contributes less to the total marketing cost like equipment and others cost (4.78%), loading (2.24%) and labour charges (2.24%).

Total marketing cost incurred by the retailer also presented in Table 4.10. He also paid high transportation cost (46.97%) because he himself took the commodity from the farmer field to local market. Bulkiness of commodity was also one of the reason for high cost of transportation. Remaining cost includes loading (17.60%), labour charges (12.27%) and equipment and other cost (23.15%), total marketing cost incurred by the retailer was Rs. 557.68.

### 5.6.3 Price spread in marketing of pineapple

The share of producer in consumer rupee was higher (49.25%) in channel – II as compared to channel – I (47.32%) which was due to presence of additional market intermediaries in channel – I. Apart from the wholesaler and retailer there was another intermediary, wholesaler cum commission agent in Channel – I. Also the price received by producer from wholesaler was low as Rs. 6270.94 compared to the price received from the retailer by selling the commodity directly to him. But still then the farmers preferred wholesalers to sell the commodity because of the high price fluctuation in open market and also because of the credit facilities that he extends and fruits does not have large demand in local market where the retailer transacted. This was also one of the main reasons as to why the farmers preferred the Channel-I.

## 5.7 PROBLEMS IN PRODUCTION AND MARKETING OF PINEAPPLE

### 5.7.1 Problems faced in production

An informal discussion with the sample farmers revealed that as such there are problems in production of pineapple. The opinion survey was conducted for the sample farmers who produce pineapple, to ascertain the problems faced. The results of the opinion survey presented in Table 4.12 are discussed here.

Majority of the pineapple growers (98.33%) in the study area expressed the problem of inadequate electricity for irrigation because of regular power cut. Tube wells are the only source of irrigation in the study area. Due to non-availability of three phase power supply for sufficient period, farmers were not able to provide sufficient quantity of irrigation for the pineapple garden.

Another problem was that of high cost of planting material (83.33%) of pineapple in the study area because of high transportation and labour cost.

Non-availability of quality planting material in time was another problem indicated by 75 per cent of farmers. Most of the farmers started growing the pineapple crop and even the mother plant takes more time to produce the daughter plant hence the most of the farmers facing the shortage of planting material in study area.

Nearly 50 per cent of the farmers expressed the problem of non-availability of fertilizers in time because inadequate amount of fertilizer stock in study region.

About 58.33 per cent of farmers expressed the problem of non-availability of adequate hired labour because pineapple is a labour intensive crop and availability of the labour was a problem especially during the peak time of harvesting, weeding season which coincides with other agriculture operations.

26.67 per cent of farmers faced the problem of lack of technical know-how about pineapple production. It is mainly because extension network by the extension department in the region.

Nearly 20 per cent of farmers faced the problem of non-availability of credit in time. They could not get credit from institutional agencies and all they borrowed was from money lenders. This has resulted in high cost of borrowing (13.33%).

Heart rot of pineapple was another major problem which needs to be addressed effectively. Research and extension machinery has to be geared up in this region to mitigate this problem.

### 5.7.2 Problems in marketing of pineapple

An informal discussion with the sample farmers revealed that with the marketing of pineapple they have lot of problems.

The opinion survey was conducted for the sample farmers who sold their produce to the wholesaler or retailer to know the problems in marketing of pineapple fruits. The results of the opinion survey presented in Table 4.13 are discussed here.

About 93.33 per cent of farmers reported that the absence of notification of the commodity in regulated markets. Markets for pineapple fruits are located at distant places and pineapple is not a notified commodity in regulated markets. Pineapple market was controlled only by some people. Majority of the market intermediaries engaged in pineapple marketing belongs to Muslim community. They have the good knowledge about this crop and market at distant places.

About 28.33 per cent of farmers opinioned that there was wide fluctuation in market price. Because of perishable nature of this commodity and also arrival of large quantity of fruits to the market at the same time, bad climatic conditions and involvement of market intermediaries were the reasons for such fluctuation in prices.

Nearly 86.67 per cent of farmers experienced the problem of lack of grading facilities at farmers level because most of the farmers not having knowledge about this crop and marketing system at distant market. Market intermediaries purchased the commodity at low price without grading and they sold the commodity at distant market after grading at high prices. Even the farmers do not have any other alternatives to dispose their goods hence they were not able to protest against all those activities of market intermediaries in study area.

About 75 per cent of farmers faced the problem of cold storage facilities at local area. Because of high cost for cold storage construction farmers were unable to have the cold storage with their own cost. Hence farmers failed to get better price in the market. They dispose their goods at whatever the price prevailing in the market. Only 5 per cent of farmers faced the problem of delay in payment because the problems faced by the market intermediaries at distant market resulted in delay in payments.

Nearly 11.67 per cent of farmers faced the problem in weightment. Most of market intermediaries do not use the accurate weighing tools like weighbridge. But the farmers were unable to protest against them because of the fear of rejection of their produce.

About 86.67 per cent of farmers faced the problem of non-availability of market information at farmers level. The market for pineapple in the study area was not an organised one. The market was mainly controlled by some whole sales who do not leak the information to the farmers. Hence the farmers had to solely depend upon the market intermediaries to sell their product.

Thus the pineapple growers have large number of problems in marketing their produce. There is a need for an agency to help the growers in marketing of the produce. Even though the pineapple cultivation is profitable, there are lot of lacuna in marketing of pineapple. Hence there is immediate need to organize marketing of pineapple through cooperative lines in the study area.

## 6. SUMMARY AND POLICY IMPLICATIONS

India has been a predominantly agrarian economy since time immemorial. The development efforts over the last few decades have doubtlessly strengthened our industrial base. However, agriculture continues to be the mainstay of our economy. Even today more than 67 per cent of population depends on it.

As is well known, India with its diversity of soil and climate is advantageously placed for producing practically all variety of tropical and sub-tropical fruits. Pineapple (*Annus comosus* L.) is one of the fruits which is being cultivated in our country.

Pineapple is good source of vitamins A and B, pineapple is fairly rich in vitamin A, calcium, magnesium, potassium and iron. It is also a source of bromelin, a digestive enzyme. Pineapple is mainly used as dessert fruit and also in processing industry to make jam, jelly, squash, canning purpose, tit bits, pineapple fruit popularly known as “queen of fruits”.

Pineapple grown in Thailand, Brazil, Malaysia and Mexican countries is used in processing industry either for canning or converted into juice and most of it is exported to Europe and North America. India's total export value of fresh pineapple fruits was Rs. 159.97 lakhs during 2002. The major markets for fresh as well as processed Indian pineapple are Nepal, Saudi Arabia, UAE, Qatar, Kuwait and UK etc.

In India it is predominantly grown in states like West Bengal, Assam, Meghalaya, Bihar, Manipur, Nagaland, Kerala and Karnataka. These states contribute more than 70 per cent of total pineapple production in the country.

In Karnataka pineapple crop occupied an area of 2142 ha during 2002-03 and was cultivated in 10 districts Shimoga, Uttar Kannada, Dakshina Kannada, Udupi, Chikkamagalur were the most predominant pineapple growing districts.

In Shimoga district, where the study was conducted, pineapple has been grown on commercial scale. The area under pineapple in this district was 1043 hectares during 2000-03. The important pineapple varieties grown were Kew, Raja, Kundlur and local.

The economics of pineapple production is indispensable since there is no proper farm business data on its cost of production. The accurate figure on establishment cost, operating cost and input requirement of pineapple orchard would be greatly helpful to the pineapple producers in general. This information will be of immense use to farm financing institutions.

Marketing also is part and parcel of production. It is very important stage at which the producer will be in a position to reap the best out of his efforts. The farmers as producers have neither the time nor the skill to undertake several activities involved in the process of marketing individually. Therefore, they cannot afford to take up marketing, which is complex and risky. Secondly the wholesaler who play a dominant role in marketing of pineapple, do not transfer the legitimate share of sale proceeds to the farmers. Therefore, the exploration of market opportunities and the development of a suitable market structure for the supply of pineapple from the point of production to the consuming centres are of great importance in this regard. With these points in view, an economic analysis was carried out in production and marketing of pineapple in Shimoga district.

1. To analyse temporal variations in area, production and productivity of pineapple in the study area.
2. To analyse the economics of production of pineapple in the district
3. To study the financial feasibility of investment in pineapple gardens in the district.
4. To identify marketing channels and estimate their price spreads.
5. To study the problems associated with production and marketing of pineapple.

Selection of sample farmers

Pineapple has been cultivated in few districts of Karnataka. Shimoga district is one of the major producers of pineapple in Karnataka. The area under pineapple in 2004-05 was 1430 hectares with production of 71500 tonnes. Pineapple is cultivated in five taluks of Shimoga district. However, the large scale cultivation of pineapple is concentrated in Soraba

and Sagar taluks. Hence these taluks were purposively selected for the study. From the selected sample taluks of Shimoga district, villages were selected based on the number of pineapple growers, number of respondents were randomly selected to obtain primary data. With regard to economics of production of the crop. Thus the total sample size was 60 pineapple growers from the two selected taluks put together. In addition, 10 wholesalers and 20 retailers involved in pineapple business in the study area were also interviewed.

#### Analytical techniques

For analyzing the data collected during the study tabular presentation compound growth rate analysis, financial feasibility analysis, functional analysis were employed.

The tabular presentation was employed for estimating the cost and return structure and also the problems faced by the pineapple growers in study area.

Compound growth rate analysis was employed to know the growth rate in the area, production and productivity of pineapple cultivation in Shimoga district and Karnataka state.

In order to know the financial feasibility of investment in pineapple cultivation the measures of project evaluation namely, net present value (NPV), benefit cost ratio (BCR), payback period (PBP) and internal rate of return (IRR) were employed.

The Cobb-Douglas production function was fitted to evaluate the resource use efficiency in the production of pineapple.

#### Findings

The growth rate analysis for area, production and productivity of pineapple in Shimoga district and Karnataka revealed positive growth in area, production and productivity. However, area growth was much higher in Shimoga district as compared to the state as a whole.

The total cost of establishment per hectare of pineapple garden was found to be Rs. 214464.40 of which total fixed cost was Rs. 182777.7 (85.225%) and total variable cost was Rs. 31686.69 (14.78%).

Out of the total fixed cost, cost of planting and planting material together contributes (25.18%) more to the total fixed cost followed by pipeline cost (16.19%), depreciation cost (15.29%), interest on fixed capital (10.22%) and cost of fencing (9.95%). To the total variable cost, contribution of fertilizer and its application (9.83%) was more followed by growth regulator and its application (2.18%) and weeding and weedicide application was (1.61%).

The average annual cost incurred by the farmer in maintaining the orchard during the period was Rs. 71876.89 per hectare. The major component of the variable cost was fertilizer constituting 32.98 per cent of total maintenance cost followed by growth regulator (6.54%) weeding (4.79%), earthing up (4.13%) and harvesting (3.65%) costs, fixed cost land rent (3.48%), land revenue (0.01%), depreciation (30.42%) and interest on fixed capital was 9.95 per cent were prominent.

The average yield of pineapple obtained by the sample farmers in study area was 61 tonnes per hectare which yielded an average gross return of Rs. 533155.06 per hectare. The orchard started yielding from second year. The average net returns per hectare worked out to be Rs. 461278.50.

Net present worth for the gardens in the study area was Rs. 532221.51. The benefit cost ratio at 9 per cent discount rate was 3.48. The pay back period was 0.46 years. The internal rate of return (IRR) was 84.07 per cent. Thus the investment in pineapple garden was highly profitable economically feasible and financially viable.

The two different channels of marketing of pineapple were identified in the study area. They are

1. Producer → wholesaler → wholesaler cum commission agent at distant market → retailers → consumer
2. Producer → retailer → consumer.

The wholesaler plays an important role in marketing of pineapple. The total marketing cost incurred by the wholesaler worked out to Rs. 4470 per tonne of pineapple. The significant item of cost was transportation cost (Rs. 2852/tonne) followed by commission charges (Rs. 627.10/tonne), waste charges (Rs. 578.08/tonne) and equipment and other cost (Rs. 213.52/tonne).

Retailers incurred a total cost of Rs. 557.68 per tonne. The major items of costs was transportation cost (Rs. 261.97/tonne) followed by equipment and other costs (Rs. 120.10/tonne), loading charges (Rs.98.16/tonne) and labour charges (Rs. 68.45/tonne).

The profit of wholesaler registered highest amount that Rs. 779.94 per tonne followed by retailer (Rs. 450) and wholesaler cum commission agent was (Rs. 178.42) in channel I. In second channel retailers margin was Rs. 6024.48.

From the discussions with the sample farmers it was found that most of the farmers had the problem of non-availability of planting material in time, non-availability of fertilizer in time, non-availability of sufficient quantity of irrigation, non-availability of adequate hired labour, lack of technical knowhow, high cost of planting and heart rot disease of pineapple. Majority of the sample farmers sold their produce to the wholesaler. The major problems in marketing of pineapple fruits were absence of regulated markets, lack of cold storage facilities, lack of grading facilities, fluctuation in market price, non-availability of market information, delay in payments and weightment problems.

Opinion survey was conducted for the sample farmers who sold produce to the wholesaler. Almost all the farmers indicated risk involved in marketing of produce of the main reason for not taking up the marketing of fruits on their own. The other reasons for selling the produce to the wholesale were distant markets credit obtained from the wholesalers etc.

#### POLICY IMPLICATIONS

Based on the findings of the study, the necessary steps to be taken up in the areas of investment, production and marketing of pineapple are drawn and are presented as under.

1. Eventhough the growth in area, production and productivity was positive, the growth in productivity was very low because of adoption of local variety in cultivation by majority of the farmers which calls for intensive efforts to increase area under high yielding varieties in study region.
2. The study revealed that the producers shares in consumer rupee is very less. Market intermediaries enjoy lions shares and producers are hard hit. In order to reduce the unwanted clutches of intermediaries, the producers themselves can taken up marketing the produce at distant market by collective marketing process.
3. The exploitation by wholesaler and retailers in marketing of pineapple is too much. The cooperative effects, by organizing marketing of pineapple in the lines of SAFAL or HOPCOMES can be explored to provide better returns to the efforts of the farmers.
4. Storage of the agricultural commodities has very important role to play to enhance the self life of the products and thus offer the commodity for sale in a phased manner to avoid unnecessary glut in the market and there by slump in the prices. The problem is more acute in the most perishable commodities like pineapple. The establishment of cold storages both at primary and terminal levels would improve the marketability of the fruit.
5. It was revealed from the study that use of FYM or organic manure and bio-pesticides was almost nil in the study area. Increased awareness and there by increased demand for organically grown products in recent years is of crucial importance interms of marketability of the produce. Hence, organic farming in pineapple has lot of scope. Therefore, the cultivators may think in these lines to produce organic pineapple.
6. The production function analysis revealed that the planting material has been under-utilized per hectare. Hence, this calls for technological development to include more number of plants per unit area to increase the productivity of the crop.

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# APPENDIX I

Date :

## Schedule – A

### I. General information :

1. Name of the respondent : \_\_\_\_\_
2. Age (years) : \_\_\_\_\_
3. Education : Illiterate/Pri./Sec./HSc./SSLC/PUC/G/PG.Diploma
4. Village : \_\_\_\_\_
5. Taluk : \_\_\_\_\_
6. Nearest market for the commodity : \_\_\_\_\_ Dist \_\_\_\_\_ km \_\_\_\_\_
7. Main occupation : \_\_\_\_\_
8. Subsidiary occupation : \_\_\_\_\_
9. Annual income : Rs. \_\_\_\_\_

II. Family size : Male : \_\_\_\_\_ Female : \_\_\_\_\_ Children : \_\_\_\_\_

### III. Farm inventory position

#### Land inventory

Sl. No.	Particulars	Irrigated		Rainfed		Land revenue		Land rent	
		Under pineapple	Under other crops	Under pineapple	Under other crops	Irrigated	Rainfed	Irrigated	Rainfed
1.	Land owned								
2.	Land leased in								
3.	Land leased out								

#### b. Farm building

Sl. No.	Items	Year of construction	Construction cost (Rs.)	Present value (Rs.)
1.	Dwelling house			
2.	Farm house			
3.	Cattle house			
4.	Storage house			
5.	Others (specify)			

#### C. Farm machinery and equipments pertaining to pineapple

Sl. No.	Items	Number	Year of purchase	Purchase value (Rs.)	Current value (Rs.)
A	IP sets				
B	Sprayers				
C	Spades				

D	Picaxes				
E	Manuring baskets				
F	Fencing of protection				
G	Tractor				
H	Power tiller				
I	Dusters				
	Other if any (Specify)				
	i.				
	ii.				
	iii.				
	iv.				

d. Livestock

Sl. No.	Animals	Number	Year of purchase	Purchase value (Rs.)	Current value (Rs.)
1.	Cows				
	i. Local				
	ii. Crossbred				
2.	Buffalos				
	i. Local				
	ii. Crossbred				
3.	Bullock pair				
4.	Calves				
5.	Poultry				
	i.				
	ii.				
	iii.				
6.	Sheep				
7.	Goat				
8.	Other s				

V. Source of irrigation

Sl. No.	Particulars	No.	Area covered (acres)	Cost of irrigation
1.	Tank			
2.	Canal			
3.	Open well			
4.	Tube well			
5.	Others			

Establishment cost of pineapple

Year of establishment :                      Variety :                      Number of acres :  
 Age :                      Years :                      Economic life of the plant :

Sl. No.	Operations	No. of times	Materials (qtls)		Prices /unit	Labour				Machine labour	Bullock labour	
			Own	Purchased		Men		Women			Owned	Hired
						FL NO	HL NO	FL NO	HL NO			
I.	Land preparation											
i.	ploughing											
ii.	Harrowing											
iii.	Clod crushing											
iv.	Pitting											
v.	Preparation of pipeline											
vi.	preparing drainage channels											
	Manures											
	i.    FYM											
	ii.   Fertilizer											
	Planting											
	Irrigation											
	Weeding											
	Earthing											
	PP measures											
	Growth regulators											
	Watch and ward											
	Fencing and protection											
	Any others											
	1.											
	2.											

FL : Family labour  
Wage per day

HL : Hired labour  
Men :

Women :

Bullock labour :

Maintenance cost of pineapple

Machine labour :



Harvesting details of pineapple

Month	No. of harvest	Total (t)	Family labour			Hired labour		
			M	W	C	M	W	C
May								
June								
July								
August								
September								
October								
November								
December								
January								
February								
March								
April								

Disposal of produce

Month of harvest	Qty harvested (t)	Qty spoiled (t)	To whom sold (t)	Qty sold	Unit price

Opinion of respondents on the constraints in production and marketing

A. Production

1. Did you seek technical guidance to grow this crop ? Yes/No.
2. If yes, who provided it ?
3. Were you satisfied with the advice provided ? If not give reasons
4. Do you get adequate number of hired labourers ? Yes/No  
If No, for what activity ?

Sl. No.	Activity	Season	Reasons
1.		Khariif/Rabi/Summer	
2.		Khariif/Rabi/Summer	
3.		Khariif/Rabi/Summer	

5. Awareness of recommended dose/practice :

Inputs/practices	Aware	Not aware
1.		
2.		
3.		

6. Disease and pest incidence

Particulars	Aware	Not aware
Insects 1. 2.		
Diseases 1. 2.		
Insecticides 1. 2.		
Pesticides 1. 2.		

7. Availability of inputs

Input	Quality		Timeliness		Cost	
	Sufficient	Insufficient	Timely	Delayed	Reasonable	High cost
Planting material						
Fertilizers						
Pesticides						
Irrigation						
Credit						

B. Marketing

a. Did you face any transport problem ? Yes/No.

If yes specify

- i. Non availability of tractor/cart
- ii. Bad connecting road
- iii. Hire charges
- iv. Others

b. Are you satisfied with the present marketing channels ?

Commission agent/wholesaler/retailers

If not, what part of marketing channels you are not satisfied ? Why ?

c. When do you collect price information ?

- a. Daily
- b. Weekly
- c. More than once a week
- d. Fortnightly
- e. As and when required

d. Source of market information

- a. News paper/ Radio/TV/ Relatives/Personal visit to market \_\_\_\_\_
- b. Merchants

e. Are you satisfied with the price received for your crop ? If not what price you wanted and why could not get that price ?

f. Are you satisfied with the market performance ?

g. If not what suggestions to you make to improve performance ?

## APPENDIX II

### Market functionaries

#### Commission agent/wholesaler/retailers

Name of the respondent : \_\_\_\_\_ Age : \_\_\_\_\_ Education : \_\_\_\_\_  
Place : \_\_\_\_\_  
Taluka : \_\_\_\_\_  
District : \_\_\_\_\_  
Annual income : \_\_\_\_\_

Quantity handled/annum : \_\_\_\_\_ tonnes  
Types of ownership : Individual/partnership / any other

Year of establishment :

Information on fruits procurement and sale

Sl. No.	Source	Quantity	Price/t	Period of procurement	Wastage	Qty sold	Sale price
1.							
2.							
3.							

How long you are in this business ?

Do you know the arrivals / prices of pineapple prevailing in other markets ?

Yes/No.

On what basis you form price ?

What facilities do you provide to the producer who brings produce for sale  
Loan/storage/transportation/advance payment/any other

Do you grade the pineapple Yes/No

If yes Do you make payment according to the grader : Yes/No.

Methods used in fixing the prices for different grades

Grade specification

Grade	Specification	Av. Quantity handled

Do you provide any credit facilities to the growers who bring the produce to your shop ?

Yes/No.

If yes \_\_\_\_\_

To how many growers

Maximum duration for which amount is advanced

Average amount advanced  
 Condition to advancing loans  
 Mode of recovery  
 Interest paid  
 Total amount advanced  
 Do you provide any input facilities to growers Yes/No.

If Yes \_\_\_\_\_

Type	Quantity kg/q/t	Value (Rs.)
Fertilizer		
Pesticide		
Insecticides		
Others		

V. Investment made in the business

A. 1. Owned (Rs.) \_\_\_\_\_ 2. Borrowed : \_\_\_\_\_ 3. Interest rate :

B. Investment on

i. Godowns (no. of godowns) : Amount (Rs. ) \_\_\_\_\_  
 ii. On shops (No. of shops ) Amount (Rs.) \_\_\_\_\_  
 iii. On equipment : \_\_\_\_\_  
 iv. If any \_\_\_\_\_

VI. Marketing costs

A. Do you have shop owned/rented :

1. If rented, what is the rent /year :  
 2. Licensed fee : 3. Maintenance cost :  
 4. Tax paid ; 5. Insurance :

B. Other marketing costs :

Mode of transport :  
 Distance traveled :  
 Total quantity transported :  
 Transportation charges :  
 Cost incurred in loading/ unloading :  
 Wastage :  
 Commission paid :

c. Labour employed in marketing of pineapple

Sl.No.	Employee	No.	Nature of work	Payment
1.	Permanent			
2.	Casual			
3.	Family			

VII. Transaction activity  
A Purchase Activity

Months	Total qty purchased	Price per unit (Rs.)	Total value (Rs.)	From whom	From where	Remarks

B. Selling activity

Month	To whom sold	Place of sale	Sale method	Qty sold	Price/ unit (Rs.)	Total value	Wastage		Commission paid	
							Qty	Value	Qty	Value

Opinion of market functionaries on the constraints in marketing of pineapple

B. Marketing

a. Did you face any transport problem ? Yes/No.

If yes specify \_\_\_\_\_

Non availability of tractor/ cart

Bad connecting road

Hire charges

Others

b. What are your suggestions to solve them ?

c. Are you satisfied with the present marketing channels ?

Commission agent / wholesaler/retailers

If not, what part of marketing channels you are not satisfied ? Why

d. When do you collect price information ?

a. Daily

b. Weekly

c. More than once a week

d. Fortnightly

e. As and when required

e. Source of market information

a.

b.

c.

f. Are you satisfied with the price received for your crop ? If not what price you wanted and why could not get that price ?

g. Are you satisfied with the market performance ?

k. If not what suggestions do you make to improve performance ?

1.

2.

3.

# PRODUCTION AND MARKETING OF PINEAPPLE IN SHIMOGA DISTRICT – AN ECONOMIC ANALYSIS

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2008

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## ABSTRACT

The study of economics of production and marketing of *Ananus comosus* is indispensable, since there is no proper farm business data on its cost of production and marketing. Economic analysis on production and marketing of pineapple was conducted in Shimoga district of Karnataka state. Primary data was collected from 60 farmers and 30 market functionaries spread over two taluks of Shimoga district. For analysis of data tabular analysis, compound growth rate analysis and financial ratio analysis were adopted.

The per hectare total cost of establishment was Rs.214464.40. The total maintenance cost during bearing period was Rs.71876.89. The average yield of pineapple was 66 tonnes per hectare per year, which accounted for about Rs.533155.26. The average net return per hectare per year was Rs.461278.50. Financial feasibility analysis showed that NPV for orchard was Rs.532221.51 per hectare at 9 per cent discount rate. The B:C ratio at 9 per cent discount rate was 3.48. The IRR was found to be 84.07 per cent. The pay back period after bearing period was 0.46 years. Functional analysis showed that 94.35 percent of variation in yield was explained by the variables included in the model, such as human labour, fertilizers, weedicides, growth regulators and planting material. Only planting material significantly contributed to the yield. MVP:MFC ratio indicated that almost all variables were over utilized in production process except planting material. Hence, still there is scope to increase the planting density to obtain the better yields. As the investment in pineapple orchard was financially feasible, the farmers, who wish to establish pineapple garden, may do so even if they have to borrow for establishing the orchards at the prevailing rate of interest from financial institutions. As the high density of planting yield higher returns, it is advisable for the farmers to go for high density planting.