

Research Article

Profitability Analysis of Long Coriander Crop Share by Small-Scale Producers in Battambang, Cambodia

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Abstract

This paper is intended to introduce Long Coriander, the best-known leafy vegetable in Southeast Asia. It is a member of the Coriander family. It has a strong coriander scent and adds flavor to common ingredients in Central and Southeast Asian cuisine, particularly in soups, curries, and noodle dishes. Beyond its culinary uses, Long Coriander also has many benefits in medicine. To meet the criteria of this study, researchers seek to investigate the profitability of the Long Coriander crop for small-scale producers in Cambodia's Battambang Province. It weighs the revenue from producing Long Coriander against the costs of planting and harvesting its crop. The study also illustrates the estimated total revenue and costs for each planting. Producing Long Coriander may beneficially result in large sums of earnings for farmers, with a profit margin of approximately 57%. Furthermore, according to an economic efficiency (EE) analysis, the cost-to-revenue ratio is higher than 1. This proves that the total amount of revenue made from the sale of Long Coriander outweighs the costs of planting and harvesting, so small-scale producers are convincingly supposed to earn more money from this crop. This research study, through dedication and commitment, aims to address the profitability potential of Long Coriander production by integrating the fundamental economic analysis methods to gather rich data that may enhance and influence further agricultural research.

Keywords

Profitability Analysis, Long Coriander, Crop, Small-Scale Producer, Agriculture, Cambodia

1. Introduction

Long Coriander also known as “Puerto Rican coriander, Black Benny, Saw leaf herb, Mexican coriander, Saw tooth coriander, Spiny coriander, Fitweed” [12]. The plant originally came from the Caribbean Islands. Much of Southeast Asia, including Indonesia, Malaysia, and Indochina, is currently experiencing its arrival [4, 11]. Although both plants

are members of the same family, Long Coriander does not look very similar in shape to coriander. However, the long, tough stems have a scent that is quite similar to the scent of coriander, suggesting that they could be used in place of or as an alternative to the former [6]. Interestingly, Asia discovered Long Coriander, and it quickly gained popularity as an al-

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Received: 21 June 2024; **Accepted:** 9 July 2024; **Published:** 23 July 2024



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ternative to Mediterranean remedies over there. Although Long Coriander was not a widely known plant, it has become a popular summer houseplant [15]. Long Coriander is now available for home growing through seed suppliers, Asian and Latin markets, as well as online seed retailers [11].

Long Coriander is one of the popular leafy vegetables with long, fragrant leaves that is popularly eaten. The evergreen stems reach 15-20 cm in height and bear long fibrous roots. The leaves, with their long-serrated margins, grow in a rosette pattern [7, 4]. The flowers are cylindrical with rounded apices, measuring about 1.2 cm long and 0.5 cm wide (Figures 1, 2). In Southeast Asia, Long Coriander flowers continuously throughout the year. The Long Coriander fruit is egg-shaped, measuring about 1.5 millimeters long and covered in round bumps [7]. Seeds are used in the reproduction process. As the farmers who had experienced in this conventional method for cultivating Long Coriander involved sowing mentioned that seeding is the standard practice for planting Long Coriander and typically apply 3-5 kilograms of seed per square meter directly to 1,600m². Prior to sowing, a two-night soaking period is recommended for the seeds. Afterward, they mixed 6 tablespoons of seeds with ashes in a specific ratio. This mixture is then directly sown onto the prepared soil surface. Proper soil moisture is crucial for germination, so a thorough watering is necessary 15 days after sowing the seeds [11, 14].

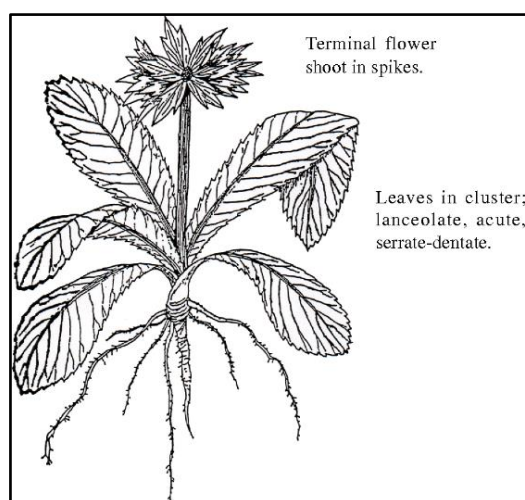


Figure 1. Botanical Illustration of Long Coriander (Source: Ramcharan, C., 1999) [8].



Figure 2. Growth Stages and Harvest of Long Coriander (Source: Authors, 2024).

Due to its special taste, Long Coriander has become an essential ingredient in many different culinary styles. Central America and the Far East are the main areas where Long Coriander is used. The Southeast Asian peninsula's countries are the most popular in Asia. It is a popular topping for soups, noodle dishes, and curries in Thailand, Malaysia, and Singapore, where it is sometimes used in place of coriander. Since coriander roots are not available, they can also be used to make Thai curry pastes. Vietnamese cookery points out the use of fresh herbs mostly; however, Long Coriander is additionally used [12, 8]. Beyond its culinary appeal, the benefit of Long Coriander consumption is more interesting, as it is a mainstay in culinary traditions across Cambodia, Thailand, India, Nepal, Vietnam, Laos, Myanmar, and southwestern tropical Asia. Prized for its aromatic essential oils, this herb is used in all its parts, with the leaves being the most common. Long Coriander adds a distinctive flavor and aroma to soups, curries, noodles, and snacks. In South American countries like Peru, Colombia, and Ecuador, the plant transcends culinary uses and finds application in traditional medicine, particularly for treating digestive and gynecological issues like bloating, diarrhea, and upset stomachs. According to studies, the plant may be able to help with many kinds of female issues related to reproduction, including regulating menstruation, easing cramps, promoting fertility, aiding childbirth, and even exerting aphrodisiac effects [7, 11, 5]. Plus, studies conducted by scientists highlight the potential benefits of consuming this plant. Long Coriander is not just flavorful but also a good source of many nutrients. It is high in minerals, vitamins, carotenoids, antioxidants, and phytosterols. The moisture content of fresh leaves is 87%, 6.5% carbohydrates, 3.3% protein, 0.6% fat, 1.7% ash, 0.06% phosphorus, and 0.02% iron. On top of that, Long Coriander is a significant source of vitamins, containing 10,460 IU of vitamin A, 60 mg of vitamin B2, 0.8 mg of vitamin B1, and 150–200 mg of vitamin C per 100 grams [12, 5].

The study on Long Coriander contributes to the field of agricultural research by demonstrating its potential as a good leafy green vegetable. Apart from that, it explores its market and economic viability as well. This analysis could convince farmers to keep planting Long Coriander to meet market demands through consideration of the related costs and potential earnings. It may also serve as an inspiration for further research on this crop.

2. Methodology

The study was conducted in Battambang province, located in northwestern Cambodia. Cambodia itself sits in Southeast Asia, on the southern portion of the Indochina Peninsula, with a climate characterized by tropical monsoons [10, 2, 9]. The area has two distinct seasons: a wet season lasting from May to October and a dry season lasting from November to April. Notably, the Mekong River runs through Cambodia's vast plains, while Tonle Sap Lake is surrounded by plateaus and cultivated hillsides [1, 3, 13].

Table 1. Selected site and sampling method.

Province	District	Commune	Village	Household Population	Purposive sample selection in Non-Random Sampling	
					Sample size	% of Sample size
Battambang	Thma Koul	Ta Meun	Samraong	245	11	22
			Ta Sei	694	8	16
			Ang Cheung	412	6	12
			Krasang	352	10	20
		Ta Pung	Tumpung Tboung	448	6	12
			Ang Tboung	441	9	18
01 Province	01 District	02 Communes	06 Villages	2592	50	100

2.1. Data Collection

The methods used to collect data in this paper were based on quantitative methods. About 50 households were interviewed in the Battambang province of Cambodia, of which six villages (Table 1) were covered using a structured questionnaire. The purposive sample in non-random sampling was selected only the farmers who plant Long Coriander to conduct this survey. Data were gathered to describe the cost of production and farmers' revenue from planting Long Coriander, and the collection process started with:

Direct Observation was initially used to better understand the general situation and the detailed demography of the target area. Based on living conditions and existing plantings of Long Coriander, this tool identified the agrarian and farming systems of the exact ecological area. It also estimated the difference in planting situation occurrence in each village.

Key informant meeting interviews with the local authority (chief of district, commune, and village) were conducted for gathering overall information about consumable equipment and total land use in Long Coriander planting and links with middlemen with price per kg and market demand.

Survey-structured questionnaire: in-depth interviews or face-to-face interviews with household farmers Long Coriander planting covers various aspects of labor and land preparation, such as organic fertilizer, energy resources, transportation cost, excavation cost, seed, chemical fertilizer, plowing cost and harvesting cost. The other factors were concentrating farmers' revenue from planting Long Coriander, harvest yield per rai (kg), number of harvests per year, and price per kg in order to determine profitability through the economic efficiency (EE) method.

2.2. Model and Data Analysis

The process of data analysis gave researchers the knowledge to analyze their collected data logically through a multi-step process. This process involved using Microsoft Excel, a widely used program for data analysis, and applying the fundamental analytical formulas along with common economic efficiency (EE) as the main input to calculate the Long Coriander crop production profit margin. The research findings were calculated using the following mathematical formulas:

$$\text{Total cost per year} = \frac{(1\text{st time} + 2 + \dots + n) \text{ Number of times per year}}{n}$$

$$\text{Single Harvest Revenue} = (\text{Harvest yield per rai (kg)} \times \text{Selling price per kg})$$

$$\text{Annual Revenue} = (\text{Single harvest revenue} \times \text{Number of harvests per year})$$

$$\text{Profit} = \text{Total revenue} - \text{Total cost}$$

$$\text{Cost-Revenue Ratio (EE)} = \frac{\text{Total revenue}}{\text{Total cost}}$$

3. Findings

3.1. Cost of Long Coriander Planting Per Rai (First Planting)

Long Coriander planting at the starting point is costly due to the numerous equipment pieces required to supply and support cultivation across 1600 m² (one rai). However, these first investments enable significant cost reductions in subse-

quent plantings. By having existing equipment and supplies on hand, future harvests will become progressively more profitable.

According to the cost of first planting per rai of Long Coriander (Table 2), the farmers used 10 pieces of plant cover with a unit price of 196,000 riels. A unit of 80 plant stakes costs 15,000 riels, and a bamboo plant stake of 20 bundles costs 15,000 riels. For 1,600 m², the irrigation system (pipe) costs a total of 2,000,000 riels. Rope weighing 7kg, each unit cost 5,000 riels. Nails cost 8,000 riels for 1 kg, while seeds for 5 kg cost 100,000 riels per unit to be cultivated. Biocide (herbicides): 15 gallons, each costing 15,000 riels. Regarding

the chemical fertilizer, 50 kg per unit equals 3,600 riels. The cost of one (pc) water pump motor or engine is 39,000 riels. Building on this, Land preparation for the 1,600m² area included the cost of fuel and labor. This involved 45 liters of energy resources at 4,500 riels per liter and 1 liter of transportation fuel at the same price. Additionally, excavation of 80 pits cost 3,000 riels each, and three plowing sessions came to a total of 50,000 riels per session. Finally, a harvesting cost was estimated for a projected yield of 2,000 kg at 500 riels per kg. The total cost for all materials and labor associated with land preparation reached 7,874,000 riels.

Table 2. The cost of Long Coriander planting per rai (first planting).

Cost of Long Coriander Planting Per Rai (First Planting)		Unit	Price Per Unit	Total Cost
Consumable Equipment	Plant Cover	10 Pieces	169,000 Riels	1,690,000 Riels
	Plant Stake	80 Pcs	15,000 Riels	1,200,000 Riels
	Bamboo Plant Stake	20 Bundles	15,000 Riels	300,000 Riels
	Pipe	-	-	2,000,000 Riels
	Rope	7 Kg	5,000 Riels	35,000 Riels
	Nail	1 Kg	8,000 Riels	8,000 Riels
	Seed	5 Kg	100,000 Riels	500,000 Riels
	Biocide	15 Gallons	15,000 Riels	225,000 Riels
	Chemical Fertilizer	50 Kg	3,600 Riels	180,000 Riels
	Water Pump Motor/ Engine	1 Pc	-	39,000 Riels
	Organic Fertilizer	-	-	100,000 Riels
	Energy Resource	45 L	4,500 Riels	202,500 Riels
	Transportation Cost	1 L	4,500 Riels	4,500 Riels
Labor and Land Preparation	Excavation Cost	80 Pits	3,000 Riels	240,000 Riels
	Plowing Cost	3 Sessions	50,000 Riels	150,000 Riels
	Harvesting Cost	2,000 Kg	500 Riels	1,000,000 Riels
Total				7,874,000 Riels

Note: - Exchange rate: 1 Cambodian riel (KHR) is equal to 0.00024 US dollars (USD).

- Specific amount: 7,874,000 riels is equivalent to approximately 1,913.78 USD.

3.2. Cost of Long Coriander Planting Per Rai (Second Planting)

The second Long Coriander planting phase has a lower cost structure than the first planting. In this case, the farmers only incur expenses for fertilizers, energy, harvesting, and transportation.

Table 3. The cost of Long Coriander planting per rai for the second planting (No natural fertilizers were used).

Cost of Long Coriander Planting Per Rai (Second Planting)	Unit	Price Per Unit	Total Cost
Biocide	10 Gallons	15,000 Riels	150,000 Riels
Chemical Fertilizer	50 Kg	3600 Riels	180,000 Riels
Energy Resource	15 L	4500 Riels	67,500 Riels
Transportation Cost	1 L	4500 Riels	4500 Riels
Harvesting Cost	1500 Kg	500 Riels	750,000 Riels
Total			1,152,000 Riels

Note: - Specific amount: 1,152,000 riels is equivalent to approximately 279.99 USD.

Analyzing Table 3, the results show the farmers' second planting cost for Long Coriander application on 1,600 m² (No natural fertilizers were used). This cost amounted to 15,000 riels per gallon for a total of 10 gallons of biocide. They used 50 kg of chemical fertilizer, with the cost of chemical fertilizer itself was 3,600 riels per kg. Additionally, 15 liters of energy resources were used, at a cost of 4,500 riels per liter. Transportation remained constant at 4,500 riels. After analyzing the entire cost of fertilizing the 1,600 m² area, it shown that the first expense was the most significant, at 7,874,000 riels. The second expense, at 1,152,000 riels, was considerably lower. Presumably, for the previous costs, the next three, four, and five costs will remain the same. Therefore, the following formula can be used to calculate the annual cost. According to the formula:

$$\text{Total cost per year} = \frac{(1^{\text{st}} \text{ time} + 2 + \dots + n) \text{ Number of times per year}}{n}$$

Description:

1st time (planting cost): 7,874,000 Riels

(n × Cost of subsequent applications): This calculates the total cost of the subsequent applications.

Number of times per year: This remains 5.46 (number of harvests per year).

Since the second, third, fourth, and fifth costs are the same as the second cost of 1,152,000 riels, only the value of the second cost can be determined.

Thus:

$$\text{Total cost per year} = \frac{(7,874,000 + 1,152,000 + 1,152,000 + 1,152,000 + 1,152,000) 5.46}{5}$$

$$= 13,630,344 \text{ Riels}$$

As a result (Table 3), the farmers will spend 13,630,344 Riels in total to plant Long Coriander on a 1,600 m² area in a year. Specific amount: 13,630,344 riels is equivalent to approximately 3,312.87 USD.

3.3. Farmers' Revenue from Planting Long Coriander

To determine annual revenue from Long Coriander sales, a two-step calculation is required. First, calculate the revenue of each Long Coriander planting by taking the harvest per rai (kg) multiplied by the selling price per kg. Then calculate the revenue from planting Long Coriander per year by simply multiplying the revenue from a single harvest of Long Coriander by the number of harvests per year (Table 4). According to the formulas:

$$\text{Single Harvest Revenue} = (\text{Harvest yield per rai (kg)} \times \text{Selling price per kg})$$

$$\text{Annual Revenue} = (\text{Single harvest revenue} \times \text{Number of harvests per year})$$

Description:

Single harvest revenue: This represents the revenue generated from one harvest cycle. It is calculated by multiplying the harvest yield per 1600 m² by the selling price per kg.

Number of harvests per year: This represents the frequency of harvests that can be achieved in a year. So, multiplying the single harvest revenue by this factor gives the total annual revenue.

Table 4. The revenue from planting Long Coriander per rai in riels.

Revenue from Planting Long Coriander (m ²)	Total	Average	Minimum	Maximum
Total Land (m ²)	357	7.14	1	42
Arable Land (m ²)	62	1.24	0.5	3
Harvest Yield per rai (kg)	57,300	1,146	600	2,000
Number of Harvests per year	273	5.46	4	7
Price per 1kg	171,100	3,422	2,300	4,500
Revenue from a Single Harvest	3,921,612 Riels			
Total Annual Revenue	21,412,002 Riels			

Note: - Specific amount (Revenue from a Single Harvest): 3,921,612 riels is equivalent to approximately 953.15 USD.

- Specific amount (Total Annual Revenue): 21,412,002 riels is equivalent to approximately 5,204.21 USD.

As per Table 4, the total land available for this analysis is 357 m², and arable land is 62 m², with an average of 1.24 m². The harvest yield per rai ranges from a minimum of 600 kg to a maximum of 2,000 kg, with an average yield of 1,146 kg. Interestingly, farmers harvest approximately 5.6 times a year, with a price per kg of Long Coriander varying between 2,300 and 4,500 riels, averaging at 3,422 riels. Compared to that, for a single harvest of Long Coriander planted on 1600 m² (one rai), farmers could expect to earn 3,921,612 riels each. Additionally, farmers may have earned revenue from the total harvest from the one-rai area, which yielded up to 21,412,002 riels in a year.

3.4. Economic Analysis of Long Coriander Planting

Determining profit is a critical component in economic analysis. This can be accomplished by applying the following formula:

$$\text{Profit} = \text{Total revenue} - \text{Total cost}$$

With a total revenue of 21,412,002 riels generated from the

total revenue from planting Long Coriander for one year, the total cost associated with planting and harvesting is 13,630,344 riels. This results in a profit of 7,781,658 riels (1,891.34 USD), with a profit percentage of 57.09% (21,412,002–13,630,344). In accordance with the earlier result, the Long Coriander planting is profitable. This profit margin serves as an illustration of the importance of economic analysis in helping farmers analyze their economic circumstances and make informed decisions for future plantings. To analyze profitability, the reverse calculation of profit margin is a common economic formula, and the cost-revenue ratio is a suitable method for determining economic efficiency (EE). is used as follows:

$$\text{Cost-Revenue Ratio (EE)} = \frac{\text{Total revenue}}{\text{Total cost}}$$

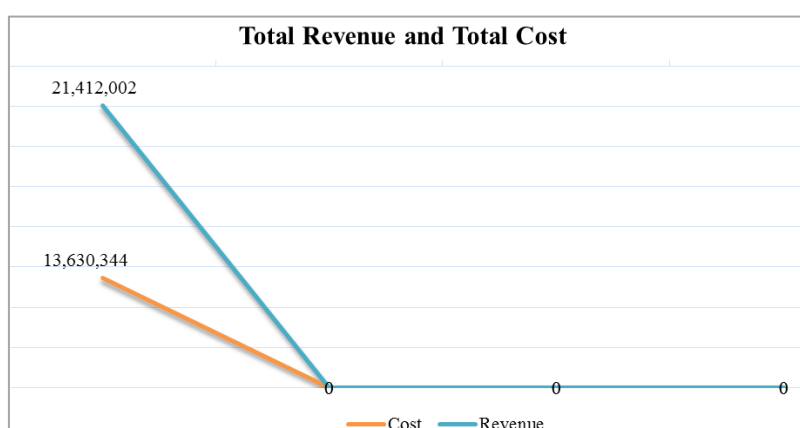
Therefore:

$$EE = \frac{21,412,002}{13,630,344} \Rightarrow EE = 1.570$$

Note: - $EE > 1$: Profit

- $EE < 1$: Loss

- $EE = 1$: Break-even scenario

**Figure 3.** Total revenue and total cost.

The analysis of the importance of profit or loss is known as economic efficiency (EE). The cost-revenue ratio compares the total revenue of Long Coriander planting to its total costs as shown in Figure 3. In this case, the cost-revenue ratio (EE) is 1.570, which means $EE > 1$, so the farmers remain highly profitable from planting Long Coriander.

4. Conclusions

In this study, researchers investigate the profitability and economic potential of Long Coriander planting in Battambang province, Cambodia. It focused on the costs resulting from planting and harvesting Long Coriander compared to the sales revenues. The findings reveal that the cost of planting Long Coriander is high at first due to the different tools and materials needed. Despite this, the cost structure of the following plantings is significantly lower. Economic analysis revealed that farmers at the study site can earn a reasonable revenue by planting Long Coriander. The cost-revenue ratio (EE) is higher than 1, and the profit margin is approximately 57%. This indicates that the total revenue from Long Coriander sales significantly outweighs the costs of planting and harvesting. As a whole, this study highlights the economic potential of Long Coriander planting, which is economically efficient and profitable. Long Coriander seems to be a highly profitable agricultural product for farmers, considering its high profitability.

Abbreviations

EE	Economic Efficiency
Kg	Kilogram
m ²	Square Meter
Pcs	Pieces
Rai	A Unit of Measurement of Land Area in Cambodia, Equal to 1,600 Square Meters (approximately 0.40 acres)
Riels (KHR)	The Official Currency of Cambodia
USD (US Dollar)	The Currency of the United States

Acknowledgments

The authors are thankful to Ms. Don Lina, Ms. Koeurn Sokunthea, and Ms. Roeun Hunny for their significant contribution to this research study. Their valuable information and supporting materials allowed this paper to accomplish its intended purpose.

Author Contributions

Siek Darith: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Resources, Software, Writing – original draft, Writing – review & editing

Lim Kim Eav: Project administration, Supervision, Validation, Visualization, Writing – review & editing

Heng Muy Kim: Funding acquisition

Conflicts of Interest

The authors declare no conflicts of interest.

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