

## Productivity and Profitability of Pepper in India

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### Abstract

Black pepper is one of the most important and earliest known spices in the world. Both in terms of area and production of pepper, India occupies leading places among the major pepper producing countries in the world. Pepper is a native product of the southern Indian coast. India had long dominated the production of pepper and is still renowned for producing the highest quality of pepper in Tellichery and other regions of Malabar. In India, Kerala has the monopoly of pepper production. Kerala occupies around 91 to 97 per cent of area and production of pepper in India. Though the open trade regime has resulted in the production of pepper mostly for the world market, India's share in total world production of pepper has fluctuated from 12 to 21 per cent between 1970 and 2005 against the increasing and declining shares of Indonesia and Malaysia respectively. The Productivity of pepper in India is low (317 kgs/hect.) due to lack of awareness of improved varieties and poor management practices adopted in the pepper plantations. The fact that pepper is such an important cash crop for a large number of relatively poor small holders has led Governments to intervene in the pepper market in several ways of development.

**Key words :** Productivity, Profitability, Marketing cost, Gross returns, Net profit.

### Introduction

India is traditionally known as the "SPICE BOWL OF THE WORLD" because most of the spices are native of our country. India is aptly known as the "LAND OF THE SPICES" because many spices originated from our country. The history of Indian spices was mostly instrumental in the exchange of ancient culture and civilization within and outside the country.

Pepper ranks the first in position, as regards to area and production among the perennial spice crop in the country. Black pepper (*Pipernigrum L*) commonly known as 'KING OF SPICES' and 'BLACK GOLD' is one of the earliest known spice crops of India originated from Western Ghats of our country for centuries.

India accounts for one - fourth of the total world production of pepper. There are four varieties of pepper known as black pepper, white pepper, green pepper and red pepper. Of these three varieties the black pepper is the most significant and largely produced and consumed variety in India. The total area under pepper cultivation in India was 2,23,060 hectares and the production was 70,600 tonnes highest during the year 2002-03.

**Table 1 Area, production and productivity of pepper in India**

Year	2000-01	2001-02	2002-03	2003-04	2004-05
Area (ha)	213860	218220	223060	223440	223440
Production (T)	63760	61460	70600	62000	51000
Productivity (kg/ha)	298	282	317	277	237

Source: Spices Statistics, Spices Board of India, Cochin.  
\* Provisional figure.

In India, pepper cultivation is mainly confined to the Southern States of Kerala, Karnataka and Tamil Nadu. Kerala continues to enjoy a near monopoly in area and production of pepper, accounting for 97 percent in production in the country and 94.31 percent of the total area under pepper cultivation, while Karnataka accounts for about 3.79 percent and the rest of about 1.90 percent is from Tamil Nadu, Andhra Pradesh and north eastern states especially Assam.

In Kerala, pepper cultivation is mainly concentrated in the various districts such as Idukki, Kottayam, Cannanore, Calicut, Wyanad etc. The important varieties grown in these areas are Panniyur - 1, Karimunda, Kottanaden, Kuthirarvaly and Pala.

#### **Statement of the Problem**

The average annual yield of spices in our country is only 18 per cent of the world's average. The major reason is that the majorities of the holdings in India are small and are cultivating old plants with regard to spices. Although Kerala is the largest producer of black pepper in India, there are fluctuations in the production and productivity. India's share in the total world production of pepper has fluctuated between 1970 and 1990 against the increasing and declining shares of Indonesia and Malaysia respectively.

India accounts for 54 per cent of total area under pepper in the world but its share of production is only 26.6 per cent whereas in other countries like Brazil, Indonesia, Malaysia account for lesser percentage of area but with more share in total production due to their higher productivity. According to the time series data from 1950-57 to 1989-90, pepper area has increased by 0.97 per cent per annum whereas the productivity declined by 0.07 per cent per annum. Pepper being an export oriented crop there are fluctuations in the quantum of export, its value and share in the world export of Pepper.

The Productivity of pepper in India is low (317 kgs/hect.) due to lack of awareness of improved varieties and poor management practices adopted in the pepper plantations. Although Kerala is the largest producer of Black Pepper in India, there are several problems associated with them. There are also certain issues to be studied, as pepper is mostly grown as mixed cropping and inter cropping. The important reason cited for this is the predominance of small growers engaged in the cultivation of pepper. Similarly, there are problems relating to the attack of pest and diseases, which is mainly responsible for the fluctuations in production.

Although pepper is the export-oriented spice, there are problems associated with the marketing and exports of pepper. There are fluctuations not only in the quantum of export of pepper but also in the export prices. India's production is not in relation to the growing global world demand for Black pepper. So, there is a significant need to study the cost of production, productivity and profitability of pepper cultivation.

In view of these significant issues arising from the cultivation of pepper in India , the proposed study will be made with the following objectives.

#### **Review of Literature**

S.Giriappa, has analysed on the topic "plantation economy in India-pepper" The main objective of the study is to analyse the trend of production of plantation crops. The study observed that pepper could be grown on areca nut and coconut palms, which is largely grown in the South. Though the world production has considerably gone up, India's share in world production has gradually declined. This is due to the entrance of many new countries in pepper production. Pepper is the most important spice exported and traded in India. About 49 percent of total export pepper realizes earnings of spices.

The low productivity of Indian pepper is due to poor genetic base of the existing strains and the free unproductive, old and senile plantations, non-availability of quality planting materials, non-adoption of scientific management, especially nutritional and plant protection crop etc., crop loss due to diseases and pests and the highly fluctuating weather conditions, unstable market prices, poor socio-economic states of the small growers, inadequate credit facilities and inadequate transfer of technology services. Since the scope of increase in the area is limited the alternative is to increase the productivity of black pepper.

Jerome, in his study indicated that the growth performance of area under pepper in Kerala was characterized by fluctuations and stagnations. The stagnant yield was found to be due to the traditional methods of cultivation, pests and disease attacks, lack of institutional support and instability in prices. According to the analysis on the trends in the farm, wholesale and export prices of pepper shows year-to-year variations and high degree of instability. The study stressed the importance of the intensive cultivation of pepper in future rather than extensive one.

Bindu Padmini, has made an attempt to study the economic analysis of pepper cultivation under differing cropping systems in Kerala. The main aim of the study is to know the existing cropping pattern and its cost of production, to calculate the yield gap and to identify its determinants and the problems encountered in the cultivation and marketing of pepper.

According to the findings of the study, it was evident that the average size of the mono cropped and intercropped farms worked out to be 1.90 and 2.40 hectares respectively and the average size of the farm for the entire study area worked out to be

2.28 hectares. The cost per kilogram of pepper worked out to be lower in intercropped farms with 57.07Rs/kg as compared to 60.61Rs/kg in mono cropped farms. The gross profit per hectare was worked out to be the highest in mono cropped farms with 46522Rs/ha as compared to the intercropped pepper with 32751Rs/ha. The major technical problems encountered were the incidence of pests and disaster, lack of suitable varieties, fluctuations in prices and the high unit cost of production due to high labour cost.

Kashy John, et.al., have made an attempt to study the seasonal climatic influence in pepper production of Idukki district According to them, pepper requires a warm and humid climate with a distributed annual rainfall of about 250 cm. The vine tolerates a minimum temperature of 10°C and maximum of 40°C, the optimum being 20 - 30°C. During the crops season 1999-2000, an observation at study in a few pepper gardens in Idukki district and discussion with experienced planters were made in understanding the influence of climate in seasonal pepper crop production. It is observed that the rainfall pattern prevailing continuously without providing a stress after the harvesting of the previous crop is the key factor that played behind the reported crop loss of not less than of 25 percent in Idukki district compared to the previous season.

#### **Objectives**

An analysis of cost components and returns is essential to evaluate the profitability of any enterprise. Pepper being a perennial crop requires huge establishment cost and maintenance cost. Hence an attempt has been made in this paper to estimate the cost of production, productivity and profitability of pepper cultivation on the basis of over all age of the plant and on the basis of stage of the plant.

#### **Methodology**

The methodology is used to fulfill the objectives of the study. For the purpose of Primary data collection Kerala is taken as universe, the districts of the state are taken as strata and the planters of pepper are the ultimate unit. Primary data were collected using stratified random sampling method during the year 2005-06. 300 pepper planters were randomly selected by using proportionate probability random sampling technique.

The list of registered pepper planters were obtained for each district from the Spices Board of India, Cochin for the purpose of selecting sample for the present study. Among 300 samples, 240 samples constitute small planters and the remaining 60 samples are large planters. In the distribution of samples, the area under pepper cultivation is taken as the weight age factor because the yield per hectare is the measuring rod of performance. Hence, it is decided to distribute 300 samples among the various pepper growing districts of the state in proportion to the area under cultivation in each district.

The study is based on primary data. The primary data were collected from pepper planters in the districts of Kerala. The researcher designed personal interview schedule exclusively meant for pepper planters. The final structure of the interview was decided

after subjecting the interview schedules to pre-test and pilot study. The data thus collected are reliable, subject to the memory of the pepper planters, as most of the planters do not maintain any records.

#### **Productivity and Profitability of Pepper - Over All**

The major crop cultivated in Kerala is cardamom, pepper, coconut, coffee, tea, jackfruit, tapioca, etc. Out of the 210 small farmers, 103 planters prefer pepper plantation as mono-cropping and 107 planters prefer pepper plantation as intercropping. According to intercropping, 93 planters have intercropped pepper with cardamom, 87 planters have intercropped pepper with coffee and 77 planters have intercropped pepper with coconut.

Sixty percent of the planter has cultivated pepper using traditional variety and 40 percent of the planter has cultivated pepper using hybrid variety. The most commonly used traditionally varieties are Karimunda and mudan and that of hybrid variety is Panniyur -1. The traditional varieties are preferred the most under pepper cultivation due to favourable climatic conditions and availability of seedlings. Sixty six percent of the pepper planters have availed of subsidy in the form of cash.

Family labour occupies very dominant position in the cultivation of pepper as most of the farmers grow pepper plants as homestead garden. When compared to hired labour, family labourers are comparatively low. Out of the hired labourers, majority of the pepper planters have hired male labourers. Male labourers are paid more owing to their hard work in nature. In Kerala the growers prefer indigenous varieties of pepper to hybrid varieties.

The output of pepper per acre and its unit cost of production were computed. The results are presented in Table 2.

**Table - 2 Productivity and unit cost of production of pepper**

Total Cost (Rs. per acre)	Output (Kg. per acre)	Cost of Production (Rs. per Kg.)
34905.70	596.00	58.57

It could be observed from table 2 that on an average the productivity of pepper per acre

was 596.00 kg. The total cost of production per acre worked out to Rs.34905.70. The cost of production was Rs.58.57 per kg. of pepper.

The average production of pepper per acre in India is not so satisfactory as compared to the world average. Analysis made using Garrett's ranking technique revealed that frequent attack of pests and diseases, lack of drive and initiation for intensive cultivation and un-favourable climatic conditions were the three major causes of low productivity. Non-availability of hybrid varieties on time and lack of proper guidance from the government agencies on scientific farming were the other two reasons for low productivity of pepper.

The gross returns and net profit of pepper cultivation per acre were estimated. The results are presented in Table 3.

**Table - 3 Profitability of pepper cultivation**

Sl. No.	Particulars	Income (in Rs.)
1.	Gross sales	50707.68
2.	Less marketing cost	1256.04
3.	Gross returns	49451.64
4.	Less variable cost	14889.83
5.	Contribution	34561.81
6.	Less fixed cost	20015.87
7.	Net profit	14545.94
8.	Net profit ratio	29.41 %

It could be seen from Table 3 that the gross returns worked out to Rs.49451.64 per acre. The gross returns were computed by deducting marketing cost incurred by the grower from the sales proceeds of pepper. The contribution worked out to Rs.34561.81 per acre when the variable cost was deducted from the gross returns. The net profit derived by deducting fixed cost from the

contribution amounted to Rs.14545.94. The net profit ratio indicates that the produced margin was 29.41 per cent of the gross returns during the period under study.

**Productivity and Profitability of Pepper Cultivation - Age-Wise of the Plant**

Pepper production has different yield patterns in different periods due to its long life tenure. Accordingly the cost of cultivation varies from period to period. Hence, the cost of cultivation has been analyzed in depth under four age groups namely, "initial bearing stage" from 4th to 6th year, "peak yielding stage" from 7th to 12th year, "declining stage" from 13th to 16th year and "depression stage" from 17th to 20th year.

The cost of production of pepper included both variable and fixed cost. The variable cost included the annual operational and maintenance cost and fixed cost included land revenue, rental value of land; annual share of net establishment cost and other fixed costs. The detailed cost of pepper production per acre was worked out and the results are presented in both age-wise and stage-wise cost of production.

The age-wise distribution of cost of cultivation of pepper output per kg and unit cost of production per acre per year were computed and is presented in Table 4.

**Table 4 Age-wise productivity, unit cost and total cost of production of pepper per year**

Costs	Age-wise Distribution (in Years)			
	4 to 6	7 to 12	13 to 16	17 to 20
<b>I. Variable Cost</b>				
Labour	8326.62	10691.64	7060.94	5488.31
Manure and fertilizers	4233.88	5453.38	3981.83	2790.67
Plant protection	414.82	536.77	499.61	370.50
Tying materials	210.83	438.80	304.30	194.61
Interest on working capital	746.78	990.68	816.37	558.13
Total variable cost (I)	13932.93	18111.27	12663.05	9402.22
<b>II. Fixed Cost</b>				
Land revenue	91.00	91.00	91.00	91.00
Rental value of land	12919.37	12919.37	12919.37	12919.37
Others costs	2835.72	2835.72	2835.72	2835.72
Annual shares of net establishment cost	4169.78	4169.78	4169.78	4169.78
Total fixed costs (II)	20015.87	20015.87	20015.87	20015.87
<b>III. Total cost of production (I + II)</b>	33948.80	38127.14	32678.92	29418.09
<b>IV. Output (kgs/Acre)</b>	489.03	780.36	493.32	415.27
<b>V. Unit cost of Production (Rs./kg.)</b>	69.42	48.86	66.24	70.84

The age-wise analysis of annual productivity of pepper in the study area disclosed that average output was 489.03 kilograms per acre during 4-6 years, 780.36 kilograms during 7-12 years 493.32 kilograms during 13-16 years and 415.27 kilograms during 17-20 years. Hence it is concluded that the pepper output starts increasing from the fourth year onwards, reaches stabilized yield between 7 and 12 years of age, starts decreasing from thirteenth year onwards and reaches the minimum yield during the last phase.

The analysis of the age-wise cost of production of pepper revealed that total variable cost per acre increased with the increase in age of the plant, reached the maximum during 7-12 years and decreased with increase in age and reached the minimum during 17-20 years of age. However, the fixed cost remained constant during all the four phases of the pepper plant. Therefore the cost of production was the maximum during the peak yielding stage and the minimum during the depression stage. The cost of production for pepper at 7-12 years of age worked out to Rs.38127.14 whereas the cost of production for 17-20 years amounted to 29,418.09. The comparative analysis of the unit cost of production showed that the unit cost for 17-20 years worked out to Rs.70.84 whereas it was only Rs.48.86 for 7-12 years. This was due to the high productivity of pepper during the peak yielding stage of the plant.

The age-wise cost and returns of pepper cultivation has been calculated and presented in the Table 5.

**Table 5 Age-wise cost and returns of pepper cultivation**

The analysis profitability among different age groups of pepper revealed that the highest contribution, Rs.46,721.46 was realized during the peak yielding stage whereas it was the minimum of Rs.25,278.42 during the depression

Sl. No.	Particulars	Age-wise Distribution			
		4 to 6	7 to 12	13 to 16	17 to 20
1.	Gross sales	41606.67	66393.03	41971.67	35331.17
2.	Marketing cost	1170.40	1560.30	1190.60	650.53
3.	Gross returns (1 +2)	40436.27	64832.73	40781.07	34680.64
4.	Variable cost	13932.93	18111.27	12663.05	9402.22
5.	Contribution (3 - 4)	26503.34	46721.46	28118.02	25278.42
6.	Fixed cost	20015.87	20015.87	20015.87	20015.87
7.	Net profit (5 - 6)	6487.47	26705.59	8102.15	5262.55

stage. Net profit to gross return has been 41.19 per cent which was the highest during the peak yielding stage 15.17 per cent, the lowest, during the depression stage.

**Productivity and Profitability of Pepper Cultivation - Stage-Wise of the Plant**

The period from initial stage to 12 years of age, the stage of pepper cultivation could be rightly called as "yield increasing stage" and the period from 13 years to 20 years of age of pepper cultivation as "yield decreasing stage". The stage-wise distribution of cost of cultivation and the productivity of pepper cultivation is presented in Table 6.

**Table 6 Stage-wise productivity unit cost and total cost of production of pepper per year**

The stage-wise analysis of pepper plants revealed that the average productivity of pepper

Cost	Stage-wise Distribution	
	Yield Increasing Stage	Yield Decreasing Stage
<b>I - Variable Cost</b>		
Labour	10444.49	6074.63
Manure and fertilizer	5819.24	3036.25
Plant protection	573.35	485.05
Tying materials	373.67	162.46
Interest on working capital	963.85	587.25
Total variable cost	18174.60	10399.64
<b>II - Fixed Cost</b>		
Land revenue	91.00	91.00
Rental value of land	12919.37	12919.37
Other cost	2835.72	2835.72
Annual share of net establishment	4169.78	4169.78
<b>III - Total Fixed Cost</b>	20015.87	20015.87
<b>IV - Total cost of production (I + II)</b>	38190.47	30415.51
<b>V - Output (kgs/acre)</b>	680.82	468.68
<b>VI - Unit Cost of Production (Rs./kg)</b>	56.09	64.90

per acre was the highest during the yield increasing stage with 680.82 kilograms and it was the lowest during the yield decreasing stage with 468.68 kilograms. The stage-wise analysis of cost of production showed that the total variable cost was the maximum of Rs.18174.60 per acre

during the yield increasing stage and it was the minimum of Rs.10,399.64 per acre during the yield decreasing stage. The total cost of production also showed a similar relationship. The analysis further revealed that the cost of production per kilogram was Rs.56.09 which was the lowest in the yield increasing stage and was Rs.64.90 which was the highest in the yield decreasing stage during the period under study.

The cost and returns on the basis of stage-wise such as "yield increasing stage" and "yield decreasing stage" have been calculated and presented in Table 7.

**Table - 7**

**Stage-Wise Cost and Returns of Pepper Cultivation**

The data revealed that the contribution arrived at was the maximum of Rs.38329.24 in the yield increasing stage and a minimum of Rs.28469.53 during the yield decreasing stage. As a result the net profit per year worked out to be the maximum

Sl. No.	Particulars	Stage-wise Distribution	
		Yield Increasing Stage	Yield Decreasing Stage
1.	Gross sales	57924.17	39872.74
2.	Marketing cost	1420.33	1003.57
3.	Gross returns (1 - 2)	56503.84	38869.17
4.	Variable cost	18174.60	10399.64
5.	Contribution (3 - 4)	38329.24	28469.53
6.	Fixed cost	20015.87	20015.87
7.	Net profit (5 - 6)	18313.37	8453.66

of Rs.18313.37 during the yield increasing stage and a minimum of Rs.8453.66 during the yield decreasing stage. The highest profit achieved during the yield increasing stage reveal that there has been high productivity during the yield increasing stage. And hence, it is rightly called as yield increasing stage.

**Suggestions**

The improved and hybrid varieties must be pest resistant and drought-tolerant. They must be suitable for cultivation in high altitudes and adaptable to different agro



climatic conditions. The latest bio-technologies like Genetic engineering and Tissue culture may be followed to develop drought and pest resistant pepper varieties to achieve the maximum level of productivity. The growers must be educated on the scientific methods of intensive cultivation in increase productivity by periodical "Growers Meet" organized by Government organizations and Extension agencies, using all the popular media of communication. Of late, due to Global warming and factors like EL-nino and La-nina phenomenon the monsoon patterns seem to be erratic, which tells upon the productivity of pepper. Therefore to ensure consistently good yield, various irrigation methods like pump irrigation with sprinkler accessories, irrigation by check dam, rivulets and by water harvesting methods may be taken up.

Pepper growers are to be motivated to form a grower's association in micro-level and to meet periodically to discuss the issues relating to pepper cultivation. Assured floor price to pepper will encourage the prospective growers to continue pepper cultivation and undertake the same on large scale. Information on Marketing should be passed on to growers and traders through the mass media and other means of communication.

Growers must be educated about quality control from the field level onwards. Quality will command good demand in the international market and fetch attractive prices. Value-added pepper products may further be popularized in domestic markets through organized marketing network. The public is to be informed through the mass media about the importance of indigenous medicines where the usage of pepper is substantial.

#### **Conclusion**

Pepper, being a significant foreign exchange earner and a source of income and employment to millions of people from time immemorial, deserves a planned and continuous attention. It is a goose that lays golden eggs. Any step taken in the right direction by the people concerned such as producers, traders, exporters, Government and the like would go a long way in reaffirming the share of Indian pepper in both domestic and foreign markets. The present study has brought into focus various issues relating to production. The policy implications suggested, if properly implemented may result in increased revenue for the nation and for the people concerned.

The researcher fervently hopes that the suggestions put forth in the light of a dedicated and strenuous study of the economics of pepper plantation in Kerala will receive the attention that they deserve. It is fondly hoped that the invaluable lessons drawn from such a study, will not end up as a cry in the wilderness. Let me conclude with the immortal words "Awake, Arise and Stop not, till the goal is reached".

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