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Income and employment patterns in the production and marketing of cherry pepper (*Capsicum annum*) in hill zone of West Bengal

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Abstract

This study examines the income and employment patterns associated with the cultivation and marketing of Cherry Pepper (*Capsicum annuum*), locally known as *Dalle Khursani*, in the hill zones of West Bengal, specifically in the Gorubathan Block of Kalimpong and the Rangli-Rangliot Block of Darjeeling district. Based on primary data collected through structured interviews with 100 sample farmers using a multistage sampling technique, the study evaluates income metrics such as gross income, net income, returns to management, and returns per rupee (RPR), along with human labor utilization patterns. Results indicate that marginal and small-scale farmers achieved higher profitability and labor efficiency compared to semi-medium farms, with marginal farms in Kalimpong showing the highest gross income (₹503,579.23) and small farms in Darjeeling recording the highest net income (₹294,441.76) and returns to management (₹275,202.81). Labor use was also intensive, with an average of 250.52 and 297.15 mandays per farm in Kalimpong and Darjeeling, respectively. The study highlights the economic potential of Cherry Pepper cultivation as a viable livelihood option in the hill regions and recommends enhanced production practices, financial support, and stronger market linkages to improve farmer income and employment generation in these areas.

Keywords: Cherry pepper, capsicum annuum, dalle khursani

Introduction

India, which is called the "Home of Spices," grows, buys, and sells more spices than any other country in the world. The (FAO, 2010) says that this land of spices grows about 70 per cent of the world's spices. Cherry Pepper (Capsicum annum) belongs to the family Solanaceae and its shape is what makes the name "dalle Khursani" meaning "roundchilli." The plant is in the genus Capsicum and the family Solanaceae. Fruits in the genus Capsicum come in a wide range of shapes, sizes, and amounts of spiciness (Simon *et al.*, 1984) [2]. Chilies, which are another name for hot peppers, are grown all over the world (Singh, 2001) [3]. Bose *et al.*, (1986) [1] said that Mexico is likely the center of variation for the common cultivated pepper Capsicum annuum, with Guatemala being a close second. Most capsicum fruits smell bad, and many foods like foods that taste like pepper.

In Darjeeling and Kalimpong, one of the most important cash crops is Cherry Pepper. During the busy season, it comes in the form of fresh green chili, but when the season is over, it's stewed.

There is a wide scope in the field of production, marketing and export of spices in West Bengal, especially in the hill districts but there is scanty information regarding the production and marketing of spices. This study focuses on analyzing the income and employment dynamics of Azalea production in Gorubathan Block of Kalimpong and Rangli-Rangliot Block of Darjeeling District.

Research methodology

The present study was carried out in Kalimpong and Darjeeling districts of West Bengal.

Source of data and sampling design

The present study is primarily based on micro level farm survey analysis. With a view to examine the components, a well-structured and pre-tested interview schedule was utilized for the collection of data from spice growers, wholesalers, commission agents and retailers present in the study area. Secondary data was taken and considered as per the requirement.

Selection of District

The present work is undertaken to critically analyze the production and marketing of Cherry Pepper and for selection of samples, a Multistage sampling technique is followed. Kalimpong and Darjeeling districts of West Bengal state are selected purposively based on availability of spice growers.

Selection of Blocks

In case of Kalimpong District, Gorubathan Block is selected purposively as there was wide scale cultivation of the spices in this block. Whereas, from Darjeeling district, Rangli-Rangliot block is selected purposively.

Selection of Clusters:
The villages Todey, Tangta and Chisang are selected purposively to form a cluster of three villages for the study of cherry pepper. Finally, 50 sample farmers were selected for each spice with the help of Simple Random Sampling Without Replacement Method. Similarly, the villages Lamahatta, Bara Mungwa and Tukdah were selected purposively to form a cluster of three villages for the study of cherry pepper. Finally, 100 sample farmers were selected for each spice with the help of Simple Random Sampling Without Replacement Method (SRSWOR).

District-wise and Block-wise sample distributions Cherry Pepper

District	Block	Selection of clusters	Selected spice
			Cherry Pepper
Kalimpong	Gorubathan	Todey, Tangta and Chisang	50
Darjeeling	Rangli-Rangliot	Lamahatta, Bara Mungwa and Tukdah	50
Total			100

Analytical techniques
Income measures
The following income measures have been calculated and studied during the course of the study:

1. **Gross income:** It is the total value of main product.

$GI = (Q_m \times P_m)$

where,
GI = Gross income
Q_m = Quantity of main product
P_m = Price of main product

2. **Returns over variable cost (RVC)**

RVC = Gross income - Cost A_1

3. **Farm business income (FBI)**

FBI = Gross income - Cost A_2

4. **Family labour income (FLI) or returns to family labour**

FLI = Gross income - Cost B_2

5. **Net income (NI)**

NI = Gross income - Cost C_2

6. **Returns to management**

RM = Gross income - Cost C_3

7. **Returns per rupee (RPR)**

RPR= Gross income/ ha ÷ Cost C_2/ha

Results and Discussion
Analysis of Income Generation patterns in the Production of Cherry Pepper in Gorubathan Block of Kalimpong District of West Bengal
The Table 1 presents size group-wise income data for Cherry Pepper farmers in Gorubathan Block. Marginal farmers achieved the highest gross income (₹503,579.23), followed by small (₹481,628.96) and semi-medium farmers (₹442,857.14), with an average gross income of ₹488,287.91. Returns over variable costs (RVC) were highest among marginal farmers (₹359,203.88), and net income (NI) showed similar trends, averaging ₹284,236.54 across farm sizes. Returns to management (RM) were highest for small farmers (₹267,419.13), and semi-medium farmers demonstrated the highest returns per rupee (RPR) at 2.47.

Table 1: Size Group-wise Income Generation pattern of Cherry Pepper in Gorubathan Block of Kalimpong District of West Bengal (2023-24)

Sl. No.	Particulars	Category of Farm			
		Size <1 (n=24)	Size 1-2 (n=21)	Size 2-4 (n=5)	Pooled
1	Gross Income	503579.23	481628.96	442857.14	488287.91
2	Returns Over Variable Cost (RVC)	359203.88	345177.47	308182.45	348349.40
3	Family Labor Income (FLI)	343706.05	331892.75	295209.31	334033.54
4	Net Income (NI)	278840.05	286892.75	255105.31	284236.54
5	Returns to Management (RM)	256366.13	267419.13	236330.12	263831.41
6	Returns Per Rupee (RPR)	2.24	2.47	2.36	2.39

Table 2 details labor utilization patterns in Gorubathan. Marginal farms employed the most family labor (216.22 mandays), while hired labor peaked for semi-medium farms (102.53 mandays). Total labor utilization averaged 250.52 mandays across all farms.

Table 2: Size Group-wise and Operation-wise Human Labour Utilization of Cherry Pepper in Gorubathan Block of Kalimpong district of West Bengal (2023-24)

Size-Group (hectare)	Total Family labour (mandays)	Total Hired Labour (mandays)	Total labour (mandays)
<1 (n=24)	216.22	89.74	305.96
1 to 2 (n=21)	150.00	100.49	250.49
2 to 4 (n=5)	133.68	102.53	235.21
Pooled	165.99	95.53	250.52

Analysis of Income Generation patterns in the Production of Cherry Pepper in Rangli-Rangliot Block of Darjeeling District of West Bengal

In Rangli-Rangliot Block, marginal farmers achieved a gross income of ₹496,051.23, with pooled averages across all farm sizes at ₹487,561.58 (Table 3). Returns over variable costs (RVC) were highest for small farmers (₹355,659.01), and net income (NI) peaked at ₹294,441.76 for small farms. Returns to management (RM) showed small farmers achieving the highest efficiency (₹275,202.81), with an overall RPR of 2.28.

Table 3: Size Group-wise Income Generation pattern of Cherry Pepper in Rangli-Rangliot Block of Darjeeling District of West Bengal (2023- 24)

Sl. No.	Particulars	Category of Farm			
		Size <1 (n=36)	Size 1-2 (n=10)	Size 2-4 (n=4)	Pooled
1	Gross Income	496051.23	486831.28	447524.75	487561.58
2	Returns Over Variable Cost (RVC)	355659.01	353359.41	317984.60	349841.70
3	Family Labor Income (FLI)	340933.85	338838.76	304090.34	335223.91
4	Net Income (NI)	272176.85	294441.76	266989.34	273871.39
5	Returns to Management (RM)	249789.41	275202.81	248935.80	252502.38
6	Returns Per Rupee (RPR)	2.22	2.53	2.48	2.28

Table 2 details labor utilization patterns in Gorubathan. Marginal farms employed the most family labor (216.22 mandays), while hired labor peaked for semi-medium farms (102.53 mandays). Total labor utilization averaged 250.52 mandays across all farms.

Table 4: Size Group-wise and Operation-wise Human Labour Utilization of Cherry Pepper in Gorubathan Block of Kalimpong district of West Bengal (2023-24)

Size-Group (hectare)	Total Family labour (mandays)	Total Hired Labour (mandays)	Total labour (mandays)
<1 (n=24)	229.19	90.01	319.20
1 to 2 (n=21)	147.99	102.79	249.78
2 to 4 (n=5)	123.67	103.43	226.10
Pooled	204.51	93.64	297.15

Conclusion

The study underscores the economic significance of Cherry Pepper cultivation in West Bengal's hill zones. Marginal and small farms demonstrated higher income levels and efficiency, particularly in Gorubathan and Rangli-Rangliot Blocks. Darjeeling achieved higher average returns, though Kalimpong exhibited less variation in farmer incomes. Enhanced production techniques, targeted financial support, and robust market linkages are recommended to maximize income and employment potential in the region's Cherry Pepper sector. This research highlights the need for policies promoting sustainable spice cultivation to uplift the socio-economic status of hill farmers while ensuring environmental preservation. The study highlights the substantial economic and employment-generating potential of Cherry Pepper (*Capsicum annuum*) cultivation in the hill zones of West Bengal, particularly in the Gorubathan Block of Kalimpong and Rangli-Rangliot Block of Darjeeling. The analysis reveals that marginal and small-scale farmers benefit more in terms of profitability and labor efficiency compared to their semi-medium counterparts. Both blocks showed high levels of labor utilization, indicating the crop's significance in providing rural employment. Notably, gross and net incomes were relatively higher among marginal and small farmers, while the returns per rupee invested reflected efficient resource use across all farm sizes.

These findings underscore the role of Cherry Pepper as a viable cash crop in the region, capable of improving rural livelihoods. However, to further enhance income levels and sustainability, the study recommends the promotion of improved agronomic practices, timely financial support, development of value chains, and robust market infrastructure. Policy interventions should focus on supporting smallholder farmers, strengthening farmer collectives, and enabling access to markets to realize the full potential of Cherry Pepper cultivation. Overall, the crop presents a strategic opportunity for sustainable agricultural development and socio-economic upliftment in the hill districts of West Bengal.

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