

Pea Farming in the High Hills of Himachal Pradesh: Assessing Costs and Benefits for Sustainable Agriculture

ABSTRACT

Pea cultivation is an important agricultural activity in the region, contributing significantly to the local economy and providing livelihood opportunities for farmers. The study examines the cost and returns analysis associated with pea cultivation in the high hills of the state. Simple random sampling has been used for the selection of respondents to collect the primary data.

The study stated that the total cost (C_3) incurred for the cultivation of pea was Rs 107123.15 per hectare. However, it was found highest in marginal farms (Rs 115210.12/ha) and lowest in medium farms (Rs 91297.73/ha). Furthermore, net income was worked out to be Rs 277918.34 per hectare. The output- input ratio implied that each rupee spent would yield a profit of Rs 2.59 for pea in the study area. Hence, the findings of the study contribute to a better understanding of the economic viability of pea cultivation and can guide efforts towards improving the efficiency and profitability of this agricultural practice in the high hills of Himachal Pradesh.

Keywords: Food security, sustainability, farmers' income, economic viability

INTRODUCTION

Pea (*Pisum sativum* L.) is leguminous vegetable rich in essential nutrients, including proteins, vitamins, and minerals (Ludvikova and Griga, 2022). China is the world's largest producer of peas, producing 11.3 million tonnes in 2020 followed by India (5.7 million tonnes), Pakistan (0.22 million tonnes), Algeria (0.21 million tonnes), the United States (0.28 million tonnes), France (0.27 million tonnes), the United Kingdom (0.16 million tonnes), and Egypt (0.15 million tonnes) (FAO, 2021). In India, during the year 2020-21, the area dedicated to pea cultivation was 567.32 thousand hectares, resulting in a production of 5845.91 thousand metric tonnes. The productivity of peas in the country was recorded at 10.30 metric tonnes per hectare. In Himachal Pradesh, specifically, the pea cultivation area for the year 2020-21 was 26000 hectares, with a recorded production of 328.80 thousand metric tonnes. The productivity in this region was measured at 12.65 metric tonnes per hectare for the same year (Anonymous, 2021). Pea cultivation is prevalent in regions like Shimla, Kullu, and Mandi districts, benefiting from the state's favorable climate and suitable agro-ecological conditions in the state. Peas are considered a high-value crop in the state, fetching relatively better prices compared to other agricultural commodities. The cultivation of peas not only provides a valuable source of income for the farmers but also helps in addressing food security challenges. Additionally, pea cultivation often adopts sustainable and organic farming practices, aligning with the growing demand for chemical-free produce in the market. Therefore, the cost and benefit analysis of pea cultivation in the high hills of Himachal Pradesh demonstrates the economic, nutritional, and environmental advantages associated with this agricultural practice. While there are initial costs involved in terms of investments and labor, the financial returns from pea cultivation contribute to the economic well-being of farmers and local communities. Moreover, the nutritional value of peas ensures improved dietary diversity, addressing food security challenges. Finally, the cultivation

of peas in this region promotes environmental sustainability by reducing the reliance on synthetic fertilizers and herbicides. By understanding and appreciating these costs and benefits, we can further support and promote pea cultivation as a sustainable and profitable agricultural activity in the high hills of Himachal Pradesh.

MATERIAL AND METHODS

The present study has been undertaken in high hills of Himachal Pradesh. Rohru, Chopal, Nankhari and Anni blocks of Shimla and Kullu districts were selected. The simple random sampling technique was applied for the selection of households in the selected blocks. A complete list of pea growers was prepared from the available data with the Directorate of Horticulture, Government of Himachal Pradesh. It's possible that the population is so vast that reaching every person would be difficult. As a result, the population should be sampled while keeping in mind the constraints of time and resources. Thus, the sample of 144 was chosen from the selected four blocks for the present study. The total pea growers were divided into three classes according to the size of their land holdings, viz., marginal (<1 ha), small (1-2 ha) and medium (2-4 ha) for the collection of primary data in the study area.

Analytical Tools

Cost of cultivation

The cost of cultivation of Pea was worked out by using various cost concepts defined below:

Cost A₁: It includes:

- (a) Cost of hired human labour
- (b) Cost of owned machinery
- (c) Cost of hired machinery
- (d) Cost of fertilizer
- (e) Cost of manure
- (f) Cost of seed (owned / purchased)
- (g) Cost of plant protection chemicals
- (h) Land revenue
- (i) Depreciation of farm machinery, equipments and farm buildings
- (j) Interest on owned working capital

Cost A₂: Cost A₁ + Rent paid for leased in land

Cost B₁: Cost A₁ + Interest on owned fixed capital assets excluding land

Cost B₂: Cost B₁ + Rental value of own land (net of land revenue) + Rent paid for leased in land

Cost C₁: Cost B₁ + Imputed value of family labour

Cost C₂: Cost B₂ + Imputed value of family labour

Cost C₃: Cost C₂ +10 per cent of cost C₂ on account of managerial function performed by the farmer.

Income measures

For working out profitability of pea cultivation in the study areas following income measures were worked out:

(a) Farm business income (FBI)

It is the disposal income out of the enterprise and is defined as:

$$\text{FBI} = \text{Gross income} - \text{Cost A}_1 \text{ (cost A}_2 \text{ in case of tenant operated land)}$$

(b) Family labour income (FLI)

It is the return to family labour (including management).

$$\text{F.L.I.} = \text{Gross income} - \text{Cost B}_2$$

(c) Net income (NI)

It is the net profit after deducting all cost items *i.e.*, *variable and fixed costs from gross income.*

$$\text{NI} = \text{Gross income} - \text{Total cost (Cost C}_3\text{)}$$

RESULTS AND DISCUSSION

Demographic profile of the respondents

The analysis of current demographic profile provides an overview of basic information related to family size and structure, their educational and occupational status of sampled households. The socio-economic status of sampled households has a significant effect on the productive use of available capital, deciding the size and efficiency of labour force that can boost their livelihood security and well-being. Table 1 revealed that the average family size in the study area was 5 persons per household, with 51.22 per cent of males and 48.78 per cent of females. The average family size in the selected area ranged from 5.00 persons per household in small and medium farm categories to 6 persons per household in marginal farmers. The proportion of males was higher than that of females in all farm categories. Nuclear families made up a larger proportion of the population in the study region compared to joint families. Nuclear families accounted for 51.04 per cent of total sample households, while joint families accounted for 48.96 per cent in the study area.

Table 1: Demographic profile of the sampled households in High Hills of Himachal Pradesh

| Particulars | Marginal | Small | Medium | Overall |
|--------------------------|-----------------|--------------|---------------|----------------|
| Family size (No.) | 6.00 | 5.00 | 5.00 | 5.00 |

| | | | | |
|---------------------------------|-------|-------|-------|-------|
| Male (%) | 51.80 | 50.37 | 51.71 | 51.22 |
| Female (%) | 48.20 | 49.63 | 48.29 | 48.78 |
| Family structure (%) | | | | |
| Joint | 51.06 | 47.37 | 45.45 | 48.96 |
| Nuclear | 48.94 | 52.63 | 54.55 | 51.04 |
| Educational status (%) | | | | |
| Illiterate | 5.16 | 4.13 | 8.06 | 4.85 |
| Primary | 11.46 | 11.85 | 3.23 | 11.08 |
| Middle | 16.62 | 14.88 | 17.74 | 15.84 |
| Matriculate | 24.07 | 23.97 | 27.42 | 24.25 |
| Intermediate | 23.50 | 24.79 | 30.65 | 24.63 |
| Graduate and above | 19.20 | 20.39 | 12.90 | 19.35 |
| Literacy rate (%) | 94.84 | 95.87 | 91.94 | 95.15 |
| Literacy index | 3.17 | 3.18 | 2.96 | 3.16 |
| Occupational status (%) | | | | |
| Agriculture | 69.37 | 80.93 | 73.33 | 75.35 |
| Business | 18.92 | 10.59 | 17.78 | 14.73 |
| Service | 11.71 | 8.47 | 8.89 | 9.92 |
| Average no. of workers | 3.52 | 3.32 | 4.50 | 3.49 |
| Average no. of dependents | 0.95 | 0.94 | 0.80 | 0.94 |
| Dependency w.r.t. total workers | 0.27 | 0.28 | 0.18 | 0.27 |

Literacy is one of the important factors capable of revealing socio-economic characteristics. Analysis of literacy status becomes important to visualize the efficient utilization of limited resources for the production process and maximization of the returns. The educational status of the farmers showed that the majority of respondents in the study area were intermediate (24.63%), followed by matriculate (24.25%) and graduates and above (19.35%). The literacy rate in three farm categories ranged from 91.94 to 95.87 percent, with an overall literacy rate of 95.15 per cent in the study area. To reflect the quality of education, the weighted literacy indices were worked out and it is found that literacy index was high (3.18) in small farm category and low (2.96) in medium farm category with an overall literacy index of 3.16. Household's economy is directly proportional to the number of active members in the family. Agriculture was found to be the most common occupation with 75.35 per cent of sampled farmers engaged in it followed by business (14.73%) and service sector (9.92%). It is clear from the table that the average number of workers in a family was 3.49 and dependency ratio w.r.t. total workers were 0.27. It indicates that on an average one worker has to support less than one family member in all farm size categories in the study area.

Cost and return analysis

Cost and return analysis of pea cultivation per hectare involves assessing the expenses incurred in growing peas and the corresponding returns or profits generated from the cultivation. Hence, farm category wise cost of cultivation of pea was estimated and results have been presented in Table 2. It is found from the table that, the costs A_1 , B_2 , C_3 that incurred for the production of pea were Rs 56211.57, Rs 72231.48 and Rs 107123.15 per hectare at overall level. Total cost (C_3) was highest in marginal farms (Rs 115210.12/ha) and lowest in medium farms (Rs 91297.73/ha). Among all the inputs, human hired labour accounted for a major chunk of the total expenditure,

affirming the claim made by Khunt and Desai (1996) and Rao and Tripathi (1979) that vegetable cultivation is highly labour intensive (Thakur *et al*, 1994).

Table 2: Cost of cultivation of Pea in High Hills of Himachal Pradesh

| | (Rs/ha) | | | |
|--|-----------------|--------------|---------------|----------------|
| Particulars | Marginal | Small | Medium | Overall |
| Cost A₁ | | | | |
| Human hired labour | 10984.25 | 9402.52 | 8808.88 | 10053.30 |
| Seed/plants | 10841.56 | 8565.89 | 7192.36 | 9466.11 |
| FYM cost | 17259.25 | 16156.23 | 13980.25 | 16487.69 |
| Fertilizer cost | 8824.56 | 7420.36 | 6589.31 | 7976.99 |
| Plant protection | 9081.69 | 7547.68 | 5402.87 | 8069.86 |
| Depreciation | 4548.69 | 3124.52 | 2839.65 | 3727.81 |
| Land Revenue | 31.25 | 31.25 | 31.25 | 31.25 |
| Interest on working capital | 409.28 | 389.44 | 395.68 | 398.56 |
| Sub-total | 61980.53 | 52637.89 | 45240.25 | 56211.57 |
| Cost A₂ | | | | |
| Cost A ₁ | 61980.53 | 52637.89 | 45240.25 | 56211.57 |
| Rental value of leased -in land | - | - | - | - |
| Sub-total | 61980.53 | 52637.89 | 45240.25 | 56211.57 |
| Cost B₁ | | | | |
| Cost A ₁ | 61980.53 | 52637.89 | 45240.25 | 56211.57 |
| Interest on Fixed capital | 2558.01 | 2115.61 | 1287.11 | 2251.62 |
| Sub-total | 64538.54 | 54753.50 | 46527.36 | 58463.20 |
| Cost B₂ | | | | |
| Cost B ₁ | 64538.54 | 54753.50 | 46527.36 | 58463.20 |
| Rental value of land | 13768.28 | 13768.28 | 13768.28 | 13768.28 |
| Rental value of leased -in land | - | - | - | - |
| Sub-total | 78306.82 | 68521.78 | 60295.64 | 72231.48 |
| Cost C₁ | | | | |
| Cost B ₁ | 64538.54 | 54753.50 | 46527.36 | 58463.20 |
| Imputed value of family labour | 26429.65 | 24365.78 | 22702.29 | 25153.20 |
| Sub-total | 90968.19 | 79119.28 | 69229.65 | 83616.40 |
| Cost C₂ | | | | |
| Cost B ₂ | 78306.82 | 68521.78 | 60295.64 | 72231.48 |
| Imputed value of family labour | 26429.65 | 24365.78 | 22702.29 | 25153.20 |
| Sub-total | 104736.47 | 92887.56 | 82997.93 | 97384.68 |
| Cost C₃ | | | | |
| Cost C ₂ | 104736.47 | 92887.56 | 82997.93 | 97384.68 |
| Value of management input(10% of cost C ₂) | 10473.65 | 9288.76 | 8299.79 | 9738.47 |
| Sub-total | 115210.12 | 102176.32 | 91297.73 | 107123.15 |

The cost of human family labour was more on the marginal farms (Rs 26429.65) than small (Rs 24365.78) and medium (Rs 22702.29) farms because of involvement of more family labour in the case of marginal farms. Human labour cost constituted a major portion of total cost because

the harvesting/picking of peas was done manually. The results are in line with Singla et al (2006) and Singh et al (2020).

It is clear from the Table 3 that the recorded yield for pea was 110.01 quintals per hectare in the study area for the year 2021. Gross income per hectare was worked out to Rs 385041.48 at overall level in the study area. It was found highest on marginal farms (Rs 408754.82/ha) and lowest on medium farms (Rs 338586.96/ha). As a result, the farm business income and farm labour income was highest on marginal farms (Rs 346774.29 and Rs 330448.00/ha). At overall level these incomes were worked out to be Rs 328829.91 and Rs 312810.01 per hectare in the study area. Net income varied from Rs 293544.70 (marginal farms) to Rs 247289.23 (medium farms) per hectare. At overall level it worked out to be Rs 277918.34 per hectare. The output-input ratio implied that each rupee spent would yield a profit of Rs 2.59 for pea at overall level. Chaudhary *et al* (2017) also reported that the returns per rupee invested from pea were 1.56 and it is profitable for vegetable growers to adopt cultivation in the region.

Table 3: Return Analysis of Pea Cultivation in High Hills of Himachal Pradesh

| Particulars | (Rs/ha) | | | |
|----------------------|-----------|-----------|-----------|-----------|
| | Marginal | Small | Medium | Overall |
| Yield(q) | 116.79 | 105.87 | 96.74 | 110.01 |
| Gross income | 408754.82 | 370542.96 | 338586.96 | 385041.48 |
| Farm business income | 346774.29 | 317905.07 | 293346.71 | 328829.91 |
| Farm labour income | 330448.00 | 302021.18 | 278291.32 | 312810.01 |
| Net income | 293544.70 | 268366.65 | 247289.23 | 277918.34 |
| Output input ratio | 2.55 | 2.63 | 2.71 | 2.59 |

CONCLUSION

According to the study, pea farming in Himachal Pradesh showed encouraging results despite the difficulties posed by the high-altitude terrain, with a sizable area under cultivation, large production levels, and impressive productivity rates. The research also revealed the positive returns on investment in pea farming by balancing the costs involved against the advantages obtained. These results add to a greater comprehension of the potential profitability and sustainability of pea farming in Himachal Pradesh's high mountains, offering useful data to farmers, decision-makers, and other stakeholders involved in the region's agricultural development.

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