

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 5; May 2025; Page No. 482-485

Received: 01-03-2025
Accepted: 03-04-2025

Indexed Journal
Peer Reviewed Journal

Comparative economic analysis of input application in orchid cultivation in Mirik and Kurseong blocks of Darjeeling district of West Bengal

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DOI: <https://www.doi.org/10.33545/26180723.2025.v8.i5g.1921>

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Abstract

Requirement of labour and input gradually decreases as the orchid matures in Mirik Block. In the second year, labour requirements for inter-culture operations reduce. Labour requirement of manuring remains steady. By the third year, inter-culture labour requirement drops. Labour requirement for harvesting increases due to higher yield. The fourth and fifth years see stable labour and input needs. Harvesting labour is consistent. Total expenditure in the fourth and fifth years remains stable. Similarly, in Kurseong Block, the first year also sees high labour requirements, with pot preparation and sowing. In the third year (2020-21), intercultural costs drop and irrigation costs increases. By the fourth year (2021-22), costs remain relatively stable, with labour costs for manuring decreasing. In Mirik Block of Darjeeling District over five years, production drops in the second year, while the price per pot increases. In the third year, production further declines, the gross return increases. In the fourth year, production fell slightly, but with the price per pot rising. In Kurseong Block of Darjeeling District over five years, in the 2nd year, production drops. In the 3rd year, production further decreases, the price surges. The data shows a trend of declining production over time, while increasing prices help maintain significant gross returns across the five years.

Keywords: Orchid, labour, inputs, economic feasibility.

Introduction

Floriculture is an age-old farming activity in India having massive potential for generating gainful self-employment among small and marginal farmers (Vahoniya *et. al.*, 2018) [2]. The primary importing nations were the United States, the Netherlands, the United Arab Emirates, the United Kingdom, and Canada. India has about 300 export-oriented units (Saxena, 2024) [1].

Among various ornamental crops, orchids hold a prominent position due to their unique aesthetic appeal, long shelf life, and high market value (Tiwari *et. al.*, 2024) [3]. With India being home to nearly 1,200 orchid species, the country has a natural advantage in cultivating this high-value crop (Hegde, 2020) [4].

The Himalayan regions, particularly the Darjeeling district of West Bengal, provide a conducive environment for orchid cultivation, characterized by favourable climatic conditions such as moderate temperatures, high humidity, and well-drained soils. Darjeeling hills are the natural abode for count-less orchids like *Cymbidium*, *Vanda*, *Dendrobium*, *Paphiopedilum*, *Lycaste*, *Odontoglossum*, *Phaius* and *Arundina* (Chakraborty, 2019) [5]. Orchids are also found to grow commercially in different hilly areas of West Bengal for its favourable agro-climatic situation.

The Mirik and Kurseong blocks of Darjeeling district, known for their thriving floriculture activities, have become focal points for orchid production. Here, smallholder farmers have increasingly adopted orchid cultivation as a sustainable livelihood option, complementing traditional agriculture. Despite its potential, orchid farming requires

substantial initial investment, specialized cultivation techniques, and meticulous resource management. This underscores the need for a detailed economic analysis. This study seeks to bridge the knowledge gap by analyzing the production aspects.

Materials and Methods

The present study is carried out in Kurseong and Mirik Blocks of Darjeeling district, West Bengal. Systematic and scientific approach are followed to outline the results of the study conducted.

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 is utilized for the collection of data from flower growers/cultivators in the study area.

Selection of District

The present work is undertaken to critically analyze the production and marketing of principal flowers and for selection of samples, a Multistage sampling technique is followed. Darjeeling district of West Bengal, India are purposively selected based on the availability of flower growers/cultivators

Selection of Blocks

Mirik and Kurseong blocks from Darjeeling district are selected purposively.

Selection of Clusters

In each of the Mirik and Kurseong Blocks, a nuclear village along with two adjacent villages are purposively selected to form a cluster of three villages. In each cluster, complete list of orchid producers are prepared separately. From each cluster, 25 sample producers are finally selected with the help of Simple Random Sampling without Replacement Method (SRSWOR) for the orchid growers. So, for the present study, 50 sample flower growers/cultivators have been selected from Mirik and Kurseong Blocks.

Analytical techniques

In order to fulfil various objectives, set-out, tabular method of analysis was followed. However, statistical tools are also used as and when required.

The methodology for assessing the costs and returns of perennial crops differs from that of seasonal or annual crops. Static analysis is better suitable for seasonal and annual crops within a specific year or time, whereas perennial crops such as orchids necessitate inter-temporal analysis (Rae, 1971) [6]. Due to the challenges in obtaining time series data on the costs and returns of a single

plantation throughout its entire lifespan, information was gathered from various growers with nurseries of differing ages, encompassing the crop's life cycle.

Results and Discussion

The Table.1 outlines the input and labour requirements for orchid cultivation in Mirik block from 2018-19 to 2022-23, summarizing the data across various farm sizes. In the first year, the establishment cost is ₹8,47,456, with labour involving 10 mandays costing ₹3,000. Pot preparation and sowing require 73,647 units (no's) at an input cost of ₹15,50,518.96, and labour of 20.60 mandays costing ₹6,180. Interculture practices demanded 25 mandays costing ₹7,500, while irrigation infrastructure (2,127.65 meters of pipes and tanks) require ₹29,833.49, along with 27 mandays costing ₹8,100. Fertilizer use in the first-year amounts to 263.58 kg at ₹10,275, requiring 14 mandays of labour costing ₹4,200. Manuring involves 5,798 kg at ₹1,07,563 with 16 mandays costing ₹5,469, and harvesting need 12 mandays at ₹3,600. The total expenditure for the first year is ₹27,26,090.40, with labour costs at ₹37,380.

Table 1: Year-wise and Item-wise Requirement of Labour and Other Inputs for Orchid in Mirik Block of Darjeeling District (2018-19 to 2022-23) (₹Hectare)

Mirik (Pooled)	2018-19				2019-20				2020-21				2021-22				2022-23			
Particulars	1st year				2nd year				3rd year				4th year				5th year			
	Input		Labour		Input		Labour		Input		Labour		Input		Labour		Input		Labour	
	Qty.	Cost	No. of mandays	Co st	Qty	Cost	No. of mandays	Co st	Qty	Cost	No. of mandays	Cost	Qty	Cost	No. of mandays	Co st	Qty	Cost	No. of mandays	Co st
Establishment cost		847456	10	3000																
Pot Preparation and Sowing	73647 (no's)	1550518	20.60	6180																
Interculture			25.00	7500			19.30	5790			7.97	2390.06								
IRRIGATION (Pipes and tanks)	2127.65 (meter)	29833.49	27.00	8100			21.37	6411			19.28	5784.00			20.19	6057			20.19	6057
Fertilizers	263.58 (kg)	10275	14.00	4200			7.24	2172												
Land revenue and tax		750				750.69				750.69				750.69				750.69		
Manuring	5798	107563	16.00	4800	1426915.66	5.27	158149	26915.66	5.29	1587.00	1426915.66	7.98	239449	26915.66	7.98	239449	26915.66	7.98	239449	26915.66
Harvesting		12.00	3600			8.25	2475			21.32	6396			18.23	5469			18.23	5469	
Expenditure		2546398	124.60	37380		27666.35	61.43	18429		27666.35	53.86	16157.06		27666.3	46.40	13920		27666.3	46.40	13920
Total expenditure	2726090.40				46604.33				44836.39				42638.33				42638.33			

Requirement of labour and input gradually decrease as the orchid matures. In the second year, labour requirement for interculture operation reduces to 19.30 mandays costing ₹5,790, with irrigation cost at ₹6,411 and fertilizer cost reduces to ₹2,172. Manuring remains steady at 1,449 kg with cost at ₹26,915.66. The total expenditure for the second year is ₹27,66,635.35. By the third year, interculture labour drops further to 7.97 mandays, costing ₹2,390.06, with similar reductions in irrigation and fertilizer costs, while harvesting labour increases due to likely higher yields, totalling ₹6,396. The fourth and fifth years see stable labour and input needs, with interculture labour at 20.19 mandays, irrigation costs at ₹6,057, and manuring costs unchanged. Harvesting labour is consistent at 18.23 mandays costing ₹5,469. Total expenditure in the fourth and fifth years

remain stable at ₹27,666.35, with labour costs at ₹13,920, which shows a decline in cost as the years passes.

The Table.2 provides the labour and input requirements for orchids in the Kurseong Block of Darjeeling District from 2018-19 to 2022-23. In the first year (2018-19), the major costs are associated with pot preparation and sowing (₹23,928.77), establishment (₹86,731), and irrigation (₹33,592 for 2,239 meters of pipes and tanks). The first year also sees high labour requirements, with pot preparation and sowing needing 28.67 man-days, intercultural activities requiring 17.55 man-days, and irrigation requiring 30 man-days. Total expenditure for the first year amounted to ₹3,41,626.8, with an additional labour cost of ₹152.30 for 45,690 labour days.

Table 2: Year-wise and Item-wise Requirement of Labour and Other Inputs for Orchid in Kurseong Block of Darjeeling District (2018-19 to 2022-23)

Kurseong (Pooled)	2018-19				2019-20				2020-21				2021-22				2022-23			
Particulars	1st year				2nd year				3rd year				4th year				5th year			
	input		labour		input		labour		input		labour		input		labour		input		labour	
	Qty.	Cost	No. of mandays	Cost	Qty.	Cost	No. of mandays	Cost	Qty.	Cost	No. of mandays	Cost	Qty.	Cost	No. of mandays	Cost	Qty.	Cost	No. of mandays	Cost
Establishment cost		867231	19.88	5964																
Pot Preparation and Sowing	74301 (nos)	2392877	28.67	8601																
Intercultural			27.65	8295			17.55	5265			10.97	3290.06								
Irrigation (Pipes and tanks)	2239 (meter)	33592	30.00	9000			22.21	6663			23.28	6984.00			22.60	6780			11.22	3366
Fertilizers	372 (kg)	14219	17.10	5130			7.74	2322												
Land revenue and tax		641				641				641.82				641.82				641.82		
Manuring	5901 (kg)	107705	16.00	4800	1475 (kg)	26555	5.25	1575	1475.3 (kg)	26555.40	4.43	132975.00	1426555.40	13.09	39275.00	1426555.40	3.55	1065		
Harvesting			13.00	3900			8.25	2475			21.32	6396.00			24.31	7293			15.73	4719
Expenditure		3416268	152.30	45690.		27197	61.00	18300		27197.22	60.00	17999		27197.22	60.00	18000		27197.22	30.50	9150
Total expenditure		3461958				45497				45196.28				45197.22				36347.22		

In subsequent years, the input costs and labour requirements gradually decrease. Irrigation costs increase slightly, while manuring costs decrease. In the third year (2020-21), intercultural costs drop. and irrigation costs increase. By the fourth year (2021-22), costs remain relatively stable, with labour costs for manuring decreasing, resulting in an overall expenditure of ₹27,197.22 for that year.

The Table.3 provides the year-wise production, average price per pot, and gross returns for pooled orchid cultivation in the Mirik Block of Darjeeling district over five years. In the first year, the total production is 38,988.57 pots per ha, with a price of ₹70 per pot, leading to a gross return of ₹50,22,915.95. Production drops to 9,821.09 pots per

hectare in the second year, while the price per pot increases to ₹90, resulting in a gross return of ₹13,84,376.11. In the third year, production further declines to 4,336.49 pots per ha, but with the price rising to ₹350 per pot, the gross return increases to ₹21,19,764.11. In the fourth year, production fell slightly to 3,780.94 pots per ha, but with the price per pot rising to ₹400, the gross return amounts to ₹18,85,917. By the fifth year, production is 3,702.44 pots per ha, with the price reaching ₹450 per pot, resulting in a gross return of ₹18,61,534. Despite the decline in production over time, the steady increase in the price per pot helps maintain substantial gross returns.

Table 3: Year-wise and Item-wise Yield, Average Price/Pot and Gross Return of Orchid in Mirik Block of Darjeeling District (2018-19 to 2022-23)

Mirik	Yield				
	1st year	2nd year	3rd year	4th year	5th year
Total Production (Pots/ha)	38988.57	9821.09	4336.49	3780.94	3702.44
Average price/ pot (₹)	70	90	350	400	450
Gross return (₹) Per Hectare	5022915.95	1384376.11	2119764.11	1885917	1861534

The Table.4 presents the year-wise pooled production, average price per pot, and gross returns for orchid cultivation in the Kurseong Block of Darjeeling district over five years. In the 1st year, the total production is 34,466.66 pots per ha, with an average price of ₹70 per pot, leading to a gross return of ₹42,52,231. In the 2nd year, production drops to 7,357.43 pots per ha, but the price increases to ₹90 per pot, resulting in a gross return of ₹10,39,604.86. In the 3rd year, production further decreases to 5,802.01 pots per

ha, but with the price surging to ₹350 per pot, the gross return rises to ₹28,42,985.14. In the 4th year, production stands at 5,384.77 pots per ha, with the price rising to ₹400 per pot, generating a gross return of ₹26,92,387. By the 5th year, production is 3,831.38 pots per ha, and the price reaches ₹450 per pot, leading to a gross return of ₹19,31,016. The data shows a trend of declining production over time, while increasing prices help maintain significant gross returns across the five years.

Table 4: Year-wise and Item-wise Yield, Average Price/Pot and Gross Return of Orchid in Kurseong Block of Darjeeling District (2018-19 to 2022-23)

Kurseong	Yield				
	1st year	2nd year	3rd year	4th year	5th year
Total Production (Pots/ha)	34466.66	7357.43	5802.01	5384.77	3831.38
Average price/ pot (₹)	70	90	350	400	450
Gross return (₹) Per Hectare	4252231	1039604.8	2842985.1	2692387	1931016

Conclusion

In Mirik Block, labour and input needs gradually decrease as the orchid matures. The total expenditure for the second year is ₹27,66,635.35. By the third year, interculture labour drops further to 7.97 mandays, costing ₹2,390.06, with similar reductions in irrigation and fertilizer costs, while harvesting labour increases due to likely higher yields, totalling ₹6,396. In Kurseong Block of Darjeeling District, total expenditure for the first year amounts to ₹3,416,268. In subsequent years, the input costs and labour requirements gradually decrease. By the fourth year (2021-22), costs remain relatively stable, with labour costs for manuring decreasing, resulting in an overall expenditure of ₹27,197.22 for that year. In Mirik Block of Darjeeling District over five years, despite the decline in production over time, the steady increase in the price per pot helps maintain substantial gross returns. In Kurseong Block of Darjeeling District over five years, there is a trend of declining production over time, while increasing prices help maintain significant gross returns across the five years.

From the above study, it is concluded that the cultivation of Orchid is very much labour-intensive and profitable. As a result, the cultivation of Orchid augments the income and employment in Mirik and Kurseong Blocks in Darjeeling District of West Bengal.

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