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COST–BENEFIT ANALYSIS AND ECONOMIC VIABILITY OF SELECTED MEDICINAL PLANT CULTIVATION IN IDUKKI DISTRICT

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ABSTRACT

Medicinal plants have significant potential for improving farm income and promoting economically viable agricultural activities. The present study was undertaken to assess the production performance, cost of cultivation, returns and economic viability of selected medicinal plants, namely Sathavari, Thippali and Chittaratha, in Idukki district of Kerala. The study analysed the major cost components, productivity, gross returns, net returns and benefit–cost ratio of the selected crops. The study concludes that Sathavari has the greatest economic potential among the selected medicinal plants, while Chittaratha also offers considerable revenue-generating potential if its major input costs can be effectively managed. Improved input-use efficiency, particularly in the management of planting material, manure and labour, can further enhance the profitability and sustainability of medicinal plant cultivation in the study area

KEYWORDS: Medicinal plants, Sathavari, Thippali, Chittaratha, Cost of Cultivation, Gross return, Net returns, Cost-benefit Analysis

INTRODUCTION

Medicinal plants constitute a vital resource base for indigenous and traditional healthcare systems. The continued growth and acceptance of AYUSH systems, both in India and internationally, depend largely on the consistent availability of good-quality plant-based raw materials. Herbal medicines are widely valued for their therapeutic benefits and are generally perceived as having fewer adverse effects when used appropriately. Medicinal plants represent an important component of biodiversity and serve as raw materials for various pharmaceutical and traditional medicine industries, particularly Ayurveda. Plant-based medicines have gained considerable acceptance because of their easy availability, relatively low cost, perceived safety, environmental sustainability and therapeutic potential. However, the increasing demand for medicinal plants has placed considerable pressure on natural resources. A substantial proportion of the raw material required by the herbal industry has traditionally been obtained through collection from wild sources, raising concerns about overexploitation and the

conservation of medicinal plant species (WHO, 1991). India and China are among the world's major producers and users of medicinal herbs and possess significant biological diversity, including several valuable and rare medicinal plant species (Deshpande, 2008).

REVIEW OF LITERATURE

Vinay Tondon (2006) draws our attention to the far-reaching consequence of the disappearance of the natural vegetation of medicinal plants. The disappearance of the natural vegetation affects the local livelihood, medicinal plant trade, quality raw drugs availability, development of new drugs and the herbal pharmaceutical industry. So he stresses the critical & immediate need to bring about a balance in our approach to conservation and the sustainable use of the vast and priceless natural heritage.

Pious (2008) points out the need for the cultivation of medicinal plants in Kerala. Due to the utilization of land to cultivate food crops, medicinal plant cultivation is very limited. So steps should be taken to cultivate medicinal plants as inter crop. In order to provide quality herbal materials to the ayurvedic industry and for the conservation of endangered medicinal plants cultivation of medicinal plants is imperative.

Rao and Syamasundar (2012) highlighted the growing importance of medicinal plants in traditional and complementary healthcare systems, while noting that overharvesting, habitat loss, climate change and unsustainable practices threaten many medicinal plant species. They emphasized cultivation as an economically viable strategy for conserving medicinal plant biodiversity and meeting the increasing demand for raw materials.

STATEMENT OF THE PROBLEM

Medicinal plants have gained increasing importance as a source of raw materials for traditional healthcare systems and as a potential avenue for income diversification among farming communities. In the absence of systematic information on the cost structure, returns and economic viability of medicinal plant cultivation, farmers may face difficulties in selecting crops that provide better economic benefits. Against this background, the present study attempts to estimate the cost of cultivation, assess the returns, and evaluate the cost–benefit ratio and economic viability of selected medicinal plants in Iddukki district.

OBJECTIVES

1. To estimate the cost of cultivation of selected medicinal plants in Iddukki district.
2. To assess the returns generated from the cultivation of selected medicinal plants in district.
3. To evaluate the economic viability of selected medicinal plants through cost–benefit analysis.

METHODOLOGY OF THE STUDY

Sample selection

Three medicinal plants were selected based on their medicinal importance and extent of cultivation to assess the cost of cultivation and returns generated from their production. The study was conducted in Idukki district of Kerala, where 60 farmers cultivating medicinal plants were randomly selected for the study. The selected medicinal plants were Sathavari (*Asparagus racemosus*), Thippali (Long Pepper), and Chittaratha (*Alpinia calcarata*). For consistency, the Malayalam names of the selected medicinal plants were used throughout the study.

Statistical tools used

The cultivation cost of medicinal plants is considered at three levels viz, Cost A, Cost B and Cost C. Benefit-Cost Ratio

Gross Income: Synonymous with value of output (both main and by product)

Net Return: Gross Income – Cost C

BCR is used as an indicator to show the viability of medicinal plants cultivation.

Benefit –Cost Ratio = G/E , where G =Gross Return and E = Total Expenditure

Table 1 Farmers cultivating different types of medicinal plants in the sample district

Medicinal Plants	Number of farmers (n=60)
Sathavari	43 (71.67)
Thippali	47 (78.33)
Chittaratha	48 (80.0)

Table 1 presents the distribution of farmers cultivating different medicinal plants in Idukki district, based on a sample of 60 farmers. The findings indicate that Chittaratha was the most commonly cultivated medicinal plant, with 48 farmers (80.00%) engaged in its cultivation. This was followed by Thippali, cultivated by 47 farmers (78.33%). Sathavari was cultivated by 43 farmers (71.67%), making it the least commonly cultivated among the three medicinal plants studied.

Table 2 Area, Production and productivity of selected medicinal plants

Medicinal Plants	TA	TP	Pdty.per acre
Sathavari	16.65	125520	7539
Thippali	13.05	11419	875
Chittaratha	10.85	94612	8720

As per the above table, among the three medicinal plants, Sathavari occupied the largest cultivated area of 16.65 acres, followed by Thippali (13.05 acres) and Chittaratha (10.85 acres). In terms of total production, Sathavari recorded the highest production of 125,520, followed by Chittaratha with 94,612 and Thippali with 11,419. However, when productivity per acre is considered, Chittaratha showed the highest productivity of 8,720 per acre, closely followed by Sathavari at 7,539 per acre. Thippali recorded the lowest productivity, at only 875 per acre.

Costs of Medicinal plants Cultivation

In this section, an attempt has been made to analyse the cost of medicinal plants cultivation. For the purpose of estimating the costs, the standard concept adopted by Farm Management studies (Directorate of Economics and Statistics) have been used. Under this concept, the cost of cultivation is computed at three levels, viz. Cost A, Cost B and Cost C. Cost A includes all the paid-out cost, Cost B includes both the interest rate of owned fixed capital and rental value of land. Cost C, ie. the total cost of cultivation includes all the costs incurred during the production process. The labour cost includes labour cost for land preparation and planting, weeding, manuring, irrigation and harvesting. The prevailing wage rate in the respective districts is taken for analyzing the labour charges. Since the cultivation of plants is in small area, machines are not using by the cultivators. Labour is employed in all farming activities. Small tools and equipments are using for cultivation. The repairing charges for these tools assumed to be fixed to estimate cost. Land tax is taken as the tax levied by the Government for one acre of land. Electricity charges and transportation costs are included in miscellaneous expenditure. Interest has been charged at the rate of 7 percent per annum on the working capital. Interest value of owned capital assets is taken by excluding land. The prevailing rent for land in the respective districts is taken as the rental value of owned land. The details of different costs of medicinal plants cultivation per acre in the selected district (plant wise) are presented in table 3-5 to

Table 3 Costs of Sathavari Cultivation (Per Acre) (value in Rs.)

Items	Cost (in Rs.)
Hired labour cost	25500
Planting material	16680
Manures	25650
Pest control	1110
Land tax	100
Repair and maintenance charges	3250
Interest on working capital	4964
Miscellaneous	1876
Cost A	79130
Interest on value of owned capital asset	1225
Rental value of owned land	8200
Cost B	88555
Imputed family labour	13800
10 % Managerial Cost	10236
Cost C (Total Cost)	112591

The cost of cultivation of Sathavari per acre in Idukki district. The total cost of cultivation (Cost C) was estimated at ₹1,12,591 per acre. The different components of cultivation cost show that labour and input costs constituted the major share of expenditure. Among the individual cost components, manure cost was the highest at ₹25,650 per acre, followed closely by hired labour cost of ₹25,500. The expenditure on planting material was ₹16,680, while imputed family labour accounted for ₹13,800. The rental value of owned land was ₹8,200, and interest on working capital amounted to ₹4,964. Relatively smaller expenses were incurred on repair and maintenance (₹3,250), miscellaneous expenses (₹1,876), pest control (₹1,110) and land tax (₹100). The total of these expenses resulted in a Cost A of ₹79,130 per acre. After adding interest on owned capital assets (₹1,225) and rental value of

owned land (₹8,200), the Cost B amounted to ₹88,555 per acre. Further inclusion of imputed family labour (₹13,800) and managerial cost at 10 per cent (₹10,236) resulted in a total Cost C of ₹1,12,591 per acre.

Table 4 Costs of Thippali Cultivation (Per Acre) (value in Rs.)

Items	Cost (in Rs.)
Hired labour cost	24300
Planting material	22500
Manures	24712
Pest control	1301
Land tax	100
Repair and maintenance charges	3250
Interest on working capital	5213
Miscellaneous	1555
Cost A	82931
Interest on value of owned capital asset	1225
Rental value of owned land	8200
Cost B	92356
Imputed family labour	18600
10 % Managerial Cost	11096
Cost C (Total Cost)	122052

Table 4 presents the cost of cultivation of Thippali per acre in Idukki district. The total cost of cultivation, represented by Cost C, was ₹1,22,052 per acre. The cost structure shows that expenditure on planting material, manure and labour constituted the major share of the total cultivation cost. Among the individual cost components, hired labour cost accounted for ₹24,300 per acre, while planting material was the highest individual expenditure at ₹22,500 per acre. The expenditure on

manures was ₹24,712, indicating that manure and planting material together formed a substantial portion of the cultivation cost. Imputed family labour accounted for ₹18,600 per acre, while interest on working capital was ₹5,213. The expenditure on repair and maintenance charges was ₹3,250, followed by pest control at ₹1,301, miscellaneous expenses at ₹1,555, and land tax at ₹100 per acre. These costs, along with the other variable expenses, resulted in a Cost A of ₹82,931 per acre. After adding interest on the value of owned capital assets (₹1,225) and rental value of owned land (₹8,200), the Cost B amounted to ₹92,356 per acre. Further, after including imputed family labour of ₹18,600 and 10 per cent managerial cost of ₹11,096, the total Cost C reached ₹1,22,052 per acre.

Table 5 Costs of Chittaratha Cultivation (Per Acre) (value in Rs.)

Items	Cost (in Rs.)
Hired labour cost	19200
Planting material	160000
Manures	60126
Pest control	6462
Land tax	100
Repair and maintenance charges	3250
Interest on working capital	17569
Miscellaneous	5100
Cost A	271807
Interest on value of owned capital asset	1225
Rental value of owned land	8200
Cost B	281232
Imputed family labour	24900
10 % Managerial Cost	30613
Cost C (Total Cost)	336745

Table 5 presents the cost of cultivation of Chittaratha per acre in Idukki district. The total cost of cultivation (Cost C) was estimated at ₹3,36,745 per acre, which is considerably higher than the costs reported for Sathavari and Thippali. Among the different cost components, planting material constituted the highest expenditure at ₹1,60,000 per acre, accounting for a substantial portion of the total cost. This was followed by manure cost of ₹60,126. Imputed family labour amounted to ₹24,900, while hired labour cost was ₹19,200 per acre. The interest on working capital was ₹17,569, indicating the relatively high working-capital requirement for Chittaratha cultivation. Other expenses included pest control (₹6,462), miscellaneous expenses (₹5,100), repair and maintenance charges (₹3,250) and land tax (₹100). These costs together with the other variable expenses resulted in a Cost A of ₹2,71,807 per acre. After adding interest on the value of owned capital assets (₹1,225) and rental value of owned land (₹8,200), the Cost B amounted to ₹2,81,232 per acre. Further inclusion of imputed family labour (₹24,900) and 10 per cent managerial cost (₹30,613) resulted in a total Cost C of ₹3,36,745 per acre. Overall, the results indicate that Chittaratha cultivation was highly cost-intensive, mainly because of the exceptionally high expenditure on planting material and manure. The high-Cost C suggests that substantial investment is required for Chittaratha cultivation.

Gross return

Gross return from medicinal plants cultivation is calculated by taking the product of quantity sold and the price per kilogram. Price varies from districts to districts depending on the demand and supply of the product. Total quantity produced cannot be sold fully. Some quantity should be lost due to wastage made during harvesting and transporting.

**Table 6 Gross Return from Medicinal Plant
Cultivation (per acre) (Value in Rs.)**

Medicinal Plants	Gross return
Sathavari	246300
Thippali	228800
Chittaratha	450142
Total	925242

The total gross return obtained from the three medicinal plants was ₹9,25,242 per acre. Among the selected medicinal plants, Chittaratha generated the highest gross return of ₹4,50,142 per acre, followed by Sathavari with ₹2,46,300. Thippali recorded the lowest gross return of ₹2,28,800 per acre. Overall, the findings show that Chittaratha was the most remunerative crop in terms of gross return per acre, while Thippali recorded the lowest gross return among the three medicinal plants. The total gross return of ₹9,25,242 demonstrates the considerable income-generating potential of medicinal plant cultivation in the study area.

Net return

Net return from cultivation provides an estimate of returns to the farmers purely of profit. The difference between gross return and total cost gives net return.

Table 7
Net Return from Medicinal Plant Cultivation
(per acre) (Value in Rs.)

Medicinal Plants	Net return
Sathavari	133709
Thippali	106748
Chittaratha	113397
Total	353854

The total net return from the three medicinal plants was ₹3,53,854 per acre. Among the selected medicinal plants, Sathavari recorded the highest net return of ₹1,33,709 per acre, followed by Chittaratha with ₹1,13,397 per acre. Thippali recorded the lowest net return of ₹1,06,748 per acre. The results indicate that Sathavari was the most profitable medicinal plant in terms of net return per acre, despite its gross return being lower than that of Chittaratha. This can be attributed to its considerably lower cost of cultivation compared with Chittaratha. Chittaratha generated the highest gross return (₹4,50,142), but its high cultivation cost substantially reduced the resulting net return to ₹1,13,397. Similarly, Thippali recorded the lowest gross return and also the lowest net return among the three crops.

Benefit-Cost analysis

The profitability of medicinal plants cultivation is analysed by the calculation of benefit cost ratio for each plant. The benefit-cost ratio is calculated by using the following formula.

Benefit – cost Ratio = G/E , where G = Gross Return and E = Total Expenditure.

If the ratio is greater than one, medicinal plants cultivation is viable.

Table 8 Benefit-cost Ratio of Medicinal Plants Cultivation

Medicinal Plants	BC Ratio
Sathavari	2.18
Thippali	1.87
Chittaratha	1.42

Among the selected medicinal plants, Sathavari recorded the highest B:C ratio of 2.18, indicating that farmers obtained ₹2.18 for every ₹1.00 invested in its cultivation. This was followed by Thippali, with a B:C ratio of 1.87, implying a return of ₹1.87 for every rupee invested. Chittaratha recorded the lowest B:C ratio of 1.42, indicating a return of ₹1.42 per rupee of investment. The results clearly indicate that all three medicinal plants had B:C ratios greater than one, suggesting that their cultivation was economically viable and profitable.

Major findings

- Sathavari performs best in terms of total production (TP), whereas Chittaratha performs best in terms of productivity per acre. Thippali ranks lowest on both production and productivity.
- The findings indicate that manure and hired labour were the major cost components in Sathavari cultivation, highlighting the importance of input and labour management in reducing the overall cost of cultivation and improving profitability.
- The findings indicate that Thippali cultivation involves relatively high expenditure on planting material, manure and labour.
- The cost structure indicates that planting material and manures are the major contributors to the cost of Chittaratha cultivation, suggesting that effective management of these inputs could play an important role in improving the economic efficiency and profitability of cultivation.
- Chittaratha's gross return was substantially higher than that of Sathavari and Thippali. This higher return may be associated with its higher productivity per acre. Although Chittaratha involved a considerably higher cost of cultivation, particularly for planting material and manure, its high gross return indicates strong revenue-generating potential.
- The findings suggest that Sathavari had the best economic performance in terms of net returns, followed by Chittaratha and Thippali.
- Sathavari cultivation offers the highest economic efficiency among the selected medicinal plants, as reflected by its highest B:C ratio of 2.18. Although Chittaratha generated the highest gross return, its relatively high cost of cultivation resulted in the lowest B:C ratio among the three crops.

CONCLUSION

The study reveals that the selected medicinal plants from Idukki district—Sathavari, Thippali and Chittaratha—differ considerably in terms of productivity, cost of cultivation and economic returns. The findings therefore suggest that Sathavari offers the greatest economic advantage to farmers, while Chittaratha has considerable potential if its major production costs can be effectively managed. Improving the efficiency of input use, particularly planting material, manure and labour, along with better cultivation and cost-management practices, could enhance the profitability of medicinal plant cultivation. Overall, the study highlights the economic viability of medicinal plant cultivation and the

importance of selecting crops and managing inputs based on both productivity and profitability considerations.

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