

ECONOMIC ANALYSIS AND PROFITABILITY OF SELECTED MEDICINAL PLANT CULTIVATION IN PALAKKAD DISTRICT, KERALA

By

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Abstract

Growing medicinal plants can help farmers diversify and earn more income. This study looks at the area, production, productivity, cost, and profits of Neelayamari, Brahmi, and Adalotakam in the district. Adalotakam had the largest area under cultivation and the highest total production. Brahmi had the highest productivity and gross return per acre. Neelayamari had the highest net return and benefit-cost ratio (1.94), followed by Adalotakam (1.53) and Brahmi (1.37). The results show that all three plants are profitable and can boost farm income. Better input management and improved farming methods could make them even more profitable.

Keywords: *medicinal plants, neelayamari, brahmi, adaloakam, cost of cultivation, gross return, net returns, and cost-benefit analysis.*

Introduction

Kerala, endowed with rich and diverse flora, has a long-standing association with Ayurveda and is widely recognised for the continued practice of traditional Ayurvedic medicine. The state occupies a significant position in India's Ayurvedic sector and has considerable potential for further development of the Ayurvedic pharmaceutical industry. The growing popularity of Ayurveda, both

domestically and internationally, has substantially increased the demand for medicinal plants, which constitute the principal raw material for Ayurvedic medicines. In Kerala, the demand for Ayurvedic medicines has been reported to grow at an annual compound rate of 10–12 percent (Ajith Kumar, 2003), and a similar growth trajectory is anticipated at the global level.

Despite these opportunities, farmers have generally been reluctant to adopt medicinal plant cultivation on a large scale. This reluctance may be associated with factors such as limited technical knowledge, uncertain markets, inadequate extension support, price fluctuations and the absence of assured procurement mechanisms. (Jones & Vijayan, 2020). According to official data from the Government of India, specifically managed by the National Medicinal Plants Board (NMPB) under the Ministry of AYUSH, exactly 1540 medicinal plant species are formally documented and utilised within the Ayurvedic system of medicine, while fewer than 20-30 species were reported to be under systematic cultivation in the country (Government of India estimate). This situation highlights the need to examine the economic viability and market potential of medicinal plant cultivation, particularly in regions such as Kerala where the Ayurvedic industry has a strong institutional and cultural base.

Review of literature

Ramakrishnappa (2002) observed that India has one of the world's richest traditions of plant-based medicine,

which remains highly relevant for ensuring healthcare security for a large section of the population. The country is estimated to have around 25,000 effective plant-based formulations used in folk medicine and preserved through the traditional knowledge of rural communities. More than 1.5 million traditional medicine practitioners reportedly use medicinal plants for preventive, promotive, and curative healthcare purposes. Furthermore, India has over 7,800 medicinal drug-manufacturing units, which collectively consume approximately 2,000 tonnes of medicinal herbs annually.

Seth and Bhavna (2004) reported that India has approximately 45,000 plant species, about 3,000 of which are known to have medicinal properties, while traditional practitioners use more than 6,000 species for various therapeutic purposes. India is one of the leading producers of medicinal herbs and is therefore often called the "Botanical Garden of the World." There are approximately 25,000 registered Ayurvedic practitioners worldwide, compared with around 70,000 practitioners of modern medicine. Traditional systems of medicine

continue to play a significant role in healthcare, with nearly 60 per cent of the world's population and about 70 per cent of India's population relying on traditional medicines.

Suneeth and Chandrakanth (2006) developed a model for assessing the economic value of medicinal plants. They proposed that investment, market value, non-market use values, and benefit-sharing mechanisms determine the economic value of medicinal plants. The study emphasised knowledge sharing as an important way to promote the conservation of medicinal plant resources and foster research partnerships between local communities and organisations. The study identified knowledge sharing as a significant factor influencing the overall value of medicinal plants.

Statement of the Problem

The increasing scarcity of medicinal plants in natural habitats, coupled with rising demand, has also contributed to the use of substitutes, allied species and adulterated or spurious materials in the herbal medicine trade. Such practices may compromise the quality and efficacy of Ayurvedic preparations

and pose a serious challenge to the credibility and sustainability of traditional Indian systems of medicine. In this context, systematic cultivation of medicinal plants offers a viable strategy for ensuring a reliable supply of quality raw materials while reducing pressure on naturally occurring plant resources. Against this background, an economic assessment of medicinal plant cultivation is important. Understanding the costs involved, returns generated, and profitability can provide valuable insights into the feasibility of commercial cultivation and help identify measures to promote its adoption among farmers.

Objectives

1. To estimate the cost of cultivation of selected medicinal plants in Palakkad district.
2. To estimate the returns generated from the cultivation of selected medicinal plants in the district.
3. To assess the economic viability of selected medicinal plants using cost-benefit analysis.

Methodology of the study

Sample selection

The researchers purposively selected three medicinal plants based on their

medicinal significance and cultivation extent to evaluate the costs and returns associated with their production. The study was conducted in the Palakkad district, Kerala, where 60 farmers cultivating medicinal plants were randomly selected as respondents. The medicinal plants selected for the study were Neelaamari (*Indigofera tinctoria*), Brahmi (*Bacopa monnieri*), and Adalotakam (*Justicia beddomei*). For consistency and ease of presentation, we used the Malayalam names of the selected medicinal plants throughout the study.

Statistical tools used

The cultivation cost of medicinal plants are considered at three levels, viz., Cost A, Cost B and Cost C.

Different concepts of cost of cultivation:

The cultivation cost of medicinal plants are considered at three levels, viz., Cost A, Cost B and Cost C.

Cost A includes Cost A1 and Cost A2.

Cost A1 is the a Actual paid-out cost for owner cultivator which includes the following cost items,

1. Value of hired human labour:
 - a. Male b. Female

2. Value of planting material
3. Value of pesticides
4. Irrigation charges
5. Land tax
6. Repair and maintenance charges
7. Miscellaneous charges
8. Interest on Working Capita

The value of hired labour is the product of mandays and the prevailing wage rate in the districts for both male and female workers. The cost of planting material is taken as equal for all districts by taking the product of the average price of planting material per kilogram/packet and the quantity needed per acre of cultivation. Cost of pest control is the product of the quantity of pesticides needed and its price. Irrigation charges are included in the labour cost and miscellaneous charges. The electricity charges for irrigation are included in miscellaneous charges. Land tax is taken as Rs.304 which is the tax levied by the government for one acre of land. Repair and maintenance charges include the repairing charges of the implements used for cultivation; this is taken as an equal amount in different districts since they are using small

equipment for cultivation. Interest on working capital has charged 7 percent per annum on the working capital.

Cost A2 is Cost A1 + rent paid for leased land. In the study, there is no leased land, and so this item is excluded.

Cost B includes Cost B1 and Cost B2. Rental value of land and interest on owned capital assets (excluding land) represent imputed cost which are added to Cost A to get Cost B1. In the study, the cultivators do not use heavy machinery and heavy capital assets since they are marginal farmers. So only a nominal amount is added to the cost as the imputed value of owned capital assets.

Cost B2 is Cost B1 + rental value of owned land and rent paid for leased-in land. Rental value of owned land is taken as the prevailing rent for land in the respective districts. The sample cultivators do not have leased-in land. So the rent paid for leased-in land is exempted in the study.

Cost C is the total cost of production, which includes all cost items, actual as well as imputed. The value of family labour is to be imputed and added to Cost B to work out Cost C. 10 percent

managerial costs are also considered to find out total

Benefit-Cost Ratio

Gross Return: Synonymous with the 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 plant 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)
Neelayamari	49 (81.67)
Brahmi	19 (31.67)
Adalotakam	41 (68.33)

Table 1 presents the distribution of farmers cultivating different types of medicinal plants in the sample district. Out of the 60 farmers surveyed, Neelayamari was the most widely cultivated medicinal plant, with 49 farmers (81.67%) engaged in its cultivation. This was followed by

Adalotakam, cultivated by 41 farmers (68.33%). Brahmi was cultivated by 19 farmers (31.67%), making it the least commonly cultivated medicinal plant among the three.

Table 2. Area, Production and productivity of selected medicinal plants

Medicinal Plants	TA	TP (in kg.)	Pdty.per acre (in kg.)
Neelayamari	14.80	36636	2475
Brahmi	2.61	100730	38593
Adalotakam	18.50	177496	9594

As per the above table, among the three medicinal plants, Adalotakam occupied the largest total cultivated area of 18.50 acres and recorded the highest total production of 177,496 kg. Its productivity was 9,594 kg per acre, indicating a relatively high level of output from the area cultivated. Neelayamari was cultivated in 14.80 acres, with a total production of 36,636 kg. Its productivity was 2,475 kg per acre, which was the lowest among the three medicinal plants. Although Brahmi occupied the smallest cultivated area of only 2.61 acres, it recorded a substantial production of 100,730 kg. It also had the highest

productivity, at 38,593 kg per acre, considerably exceeding that of Neelayamari and Adalotakam.

Costs of Medicinal plants Cultivation

In this section, an attempt has been made to analyse the cost of medicinal plant cultivation. For the purpose of estimating the costs, the standard concept adopted by Farm Management studies (Directorate of Economics and Statistics) has been used. The details of different costs of medicinal plant cultivation per acre in the selected district (plant-wise) are presented in Table 3-5

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

Items	Cost (in Rs.)
Hired labour cost	30000
Planting material	24200
Manures	35990
Pest control	2080
Land tax	304
Repair and maintenance charges	3250
Interest on working capital	6819
Miscellaneous	1593
Cost A	104236
Interest on value of owned capital	2925

asset	
Rental value of owned land	8500
Cost B	115661
Imputed family labour	29200
10 % Managerial Cost	14486
Cost C (Total Cost)	159347

The above table presents the cost of cultivation of Neelayamari per acre. The total cost of cultivation, represented by Cost C, was Rs.1,59,347 per acre. The expenditure consisted of both variable and fixed/imputed costs. Among the individual cost components, manures constituted the highest expenditure at Rs.35,990 per acre, followed by hired labour cost of Rs.30,000 and planting material cost of Rs.24,200. These three components together accounted for a substantial share of the total cultivation cost, indicating that input and labour requirements are major contributors to the cost of Neelayamari cultivation. The expenditure on interest on working capital was Rs.6,819, while repair and maintenance charges amounted to Rs.3,250. Pest control involved a relatively small expenditure

of Rs.2,080, while miscellaneous expenses were Rs.1,593. Land tax was the lowest recorded cash expenditure at Rs.304 per acre. The Cost A was Rs.1,04,236 per acre. After adding interest on the value of owned capital assets (Rs.2,925) and rental value of owned land (Rs.8,500), the Cost B increased to Rs.1,15,661 per acre. Further, the imputed value of family labour (Rs.29,200) and managerial cost (Rs.14,486) resulted in a total Cost C of Rs.1,59,347 per acre.

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

Items	Cost (in Rs.)
Hired labour cost	43000
Planting material	104950
Manures	81454
Pest control	5211
Land tax	304
Repair and maintenance charges	3250
Interest on working capital	16928
Miscellaneous	3665
Cost A	258762
Interest on value of owned capital asset	3225
Rental value of owned land	8500

Cost B	270487
Imputed family labour	54550
10 % Managerial Cost	32503
Cost C (Total Cost)	357540

Table 4 presents the cost of cultivation of Brahmi per acre. The total cost of cultivation (Cost C) was estimated at Rs.3,57,540 per acre, indicating that Brahmi cultivation involved substantially higher expenditure compared with Neelayamari.

Among the different cost components, planting material constituted the highest expenditure at Rs.1,04,950 per acre, followed by manures at Rs.81,454 and hired labour at Rs.43,000. These three components were the major contributors to the total cost of Brahmi cultivation, highlighting the relatively high input and labour requirements of the crop. The interest on working capital amounted to Rs.16,928 per acre, while expenditure on pest control was Rs.5,211. Repair and maintenance charges accounted for Rs.3,250, and miscellaneous expenses were Rs.3,665. The land tax, at Rs.304 per acre, represented the smallest cost

component. The Cost A was Rs.2,58,762 per acre. After including interest on the value of owned capital assets (Rs.3,225) and rental value of owned land (Rs.8,500), the Cost B amounted to Rs.2,70,487 per acre. Further inclusion of imputed family labour of Rs.54,550 and managerial cost of Rs.32,503 resulted in a total Cost C of Rs.3,57,540 per acre.

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

Items	Cost (in Rs.)
Hired labour cost	23900
Planting material	47250
Manures	57593
Pest control	1646
Land tax	304
Repair and maintenance charges	4750
Interest on working capital	9820
Miscellaneous	3215
Cost A	148478
Interest on value of owned capital asset	9706
Rental value of owned land	8500
Cost B	166684

Imputed family labour	25200
10 % Managerial Cost	17550
Cost C (Total Cost)	209434

The total cost of cultivation (Cost C) of Adalotakam was estimated at Rs.2,09,434 per acre. The cost structure indicates that expenditure on inputs, particularly manures and planting material, formed a major share of the total cultivation cost. Among the different cost components, manures constituted the highest expenditure at Rs.57,593 per acre, followed by planting material at Rs.47,250 and hired labour at Rs.23,900. These were the major cost components, indicating that nutrient management, planting material and labour requirements significantly influenced the cost of Adalotakam cultivation. The interest on working capital amounted to Rs.9,820 per acre, while repair and maintenance charges were Rs.4,750. Miscellaneous expenses accounted for Rs.3,215, whereas pest control expenditure was relatively low at Rs.1,646. Land tax, at Rs.304 per acre, was the smallest cost component. The Cost A was Rs.1,48,478 per acre.

With the addition of interest on the value of owned capital assets (Rs.9,706) and rental value of owned land (Rs.8,500), the Cost B amounted to Rs.1,66,684 per acre. Further, after including imputed family labour of Rs.25,200 and 10 per cent managerial cost of Rs.17,550, the total Cost C increased to Rs.2,09,434 per acre.

Gross return

Gross return from medicinal plant cultivation is calculated by taking the product of the quantity sold and the price per kilogram. Price varies from district to district depending on the demand and supply of the product. The 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
Neelayamari	309560
Brahmi	491160
Adalotakam	319800
Total	1120520

Table 6 presents the gross returns obtained from the cultivation of

selected medicinal plants on a per-acre basis. The results show considerable variation in gross returns among the three medicinal plants. Brahmi generated the highest gross return of Rs.4,91,160 per acre, indicating its strong revenue-generating potential. This was followed by Adalotakam, which provided a gross return of Rs.3,19,800 per acre. Neelayamari recorded the lowest gross return of Rs.3,09,560 per acre. The combined gross return from the three medicinal plants amounted to Rs.11,20,520 per acre. Brahmi alone accounted for approximately 43.83 per cent of the total gross return, followed by Adalotakam (28.54 percent) and Neelayamari (27.63 percent).

Net return

Net return from cultivation provides an estimate of returns to farmers purely in terms 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
Neelayamari	150213

Brahmi	133620
Adalotakam	110366
Total	394199

Table 7 presents the net returns obtained from the cultivation of selected medicinal plants per acre, calculated after deducting the total cost of cultivation from the gross returns. Among the three medicinal plants, Neelayamari recorded the highest net return of Rs.1,50,213 per acre, followed by Brahmi with Rs.1,33,620 per acre. Adalotakam recorded the lowest net return of Rs.1,10,366 per acre. The total net return from the three medicinal plants was Rs.3,94,199 per acre.

The higher net return from Neelayamari is particularly noteworthy. Although Brahmi generated the highest gross return (Rs.4,91,160 per acre), its high cost of cultivation (Rs.3,57,540 per acre) reduced the resulting net return. In contrast, Neelayamari had a considerably lower cultivation cost of Rs.1,59,347 per acre, enabling it to achieve the highest net return. Adalotakam recorded a gross return of

Rs.3,19,800 per acre and a total cultivation cost of Rs.2,09,434 per acre, resulting in a net return of Rs.1,10,366 per acre.

Benefit-Cost analysis

The profitability of medicinal plant cultivation is analysed by calculating the calculation of benefit cost ratio for each plant. The benefit-cost ratio is calculated 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 plant cultivation is viable.

Table 8. Benefit-cost Ratio of Medicinal Plants Cultivation

Medicinal Plants	BC Ratio
Neelayamari	1.94
Brahmi	1.37
Adalotakam	1.53

Table 8 presents the Benefit–Cost (B:C) ratio of the selected medicinal plants, which measures the economic efficiency and profitability of cultivation. A B:C ratio greater than 1 indicates that the returns obtained

from cultivation are higher than the costs incurred.

Among the selected medicinal plants, Neelayamari recorded the highest B:C ratio of 1.94, indicating that it was the most economically efficient crop. This implies that for every Rs.1 invested in Neelayamari cultivation, the farmer received Rs.1.94 as gross return. Adalotakam recorded the second-highest B:C ratio of 1.53, indicating a favourable return relative to the cost incurred. Brahmi had the lowest B:C ratio of 1.37, suggesting comparatively lower economic efficiency. However, since its ratio was still greater than 1, Brahmi cultivation remained economically viable.

Major findings

1. Adalotakam had the highest area and total production, whereas Brahmi was the most productive on a per-acre basis. The comparatively high productivity of Brahmi suggests that it has considerable potential for generating higher output from a limited cultivated area.
2. Hired labour and planting material were the major components of

Neelayamari cultivation costs, while the inclusion of family labour and managerial costs substantially increased the overall economic cost of cultivation.

3. Brahmi cultivation was highly input-intensive, with planting material, manures and labour accounting for the major share of the cultivation cost. The substantial expenditure on planting material was particularly notable and was the single largest cost component.
4. Adalotakam cultivation involved moderate production costs, with manures and planting material being the two major expenditure items. Compared with Brahmi, the total cost of Adalotakam cultivation was considerably lower, while it was higher than the cost of Neelayamari cultivation.
5. Brahmi was the most remunerative medicinal plant in terms of gross returns per acre, despite having a relatively smaller cultivated area. The higher gross return from Brahmi may be attributed to its substantially higher productivity per acre. Adalotakam and Neelayamari also generated

substantial returns, indicating that all three medicinal plants have income-generating potential for farmers.

6. Neelayamari was the most profitable crop in terms of net return per acre, followed by Brahmi and Adalotakam. The results also highlight that higher gross returns do not necessarily translate into higher net returns, as the level of production costs plays an important role in determining profitability.
7. Overall, the findings indicate that all three medicinal plants were economically profitable, with B: C ratios exceeding unity. Neelayamari emerged as the most profitable and economically efficient crop, followed by Adalotakam and Brahmi. The comparatively lower B: C ratio of Brahmi may be attributed to its higher cost of cultivation, particularly the expenditure on planting material, manures and labour.

Conclusion

The cultivation of medicinal plants has considerable potential to enhance farm

income and provide a viable alternative to conventional crops. Among the selected medicinal plants, Brahmi recorded the highest productivity and gross return per acre, demonstrating its potential to generate high output from a limited area; however, its profitability was constrained by the relatively high cost of cultivation. Adalotakam recorded the highest cultivated area and total production, with moderate production costs and favourable economic returns. Neelayamari emerged as the

most profitable and economically efficient crop, recording the highest net return and B: C ratio, primarily due to its comparatively lower cost of cultivation. Therefore, greater emphasis on cost-effective cultivation practices, efficient use of planting materials and manures, improved productivity, and appropriate farm management can further enhance the profitability of medicinal plant cultivation and contribute to sustainable income generation for farmers.

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