

**ECONOMICS OF PRODUCTION AND MARKETING OF
PATCHOULI IN NORTH KARNATAKA**

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I. INTRODUCTION

Aromatic plants are the plants, which contain essential oils in them. These essential oils or volatile oils as they are often called are found in different species of plants which are known to be very complex in their chemical nature. These are the mixture of acyclic and cyclic monoterpenoids, the physiological significance of which as far as the plant is concerned is not obvious. These probably represent byproducts of metabolism rather than foods and they have no apparent function in the plants with regard to primary metabolism.

The characteristic flavour and aroma that they impart are basically advantageous in attracting insects and other animals which play a key role in pollination or dispersal of seeds and fruits. However, the aroma in these essential oils is being exploited largely in perfumery, cosmetic and pharmaceutical industries.

India has a perfumery tradition that dates back to over 5000 years to Indus valley civilization. In the excavations of Harappa and Mohanjodaro, a "water distillation still" and "receiver" have been recorded whose shape resemble the "deg" and "bhaka" currently used by "attars" (traditional perfumers) of kannauj in India.

Bucchbauer Gerhard (1990) has recorded examples of several aromatic plants presently in use for medication which have come to us from our ancestors inhabiting different countries. Thus, 'aniseoil', 'citronella oil', 'eucalyptus oil', 'spruce oil' and aroma chemicals like camphor, menthol, cineol, thymol and guacacol are still used as both aromatic and additive. In addition to the aromatic oils, the finer perfumes contain fixative substances, which are less volatile than the oils which delay equalize evaporation. There are several aromatic species which are utilized for this purpose. Patchouli is one among them.

The patchouli plant was first described by Pelletier Scutelet and named *Pogostemon patchouli*. In 1986, Holmes identified it as *Pogostemon cablin* Benth. a native of the Philippine islands, the word "Cablin" being arrived from "Cablam", vernacular name of the plant in the Philippines. The plant has also been described by Blanco in his Flores de Filipinos as *Mentha cablin*. Patchouli (*Pogostemon patchouli* pellet syn. *P. Cablin* Benth) is a potential member of laminaceae known for its aromatic property. It is the source of commercial patchouli oil available in Domestic and International market (Ahmed, 2002).

Today the true patchouli plant of commerce, *Pogostemon cablin* Benth. (syn. *P. patchouli* pellet) belonging to family Laminaceae, which serves for distilling the essential oil is cultivated in British Malaya (Straits Settlements and Johore State) and more extensively in Indonesia (Northern Sumatra). The Malayan Vernacular term "Dhulam wangi or tilam wangi" means sweet or cultivated patchouli. Patchouli is grown mainly in Indonesia, Malaysia, China and to lesser extent in Madagascar, Reunion and Seychelles.

The commercial oil of patchouli is obtained by steam distillation of the shade dried leaves and is one of the most important naturally occurring essential oil used in perfumery industry. Although rarely used as dominant source of fragrance in its own right, the oil is widely used to give a solid foundation and lasting character to a fragrance. Patchouli oil has notably strong fixative properties and helps to prevent rapid evaporation of a perfume and thereby promotes, tenacity, its dominant woody note, although the aroma possesses other characteristics and is very complex. The oil is generally blended with other essential oils, such as geranium or clove before use.

Patchouli oil is used in a wide range of toilet soaps, scents, lotions, pre-shave and after-shave lotions and detergents. Its strong tenacity render it to be particularly suitable for heavy perfumes and for imparting a lasting character and strength to lighter perfumes. In very low concentration (0.002% or 2.21 ppm) the oil is extensively used as a flavour ingredient in major food products including alcoholic and non alcoholic beverages, frozen dairy desserts, candy, baked goods, gelatin, meat and meat products. Blended with sandalwood, it gives one of the finest attars, widely used in soaps, cosmetics, tobacco and incense sticks.

Dry patchouli leaves are used for scenting wardrobes. The leaves and tops are added in bath for their antirheumatic action. In Chinese medicine, decoction from the leaves are used with other drugs to treat nausea, vomiting, diarrhoea, cold and headaches (Lecung,

1980). A related species patchouli (*Pogostemon heyneanus*) is reported to contain principle possessing anticancer activity (Purushothaman *et al.*, 1985).

Adulteration of patchouli oil is quite common and is done on large scale. The main adulterant is gurjon balsam oil. The other adulterants include copaiba balsam, oil, 8-camphene methanol, cedar wood oil, castor oil and isobornyl acetate etc (Farooqi *et al.*, 2000).

Pogostemon cablin yields patchouli oil, which has a great demand in the perfume and flavour industry. At present, the global requirement of patchouli is met mainly through production from Indonesia. However, due to adverse conditions in Indonesia, the supply of oil is irregular. India's available infrastructure and environment can provide an opportunity to gain a major part of the world market.

Commercial cultivation of the crop in India was first attempted by Tata Oil Mills in 1942 (Kumar *et al.*, 1986). After initial stray attempts to grow the crop, its systematic cultivation started in 1962 by CIMAP (Kumar *et al.*, 1986). Though efforts have been made by several institutions since early fifties, current indigenous production of patchouli oil is hardly a few hundred kilograms and that too with high quality variation.

The pleasant aroma and versatility of Patchouli and its extensive usage in perfume, beverage, agarbathi, soap and food industry has increased its market potentiality. Indian demand for Patchouli oil is around 220 tons valued at 33 crores while global demand is to the tune of 1600 tons of oil per annum with a value of 240 crores (Vijaya Kumar, 2004). Since there is no systematic chemical to replace the Patchouli oil its unique market position in aroma industry is further enhanced (Farooqi *et al.*, 2001). International prices have recently gone up to US \$20 to 25 per kg, therefore landed cost would be higher than Rs. 1500 per kg. From the above figures, there is large potential for patchouli oil production in India.

Although, most of the global market demand is met by Indonesia, the quality of oil produced is inferior with iron contamination, due to poor and crude extraction and processing ability. On the contrary, large part of the distilled oil in India is processed in quality stainless steel vessels making the oil superior and light coloured. The opinion of perfumes worldwide substantiate that the Indian patchouli oil has an excellent odour profile and free from iron contamination making it acceptable even for fine fragrance manufacturing (Venugopal *et al.*, 2004). In the new era of globalization and quality competitiveness, India has an edge over others for global patchouli oil market with focussed programmes for promoting cultivation of this plant. India with its vast geographical area and diverse climate can become the second largest producer of patchouli oil in the world.

IMPORTANCE OF THE STUDY

The commercial cultivation of patchouli is of recent origin in India. It is slowly spreading in the states of Karnataka, Gujarat, Assam, Andhra Pradesh and Kerala. Karnataka is a leading producer of patchouli. In Northern Karnataka, the area is spreading faster than ever before. The districts of Uttar Kannada, Haveri, Dharwad, Belgaum and Bellary have recorded higher acreage (Venugopal *et al.*, 2004). Presently, the crop covers an estimated area of 200 acres in northern districts of Karnataka (Venugopal *et al.*, 2004).

North Karnataka is blessed with diverse agro-climatic conditions in the districts such as Uttar Kannada, Haveri, Belgaum, Dharwad, which provides optimum growing conditions for patchouli. Warm and humid places with fairly heavy and even distribution of rainfall are preferred by patchouli. The districts of Uttar Kannada, Haveri have humid climate with good rainfall distribution, suitable for cultivation of patchouli.

Indian demand for patchouli oil is around 220 tonnes valued around 33 crores (Vijaykumar, 2004). But, current production of patchouli oil is hardly few hundred kilograms with large variation in quality (Farooqi *et al.*, 2000). In spite of farmers' enthusiasm to cultivate patchouli, there is huge scarcity of genuine planting material at reasonable price. Lack of market information and inability to increase the yield potentiality due to lack of advanced technology are a few major constraints to mention. Therefore, there is a need to reorient the production and marketing structure. Hence, a comprehensive study on production and

marketing of patchouli has become imperative. Therefore, the study was undertaken with the following specific objectives.

1. To study the feasibility of investment in Patchouli cultivation
2. To analyse the cost and returns in Patchouli cultivation
3. To study different marketing channels used by the Patchouli cultivators
4. To ascertain constraints in production and marketing of Patchouli

HYPOTHESIS

1. Investment in patchouli cultivation is financially feasible
2. Patchouli production is a profitable enterprise
3. There are many marketing channels in patchouli marketing
4. Patchouli growers in the study area are facing numerous production and marketing problems

LIMITATIONS OF THE STUDY

The area, production and marketing of patchouli have not been documented by any institution/government. Thus, the data on production and estimated requirement do suffer from lack of authentic statistical information.

Since, the data was collected by survey method, the inherent lacunae associated with this type of enquiry have crept into the study, even though the estimates were provided by the recall memory on account of the non-maintenance of the farm records. Sincere efforts have been made to elicit accurate and reliable information as far as possible by cross questioning, the degree of discrepancy if any would be negligible as the estimates presented are in averages.

It may however, be recognized that the finding of the study need not be generalized beyond the boundaries of the area under investigation and applicable to such other areas having similar agro-climatic and socio-economic conditions.

PRESENTATION OF THE STUDY

For analytical convenience the thesis is organized into seven chapters. Initial chapter encompasses the introduction, the scope and the objectives of the study. Chapter two presents a review of the relevant literature relating to the topic under study. Chapter three covers the sources of data and methodology used in the study. Chapter four presents the results of the study, while chapter five is concerned with discussion; chapter six presents the summary and policy implications of the study and last chapter presents the list of literature referred for the study.

II. REVIEW OF LITERATURE

This chapter reviews the research work done in the fields related to the objectives of the study. There are hardly any comprehensive studies made available on economics of production and marketing of patchouli marketing channels and production and marketing problems. Since, patchouli is an aromatic crop, which is perennial it is essential to have better understanding about the new crop and to maintain the tempo of production and marketing of patchouli in the long-run. A few studies conducted on production and marketing of medicinal and perennial crops in general and aromatic crops in particular have been reviewed and are presented under the following sub-heads.

- 2.1 Cost and returns in the cultivation of perennial crops and aromatic and medicinal crops
- 2.2 Financial feasibility of perennial crops
- 2.3 Marketing channels and marketing costs
- 2.4 Problems in production and marketing of aromatic and perennial crops

2.1 COST AND RETURNS IN THE CULTIVATION OF PERENNIAL CROPS AND AROMATIC AND MEDICINAL CROPS

Ravishankar (1993) estimated the average cost of cultivation and net returns of Davana (*Artemesia pallens*) at Rs. 8,145 per acre and Rs. 6,090 per acre, respectively. The net return per rupee of total cost was found to be Rs. 0.74, while the same per rupee of variable cost was at Rs. 1.07.

Farooqi and Vasundhara (1997) studied the cost of cultivation of medicinal plants like Ashwagandha, Coleus, Long pepper (as inter crop in coconut garden) and Periwinkle. They found that the cost of cultivation and the net returns per acre for Ashwagandha were Rs. 2,267 and Rs. 9,878 respectively followed by Coleus (Rs. 2,631 and Rs. 29,757), Long pepper (Rs. 36,599 and Rs. 86,477) and Periwinkle (Rs. 3,846 and Rs. 16,396).

Suneetha (1998) studied the cost of cultivation of medicinal crops in Kerala. The cost of cultivation of *Plumbago*, *kaempferia*, *Aloe*, *Ocimum* and long pepper as inter crops in coconut garden was estimated using partial budgeting technique. These medicinal crops provided additional returns of Rs. 30,340 per acre per annum. The additional cost involved in cultivation was Rs. 25,091 per acre for all the above mentioned medicinal crops.

Jarial (1999) estimated the total expenditure in the cultivation of Safed musali at Rs. 2,95,000 and total income at Rs. 6,30,000 per acre. He also estimated that the total cost of cultivation per acre of Senna was Rs. 3,700 and income from the sale of leaves were Rs. 15,000. Net income observed during the first year was Rs. 11,300 and it was Rs. 13,300 during the subsequent years.

Lokesh (1999) estimated the total cost of cultivation of sweet flag at Rs. 28,789 per acre in the case of sewage water farms and Rs. 30,880 in the case of ground water farms. The average yield and gross returns per acre was higher (23.02 quintal and net returns of Rs. 54,374) in the case of sewage water farms than the ground water farms (16 quintal and Rs. 45,152).

Vasudeva (1999) observed that the total cost of cultivation of periwinkle per hectare was Rs. 15,000 and the returns from leaves, stem and root were Rs. 36,000, Rs. 3,000 and Rs. 30,000 respectively. The net profit was Rs. 54,000.

Farooqi *et al.* (2000) in their study had worked out the economics of Rosemary cultivation at Bangalore and found that the cost of establishment was Rs. 64,400 and the average cost of maintenance was Rs. 19,400 per ha per year. It was revealed from the study that expenditure on the planting material (Rs. 50,000) was the single largest item. It was also revealed that expenditure on distillation (Rs. 4000), fertilizers (Rs. 4000), plant protection (Rs.

3000) and harvesting (Rs. 2000) were the main items in the maintenance cost of Rosemary cultivation.

Farooqi *et al.* (2001) they had worked out the economics of Palmarosa cultivation at Bangalore and found that the cost of establishment was Rs. 15355 per ha and maintenance cost was Rs. 14,900 per ha per year. From this study, land preparation (Rs. 4000) and was the main cost of the establishment, distillation and fertilizers were the main costs in maintenance cost of Palmarosa cultivation. They also worked out the economics of geranium cultivation in Bangalore and found that the cost of establishment geranium was Rs. 87,000 per ha and average cost of maintenance was Rs. 16,500 per ha per year. They found that the average net returns was Rs. 83,500. It was revealed from the study that cost of planting material (Rs. 75,000), harvesting (Rs. 2000) and distillation cost were the important items of expenditure. They worked out Patchouli cultivation in Bangalore had worked out the economics of patchouli cultivation. They found that the establishment cost was Rs. 65800 per ha and the average net returns was Rs. 78,800 per year. From their study, it was revealed that cost of planting material (Rs. 50,000) was the single major important cost in the establishment of the crop.

Jadhav *et al.* (2001) studied per hectare cost of cultivation of Isabgoal and Patchouli and was Rs. 3994.46 and Rs. 32707.16 and per acre returns were Rs. 5172 and Rs. Rs. 1012114, respectively. The per acre return of Patchouli was more than the Isabgoal. The Benefit Cost ratio was 1.26 and 2.00 for Isabgoal and Patchouli, respectively.

Subrahmanyam and Gajanan (2001) reported that the growers of lemongrass in Idukki district of Kerala realised Rs. 5,996 as net returns per acre after meeting Rs. 24,017.50 towards the cost of cultivation including distillation.

Farooqi and Vasundhara (2001b) estimated the cost of cultivation of Ashwagandha and found that the cost on FYM was Rs. 400 (2 tonnes) and cost on seeds was about Rs. 1000 (5.0 kgs). Net returns obtained per acre of Ashwagandha was Rs. 9878 after meeting the cost of production (Rs. 2267).

2.2 FINANCIAL FEASIBILITY OF PERENNIAL CROPS

Thakur *et al.* (1987) evaluated economic feasibility and profitability of kinnow plantations in Kangra district of Himachal Pradesh. The study revealed that the investment on plantation was Rs. 8,208 and maintenance cost was Rs. 10,580 per acre. The pay back period for the orchard was 6 years. The total net present worth was Rs. 13,040. The internal rate of returns was as high as 46 per cent for the plantation.

Mallareddy (1989) made an attempt to evaluate the financial feasibility of sweet orange plantation in Prakasam district, Andhra Pradesh. The study showed that per acre net present value for the entire life period of the project was found to be Rs. 11,833.43 in case of small orchard, Rs. 27,540.33 in large orchard and Rs. 16,682.94 in average orchard. The discounted benefit cost ratio at 12 per cent discount rate was 1.28 in small orchard, 2.04 in large orchard and 1.47 in average orchard. The pay back period was eight, seven and eight years in small, large and average orchards, respectively and internal rate of returns was 14.70, 21.24 and 16.26 per cent in small, large and average orchards respectively.

Azad and Sikka (1991) in their study on production and marketing of temperate fruits applied project evaluation measures to study economic viability of fruits like apple, peaches and plum. The net present value was Rs. 26,237 for apples, Rs. 89,222 for peaches and Rs. 1,17,137 for plums. The internal rate of return was 32, 36 and 47 per cent respectively. The benefit cost ratio were 1.36, 3.87 and 5.10 in that order.

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. 73,804 per hectare. The benefit cost ratio internal rate of returns and pay back period were found to be 3.88, 57.82 per cent and 6 years respectively.

Koujalagi and Kunnal (1992) evaluated financial feasibility of pomegranate orchards in Bijapur district of Karnataka. The study revealed per hectare establishment cost was Rs. 15,230 and maintenance cost was Rs. 13,050. The discounted benefit cost ratio at 12 per

cent discount rate was 1.53. The net present worth for the entire life period of the project was Rs. 18,283.81. The payback period was 6.56 years and internal rate of return was 15.55 per cent.

Hiremath (1993) in his study on economics of production and marketing of lime, estimated the cost and returns at a discounted rate of about 14 per cent and computed the principal financial feasibility measures namely NPV, BCR, IRR and payback period. At normal cost and returns NPV was y.1,16,183.61, y.1,34,793.90 and y.138263.24 for small, medium and large gardens, respectively. The BCR was about 3.06, 3.74 and 3.93 for small, medium and large gardens, respectively. IRR was about 25.82, 27.65, 28.23 per cent and PBP was about 7.00, 6.61 and 6.40 years for small, medium and large gardens, respectively.

2.3 MARKETING CHANNELS AND MARKETING COSTS

Singh and Kahlon (1968) reported that the sale of grapes in Punjab through retailer was highest (41.05%) followed by sales through commission agents (40.60 per cent), wholesalers (11.26%) and pre-harvest contractors (4.53%).

Singh and Kahlon (1969) in a study on marketing of grapes in Punjab observed that commission agents and retailers were important channels for selling grapes. About 41 and 40 percent of produce was marketed through commission agents and retailers respectively. Further analysis showed that grading and packing formed 72.6 percent of total marketing costs in the primary markets transportation cost accounted for 10.96 percent and 34 percent in these markets respectively.

George and Singla (1969) studied marketing of sweet oranges in Punjab and found that 77.39 percent of farmers disposed their produce to the pre-harvest contractors, 20.38 per cent to the distant terminal markets and rest to the local whole salers and retailers and directly to consumer.

Kochhar and Thakur (1971) reported that most common mode of marketing apples in Himachal Pradesh was through commission agents which accounted for about 85.63 of the marketable surplus. The next important method of sale was through pre-harvest contractors which accounted for only 14.67 percent of total marketable surplus.

Krishnamurthy *et al.* (1978) studied the economics of production and marketing of Coorg mandarin oranges in Karnataka and found that the pre-harvest contractors made a net profit of R. 25.06 per thousand fruits and incurred expenses of Rs. 24.24 commission charges which were Rs. 10.71 per thousand fruits formed 44.18 percent of the total marketing cost. Harvesting and transportation costs were the other important items of marketing cost. The grower received Rs. 57.89 per thousand fruits.

Patil *et al.* (1983) studied the marketing margins and price spread in the marketing of Alphonso mangoes in Ratnagiri district. Out of the four identified channels the direct sale to consumer was the most profitable, while selling through pre-harvest contractors was the least profitable.

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

Raikar (1990) identified five channels of trade in cashew nut namely.

1. Grower → Itinerant trader → Processor
2. Grower → Pre-harvest contractor → Itinerant trade → Processor
3. Grower → Village dealer → Processor
4. Grower → Trader (wholesaler) → Processor

5. Gower → Processor

6. Grower → Commission agent → Trader (wholesaler) → Processor

The result further revealed that producer's share in consumer's rupee was more in channel-3. This share was reduced to 37.50 % when producer sold his standing crop to pre-harvest contractor (Channel 2).

The producer's share in the consumer's rupee was the highest in Bijapur market (54.82 percent) followed by Hubli (49.33 percent) and Bangalore markets (48.11 percent) in spite of receipt of lower net prices of Rs. 487.92 by the producers in Bijapur market as compared to Rs. 505.65 and Rs. 553.27 per quintal received by the producer in Hubli and Bangalore markets, respectively.

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

Channel-1 : Farmer → Pre-harvest contractor → secondary wholesaler

Channel-2 : Farmer → pre-harvest contractor → commission agent → wholesaler → retailer → consumer.

Channel-3 : Farmer → Regulated market wholesaler → Retailer → consumer

Channel-4 : Farmer → Regulated market → secondary wholesaler.

Among these, channel-1 and channel-4 dropped for the study because of the involvement of secondary wholesaler in proven marketing, which was very limited. It was found that channel-2 was relatively efficient than that of channel-3 since the share of producer in consumer rupee in channel-3 (71.60%) was higher than that of channel-2 (61.27%) mainly due to distress sale to the pre-harvest contractors who were the usual financiers for the farmers.

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

i. Farmer → Village trader → Wholesaler → Processor → Trader

ii. Farmer → Co-operative marketing society

iii. Farmer → Commission agent → Wholesaler → Processor

iv. Farmer → Processor

A majority of the farmers (60%) adopted channel-I, followed by channel-II (26.25%), channel-III (10%) and channel-IV (3.75%).

Gangal (2002) studied the performance of banana plantation in North Karnataka and identified two important marketing channel through which banana is transferred from produce to ultimate consumes.

Channel-1: Produces → commission agent – cum – wholesales → Retailers → consumes

Channel-2: Produces → produces → village trade → consumes

Nearly 70% of the farmers as well as produce was sold through commission agent cum wholesale and remaining 30% was sold through village level trades.

Vinayak (2005) studied the Ashwagandha cultivation under contract farming in Karnataka. He revealed that cultivation of Ashwagandha was found only under contract farming.

2.4 PROBLEMS IN PRODUCTION AND MARKETING OF AROMATIC AND PERENNIAL CROPS

Ramaiah (1971) in his study on problems of small coffee growers revealed that high incidence of indebtedness and large family size, limited number of co-operatives, credit supply being neither need based. Supply of inputs like fertilizers being untimely and often poor in quality, too much fragmentation of land holdings resulting in a large number of non viable units and inadequacy of technical services were the problems of small coffee growers.

Kantharaju (1989) reported that the incidence of pest and diseases, failure of rainfall and poor planting material were the problems. The problems related to the credit were insufficient time for repayment of loan, non-availability of credit in time and inadequate amount of credit. High rate of taxes, large transportation cost and lack of transportation were the main marketing problems.

Hiremath (1993) studied the economics of production and marketing of lime in Bijapur district, Karnataka and identified the problems relating to production and marketing of lime. The absence of processing facility, absence of cold storage facility, fluctuations in prices were the major problems expressed by 100 percent of farmers and other problems were absence of cooperative marketing of lime, non-availability of packing material at reasonable price and difficulty in transportation.

Senthilnathan and Srinivasan (1994) studied the problems in poovan banana cultivation in Trichy, Lalgudi and Kulithali taluks of Rrichirapalli district of Tamil Nadu. They reported that, in Trichy taluk 20 farmers expressed high initial investment, 16 wind damages, 12 price fluctuations and 10 disease problems. In Lalgudi taluk, 17 farmers expressed high initial investment, 11 price fluctuations, 13 diseases incidence and nine wind damage. In Kulithali, disease incidence expressed by 2, wind damage by 20, initial investment by 18 and price factor by 14 farmers.

Gummagolmath (1995) identified the problems in production and marketing of mango in Dharwad district of Karnataka. 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 percent of medium and 50 per cent of large orchardists and other problems were high commission and existence of under dealing 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 one third of the growers (68%) opined that there was no need to use of fertilizers and plant protection chemicals, high cost of fertilizers (13%) and plant protection chemicals (27%) were other constraints expressed by the cashew growers. They further reported that the 41 and 32 percent of the respondents expressed the high cost of improved planting material and irregular supply of this input, respectively.

Farooqui *et al.* (2000) found that inefficient organization lack of research, unplanned exploitation of natural resources, failure to grow on large scale, inferior method, of production, malpractices and adulteration are the major constraints in the production and marketing of aromatic crops.

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.

Venugopal *et al.* (2004) in this study on the potentials and problems on patchouli cultivation in North Karnataka found that non-availability of genuine planting material, soil fertility status, post-harvest handling, lack of market information and frequent irrigation were the major problems.

III. METHODOLOGY

Various analytical techniques, measures and tools are used to find out the answers for the questions raised in the form of objectives of this study. In this chapter details of methodology followed are discussed under the following headings.

- 3.1 Description of the study area and patchouli crop
- 3.2 Selection of study area and sampling procedure
- 3.3 Nature and sources of data
- 3.4 Analytical techniques
- 3.5 Definitions of terms and concepts

3.1 DESCRIPTION OF THE STUDY AREA AND PATCHOULI CROP

3.1.1 Karnataka

Karnataka is the eighth largest state in India covering an area of 1,91,791 Sq. kilometers, occupying 7.75 per cent of the total geographical area of the Country, bound by Andhra Pradesh in the east, Maharashtra and Goa in the west coast and Tamil Nadu and Kerala in the south and Arabian Sea in the west. Karnataka state is situated between 11°31' and 18°48' North Latitudes and 74°12' and 78°40' East Longitudes and lies in the West-Central part of the Deccan Peninsular India. Its length from North to South is 700 Kms. and from East to West is 400 Kms.

As per the 2001 census, Karnataka is the eighth largest state in India with a total population of about 5.27 crores. The population density of the state was about 275 persons per sq. kilometer. Karnataka state accounts for 5.14 per cent of the country's total population in 2001 as against 5.34 per cent in 1991. The state has 27 districts with 175 taluks and 29,404 villages.

Karnataka is situated in tropical zone and enjoys warm climate throughout the year. The mean temperature ranges from 21.5°C to 31.7°C, the maximum and minimum temperature being 42°C and 14°C respectively. The average temperature in the state is about 24°C. In general, the climatic condition is favourable for crop cultivation.

The normal rainfall of the state ranges from as low as 569 mm to as high as 4029-mm. Average annual rainfall of the state is 1354 mm. The major part of the rainfall of the state is received from the southwest monsoon, which commences in the first week of June and continues till the end of September. Major part of the state has red soils. Laterite soils are found in the hilly and coastal regions of the western parts. The northern part of the state has black soils with high moisture holding capacity. Karnataka is one of the progressive states with excellent potential for horticulture development.

The geographical area of Karnataka State is 190.50 lakh ha, of which an area of 121.82 ha, comes under the cultivable area, constituting 64 per cent of the geographical area. Out of the cultivable area, 15.30 lakh ha is covered under horticulture (Government of Karnataka, 2001). Horticultural area in the state accounts for about 8 per cent of the total geographical area, forming about 13 per cent of the total cultivable area. Out of 15.30 lakh ha, of horticultural area, 6.26 lakh ha comes under garden/plantation crops, 3.77 lakh ha, under vegetables, 2.61 lakh under fruits, 2.45 lakh ha under spice and 0.21 lakh ha under commercial flowers.

3.1.2 Northern Karnataka

The study was taken up in Northern parts of Karnataka due to the concentration of patchouli crop. Northern Karnataka covers a geographical area of 118.98 lakh ha that constitutes about 56 percent of the state total geographical area (190 lakh ha). Northern Karnataka has a population of 1,92,73,000. North Karnataka receives an average annual

rainfall of about 941 mm both from south-west and north-east monsoons. The temperature ranges from 21.5°C to 45.2°C. The climatic endowments are favorable for the production of different crops throughout the year if water is available. There are three distinguished agricultural seasons viz., *Kharif* (June to Sept), *rabi* (Oct to Jan) and Summer (Feb to May). The southwest monsoon commences at the end of May or early June and it continues intermittently till the end of the September.

The North Karnataka comprises of 12 districts of which Uttara Kannada and Haveri districts are chosen since the selected districts have the highest area and production of patchouli in the state and they have suitable climatic conditions for growing this crop. Currently, it is cultivated on a commercial scale in the study area (Table 3.1 and 3.2).

3.1.3 Uttara Kannada district

Uttara Kannada, one of the twenty seven districts of the Karnataka state, is situated roughly in the mid-north-western part of the state. The district lies between 13°55' and 15°31' north latitude and between 74°9' and 75°10' eastern longitude. It is surrounded on the east by Dharwad and Haveri districts, on the south by Shimoga and Udupi districts, on the North by Belgaum district and Goa state and on the west by the Arabian sea. The district is endowed with 144 km of coastal line running from Karwar to Bhatkal taluks.

Uttara Kannada district comprises of 35 hoblis. These hoblis are falling in 11 taluks of the districts. Table 3.1 gives the description of taluks and hoblis in each taluka. The total area of the districts is 1024679 sq. km consisting of 1289 villages (Table 3.1).

Topography, rainfall, climate and soil type

Uttara Kannada district is characterized by highly undulating topography of river basins, mountains, deep valleys and plains. The average altitude ranges from 25 to 619 meters MSL.

The district is hilly and thickly wooded in most of the parts. Its major part is essentially high land, the lowland being restricted to pockets along with course of rivers. A somewhat broken and irregular Sahyadri range of central hills with an average height of 700 m divides the district into two parts, the uplands or the regions above the ghat with an area of nearly 7770 sq. km, which is 600 to 700 meters above sea level and the low lands covering about 3370 sq. km.

The average temperature varies widely through space and touches around 20 to 25°C in the coastal areas and around 12 to 15°C in upghats and plains during winter months (December to February). During summer (March to June) it varies varying between 30 to 38°C across the regions. The air is highly humid all through the year and particularly in the southwest monsoon months (May to September). The sky is heavily clouded or overcast on most of the days during the southwest monsoon season.

The soils are mostly of lateritic origin, which is reddish throughout the district except in coastal areas where only along the coastal belt upto an average distance of 3 kms from sea, coastal alluvial beds are observed.

The geographical area of Uttara Kannada district is 1024679 hectare consisting of 35 hoblis and 1289 inhabited villages. The population of the district was 1353644 and the density of population of the district was 132.42 per sq. km. Average rainfall was 2835.5 mm per year and average number of rainy days were 103.4.

The geographical area of Sirsi taluk is 132233 hectare consisting of four hoblies and 221 inhabited villages. The population of the taluk was 175550 and the density of population of the taluk was 132.99 per sq. km. Average rainfall was 2534.6 mm per year and average number of rainy days were 104.2.

The geographical area of Siddapur taluk is 85928 hectare consisting of three hoblies and 195 inhabited villages. The population of the taluk was 100870 and the density of population of the taluk was 117.42 per sq. km. Average rainfall was 2982.5 mm per year and average number of rainy days were 106.0.

Table 3.1: General features of North Canara district

Sl. No.	Particulars	Unit	North Canara	Siddapura	Sirsi	Yellapura	Study area
1.	Geographical area	Hectares	1024679	85928	132233	130110	348271
2.	Hoblies	No	35	3	4	2	9
3.	Villages	No	1289	195	221	127	543
4.	Population	No	1353644	100870	175550	73497	349917
5.	Density of population	Per sq.km	132.42	117.42	132.99	56.49	102.3
6.	Average rainfall	mms	2835.5	2982.5	2534.6	2698.7	2738.6
7.	Average number of rainy days	No days	103.4	106	104.2	104.6	104.93

*Source: North Canara district at a glance, 2003-04
District Statistical Office, North Canara*

Table 3.2: Land use pattern of North Canara district (2001-02)

(area in ha)						
Sl. No.	Particulars	North Canara	Siddapura	Sirsi	Yellapura	Study area
1.	Geographical area	1024679	85928	132233	130110	348271
2.	Forest area	814455	68130	103270	116986	288386
3.	Land not available for cultivation	50424	2190	4441	2214	8845
4.	Fallow land	19903	1185	251	1061	2497
5.	Net cultivable area	108587	10784	15246	8017	34047
6.	Irrigated area	21039	1034	1805	2660	5499

*Source: North Canara district at a glance, 2003-04
District Statistical Office, North Canara*

The geographical area of Yallapur taluk is 130110 hectare consisting of two hoblies and 127 inhabited villages. The population of the taluk was 73497 and the density of population of the taluk was 56.49 per sq. km. Average rainfall was 2698.7 mm per year and average number of rainy days were 104.6.

Land utilization

The land utilization pattern in the study area has been depicted in Table 3.2. The total geographical area of Uttara Kannada district is 1024679 hectare, out of which the net cultivable area is 108587 hectare. The total irrigated area is 21039 hectare. The area not available for cultivation is 50424 hectare, fallow land is 19903 hectare and 814455 hectare area is under forests.

The total geographical area of Sidapur taluk is 85928 hectares, out of which the net cultivable area is 10784 hectare. The total irrigated area is 1034 hectare. The area not available for cultivation is 2190 hectares, fallow land is 1185 hectare and 68130 hectare area is under forests.

The total geographical area of Sirsi taluk is 132233 hectares, out of which the net cultivable area is 15246 hectare. The total irrigated area is 1805 hectare. The area not available for cultivation is 4441 hectares, fallow land is 251 hectare and 103270 hectare area is under forests.

The total geographical area of Yallapur taluk is 130110 hectares, out of which the net cultivable area is 8017 hectare. The total irrigated area is 2660 hectares. The area not available for cultivation is 2214 hectares, fallow land is 1061 hectare and 116986 hectare area is under forests.

3.1.4 Haveri district

The geographical area of Hangal taluk is 77525 hectare consisting of three hoblies and 151 inhabited villages. The population of the taluk was 230750 and the density of population of the taluk was 297 per sq. km. The growth rate of population in the taluk is 12.67 per cent (1991-2001) during the past decade (Table 3.3).

The geographical area of the Hirekerur taluk is 80,694 hectares consisting of three hoblies and 128 inhabited and 3 un-inhabited villages. The population of the taluk was 2,12,458 and the overall population density of the taluk is 263 per sq. km. The growth rate of population in the taluk was 10.7 per cent (1991-2001) during the past decade (Table 3.3).

The geographical area of Byadagi taluk is 43,656 hectare consisting of two hoblies and 66 inhabited and one un-inhabited villages. The population of the taluk is 1,27,944 and the average population density of the taluk is 293 per sq. km. The growth rate of population in the taluk was 14.27 per cent (1991-2000) during the past decade (Table 3.3).

Climate, rainfall and soil type

There are three distinct agricultural seasons in the district viz., *kharif* (June-September), *rabi* (October-January) and summer (February-May). The southwest monsoon commences by the end of May or early June and it continues intermittently till the end of September.

The average annual rainfall in the district was 752.8 mm with a major portion of the same being received from Southwest monsoon only. The average temperature ranged from 16°C to 42°C. The average annual rainfall in Hangal taluk was 933.4 mm with temperature range of 16°C and 42°C. The number of rainy days in the district was 63 days during 2002 but in Hangal taluk it is 70.5 days.

The average annual rainfall in Hirekerur taluk was 809.11 mm with temperature ranging from 16°C to 42°C. The average number of rainy days in 2002 was 66.5 days.

The average annual rainfall in Byadagi taluk was 712.6 mm with temperature ranging from 16°C to 42°C. The average number of rainy days in 2002 was 63.8 days.

Table 3.3: General features of Haveri district

Sl. No.	Particulars	Unit	Haveri district	Hanagal	Hirekerur	Byadagi	Study area
1.	Geographical area	Hectares	485156	77525	80694	43656	201875
2.	Hoblies	No	19	3	3	2	8
3.	Villages	No	675	151	128	66	345
4.	Population	No	1439116	230750	212458	127944	571152
5.	Density of population	per sq.km	296	297	263	293	284.33
6.	Growth rate of population Percent(1991-2001)	Percentage	13.29	12.67	10.7	14.27	12.547
7.	Average rainfall	mms	752.8	933.4	809.1	712.6	818.37
8.	Average number of rainy days	No days	63	70.5	66.5	63.8	66.93

Source : Haveri district at a glance, 2003-04
District Statistical Office, Haveri

Table 3.4: Land use pattern of Haveri district (2001-02)

(area in ha)						
Sl. No.	Particulars	Haveri district	Hanagal	Hirekerur	Byadagi	Study area
1.	Geographical area	485156	77525	80694	43656	201875
2.	Forest area	47452	8474	8876	4889	22239
3.	Land not available for cultivation	37370	8364	6856	2613	17833
4.	Fallow land	17303	4138	2999	1307	8444
5.	Net cultivable area	359802	51379	54850	33016	139245
6.	Irrigated area	62522	21603	5555	3124	30282

*Source: Haveri district at a glance, 2003-04
District Statistical Office, Haveri*

The major soil type in the district has been red loamy soils, which are shallow in depth and well drained. Some patches of black soils are also found in the district.

Land utilization

The land utilization pattern in the study area has been depicted in Table 3.4. The total geographical area of Haveri district is 4,85,156 hectare, out of which the net cultivable area is 3,59,802 hectare. The total irrigated area is 62,522 hectare. The area not available for cultivation is 37,370 hectare, fallow land is 17,303 hectare and 47,452 hectare area is under forests.

The total geographical area of Hangal taluk is 77525 hectare, out of which net cultivable area is 51379 hectare. In the taluk 8364 hectare of land is not available for cultivation, fallow land is 4138 hectare and forest land is 8,474 hectare during the year 2001-02 (Table 3.4).

The total geographical area of Hirekerur taluk was 80,694 hectare, out of which the net cultivable area was 54,850 hectares. Total irrigated area is about 5555 hectares. In the taluk, area not available for cultivation is 6,856 hectares, fallow land is 2,999 hectares and forest land is 8,876 hectares during the year 2001-02 (Table 3.4).

The total geographical area of Byadagi taluk is around 43,656 hectares, out of which the net cultivable area was 3,016 hectares. The total irrigated area was 3,124 hectares. In the taluk 2,613 hectares of land was not available for cultivation 1,307 hectares was fallow land and 4,889 hectares was forest area (Table 3.4).

Description of the patchouli crop

Patchouli (*Pogostemon patchouli* Pellet.), (syn. *P. cablin* Benth.), belonging to family Lamiaceae, is the source of patchouli oil. A native of the Philippines, it grows wild in Malaysia, Indonesia and Singapore and is cultivated mainly for its oil. The cultivation of patchouli is reported to have started first in Java in 1895 with planting material imported from Singapore, though the identity of the species is uncertain. It is now cultivated on commercial scale in Indonesia, Malaysia, China and Brazil. The commercial oil of patchouli is obtained by steam distillation of the shade dried leaves and is one of the most important naturally occurring essential oil used in the perfumery industry. Patchouli oil has notably strong fixative properties and helps to prevent rapid evaporation of a perfume and thereby promotes tenacity.

In the tropics, there are several species of Labitatae (Lamiaceae) with patchouli like odour, used mostly for perfuming of shawls, carpets and woven materials, but leaves of only one species is actually used for distillation of essential oil. Soil, climatic conditions and domestication in several Asiatic countries have caused variations in the morphology of the patchouli grown, rendering their botanical classification difficult. Patchouli is reported to flower only in its natural habitat. Flowering has been induced by short day conditions.

Several varieties of patchouli both wild and cultivated, whose leaves and buds yield oils with patchouli like odour are found growing in India, particularly in Western Ghats and districts of Malabar. *Pogostemon heyneanus* (syn. *P. fleurissant* Benth.), though indigenous to India, is not cultivated on a commercial scale.

Soil and climate

For optimum performance, it requires sub-tropical climate with a fairly heavy and evenly distributed rainfall. Under South Indian conditions, the crop has been found to flourish well upto an altitude of 800-1050 MSL. Partially shaded, well drained fertile soils with evenly distributed rainfall or areas with assured irrigation are ideal for commercial plantation of patchouli in India. A moderate temperature of 22 to 28°C and an average humidity of 75 per cent are considered ideal for its growth.

Preparation of land

The main field intended for planting patchouli must be thoroughly prepared by ploughing it with a disc plough and then a tiller. As the crop is susceptible to nematode attack, furdan at 20 kg per ha or Dasanit at 150 kg per ha is recommended to be broadcast in the field and mixed well with the soil a few days before transplanting.

Propagation

Propagation is generally done by cuttings raised during rainy season. Shoot tip cuttings 10 to 12 cm long with 3 to 4 nodes together with terminal bud and a crown of leaves are ideal for propagation.

Transplanting

Rooted cuttings are transplanted (generally in the evening) in the main field at a distance of 60 cm in rows spaced 60 cm apart (27,780 cuttings are required per hectare). Immediately after transplantation, irrigating the field will help in better establishment of the plants.

Interculture

Patchouli plants can effectively suppress weed growth because of their bushy nature. However, the field should be kept weed free during the first 2 to 3 months of crop growth either hoeing 2 to 3 times or by hand weeding. Weeding is also necessary after about one and half month of each of the foliage harvests.

Irrigation

Irrigation is necessary in areas where rainfall is inadequate. Immediately after transplanting, the field must be irrigated every day for the first 3 to 4 days and subsequently on alternate days for 10 to 15 days. After three weeks, twice a week (depending on the type of soil and climate) is considered sufficient. The crop is highly susceptible to water logging.

Diseases and pests

Disease

Leaf blight, wilt, viral diseases, yellow mosaic virus are commonly observed diseases in patchouli.

Insects

Two insect pests, leaf eating caterpillar and leaf roller are generally found to attack patchouli.

Nematodes

Root knot of patchouli is caused by a nematode *Meloidogyne incognita* (Kofoid and White) Chitwood, an obligate parasite that enters the root through a thrust of stylet around the region of cell elongation.

Harvesting and drying

Patchouli plants take 5-6 months to attain full growth. First harvesting of leaves and tender shoots is done with sharp sickles after about six months of planting when the foliage turns pale-green to light brown and the crop emits the characteristic patchouli odour. Harvesting is done in the cool hours of morning or evening. Young shoots are cut 10-20 cm below the apex to get 3-5 pairs of mature leaves. When the growth is vigorous, longer shoots can be harvested. A few shoots are left over the plant to ensure resuming of growth for the next harvest. Subsequent harvests are made after every 3-4 months interval depending on local environmental conditions and management practices.

Table 3.5: Estimated area of patchouli cultivation in North Karnatak

Sl. No.	Particulars	Area (acres)
1.	North Canara (Uttara Kannada)	100
2.	Haveri	50
3.	Dharwad	20
4.	Belgaum	15
5.	Bellary	15
6.	Total area	200

Source: Paper published in Second Global Summit on Medicinal and Aromatic Plants, 2004 by C. K. Venugopal et al., New Delhi, India

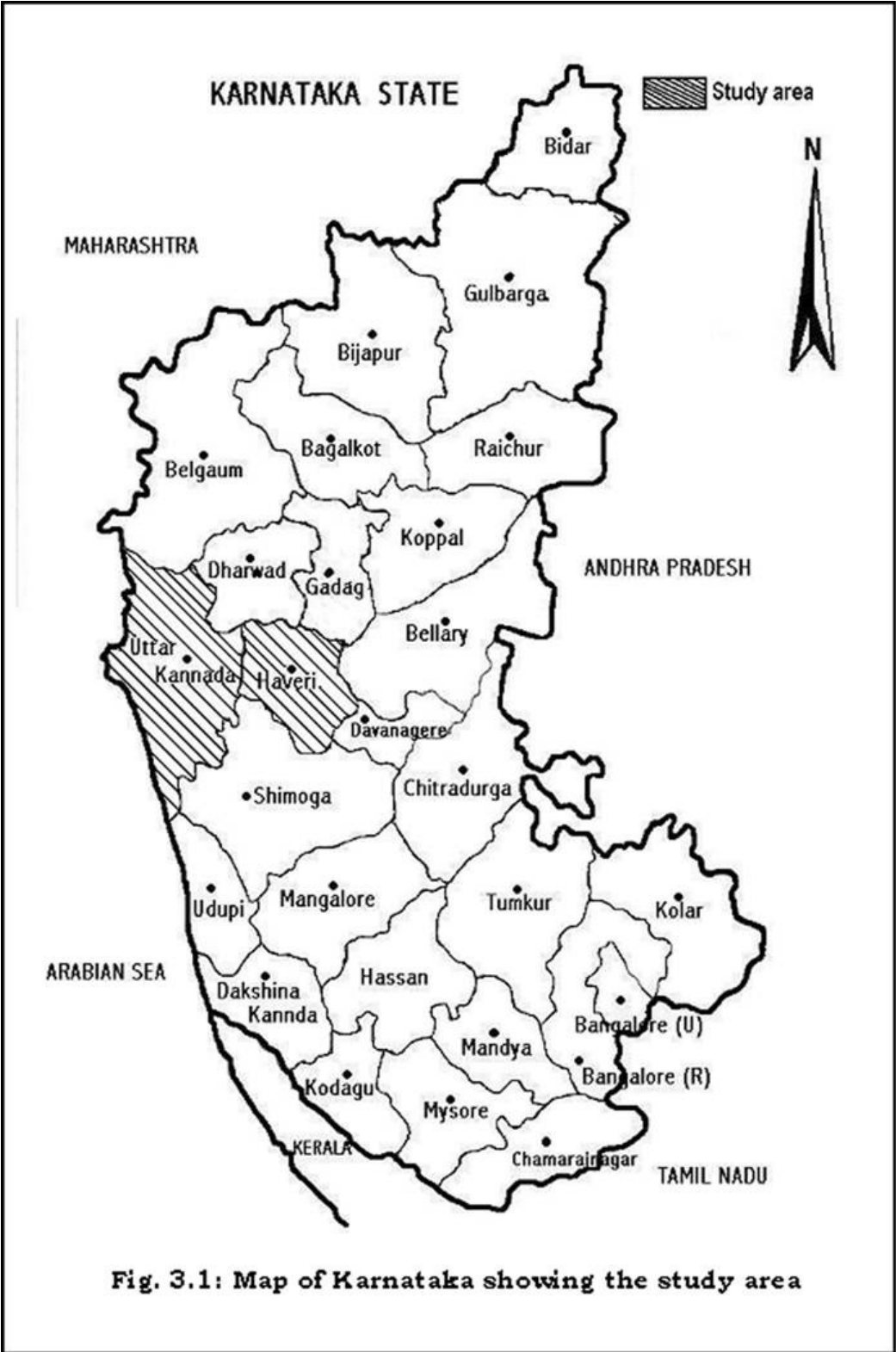


Fig. 3.1: Map of Karnataka showing the study area

Fig. 3.1: Map of Karnataka showing the study area

Proper drying of the herbage prior to distillation is very important to improve the yield and quality of oil. For higher recovery of oil, the moisture content of the herbage should be between 2.5 and 8.3 per cent. The herbage is spread out in thin layers on a hard dry surface in sheds, allowing free circulation of air. During drying, the material is frequently turned over to ensure even thorough drying and prevent fermentation.

Distillation

Steam distillation of air dried leaves yield oil of patchouli. Different methods of distillation are employed by distillers. Experienced distillers prepare oils of special quality by varying the conditions of distillation.

3.2 SELECTION OF STUDY AREA AND SAMPLING PROCEDURE

A purposive sampling procedure is adopted for the purpose of selection of representative districts, taluks and villages which are detailed below.

Selection of study area

Uttara Kannada and Haveri districts are purposively selected for the study, as these districts are having highest area in the state (Table 3.5).

Sampling procedure

To evaluate the objectives of the study, all the farmers growing patchouli in the study area are chosen.

Selection of taluks

In Uttara Kannada district, Sirsi, Siddapur and Yellapur taluks and in Haveri district, Hangal, Hirekerur and Byadagi taluks were purposively selected, because the area under patchouli crop is almost entirely concentrated in these taluks.

Selection of sample farmers

All the farmers growing patchouli crops was purposively selected from each village in consultation with the officials of KVKs, RSKs and Offices of Department of Horticulture in the study area. Thus, total patchouli growing farmers are 30 in each district, leading to a sample size of 60 farmers.

3.3 NATURE AND SOURCE OF DATA

The primary data was collected with the aid of well structured and comprehensive schedules exclusively prepared for the study. The schedule was prepared after discussing with various specialists. The schedule was subjected to pre-testing to know the lacuna and for further improvement. The study is conducted during June to August months in the year 2005. The primary data was collected from the head of the family growing patchouli by personal interview method. In this study most of the primary data is based on the memory of the patchouli growing farmers.

Secondary data pertaining to the area, production and marketing is not available. Data have not been documented by any institution, District Statistical Office, Horticultural Department (or) by the Karnataka Aromatic and Medicinal Planters Association (KAMPA).

The schedules used for data collection was designed based on the objectives of the study. The data so collected relate to

Table 3.6: Distribution of sample farmers in study area

District	Taluks	Villages	No. of farmers	Per cent to total
North Canara	Sirsi	Bhashi	1	3.33
		Bhirumbae	2	6.67
		Devanahalli	1	3.33
		Ajjarani	1	3.33
		Gudnapura	2	6.67
		Sirsi	2	6.67
		Bnavasi	1	3.33
	Siddapur	Etagi	2	6.67
		Heruru	1	3.33
		Kanagoda	3	10.00
		Hosalli	2	6.67
		Mannanelli	2	6.67
		Magegara	1	3.33
		Bilalagi	1	3.33
	Yallapur	Arenduru	2	6.67
		Shivalli	2	6.67
		Tatagar	2	6.67
		Delikoppa	1	3.33
		Chendaguli	1	3.33
Haveri	Hirekerur	Kabbakki	2	6.67
		Koda	2	6.67

		Aladageri	2	6.67
	Hangal	Hamsabavi	3	10.00
		Damalli	2	6.67
		Kalleru	2	6.67
		Akki Alur	3	10.00
		Chikkahunasi	1	3.33
		Honnur	1	3.33
		Nelagal	3	10.00
		Tiluvalli	2	6.67
	Byadagi	Hireanaji	2	6.67
		Chikkani	1	6.67
		Hasandi	1	3.33
		Motebennur	1	3.33
		Chickbasur	155	3.33
		Sangur	2	6.67
		Kaginele	1	3.33

- a. General characteristics such as name, educational qualification, occupation, land holding, total area under Patchouli cultivation, bearing area, variety cultivated
- b. Investment details for the establishment of Patchouli gardens, maintenance of Patchouli cultivation, output obtained, and details on returns of the Patchouli
- c. Investment relating to irrigation equipments, farm equipments and cost structure.

3.4 ANALYTICAL TECHNIQUES

The following are the major analytical techniques used in the analysis of the data collected during the study.

1. Financial analysis
2. Tabular analysis

3.4.1 Financial analysis

The discounted cash flow technique is employed as a useful tool in evaluating long term projects in agriculture. Many studies conducted earlier (Prest and Turvey, 1965; Dalton, 1967; Menon, 1979) successfully employed this technique to evaluate the investment in agricultural projects. Hence, for evaluating the investments and to find out the financial viability of investment in Patchouli farms, a few measures of project evaluation techniques (discounted cash flow techniques) are used. These measures are advocated as tools or aid to evaluate and find out the worthiness of an investment, especially those of projects.

To evaluate the financial feasibility of Patchouli farms the standard evaluation techniques viz., Net Present Value (NPV), Benefit Cost Ratio (BCR), Pay Back Period (PBP) and Internal Rate of Return (IRR) are estimated.

Net present value

The net present value represents the discounted value of the net cash flows to the project or it is simply the present worth of net benefit of a project discounted at the opportunity cost of capital. This criterion ranks the investments for selecting the best alternative. Generally, higher the net present worth, better would be the preference. In computing net present worth, the difference between the present value of the cost is considered at a discount rate of 9.5 per cent. This is the rate at which agricultural loans are given by Banks for agricultural projects. The general verbal and mathematical form of net present worth criterion is presented below.

$$\text{NPV} = [\text{Present worth of benefits}] - [\text{Present worth of costs}]$$

$$\text{NPV} = \left(\sum_{i=1}^n Y_n (1+r)^{-n} - I_0 \right)$$

Where,

- Y_n = Net cash inflows in the n^{th} year
 r = Discount factor (9.5%)
 I_0 = Initial investment
 n = Number of years

In order to select worthiness of the project, the net present value should be positive.

Benefit: cost ratio

It is the ratio of discounted cash inflows and outflows, which must be unity or more for an enterprise to be considered worthwhile. The minimum ratio required is 1:1. This 1:1 indicates the coverage of costs without any surplus benefits. But usually the ratio should be

more than unity in order to provide some additional returns over the cost for clear decision. The benefit:cost ratio is stated both verbally and mathematically as ;

$$\text{B:C ratio} = \frac{\text{Present worth of benefits}}{\text{Present worth of costs}}$$

$$\text{B:C} = \left(\sum_{i=1}^n Y_n (1+r)^{-n} \div I_0 \right)$$

Where,

Y_n = Net cash inflows in the n^{th} year

r = Discount factor (9.5%)

I_0 = Initial investment

n = Number of years

Internal rate of return

The internal rate of return is the rate of return which equates the present worth of benefits to present worth of costs, which means the net present worth is zero. This represents the average earning power of an investment from the projects. Mathematically, it is represented as:

$$\text{IRR} = \sum_{i=1}^n \frac{B_n - C_n}{(1+d)^n} = 0$$

Where,

B_n = Benefits in each year

C_n = Costs in each year

n = Number of years

d = Discount rate

The IRR is arrived at through interpolation technique by using different discount rates so as to see the net present worth is equal to zero. Therefore, the project costs and benefits are discounted at certain rate to find out the present worth of the project, so that it is positive. Again by selecting a higher discount rate the cost and benefits are discounted throughout the project period to get a negative net present worth which is essential for interpolation. The interpolation formula employed in this study is as follows.

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

The IRR should be more than the discount rate for being considered as promising economic feasibility and financial soundness.

Pay back period

Pay back period represents the length of time required for the project to recover its original investment. In the present study, pay back period is calculated by successively

deducting the initial investment from the net return until the initial investment is fully recovered.

It is given by

$$= \sum_{n=1}^{t^*} C_n < \sum_{n=1}^{t^*} B_n$$

Where,

t^* is the lowest value of 'n' for which inequality holds.

Tabular analysis

The technique of tabular analysis is employed for determining the investment pattern in the Patchouli gardens. This analysis is used to estimate the cost of the establishment of Patchouli gardens during non-bearing period, maintenance cost of Patchouli gardens during bearing period, cost structure, returns and profits.

Establishment cost

The establishment period of a Patchouli garden is about five months. The costs incurred in establishing a Patchouli garden during the first five months is considered at prevailing wage rates and input prices. The establishment period upto five months is taken as zero year. From 5th month the returns started by considering maintenance cost of 1st, 2nd and 3rd year i.e. during bearing period. The economic life of the patchouli gardens is estimated to be 3 years. The establishment cost is classified into material cost, labour cost and fixed cost.

Cost incurred during the first five months of establishment of a patchouli crop. The costs incurred under this comprises land preparation including machine labour, transplanting and gap filling, application of manures, irrigation and fertilizers, spraying of chemicals, materials and repairs, cost of planting material, fertilizer, plant protection chemicals, weeding and all other after care operations.

Maintenance cost

It includes all the costs incurred annually for the maintenance and production on the patchouli gardens after fifth months onwards till the end of the life span of 3 years. The maintenance cost is divided into variable cost and fixed cost. The variable cost included the cost of farmyard manure, fertilizer, plant protection chemicals and labour cost for various operations.

Yield and returns

In the study area, patchouli is sold in the form of patchouli herbage (after the crop is harvested, it is dried under shade and is called patchouli herbage). Yield and prices realized by the growers for the patchouli herbage is used to calculate gross herbage is used to calculate gross returns, net returns and returns per ha of patchouli garden.

DEFINITIONS OF TERMS AND CONCEPTS

A. Labour cost: It is computed based on the actual wages paid by the producers (8 hours) in the study area for men, women and bullock pairs during the study period. The same wage rates is considered for imputing family labour. While expressing labour in mandays, womandays is converted into mandays by taking 0.65 and 0.60 mandays equal to one womandays in Uttara Kannada and Haveri districts, respectively. The average wage rates considered in the current study are Rs. 50 and Rs. 30 for men and women, respectively in Haveri district, while in Uttara Kannada district, the average wage rate considered are Rs. 54 and Rs. 35 for men and women, respectively.

B. Material costs: The planting material used (cuttings) is valued at the current market rate of Rs. 1.28 and 1.47 in Uttara Kannada and Haveri districts, respectively. Remaining material

costs covered in this are expenditure on fertilizers, plant protection chemicals, farmyard manures.

C. Interest on working capital: The interest on working capital is computed at the rate of 8.5 per cent per annum.

D. Interest on fixed capital: Interest is worked out at the rate of 9.5 per cent per annum.

II. Fixed costs: include the land revenue, amortised establishment cost, depreciation cost and rental value of owned land.

i. Amortised establishment cost: The total establishment cost (up to the bearing age *i.e.*, 5th month) is apportioned over a period of 3 years as the patchouli gardens life span.

ii. Depreciation cost: Depreciation on machinery and equipments is calculated by using straight line method *i.e.* dividing the original cost less junk value of the item, by the expected life of the item.

$$\text{Depreciation} = \frac{\text{Purchase value} - \text{residual value}}{\text{Expected life of the item}}$$

While calculating depreciation, the working life of pumpset is considered to be 15 years since planters usually replace them after 15 years. The apportioned establishment cost is worked out to be the total establishment costs of patchouli gardens

iii. Land revenue: Land revenue paid by the farmers during the current year is considered for this study.

iv. Land value and rental value of land: Rental value of land is imputed at the prevailing land rent per hectare per annum in the study area.

Marketing costs

Marketing costs are the cost incurred in on-loading, unloading, transportation etc. in marketing the produce. These are the actual expenses incurred in bringing (or) giving the produce to the company/local processor. The marketing cost is a vital factor in determining the profitability of patchouli growers and middleman.

Marketing functionary (intermediaries)

The only intermediary present is the agent of the company, who procured the patchouli herbage from the farmers at cheaper price and sold it to the company at a fixed price (fixed by company).

Local processor

Local processors are those processors of patchouli herbage present in study area. Local processor had buyback arrangement with farmers and also procured the produce which is brought to them by farmers. Buyback arrangement is only oral.

Company

These are the processors of aromatic crops present far away from the study area. These companies also had buyback arrangement with farmers and they also procured the produce from their agents present in the study area. Buyback arrangement with farmers and also procured the produce which is brought to them by farmers. Buyback arrangement is only oral.

Marketing channels

Refers to the alternate routes of product flow from the producers to the processors. In this study, the marketing channel is limited only to the point of processing (*i.e.*, until the local processor/company gate).

IV. RESULTS

Keeping in view of the objectives, the data pertinent to the present study were collected and analyzed using appropriate techniques. The results of the analysis are presented in this chapter under the following headings.

- 4.1 Socio-economic characteristics of the sample farmers
- 4.2 Cost and returns of patchouli cultivation
- 4.3 Financial feasibility of investment in patchouli cultivation
- 4.4 Marketing of patchouli
- 4.5 Problems in the production of patchouli
- 4.6 Problems in the marketing of patchouli

4.1 SOCIO-ECONOMIC CHARACTERISTICS OF THE SAMPLE FARMERS

The results with respect to socio-economic characteristics of sample farmers are presented as follows (Table 4.1).

4.1.1 General features of patchouli growing farmers

The average age of the sample farmers in North Canara district was 42.34 years and it was 41.6 years in Haveri district. With respect to the family size of sample farmers, it was 4.12 and 4.77 persons per family in North Canara and Haveri districts, respectively.

All the farmers in the study area were literates. In North Canara district, 26.67, 36.67 and 36.67 per cent of the farmers had studied upto primary, high school and college level, respectively and in case of Haveri district, 20.00, 53.33 and 26.67 per cent of the farmers had studied upto primary, high school and college level, respectively.

4.1.2 Land holding pattern of sample farmers

It could be observed from the Table 4.2 that the average size of land holding in North Canara and Haveri districts was 2.12 ha and 4.81 ha respectively. Further, 32 per cent (0.68 ha) of the total land holding in North Canara district, 73.34 per cent (3.53 ha) of the total land holding in Haveri district was dry land and the remaining 68 per cent (1.44 ha) and 26.66 per cent (1.28 ha) of the total land in North Canara and Haveri districts, respectively was irrigated. It was observed that 44.82 per cent (0.95 ha) and 9.83 per cent (0.47 ha) of total land holding of sample farmers in North Canara and Haveri districts respectively was under patchouli cultivation and it was irrigated land.

4.2 COST AND RETURNS IN PATCHOULI CULTIVATION

4.2.1 Investment pattern in patchouli cultivation

Investments in patchouli cultivation are the costs incurred in establishing the patchouli farm. These are the costs incurred during zero year and they include costs on well, pumpset, sprayer, planting material and plantation. Results of the investments in patchouli cultivation of Uttara Kannada and Haveri are presented in Table 4.3 and 4.4.

Total investment in patchouli cultivation in Uttara Kannada and Haveri districts are 73693.96 and 73656.06, respectively. In this, lion share was occupied by the cost of seedlings followed by cost of well. This was followed by cost of pumpset, land preparation, transplantation and sprayer. The cost of seedling was Rs. 41951.45 and Rs. 41630.59 in Uttara Kannada and Haveri districts, respectively. The cost of the well was Rs. 17190.85 and Rs. 17590.85 in Uttara Kannada and Haveri districts, respectively. The cost of pumpset was Rs. 9726.70 and Rs. 9726.70 in Uttara Kannada and Haveri districts, respectively. The cost of land preparation was Rs. 3022.94 and Rs. 3110.17 in Uttara Kannada and Haveri districts,

Table 4.1: Demographic profile of sample farmers in the study area

Sl. No.	Particulars	Unit	North Canara		Haveri	
			Average	Percentage	Average	Percentage
1.	Age of the farmer	Years	42.34	-	41.6	-
2.	Size of the Family	Number	4.12	-	4.77	-
3.	Educational level					
i	Illiterate	Number	0	0	0	0
ii	Literate	Number	30.00	100.00	30.00	100.00
	a. Primary School	Number	8.00	26.67	6.00	20.00
	b. High school	Number	11.00	36.67	16.00	53.33
	c. College and above	Number	11.00	36.67	8.00	26.67

Table 4.2: Average land holding pattern of sample farmers

Sl. No.	Particulars	Unit	North Canara		Haveri	
			Area	Percentage	Area	Percentage
1.	Dry land	Hectare	0.68	32.00	3.53	73.34
2.	Irrigated land	Hectare	1.44	68.00	1.28	26.66
	Total land	Hectare	2.12	100.00	4.81	100.00
3.	Average area under Patchouli crop	Hectare	0.95	44.82	0.47	9.83

Table 4.3: Investment pattern in patchouli cultivation in Uttara Kannada district

Sl. No.	Particulars	Unit	Value	Percentage
	Variable Cost			
1	Cost of seedlings	No.	41951.45	56.93
2	Land preparation	MH	3022.94	4.10
3	Transplanting	MD	1069.12	1.45
4	Well	No.	17190.85	23.33
5	Pump set	No.	9726.70	13.20
6	Sprayer	No.	732.90	0.99
	Total		73693.96	100

Table 4.4: Investment pattern in patchouli cultivation in Haveri district

Sl. No.	Particulars	Unit	Value
	Variable Cost		
1	Cost of seedlings	No.	41951.5
2	Land preparation	MH	3022.94
3	Transplanting	MD	1069.12
4	Well	No.	17190.9
5	Pump set	No.	9726.7
6	Sprayer	No.	732.9
	Total		73693.96

respectively. The cost of transplanting was Rs. 1069.12 and Rs. 864.85 in Uttara Kannada and Haveri districts, respectively. The cost of sprayer was Rs. 732.90 and Rs. 732.90 in Uttara Kannada and Haveri districts, respectively.

4.2.2 Maintenance cost of patchouli crop

Maintenance costs were the recurring costs incurred after the establishment of the plants *i.e.*, after five months of transplanting, for upkeep of the plants so that good yield can be obtained over the economic lifespan of the plants.

Maintenance cost include the expenditure towards the use of labour, material inputs along with fixed costs per year. Human labour was used for gap filling, applying manure and fertilizers, weeding, irrigation, spraying of chemicals, harvesting, drying and others. Material costs include costs incurred on farmyard manure, fertilizer, chemicals, irrigation charges and others. Fixed costs include rental value of land, land revenue apportioned establishment cost, depreciation and interest on fixed capital.

4.2.2.1 North Canara district

Details of the results on maintenance cost per hectare per year are presented in Table 4.5.

Average per hectare cost of maintenance was Rs. 74336.91. Among the maintenance costs, fixed cost, material cost, labour cost and interest on working capital *i.e.*, interest on material and labour cost accounted for Rs. 35039.14 (47.14%), Rs. 19969.22 (26.86%), Rs. 16249.92 (21.86%) and Rs. 3078.63 (4.14%), respectively.

In case of labour cost, major labour costs were incurred on irrigation Rs. 3899.25 (5.25%) followed by weeding Rs. 3795.44 (5.11%), harvesting Rs. 2772.45 (3.73%), drying Rs. 1774.15 (2.39%) and fertilizer application Rs. 1546.86 (2.08%). Further, in case of material cost, which was Rs. 19969.22 (26.86%), major items of cost were cost of farmyard manure Rs. 13009.82 (17.50%), cost of fertilizer Rs. 4805.48 (6.46%) and cost of irrigation charges Rs. 794.85 (1.07%). Among the fixed cost, apportioned establishment cost accounted for Rs. 27078.98 (36.43%) followed by rental value of land Rs. 4250.00 (5.72%), interest on fixed capital Rs. 3039.93 (4.09%) and depreciation Rs. 645.23 (0.87%).

4.2.2.2 Haveri district

Details of the results on maintenance cost per hectare per year are presented in Table 4.6.

Average per hectare cost of maintenance was Rs. 71907.73. Among the maintenance cost, fixed cost, material cost, labour cost and interest on working capital *i.e.*, interest on material and labour cost accounted for Rs. 34049.63 (47.35%), Rs. 20857.63 (29.01%), Rs. 14034.62 (19.52%) and Rs. 2965.84 (4.12%), respectively.

In case of labour cost, irrigation charges accounted for Rs. 3335.85 (4.64%) followed by weeding Rs. 2987.44 (4.15%), harvesting Rs. 2569.83 (3.57%), fertilizer application Rs. 1544.38 (2.15%) and drying Rs. 1366.46 (1.90%). Further, in case of material cost, which was Rs. 20857.63 (29.01%), major items of cost were farmyard manure Rs. 13565.79 (18.87%), cost of fertilizer Rs. 4772.36 (6.64%) and cost of plant protection chemicals Rs. 1010.05 (1.40%). Among the fixed costs, apportioned establishment cost accounted for 26695.89 (37.13%) followed by rental value of land Rs. 3750.00 (5.22%), interest on fixed capital Rs. 2954.08 (4.11%) and depreciation Rs. 624.67 (0.87%).

4.2.3 Yield and returns structure of patchouli

4.2.3.1 North Canara district

It could be seen from Table 4.7 that average total yield in the first year *i.e.*, after five months was 5421.37 kgs, which fetched Rs. 106096.14. In second year, average yield was 10300.53 kg, which fetched Rs. 201581.35. In the third year, average yield was 9196.22 kg, which fetched Rs. 179970.06. In the North Canara district, average value per kg of patchouli herbage was Rs. 19.57.

Table 4.5: Maintenance cost of patchouli garden in North Canara district

(Rs./ha)

Sl. No.	Particulars	Unit	Quantity	Value	per cent
I	Variable Cost				
A	Labour cost				
1.	gap filling	MD	13.52	731.22	0.98
2.	FYM application	MD	9.97	539.52	0.73
3.	Fertiliser application	MD	28.6	1546.86	2.08
4.	Weeding	MD	70.17	3795.44	5.11
5.	irrigation	MD	72.09	3899.25	5.25
6.	spraying of chemicals	MD	10.42	563.39	0.76
7.	harvesting	MD	51.26	2772.45	3.73
8.	drying	MD	32.8	1774.15	2.39
	Others	Rs.	0	627.64	0.84
	Total Labour cost	Rs.		16249.92	21.86
B	Material Cost				
1.	Cost of FYM	Tonnes	48.1	13009.82	17.50
2.	Cost of Fertilizer	Kgs	694.84	4805.48	6.46
3.	Cost of PPC	Liters	7.87	775.90	1.04
4.	irrigation charges	Rs.		794.85	1.07
5.	Others	Rs.		583.17	0.78
	total material cost	Rs.		19969.22	26.86
	Interest on working capital @8.5%	Rs.		3078.63	4.14
	Total Variable Cost	Rs.		39297.77	52.86
II	Fixed Cost				
1.	Rental value	Rs.		4250.00	5.72
2.	Land revenue	Rs.		25.00	0.03
3.	Apportioned establishment cost	Rs.		27078.98	36.43
4.	Depreciation	Rs.		645.23	0.87
5.	Interest on fixed capital@9.5%	Rs.		3039.93	4.09
	Sub total	Rs.		35039.14	47.14
	Total	Rs.		74336.91	100.00

Figures in the percentage column indicate per cent to total maintenance cost

Table 4.6: Maintenance cost of patchouli garden in Haveri district

					(Rs./ha)
Sl. No.	Particulars	Unit	Quantity	Value	per cent
I	Variable Cost				
A	Labour cost				
1.	gap filling	MD	14.23	711.65	0.99
2.	FYM application	MD	8.45	422.54	0.59
3.	Fertiliser application	MD	30.89	1544.38	2.15
4.	Weeding	MD	59.75	2987.44	4.15
5.	irrigation	MD	66.72	3335.85	4.64
6.	spraying of chemicals	MD	8.07	403.60	0.56
7.	harvesting	MD	51.4	2569.83	3.57
8.	drying	MD	27.33	1366.46	1.90
	Others	Rs.		692.87	0.96
	Total Labour cost	Rs.		14034.62	19.52
B	Material Cost				
1.	Cost of FYM	Tonnes	45.22	13565.79	18.87
2.	Cost of Fertilizer	Kgs	594.27	4772.36	6.64
3.	Cost of PPC	Liters	7.52	1010.05	1.40
4.	irrigation charges	Rs.		845.99	1.18
5.	Others	Rs.		663.44	0.92
	total material cost	Rs.		20857.63	29.01
	Interest on working capital @8.5%	Rs.		2965.84	4.12
	Total Variable Cost	Rs.		37858.09	52.65
II	Fixed Cost				0.00
1.	Rental value	Rs.		3750.00	5.22
2.	Land revenue	Rs.		25.00	0.03
3.	Apportioned establishment cost	Rs.		26695.89	37.13
4.	Depreciation	Rs.		624.67	0.87
5.	Interest on fixed capital@9.5%	Rs.		2954.08	4.11
	Sub total	Rs.		34049.63	47.35
	Total	Rs.		71907.73	100.00

Figures in the percentage column indicate per cent to total establishment cost

MH – Machine hours MD – Man days

Table 4.7: Yield and Returns of Patchouli Farms in North Canara District

Years	I harvest		II harvest		III harvest		Total yield (kg)	Gross returns (Rs)
	Yield (kg)	Value (Rs)	Yield (kg)	Value (Rs)	Yield (kg)	Value (Rs)		
1	0.00	0.00	2240.37	43844.12	3180.99	62252.02	5421.37	106096.14
2	3401.74	66572.13	3442.92	67377.91	3455.87	67631.31	10300.53	201581.35
3	3393.50	66410.76	3323.50	65040.80	2479.23	48518.50	9196.22	179970.06
Grand total							15919.02	487647.52

(Rs./ha)

Table 4.8: Yield and returns of Patchouli Farms in Haveri District

Years	I harvest		II harvest		III harvest		Total yield (kg)	Gross returns (Rs)
	Yield (kg)	Value (Rs)	Yield (kg)	Value (Rs)	Yield (kg)	Value (Rs)		
1	0.00	0.00	2241.22	43345.23	3127.46	60485.14	5368.68	103830.37
2	3368.80	65152.51	3418.21	66108.15	3388.56	65534.82	10175.57	196795.49
3	3216.42	62205.55	3055.80	59099.25	2421.58	46833.36	8693.80	168138.16
Grand total							15083.05	468764.02

4.2.3.2 Haveri district

The average yield and returns structure of patchouli is presented in Table 4.8.

Average total yield in first year i.e., after five months was 5368.68 kg, which fetched Rs. 103830.37. Average total yield in second year was 10175.57 kg, which fetched Rs. 196795.49 and the average total yield in third year was 8693.80 kg which fetched Rs. 168138.16. In Haveri district, average price per kg of patchouli herbage was Rs. 19.34 per kg.

4.2.4 Average cash flows in patchouli garden

4.2.4.1 North Canara district

Average cash flows are presented in Table 4.9. The cash flows are discounted at 9.5 per cent. In the first five month of first year Rs. 81236.95 was spent on the establishment of the crop, Rs. 49557.94, Rs. 74336.91 and Rs. 74336.91 was spent in first year (after five months), second year and third year, respectively. The gross returns were Rs. 106096.14, Rs. 201581.35 and Rs. 179970.06 in first year (after five months), second year and third year, respectively. The net returns were Rs. 56538.20, Rs. 127244.44 and Rs. 105633.15 in first year (after five months) second year and third year, respectively.

The discounted costs were Rs. 45258.39, Rs. 61997.80 and Rs. 56618.99 in first year (after five months), second year and third year, respectively. The discounted returns were Rs. 96891.46, Rs. 168121.06 and Rs. 137074.89 in first year (after five months), second year and third year, respectively. The discounted net returns were Rs. 51633.06, Rs. 106123.30 and Rs. 80455.90 in first year (after five months), second year and third year, respectively.

4.2.4.2 Haveri district

Average cash flows are presented in Table 4.10. The cash flows are discounted at 9.5 per cent. In the first five month of first year Rs. 80087.66 was spent on the establishment of the crop, Rs. 47938.49, Rs. 71907.73 and Rs. 71907.73 was spent in first year (after five months), second year and third year, respectively. The gross returns were Rs. 103830.37, Rs. 196795.49 and Rs. 168138.16 in first year (after five months), second year and third year, respectively. The net returns were Rs. 55891.88, Rs. 124887.76 and Rs. 96230.43 in first year (after five months) second year and third year, respectively.

The discounted costs were Rs. 43779.44, Rs. 59971.84 and Rs. 54768.80 in first year (after five months), second year and third year, respectively. The discounted returns were Rs. 94822.25, Rs. 164129.60 and Rs. 128063.07 in first year (after five months), second year and third year, respectively. The discounted net returns were Rs. 51042.81, Rs. 104157.76 and Rs. 73294.27 in first year (after five months), second year and third year, respectively.

4.3 FINANCIAL FEASIBILITY OF INVESTMENT IN PATCHOULI GARDENS

To evaluate the financial feasibility of investment in patchouli gardens, the project evaluation criteria such as Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR) and Pay Back Period (PBP) were employed and the results were presented in Table 4.11.

4.3.1 Net Present Value (NPV)

Net Present worth of investment is the difference between the present value of series of inflows (returns) and outflows (costs) over the economic life period of the patchouli crop.

Results of the financial feasibility indicated that per ha NPV at 9.5 per cent discount rate for entire life period of patchouli gardens (3 years) was found to be Rs. 156975.27 in North Canara district and Rs. 148407.19 in Haveri district.

Table 4.9: Cash flows in patchouli garden in Uttara Kannada

Year	Cost	Gross returns	Net returns	Discounted cost	Discounted returns	Discounted net returns
0	73693.96		-73693.96			-73693.96
1	74336.91	106096	31759.23	67887.589	96891.4521	29003.863
2	74336.91	201581	127244.44	61997.7982	168121.057	106123.258
3	74336.91	179970	105633.15	56618.9938	137074.889	80455.8955
Total	296704.69	487648	264636.82	186504.38	402087.4	141889.06

Table 4.10: Cash flows in patchouli garden in Haveri district

Year	Cost	Gross returns	Net returns	Discounted cost	Discounted returns	Discounted net returns
0	73656.06		-73656.06			-73656.06
1	71907.73	103830	31922.64	65669.1598	94822.2557	29153.0959
2	71907.73	196795	124887.76	59971.8354	164129.597	104157.762
3	71907.73	168138	96230.43	54768.7995	128063.077	73294.2776
Total	191754	468764	277010.06	180409.79	387014.93	132949.08

Table 4.11: Financial feasibility tests in patchouli gardens

SI. No.	Particulars	Units	Uttara Kannada	Haveri
1.	Net Present Value (At 9.5 % discount rate)	Rs./ hectare	141889.1	132949.075
2.	Benefit Cost Ratio (At 9.5 % discount rate)		1.925382	1.804998462
3.	Pay Back Period	Years	0.835416	0.873251088
4.	Internal Rate of Return	Per cent	81.62	78.92

In total, the net present value (NPV) was positive in both the districts, whereas the NPV was higher in North Canara district as compared to Haveri district.

4.3.2 Benefit : Cost ratio (BCR)

This criterion indicates the rate of returns per rupee invested in patchouli cultivation. The B:C ratio at 9.5 per cent discount rate was 2.45 and 2.44 in North Canara and Haveri district, respectively. In nutshell, B:C ratio in both the districts was more than unity and indicated that patchouli gardens were financially sound. B:C ratio was marginally higher in case of North Canara district.

4.3.3 Payback period (PBP)

It is the period required to recover the initial investment incurred in establishing the patchouli gardens and it was found to be 0.28 years in North Canara and 0.29 years in Haveri district. This clearly indicated that it would take an average of 0.28 years and 0.29 years to recover the initial investment in North Canara and Haveri districts, respectively. Payback period was found to be marginally high in case of Haveri district.

4.3.4 Internal rate of returns (IRR)

This criterion measures the rate of returns that can be realized by reinvestment of the returns in patchouli cultivation. Hence, the IRR indicates an important basis of investment and scores over other criterion evaluations, 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 period and more particularly in the initial years of patchouli garden enterprise. In case of North Canara, internal rate of return was found to be 88.93 per cent and 87.30 per cent in case of Haveri district. In nutshell, the internal rate of returns (IRR) was observed well above the bank rate and it was higher in the case of North Canara district (88.93%) as compared to Haveri district (87.30%).

4.4 MARKETING OF PATCHOULI

In this section, different marketing channels followed by patchouli growers were identified along with marketing costs and marketing margin of intermediaries (agents of company) (Table 4.12).

Marketing channels followed by patchouli growing farmers in the study were;

Five channels were identified in the study area and they are as follows.

1. Farmer → Local processor
2. Farmer → Buying arrangement with local processor
3. Farmer → Buying arrangement with company
4. Farmer → Agents of company → Company
5. Farmer-cum-distiller → Local factory

In first channel, small farmers themselves brought the produce to the local processors (e.g., Bharat Aromatics) and sold it directly to the local processor. This channel was followed by 16.67 per cent of the farmers of North Canara and was not followed by farmers of Haveri district.

In second channel, local processor came to the grower and took the patchouli herbage from the farmer. This channel was the most popular channel in North Canara district used by large number of farmers i.e., 43.33 per cent, but only 23.33 per cent of farmers in Haveri district followed this channel. There was a buyback arrangement between the farmer and the local processor. There was no written agreement between the local processor and the farmer and the agreement was only oral.

Table 4.12: Marketing channels followed by patchouli grower in the study area

(in numbers)

Sl. No.	Particulars	North Canara		Haveri	
1.	Channel-I	5	(16.67)	-	
2.	Channel-II	13	(43.33)	7	(23.33)
3.	Channel-III	3	(10.00)	7	(23.33)
4.	Channel-IV	7	(23.33)	16	(53.34)
5.	Channel-V	2	(6.67)	-	
	Total	30	(100)	30	(100)

Figures in the parentheses indicate per cent to respective total

In the third channel, there was a buyback arrangement between the farmer and the company (e.g., Kelkar Company, Mumbai). In this channel 10 per cent of the farmers in North Canara district and 23.33 per cent of the farmers in Haveri district sold their produce through this channel.

In the fourth channel, agents of the company purchased patchouli herbage from the farmers and they sold it to the company. This channel was followed by 23.33 per cent of the farmers in North Canara district and 53.34 per cent of the farmers in Haveri district.

In the fifth channel, farmer himself distilled the patchouli herbage and sold it to the local factory like agarbatti factory. This was followed by only 6.67 per cent of North Canara farmers and was not followed in Haveri district.

It is clear from the results that the channel-II was predominant in North Canara district (43.33%) and channel-IV was predominant in Haveri district (53.34%)

4.4.1 Marketing cost incurred by patchouli growers in different marketing channel

Marketing cost incurred by patchouli growers is presented in Table 4.13. The first channel was followed by the farmers of North Canara district only. In the first channel, producer himself took the produce to the local processor. Major item of cost was transportation (Rs. 265.52/tonne) followed by loading (Rs. 106.56/tonne), unloading (Rs. 106.56/tonne) and miscellaneous charges (Rs. 56.54/tonne) accounting for 49.61%, 19.91%, 19.91% and 10.57% of the total marketing cost respectively.

Second, third and fourth channels were followed by the farmers of both the districts. Since, the buyer himself came to farmers field to procure the produce, the only marketing cost incurred by the farmer was loading the produce which was Rs. 106.56 per tonne in North Canara district and Rs. 94.72 in Haveri district in each channel.

Fifth channel was followed by the farmers of North Canara only, since the farmer himself distilled the patchouli herbage he incurred distillation charge which was Rs. 3123.67 per tonne.

Table 4.13: Marketing cost incurred by patchouli growers in different marketing channels in North Canara district

(Rs./t)						
Sl. No.	Item of cost	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
1.	Loading	106.56 (19.91)	106.56 (100)	106.56 (100)	106.56 (100)	
2.	Unloading	106.56 (19.91)				
3.	Transportation	265.52 (49.61)				
4.	Distillation	-				3123.67 (100)
5.	Miscellaneous	56.54 (10.57)				
		538.18 (100)	106.56 (100)	106.56 (100)	106.56 (100)	3123.67 (100)

Figures in the parentheses indicate per cent to respective total

Note : Haveri district

Since Channel-II, Channel-III and Channel-IV were followed, the only marketing cost incurred by the farmers was loading the produce which was Rs. 94.72/tonne

4.4.2 Price received by patchouli growers in different marketing channel

4.4.2.1 North Canara district (4.14)

In first channel, price received by farmers was Rs. 20200 per tonne, the marketing cost was Rs. 538.18 per tonne (2.65% of total price received) and net price received was 19664.82 per tonne (97.35% of total price received).

In second and third channel, the price received by the farmers, marketing cost and net price received were equal amounting to Rs. 20000.00 per tonne, 106.56 per tonne (0.53% of the total price received) and Rs. 19893.44 per tonne (99.47% of the total price received), respectively.

In fourth channel, the farmers received the lowest price since it was sold to the agents of the company amounting to Rs. 19156.56 per tonne. Marketing cost was Rs. 106.56 per tonne (0.56% of the total cost received) and net price received by the farmers was Rs. 19049.44 per tonne (99.44% of the total price received).

In fifth channel, the farmer received highest price since distillation to extract the oil was carried by himself. Price received by the farmer was Rs. 37500.00 per tonne distillation charges were Rs. 3123.67 per tonne (8.33% of total price received) and the net price received was Rs. 34376.33 per tonne (91.67% of the total price received).

4.4.2.2 Haveri district

In Haveri district only second, third and fourth channels were followed (Table 4.15). In second and third channel, the price received by the farmers, marketing cost incurred and net price received by the farmers were equal amounting to Rs. 20000 per tonne, Rs. 94.72 per tonne (0.47% of total price received) and Rs. 19905.28 per tonne (99.53% of the total price received), respectively.

In fourth channel, the price received by the farmers was least amounting to Rs. 19071.67 per tonne, marketing cost was Rs. 94.72 per tonne (0.50% of the total cost received) and net price received was Rs. 18976.95 per tonne (99.50% of the total cost received).

4.4.3 Marketing cost incurred by the agents of the company

The only intermediary present was agent of the company who was found in fourth channel. Marketing cost incurred by the agents of the company is presented in Table 4.16, it included cost incurred on unloading, transportation, storage and storage loss.

4.4.3.1 North Canara district

The total marketing cost incurred by the agents of the company was Rs. 544.85 per tonne. Major item of cost was transportation for which he incurred Rs. 315.33 per tonne accounting for 57.87 per cent of the total cost followed by unloading charges (19.56%), storage loss (17.54%) and cost of storage (5.03%).

4.4.3.2 Haveri district

Similarly, the total marketing cost incurred by agents of the company was Rs. 504.73 per tonne, which was slightly lower compared to North Canara district. Here also, among various items of cost, transportation charges accounted for major share Rs. 285.75 per tonne (56.61%), followed by storage loss (19.53%), unloading charges (18.77%) and cost of storage (5.09%).

4.4.4 Marketing margin of the agents of the company

Marketing margin of the agent of the company are presented in Table 4.17.

4.4.4.1 North Canara district

Marketing margin of the agents of the company was Rs. 548.59 per tonne (2.71%) of the total price received from the company). Agent of the company spent 94.60 and 2.69 per

Table 4.14: Price received by patchouli growers in different marketing channels in North Canara district

(Rs./t)						
Sl. No.	Particulars	Channel-I	Channel-II	Channel-III	Channel-IV	Channel-V
1.	Price received	20200.00 (100.00)	20000.00 (100.00)	20000.00 (100.00)	19156.56 (100.00)	37500.00 (100.00)
2.	Marketing cost	538.18 (2.65)	106.56 (0.53)	106.56 (0.53)	106.56 (0.56)	3123.67 (8.33)
3.	Net price received	19664.82 (97.35)	19893.44 (99.47)	19893.44 (99.47)	19049.44 (99.44)	34376.33 (91.67)

Figures in the parentheses indicate per cent to respective total

Table 4.15: Price received by patchouli growers in different marketing channels in Haveri district

(Rs./t)

Sl. No.	Particulars	Channel-II	Channel-III	Channel-IV
1.	Price received	20000.00 (100.00)	20000.00 (100.00)	19071.67 (100.00)
2.	Marketing cost	94.72 (0.47)	94.72 (0.47)	94.72 (0.50)
3.	Net price received	19905.28 (99.53)	19905.28 (99.53)	18976.95 (99.50)

Figures in the parentheses indicate per cent to respective total

Table 4.16: Marketing cost incurred by the agents of the company

(Rs./t)

Sl. No.	Particulars	North Canara	Haveri
1.	Unloading	106.56 (19.56)	94.72 (18.77)
2.	Transportation	315.33 (57.87)	285.75 (56.61)
3.	Cost of storage	27.40 (5.03)	25.70 (5.09)
4.	Storage loss	95.56 (17.54)	98.55 (19.53)
	Total marketing cost	544.85 (100)	504.73 (100)

Figures in the parentheses indicate per cent to respective total

Table 4.17: Marketing margin of agents of the company

(Rs./t)

Sl. No.	Particulars	North Canara	Haveri
1.	Price received from company	20250 (100)	20250 (100)
2.	Purchasing price from farmers	19156.56 (94.60)	19071.67 (94.18)
3.	Marketing cost	544.85 (2.69)	504.73 (2.49)
	Marketing margin	548.59 (2.71)	673.60 (3.33)

Figures in the parentheses indicate per cent to respective total

Table 4.18: Problems in production of patchouli in the study area

Sl. No.	Problems	(n=30)	
		North Canara	Haveri
1.	Non-availability of genuine planting material	19 (63.33)	27 (90.00)
2.	Lack of well drained soil	19 (63.33)	18 (60.00)
3.	Post-harvest handling/shade drying	21 (70.00)	25 (83.33)
4.	Infestation of plants by wilt caused by fungus	9 (30.00)	10 (33.33)
5.	Lack of proper package of practice	10 (33.33)	19 (63.33)
6.	Lack of technical assistance	21 (70.00)	22 (73.33)
7.	Frequent irrigation	30 (100.00)	30 (100.00)
8.	Water logging in rainy season	30 (100.00)	28 (90.00)
9.	Root knot nematode attack	21 (70.00)	27 (90.00)
10.	Leaf blight	4 (13.33)	7 (23.33)

Figures in the parentheses indicate per cent to respective total

cent of the total price received from the company on purchasing the produce from the farmer and marketing of the produce, respectively.

4.4.4.2 Haveri district

Marketing margin of the agent of the company was Rs. 673.60 per tonne (3.33% of the total price received from the company), which was higher compared to North Canara district. Agents of the company spent 94.18 and 2.49 per cent of the total price received from the company on purchasing the produce from the farmer and marketing of the produce, respectively.

4.5 PROBLEMS IN PRODUCTION OF PATCHOULI

Several production problems in patchouli cultivation were experienced by the patchouli growers. The problems in patchouli cultivation in the study area were analysed in depth and summarized below in the Table 4.18.

Problem of frequent irrigation was expressed by all the sample farmers in both the districts and problem of water logging in rainy season because of which the plant show wilting symptom and death of the plant if it prolongs was expressed by all the farmers of North Canara and 90 per cent of sample farmers in Haveri district. Problem of root knot nematode was expressed by 70 per cent of sample farmers in North Canara district and 90 per cent the sample farmers in Haveri district. Post-harvest handling/shade drying problem was expressed by 70 per cent and 83.33 per cent of the farmers in North Canara and Haveri districts, respectively. Non-availability of genuine planting material was expressed by 63.33 per cent of North Canara farmers and 90 per cent of the Haveri district farmers. Further, lack of well drained soil, infestation of the plants with wilt caused by fungus, lack of proper package of practice, lack of technical know-how and technical assistance and leaf blight was expressed by 63.33, 30.00, 33.33, 70.00, 13.33 per cent of North Canara district farmers and 60.00, 33.33, 63.33, 73.33 and 23.33 per cent of Haveri districts farmers, respectively.

4.6 PROBLEMS IN MARKETING OF PATCHOULI

Marketing constraints in the study area were analysed and results are presented in Table 4.19. Non-availability of method/instrument to assess the quality of patchouli herbage at farm level at the time of selling was the major problem expressed by 83.33 and 96.67 per cent of the farmers of North Canara and Haveri districts, respectively. The problem of cheating the farmers by the agents of the company was expressed by 50 and 83.33 per cent of the North Canara and Haveri district farmers, respectively. Lack of market information was expressed by 63.33 and 80.00 per cent of the farmers of North Canara and Haveri district, respectively.

Table 4.19: Problems in marketing of patchouli in the study area (n=30)

Sl. No.	Problems	North Canara	Haveri
1.	Non-availability of method/instrument to assess the quality of patchouli herbage at farm level	25 (83.33)	29 (96.67)
2.	Cheating the farmers by the agents of the company	15 (50.00)	25 (83.33)
3.	Lack of market information	19 (63.33)	24 (80.00)

V. DISCUSSION

The main focus of this chapter is to throw light on the causes responsible for the findings, which are discussed under following headings.

- 5.1 Socio-economic characteristics of sample farmers
- 5.2 Costs and returns structure in patchouli cultivation
- 5.3 Financial feasibility of investment in patchouli cultivation
- 5.4 Marketing of patchouli herbage
- 5.5 Problems in the production of patchouli crop
- 5.6 Problems in the marketing of patchouli herbage

5.1 SOCIO-ECONOMIC CHARACTERISTICS OF SAMPLE FARMER

5.1.1 General features of patchouli growing farmers

It is clear from the results of the Table 4.1 that most of the farmers were youth, had a nuclear family and all were literates. All these factors had helped the sample farmer in both the districts to cultivate a crop of recent origin *i.e.*, patchouli and perceive positively to take up patchouli as remunerative enterprise. This enabled the respondents to allocate a manageable size of total area under patchouli cultivation to get higher returns.

5.1.2 Land holding pattern of sample farmers

From the Table 4.2 it could be observed that the average land holding of the sample farmers in North Canara (2.12 ha) was less than that of Haveri district (4.81 ha) this was because North Canara was a Malnada region with uneven topography and Haveri was Aremalnad region with comparatively even topography.

It was also observed that 68.00 per cent of the total area of the sample farmers of North Canara was irrigated but it was only 26.66 per cent in Haveri district. This was because North Canara was a Malnda region and they had more access to water sources for irrigation like rivers, streams and ponds which were absent in Haveri district.

Average area under patchouli crop (0.95 ha in North Canara and 0.47 ha in Haveri district) the percentage of total area under patchouli crop was higher in North Canara (44.82% of total land holding) than Haveri (9.83% of total land holding) mainly due to easy availability of water in North Canara.

5.2 COST AND RETURNS STRUCTURE IN PATCHOULI CULTIVATION

5.2.1 Investment pattern in patchouli cultivation

Investments in patchouli cultivation are the costs incurred in establishing the patchouli farm. These are the costs incurred during zero year and they include costs on well, pumpset, sprayer, planting material and plantation. Results of the investments in patchouli cultivation of Uttara Kannada and Haveri are presented in Table 4.3 and 4.4.

Total investment in patchouli cultivation in Uttara Kannada and Haveri districts are 73693.96 and 73656.06, respectively. In this, lion share was occupied by the cost of seedlings followed by cost of well. This was followed by cost of pumpset, land preparation, transplantation and sprayer. The cost of seedling was Rs. 41951.45 and Rs. 41630.59 in Uttara Kannada and Haveri districts, respectively. The cost of the well was Rs. 17190.85 and Rs. 17590.85 in Uttara Kannada and Haveri districts, respectively. The cost of pumpset was Rs. 9726.70 and Rs. 9726.70 in Uttara Kannada and Haveri districts, respectively. The cost of land preparation was Rs. 3022.94 and Rs. 3110.17 in Uttara Kannada and Haveri districts,

respectively. The cost of transplanting was Rs. 1069.12 and Rs. 864.85 in Uttara Kannada and Haveri districts, respectively. The cost of sprayer was Rs. 732.90 and Rs. 732.90 in Uttara Kannada and Haveri districts, respectively.

The investment pattern in the cultivation of patchouli in both the districts were almost same. This is mainly because the investment cost included the material costs, therefore the total cost of investment and the pattern of investment was almost same in both the districts.

5.2.2 Maintenance cost of patchouli crop

The maintenance cost (Table 4.5 and 4.6.) as indicated in the results included the wages of labour, cost of materials utilized and some fixed costs.

The average total cost of maintenance per ha per year was Rs. 74336.91 and Rs. 71907.73 in North Canara and Haveri district, respectively.

Among the various costs incurred on the maintenance of the crop fixed cost accounted for 47.35 per cent (Rs. 34049.63) and 47.14 per cent (Rs. 35039.14) of the total maintenance cost in Haveri and North Canara districts, respectively. This higher fixed cost was mainly because of the higher apportioned establishment cost (37.13% in Haveri district and 36.43% in North Canara) and higher rental value of land (5.72% in North Canara and 5.22% in Haveri district).

Apportioned establishment cost was higher because the economic life span of the crop was only three years and therefore whole establishment cost was divided equal for each year, Rental value of land was higher because Haveri was seed production area and North Canara was Malnad region. Because of higher apportioned establishment cost and higher rental value of land the interest on fixed capital was also higher (4.09% in North Canara district and 4.11% in Haveri district).

Material cost accounted for 29.01 per cent and 26.86 per cent of the total maintenance cost in Haveri and North Canara districts, respectively. Cost of manure occupied lion share *i.e.*, 18.87 per cent and 17.50 per cent of the total maintenance cost in Haveri and North Canara district, respectively.

This high cost on manure was because the local buyers and the companies which have been buying patchouli herbage, preferred to buy the crop which had been grown by applying large quantity of manure. Because the crop so grown have higher oil recovery. Other major items of cost was the cost of fertilizer accounting for 6.64 per cent in Haveri district and 6.46 per cent in North Canara district.

Among the labour cost, major costs were irrigation cost (5.25% in North Canara district and 4.64% in Haveri district), cost on weeding (5.11% in North Canara district and 4.15% in Haveri district) and cost of harvesting (3.73% in North Canara and 3.57% in Haveri district).

Patchouli crop was irrigated frequently *i.e.*, once in 2-3 days throughout the year and it was irrigated with personal presence because ridges and furrow method was followed in the patchouli cultivation and also to see that there was no standing water, so the cost on irrigating was higher. Weeding cost was higher because the roots of patchouli are very delicate and are not deep rooted therefore use of machine (or) animal power was not practiced and proper care was taken during hand weeding. Harvesting was done with utmost care using experienced labour because if harvesting was not done properly it affected the next harvest and also was the case for many diseases and pests, therefore the cost of harvesting was higher.

The cost of maintenance of the crop was higher in North Canara compared to Haveri mainly because of the higher labour cost and higher rental value of land in North Canara district.

5.2.3 Yield and returns structure of patchouli

It could be revealed from the results that the crop yielded less during first year which gradually increased from harvest to harvest and reached maximum during second (or) third

harvest of second year and from then onwards the yield again decreased gradually from harvest to harvest. The crop was uprooted after three years due to very low yield in successive harvest, low quality of patchouli herbage and high incidence of pest and disease (Table 4.7 and 4.8).

The average total yield of the patchouli crop was 15919.02 kg and total returns was Rs. 487647.52 in North Canara district and the average total yield was 15083.05 kg and total the returns was 468764.02 in Haveri district. It could be observed from the results that average yield in Haveri district was lower compared to North Canara district, because the problem of root knot nematode was high in Haveri district and returns per Kg of patchouli herbage was higher in North Canara district compared to Haveri district. Average value of patchouli herbage was Rs. 19.57 per kg and 19.34 per kg in North Canara and Haveri districts, respectively.

5.2.4 Average cash flows in patchouli cultivation

Average cash flows in patchouli cultivation are tabulated in the Table 4.9 and 4.10.

The findings of the study indicated that the overall total cost of cultivation was Rs. 198231.76 in North Canara district and it was 191753.95 in Haveri district. The overall gross returns was Rs. 4876475.56 and Rs. 468764.01 in North Canara and Haveri district respectively. The overall total net return was Rs. 289415.80 and Rs. 277010.06 in North Canara and Haveri district respectively. Cost, gross returns and net returns were discounted at 9.50 per cent to get discounted cost, discounted returns and discounted net returns, respectively.

Gross returns and net returns were low in first year and highest in second year and again decreased in third year because of lower yield in first and second year and highest yield in second year.

Overall total cost in North Canara district (Rs. 198231.76) was higher than Haveri district (Rs. 191753.95) mainly due to higher labour cost and higher rental value of land. North Canara district had a better climate for growing patchouli with higher rainfall and better water sources than Haveri district. Higher yield was obtained in North Canara district than Haveri district, so gross returns and net returns were higher in North Canara district.

5.3 FINANCIAL FEASIBILITY

The analysis of financial feasibility of long-term investments in patchouli garden is essential to evaluate whether the heavy investments made in the initial period of the project would yield sufficient returns to cover the cost and recover the investment in a reasonable period of time. In this regard, the use of discounted cash flow techniques was found to be more appropriate. Financial feasibility of investments in patchouli garden in North Canara and Haveri districts were studied by using the project analysis technique with the help of four evaluation criteria's such as Net Present Value, Benefit-Cost Ratio, Pay Back Period and Internal Rate of Return. These estimates have been presented in Table 4.11.

Dalton (1967) indicated that discounted cash flow technique was a guiding aid for deciding investments. They also indicated the cost benefit analysis as a practical tool for assessing enumeration and evaluation of all relevant costs and benefits from the projects over a period of time.

5.3.1 Net Present Value (NPV)

The net present value shows the present value of all the future flow of profits from the patchouli garden. In this study net present value was positive Rs. 156975.27 in North Canara district and Rs. 148407.19 in Haveri district.

Thus, it could be concluded that investment in patchouli garden has been economically feasible and financially sound. The higher magnitude of net present value may be attributed to realization of continuous high returns during the economic life of patchouli garden in both the districts.

5.3.2 Benefit Cost Ratio (BCR)

This criterion indicates the returns per rupee invested in patchouli garden and a wise investor always expects a higher ratio. It is the sum of discounted net benefits to the initial investment. The benefit-cost ratio at 9.5 per cent discount rate in the present study was found to be 2.45 and 2.44 in North Canara and Haveri districts respectively. Thus, it was inferred that for every rupee of the present value of investment, the patchouli yields Rs. 2.45 (in North Canara) and Rs. 2.44 (in Haveri) over the entire life of the plantations (3 years). All these values were above unity and the investment in both the study districts could be considered to be a profitable venture. Thus, it could be concluded that investment in patchouli garden was economically feasible and financially sound.

5.3.3 Internal Rate of Return (IRR)

This criterion measured the rate of return that can be realized by re-investment of the returns of papaya orchard. Hence the IRR has to be considered as an important tool and scores over other criteria of evaluation, which do not consider the reinvestment opportunities. In the present study the IRR was found to be very high (88.93% in North Canara district and 87.30% in Haveri district) because of higher net returns over the years. All the ratios were found to be higher than the opportunity cost of capital (9.5% at present rate of interest) of commercial banks for long term loans, indicating a higher average earning power of money invested in the project. Hence, it can be inferred that the investment in patchouli enterprise was found to be economically feasible, financially sound and highly profitable.

5.3.4 Pay Back Period (PBP)

The period required to recover initial investment incurred in establishing patchouli garden was found to be 0.28 in North Canara district and 0.29 in Haveri district. This clearly indicates that a shorter period of less than one and half year was required to get back the initial investment. This could be attributed to the fact that the initial investment itself was lower, besides higher rate of returns. The pay back period in patchouli was found to be lower than that of other perennial horticulture crops. From this it can be concluded that in patchouli gardens pay back period was shorter than that of other perennial crops. However, this criterion does not take into account the returns generated after pay back period and the time value of money.

5.4 MARKETING OF PATCHOULI

5.4.1 Marketing channels followed by patchouli growing farmers in the study area

Marketing channels followed by patchouli growing farmers in the study area were analyzed in depth and results are discussed as follows (Table 4.12).

In the channel-I, 16.67 per cent of the farmers of North Canara sold their produce directly to the local processor though they received relatively lower price compared to second, third and fourth channel. Small farmers with very less area under patchouli crop with lesser quantity of patchouli herbage followed this channel. Since, neither the agents of the company nor the company persons preferred to procure their produce by coming to their field. This was not followed by the farmers of Haveri district, because of the absence of local processors near to their place therefore generally they followed fourth channel.

Channel-II was followed by 43.33 and 23.33 per cent of the farmers in North Canara and Haveri district, respectively. The local processor were from North Canara district they had buyback agreement with the farmers of both district. The local processors had only oral agreement and they were selective in making the agreement. Agreement was made with progressive farmers with larger area under patchouli crop, who followed better package of practices and normally used to grow a good crop with better quality.

Channel-III was followed by 10.00 and 23.33 per cent of sample farmers of North Canara district and Haveri district, respectively. Third channel was almost identical to the second channel the only difference was that the buyer was a large company located faraway

from the study area (Kelkar Company of Mumbai). Here also the agreement was oral and they were selective in making the agreement. Agreement was made with progressive farmers who followed better package of practices and normally used to grow a good crop with better quality.

Channel-IV was followed by 23.33 and 53.34 per cent of North Canara and Haveri farmers, respectively. This channel was generally followed by small farmers or the farmers who were growing patchouli for the first time or the farmers who were not in contact with local processor or the companies

Channel V was followed by 6.67 per cent of the sample farmers, they had their own distillation unit, extracted oil from the patchouli herbage and sold it to local factory like agarbatti factories. These farmers procure the patchouli herbage from other farmers. This channel was followed by the farmers who had large area under Patchouli cultivation

5.4.2 Marketing cost incurred by patchouli growers in different marketing channels

Marketing cost incurred by the producers in different channel is given in the Table 4.13. Total marketing cost was higher when the producer himself took the produce to the local processor channels accounting to Rs. 538.18 in North Canara district and this channel was not found in Haveri district. Major item of cost incurred was on transportation (49.61%) followed by loading (19.91%), unloading (19.91%) and miscellaneous charges (10.57).

In second, third and fourth channel buyer himself came to farmers field to procure the produce therefore only loading of the produce was done by the producer, which accounted to Rs. 106.56 and Rs. 94.72 in North Canara and Haveri district, respectively. Higher loading charges in North Canara was mainly due to high labour cost.

In channel-V, since the farmer distilled the patchouli herbage on his own he incurred distillation charge of Rs. 3123.67 in North Canara. No farmer distilled the patchouli herbage in Haveri district, hence this channel was absent in Haveri district.

5.4.3 Price received by the patchouli growers in different marketing channel

Table 4.14 and 4.15 revealed that the price received by the farmers in different channels was not same. The reasons for the difference in prices are discussed in this section.

In fifth channel Farmers got the highest returns for their produce. In this channel, the farmer distilled the patchouli herbage and recovered an average of 25 kg of patchouli oil per tonne, which he sold to the local agarbatti factory at the rate of Rs. 1500 per kg, thereby received Rs. 37500 per tonne of the patchouli herbage, Rs. 3123.67 per tonne was spent on distillation and net price received by him was Rs. 34376.33 per tonne

In channel-I though the farmer received higher price *i.e.*, 20200 per tonne, net price received by the farmer was less *i.e.*, Rs. 19664.82 because Rs. 535.18 was spent on marketing the produce.

In channel-II and channel-III the price received by the farmers was Rs. 20000.00 in both the districts, which was fixed by the local processor/company, Rs. 106.56 and Rs. 94.72 was spent on marketing the produce by the farmers of North Canara district and Haveri district, respectively in both the channels. Net price received by the farmers was Rs. 19893.44 and Rs. 19905.28 in North Canara and Haveri district farmers, respectively in second and third channel.

In case of fourth channel farmers received the least price compared to the other four channels. In North Canara district, Rs. 19156.56 was the price received, Rs. 106.56 was the marketing cost and Rs. 19049.44 was the net price received. The price received by the farmers of Haveri in the fourth channel was less compared to North Canara farmers in the same channel *i.e.*, Rs. 19071.67 was the price received. marketing cost was Rs. 94.72 and net price received was Rs. 18976.95.

The main reason for following channel-IV was that the farmers received planting material from the agents of the company who were the leading and sometimes only sellers of

the planting material in the region and gave some fraction of the total cost of planting material (or) sometimes no money was given and promised to give the cost of planting material by selling their produce to him. Another reason was small area under patchouli crop with less patchouli herbage was not preferred by the company/local processor, made the farmers to sell their produce to the agents of the company. There was no local processor or any farmer who also distilled the patchouli herbage in Haveri district, so the farmers of Haveri had to sell their produce at a lower price. Agents of the company took advantage of the above mentioned things and fixed a lower price for the farmers produce, which was different for different individual farmers

5.4.4 Marketing cost incurred by the agents of the company

There were several marketing costs incurred by the patchouli growers such as unloading, transportation, cost of storage and storage loss (Table 4.16).

Marketing cost incurred by the producer is given in Table 4.16 revealed that total marketing cost of agents of the company was Rs. 544.85 and Rs. 504.73 in North Canara and Haveri district, respectively. Among the various items of cost major cost was cost of transportation amounting Rs. 315.33 (57.87%) and Rs. 285.75 (56.61%) per tonne in North Canara and Haveri districts, respectively, followed by unloading charges (19.56% in North Canara and 18.77% in Haveri district), storage loss (17.54% in North Canara and 19.53% in Haveri district) and cost of storage (5.03% in North Canara and 5.09% in Haveri district).

5.4.5 Marketing margin of agents of the company

The results are presented in Table 4.17. Marketing margin of the agents of the company was Rs. 548.59 and Rs. 673.60 in North Canara and Haveri district, respectively. Marketing margin was higher for the agents of the company in Haveri district since, they procured the patchouli at lower price (Rs. 19071.67/tonne) in Haveri district compared to that of North Canara district (Rs. 19156.56/tonne) and also because of lower marketing cost (Rs. 504.73) in Haveri district compared to that of North Canara district (Rs. 544.85/tonne).

5.5 PROBLEMS OF PRODUCTION

It is apparent from the results presented in Table 4.18 that frequent irrigation was the problem expressed by all the sample farmers in the study area. The crop loves humid condition and essentially needs moist micro-climate in its canopy area. Therefore frequent irrigation was required for good growth and spread of patchouli. In the study area, ridges and furrow method was followed in the cultivation, which made irrigating the crop frequently, more difficult.

Water logging especially during the rainy season was one of the problem expressed by all the farmers in North Canara and 90 per cent of the farmers in Haveri district. This problem was because of heavy and continuous rain during the rainy season in the study area and was higher in North Canara than in Haveri district. Due to heavy rain, water logging took place and the crop was destroyed even if good drainage was provided since the crop was very much susceptible for water logging.

Root knot nematode attack problem was expressed by 70.00 and 90.00 per cent of the North Canara and Haveri farmers, respectively. Root knot nematode is commonly found in tropical and sub-tropical regions. It causes galls generally at the base of lateral roots, which is commonly known as root knot. It was found that farmers of North Canara were using furrow during transplanting eventhough about 50 per cent of the farmers were not knowing why they are using it and hence the incidence was less in North Canara compared to Haveri district. In the beginning there will be hardly any difference between the infected and healthy plants. Typical symptoms of an infested plant become apparent only after eight months because of this farmers were not able to take any control measures at the early stages. Above all most of the farmers were ignorant of the cause in Haveri district. Farooqi *et al.* (2000) in their study found that root knot nematode was the major pest affecting the patchouli crop.

The oil recovery in terms of quality and quantity in patchouli was influenced by method of drying. Essentially, the leaves have to be dried under shade. Therefore,

infrastructure like drying shade was required which needs additional investment. During the process of drying, the foliage should be frequently turned upside down otherwise gets infected with fungal growth resulting in contamination of product. This problem is expressed by 70.00 and 83.33 per cent of farmers of North Canara and Haveri districts, respectively. In the study area generally, the crop was dried under coconut or arecanut gardens which was very difficult during rainy season. This problem was expressed by more no of farmers in Haveri district compared to North Canara farmers because many of the farmers in Haveri district were not having coconut or Arecanut gardens to dry the patchouli after harvesting under shade. Venugopal *et al.* (2004) identified post-harvest handling/shade drying as one of the major problem in production of patchouli in North Karnataka.

Non-availability of genuine planting material was expressed by 63.33 and 90.00 per cent of the sample farmers of North Canara and Haveri district, respectively. Patchouli is multiplied through shoot tip cuttings and tissue culture. The availability of genuine quality planting material at reasonable cost is a major limitation for taking the cultivation of patchouli.

Farmers who thought of growing the patchouli crop brought the planting material from the farmers who were already growing patchouli (or) by the agents of company, who sold the planting material which were not genuine at very high price. Department of Horticulture at taluk or district headquarters was not providing any planting material for the past 3-4 years. During 1999-2001, though planting materials were provided they were limited in number *i.e.*, between 100 to 600 cuttings per farmer, which were insufficient to take up the cultivation of the crop. Farmers were not aware of getting planting material from University of Agricultural Sciences, Dharwad and the University is located away from the study area. The problem of planting material was much lesser in North Canara district compared to Haveri district because of the presence of larger number of growers with larger holdings in North Canara district, who generally provide planting material. Venugopal (2004) identified non-availability of genuine planting material as the major problem in the production of patchouli in North Karnataka,

Problems of lack of well drained soil for cultivation was expressed by 63.33 and 60.00 per cent of the farmers of North Canara and Haveri districts, respectively. Patchouli crop needs humid and moist micro-climate therefore it needs to be irrigated frequently but there should not be standing water or water logging, there fore if the soil was not well drained cultivation of crop was not possible.

Lack of technical assistance was expressed by 70.00 and 73.33 per cent of the sample farmers in North Canara and Haveri districts, respectively. Since, the crop is of recent introduction, not much is known about the proper cultivation of the crop on scientific lines. Even the farmer who was growing the crop for years was not knowing the exact way of growing. Based on his experience, they themselves were following certain methods and they expressed that absence of technical assistance as one of the major problem eventhough they are ready to pay for it. This problem was expressed almost equally by the farmers of both the districts.

Lack of availability of proper package of practice was expressed by 33.33 and 63.33 per cent of the farmers of North Canara and Haveri districts, respectively. Though, the cultivation of the patchouli crop has been taken by innovative and educated farmers there was lack of availability of proper package of practice for the growers for the cultivation of crop and to refer whenever they were in need. This problem was felt less by North Canara farmers compared to Haveri farmers because of the cordial relation maintained between good and innovative farmers who were growing patchouli for many years and the farmers who were growing recently and also because the local processors (ex. Bharat Aromatics Siddapura North Canara district) prepared package of practice for the cultivation of patchouli, which was made available to the farmers.

Infestation of the plant by wilt caused by fungus was expressed by 30.00 and 33.33 per cent of the farmers of North Canara and Haveri districts, respectively. It was observed that the infestation was prolonged under faulty harvesting methods and low fertility status of soils. This problem was expressed almost equally by the farmers of both the districts. Venugopal *et al.* (2004) in his study identified wilt caused by fungus has one of the problem in the cultivation of the patchouli crop in North Karnataka.

Problem of leaf blight was expressed by 13.33 and 23.33 per cent of the farmers of North Canara and Haveri districts, respectively. This disease was characterized by brown spots near the margin or apical region of leaves which enlarge irregularly and created drying of the plants. It was seen in one year plants and less series. Farooqi *et al.* (2000) had identified leaf blight as one of the diseases affecting the production of patchouli.

5.6 MARKETING PROBLEMS

It can be observed from the Table 4.19 that non-availability of method/instrument to assess the quality of patchouli herbage at farm level was the major problem expressed by 83.33 and 96.67 per cent of the farmers of North Canara and Haveri district, respectively. Almost all the farmers sold their produce by shade drying the patchouli crop after harvesting and they were not satisfied with the buyers. Because, buyer always told that produce was not dried properly, leaf to stem ratio in the produce was very less and oil recovery from the given produce will be very less. Because of this, the farmers opined that it would be better if there was any method/instrument which assesses the quality of the patchouli herbage and thereby fixing the price of the produce at farm gate. By this they also opined that they would get proper price for their crop and could stop bargaining by the buyer for lesser price for their produce keeping the quality of the produce as the main criteria. This problem was expressed by more number of respondents of Haveri district compared to North Canara, because in Haveri district most of the crop grown was sold to the agents of the company, who fix different prices for different farmers taking the quality as the main criteria.

Problem of lack of market information was opined by 63.33 and 80.00 per cent of the farmers of North Canara and Haveri district, respectively. Though, stable buy back market exists for patchouli, due to lack of awareness, the farmers were speculative about the marketing. Lack of information on firms procuring the produce and unregulated markets, non-existence of regulating agencies was one of the main problems in the marketing of Patchouli. This problem was expressed by more number of farmers of Haveri than the North Canara farmers because most of the produce of North Canara was sold to local factories or local distillers and there was not much price difference between the price received by different farmers. Venugopal *et al.* (2004) in his study identified lack of market information as the major problem in marketing of patchouli herbage.

Problem of cheating the farmers by the agents of the company was expressed by 50.00 and 83.33 per cent of the farmers of North Canara and Haveri district, respectively. The agents of the company had always given less price to the patchouli herbage than the actual value of the patchouli herbage. This was being done by the agents of the company by taking advantage of the lack of market information among the farmers, lack of proper knowledge among the farmers about the quality parameters to be considered in the patchouli herbage and lack of awareness of market prices by the farmers. This problem was expressed by less number of farmers of North Canara than Haveri district because in North Canara there were many local distillers, factories who buy the patchouli herbage and North Canara farmers were aware of the existing market prices.

VI. SUMMARY AND POLICY IMPLICATIONS

Agriculture is the mainstay of the Indian economy contributing 22.1 per cent to the GDP (2003-04). With the liberalization of Indian economy in 1991, there has been a considerable increase in the integration with the global economy. The share of agricultural exports in the country's total export is fast reducing. At present, it accounts for about 11 per cent. With a view to improve the share of agricultural exports in the country emphasis on diversification of agriculture into high value commercial and exportable crops is necessary. Agricultural exports are contributing around 12.26 per cent to India's total export earnings (2003-04) and also play a significant role in employment generation, particularly in the rural sector. The New Agricultural Policy, therefore, emphasizes diversification of agriculture.

The commercial cultivation of patchouli is of recent origin in India. It is slowly spreading in the states of Karnataka, Gujarat, Assam, Andhra Pradesh and Kerala *etc.* Karnataka is leading in the production of patchouli. In Northern Karnataka, the area is spreading faster than ever before. The districts of Uttar Kannada, Haveri, Dharwad, Belgaum and Bellary have recorded higher acreage. (Venugopal *et al.*, 2004). Presently, the crop covers an estimated area of 200 acres in northern districts of Karnataka (Venugopal *et al.*, 2004).

North Karnataka is blessed with diverse agro-climatic conditions in districts like Uttar Kannada, Haveri, Belgaum, Dharwad which provides optimum growing conditions for patchouli. Warm and humid places with fairly heavy and even distribution of rainfall are required for patchouli cultivars. The districts of Uttar Kannada and Haveri have the humid climate with good rainfall distribution, suitable for cultivation of patchouli.

Indian demand for patchouli oil is around 220 tonnes valued at around Rs. 33 crores (Vijaykumar, 2004). But, current production of patchouli oil is hardly a few hundred kilograms and that too quality variation is very large (Farooqi *et al.*, 2000). In spite of farmers enthusiasm to cultivate patchouli, inadequate supply of genuine planting material on large scale at reasonable price, lack of market information and inability to increase the yield potentiality due to lack of advanced technology are a few setbacks to mention. Therefore, there is a need to reorient the production and marketing structure. Hence, a comprehensive study on production and marketing of patchouli has become imperative. Therefore, the study was undertaken with the following specific objectives.

1. To study the feasibility of investment in Patchouli cultivation
2. To analyse the cost and returns in Patchouli cultivation
3. To study different marketing channels used by the Patchouli cultivators
4. To ascertain constraints in production and marketing of Patchouli cultivation

METHODOLOGY

North Canara and Haveri districts were purposively selected for the study, as these districts have highest area under patchouli crop in the state. Sirsi, Siddapur and Yellapur taluks in North Canara and Hangal, Hirekerur and Byadagi taluks in Haveri districts were purposively selected because patchouli crop was almost entirely concentrated in these taluks. Primary data was collected with the aid of well structured and comprehensive schedule exclusively prepared for the study.

Tabular analysis was employed for determining the costs and returns of production as well as marketing of patchouli. Standard financial feasibility evaluation techniques viz., NPV, IRR, PBP and BCR were used to find out the economic viability of investment in patchouli farms.

Findings of the study

1. General characteristics of the farmers in the study area revealed that all the farmers were literates and average area under the patchouli crop was 0.95 ha (45.02% of total land

holding) and 0.47 ha (9.77% of total land holding) per farmer in North Canara and Haveri districts, respectively.

2. Per hectare establishment cost was Rs. 81236.95 and Rs. 80087.66 in North Canara and Haveri districts, respectively per ha per year. Maintenance cost of patchouli gardens was Rs. 74366.91 and Rs. 71907.73 in North Canara and Haveri districts, respectively.
3. Average total yield of patchouli garden was 24918.12 kgs and 24238.05 kgs in North Canara and Haveri district, respectively and the corresponding gross returns were Rs. 487647.56 and Rs. 468764.01 in North Canara and Haveri district, respectively.
4. The results of the financial feasibility study indicated that per ha NPV for entire life period of patchouli garden (3 years) was found to be Rs. 156975.27 and Rs. 148407.19 in North Canara and Haveri districts, respectively. B:C ratio at 9.5 per cent discount rate was 2.45 in North Canara district and 2.44 in Haveri district. Payback period was 0.28 years in North Canara districts and 0.29 years in Haveri districts and internal rate of return was 88.93 and 87.30 per cent in North Canara and Haveri districts, respectively.
5. Producers preference for different marketing channels were assessed and five channels were identified in the study area.
 - a. In the first channel, farmer took the produce to the local processor. This channel was followed by 16.67 per cent of the farmers in North Canara and was not followed by the farmers of Haveri. In second channel, local processor had buyback arrangement with the farmers, which was only oral arrangement. This channel was followed by 43.33 per cent of North Canara and 23.33 per cent of Haveri district farmers. In third channels also, there was buyback arrangement but with big aromatic crops processing company, 10 per cent and 23.33 per cent of the farmers of North Canara and Haveri district sold their produce. Fourth channel is the only channel with market intermediary, 23.33 per cent and 53.34 per cent of the farmers of North Canara and Haveri district sold their produce through this channel. In fifth channel, farmer himself distilled the patchouli herbage and he sold the oil to local factors. This channel was followed by 6.67 per cent of North Canara district farmers and absent in Haveri district.
6. Marketing cost incurred by patchouli growers in channel-I, channel-II, channel-III, channel-IV and channel-V was Rs. 538.18, Rs. 106.56, Rs. 106.56, Rs. 106.56 and Rs. 3123.67 in North Canara district, respectively. It was Rs. 94.72 when the producer sold the produce through channel-II (or) channel-III (or) channel IV in Haveri district, because loading cost was the only cost incurred by the producer. Channel-I and channel-V were none in Haveri district.
7. Marketing cost incurred by the agents of the company (intermediary) was Rs. 544.85 and Rs. 504.73 in North Canara district and Haveri district, respectively and the marketing margin was Rs. 548.59 and Rs. 673.60 in North Canara and Haveri districts, respectively.
8. Price received by the farmers of North Canara district when they sold their produce through channel-I, channel-II, channel-III, channel-IV and channel-V was Rs. 20200.00, Rs. 20000.00, Rs. 20000.00, Rs. 19156.56 and Rs. 37500.00, respectively. The corresponding net price received was Rs. 19664.82, Rs. 19893.44, Rs. 19893.44, Rs. 19049.44 and Rs. 34376.33. The price received by the farmer in channel-V was highest because he distilled the patchouli herbage and the lowest price was received by farmer who sold produce to the agents of the company. Similarly, in Haveri district, price received by the farmers when the produce was sold through channel-II, channel-III and channel-IV was Rs. 20000.00, Rs. 20000.00 and Rs. 19071.67, respectively. The corresponding net price received was Rs. 19905.28, Rs. 19905.28 and Rs. 18976.96, respectively. Here also, the farmer received least price when he sold the produce to agents of the company.
9. Major problems faced by the farmers in the production of patchouli were water logging in rainy season, frequent irrigation and nematode attack expressed by 100, 100 and 70 per cent of North Canara district farmers and 100, 90 and 90 per cent of the farmers of Haveri district, respectively. Other problems were post-harvest drying, need of well

drained soil to grow the crop infestation of plants with wilt caused by fungus, lack of proper package of practice, need of technical assistance and leaf blight.

10. Three problems were expressed by the farmers in the marketing of patchouli. They were non-availability of method/instrument to assess the quality of patchouli herbage at farm level expressed by 83.33 and 96.67 per cent of the farmers, of North Canara and Haveri district, respectively. Secondly, cheating the farmers by the agents of the company expressed by 15 per cent and 25 per cent farmers of North Canara and Haveri district, respectively. Third was lack of market information expressed by 63.33 per cent and 80.00 per cent of North Canara and Haveri farmers, respectively.

POLICY IMPLICATIONS

1. Investment in patchouli gardens were found to be economically sound and financially feasible, farmers should be encouraged to take up the cultivation of the crop on large scale. This will reduce the imports and also helps to take advantage in international market by exporting, especially under the trade liberalization regime.
2. In spite of farmers enthusiasm to cultivate patchouli, inadequate supply of genuine planting material on large scale at reasonable price was the main limitation for the farmers to take up patchouli cultivation on large scale and it was also the main limitation to establish new patchouli garden. Therefore, genuine planting material should be made available to the farmer through the Department of Horticulture or Research Institutes.
3. Net returns obtained after processing (steam distillation) was double compared to unprocessed. Therefore, the farmers should be encouraged to take up processing by themselves by giving subsidy and/or loan for establishing the steam distillation unit.
4. Lack of technical guidance and package of practice was expressed by the farmers. Therefore, there is a great need for extension activities by the subject matter specialists in SAU's, KVK's (or) NGO volunteers to develop standard package of practice.
5. All patchouli growing farmers should come together and form co-operatives by which they can discuss and solve their problem (e.g., Distilling the patchouli herbage on co-operative basis, which gives high profit).
6. In the study area, there was no contract farming. Since, patchouli is an aromatic plant of recent origin not much is known to the farmers about production (or) marketing, there is a great need for contract farming, because contract farming will solve most of the prevailing production and marketing problems i.e., genuine planting material, technical guidance, market information, cheating of farmers by middlemen.
7. Price of patchouli was largely quality based. Therefore, there is a great need to create testing facility at procurement levels. Further, lack of testing facility at procurement stage was expressed as a problem by majority of farmers.

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ECONOMICS OF PRODUCTION AND MARKETING OF PATCHOULI IN NORTH KARNATAKA

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ABSTRACT

Medicinal and aromatic plant cultivation is emerging as one of the major high value commercial crops in India with great potential for exports. Patchouli is an important aromatic plant is cultivated on a large scale in Karnataka, Gujarat, Andhra Pradesh, Kerala and other states, patchouli is in great demand within the country and abroad. North Canara and Haveri districts were purposively selected for the study, as these districts have highest area under patchouli crop in the state. Sirsi, Siddapur and Yellapur taluks in North Canara and Hangal, Hirekerur and Byadagi taluks in Haveri districts were purposively selected because patchouli crop was almost entirely concentrated in these taluks.

Although, the cost of establishment is high, the return from the investment in patchouli cultivation are attractive. The values of B:C ratio (2.45 in Uttara Kannada and 2.44 in Haveri districts), net present value (Rs. 156975.27 in Uttara Kannada and Rs. 148407.19 in Haveri districts) and internal rate of returns (88.93% in Uttara Kannada and 87.30% in Haveri districts) are fairly high reflecting greater financial viability of investment in patchouli cultivation.

Since, it is a new crop, which was introduced recently farmers face certain problems especially in production and marketing. Major problems faced by the farmers in the production of patchouli were water logging in rainy season, frequent irrigation and nematode attack. Other problems were post-harvest drying, need of well-drained soil to grow the crop infestation of plants with wilt caused by fungus, lack of proper package of practice, need of technical assistance and leaf blight. Three problems were expressed by the farmers in the marketing of patchouli. They were non-availability of method/instrument to assess the quality of patchouli herbage at farm level. Secondly, cheating the farmers by the agents of the company. Third was lack of market information.