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Economics and Marketing of Exotic Vegetables in Tribal District of Lahaul and Spiti

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Abstract: The present study was undertaken to work out economics of exotic vegetables cultivation in Lahaul valley of Lahaul and Spiti district in the state. The study is based on primary data collected through survey method using proper sampling technique during 2019-20. The total cost of cultivation per hectare for exotic vegetables was Rs 215315 and Rs 299183 for lettuce and broccoli, respectively. The net returns over total cost were highest in broccoli (Rs 1825817) followed by lettuce (Rs 565935), yielding output-input ratio of 7.10 and 3.62 which was much higher compared to traditionally grown vegetables of green pea, potato and cauliflower. The regression analysis revealed that area under crop and total labour were the important factors affecting the output of these crops. The crop output was marketed through two distinct channels: channel I - producer-trader-retailer-consumer and channel II - producer- contractor cum trader-retailer-consumer. The greater number of farmers followed channel I, through which about 3145 quintals and 1515 quintals of lettuce and broccoli, respectively was marketed. The adoption of exotic vegetables cultivation resulted in higher returns for the farmers compared to traditionally grown vegetables in the region. The policymakers should devise policies that encourage cultivation of these crops in similar areas to improve the farm income.

Keywords: Exotic vegetables, Cost, Returns, Marketing channels, Lahaul & Spiti

The diverse climate of India assures the production of a wide range of fruits and vegetables. After China, India is the world's second-largest producer of fruits and vegetables (Anonymous 2021). A large segment of the population still relies on agriculture for a living, and there is declining profitability on small farms. Therefore, strategic shift from food security to income security is still needed (Madhur 2016). Vegetables production could be the major contributor in this process. The production of vegetables in India is estimated to be 212.53 million tonnes in 2022-23 (first advance estimates) compared to 209.14 million tonnes in 2021-22 (Anonymous 2023a). In India, the North Western Himalayas and the Nilgiri hills provide good climatic conditions for the cultivation of exotic vegetables, particularly during the hotter months, whereas these vegetables can be grown in plains during the winter months (Kohli et al 2010). Despite a naturally favourable environment for growing these high-value vegetables, the country unfortunately lacks adequate export facilities and local marketing infrastructure (Rao and Mrunalinisasanka 2015).

In Himachal Pradesh, the area of 616.85 ha area was being cultivated under various exotic vegetables in Himachal Pradesh with a production of 13331.53 tonnes for the year of 2022-23 (Anonymous 2023b). The tribal district Lahaul and Spiti stands out for its exceptional agricultural productivity, particularly in vegetables and fruits as evident by the study conducted by Chand et al (2009). Among the 551 districts studied, Lahaul and Spiti was the leading district with an agricultural productivity of Rs 1.50 lakh per hectare. The decision to undertake a study on economics and marketing of exotic vegetables in the district was motivated by its notable progress in agricultural diversification towards exotic vegetable crops.

MATERIAL AND METHODS

The Lahaul and Spiti district was purposively chosen for this study as farmers are increasingly preferring growing exotic vegetables, mainly lettuce and broccoli. The study is based on primary data collected through survey method from 60 farmers selected using proportional allocation technique from 10 randomly selected villages spread in the valley in 2019-20. For computing the economics of growing these crops, standard Farm Management cost concepts (Cost A_1 to Cost C_3) used by the Commission for Agricultural Costs and Prices (CACP) have been used. Output-input ratios (returns per rupee) were estimated using the simple formula:

$$\text{Output-input ratio (returns/rupee)} = \frac{\text{Gross returns}}{\text{Total cost}}$$

Further, to examine the factors affecting the output,

following Cobb-Douglas production function was employed because based on the statistical significance of regression coefficients and the value of R^2, Cobb-Douglas proved to be best fit among various multiple linear and log-linear functions.

The multiple log linear (Cobb-Douglas) model of the following form was used.

$$Y = b_0 X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} e^u$$

Logarithm form of the model is:

$$\text{Log } Y = \text{Log} b_0 + b_1 \text{Log} X_1 + b_2 \text{Log } X_2 + b_3 \text{Log } X_3 + b_4 \text{Log} X_4 + u$$

where,

Y= Output of crop (q); b_0 = Constant term

X_1 = Area under crop (ha); X_2 = Human labour (man days)

X_3 = Cultivated land fragments (Number); X_4 = Fertilizers (kg)

$b_{i's}$ = Regression coefficients (Production elasticities),

I= 1,2,..,4

u = Random term

RESULTS AND DISCUSSION

Cost incurred in producing different vegetables: The similarity between Cost A_2 and Cost A_1 can be attributed to the fact that only a small number of farm households opted leased-in land for vegetable cultivation (Table 1). Cost B_2 (which includes rental value of owned land) was Rs 425315/ha and Rs 509183/ha for lettuce and broccoli, respectively. The total cost per hectare (Cost C_3) was Rs 544575 and Rs 669885 for lettuce and broccoli, respectively. The per hectare Cost B_2 for potato, cauliflower and pea was Rs 567818, Rs 478557 and Rs 417415, respectively. Cost C_3 or the total cost per hectare was Rs 740801, Rs 601827 and Rs 528925 for potato, cauliflower and pea, respectively.

Returns from different vegetables: The per hectare total variable cost accounted for around 77.0 per cent and 83.0 per cent of total cost in lettuce and broccoli, respectively (Table 2). Whereas in case of exotic vegetables, broccoli gave highest net returns per hectare (Rs 1825811) followed by lettuce (Rs 565935). In case of other vegetables, the total variable cost per hectare accounted for 86.56, 82.10 and 76.82 per cent of total cost in potato, cauliflower and pea, respectively. Potato yielded the highest gross returns per hectare of Rs 843750 followed by pea and cauliflower. The

Table 1. Cost structure of different vegetable crops

(Rs/ha)

Particulars	Exotic vegetables		Other vegetables		
	Lettuce	Broccoli	Potato	Cauliflower	Pea
Cost A_1	194709	278577	337212	247951	186809
Cost A_2	194709	278577	337212	247951	186809
Cost B_1	215315	299183	357818	268557	207415
Cost B_2	425315	509183	567818	478557	417415
Cost C1	285068	398986	463455	337116	270841
Cost C_2	495068	608986	673455	547116	480841
Cost C_3	544575	669885	740801	601827	528925

Table 2. Cost and returns from exotic vegetables

(Rs /ha)

Particulars		Exotic vegetables		Other vegetables		
		Lettuce	Broccoli	Potato	Cauliflower	Pea
Total variable cost		167234	251102	309737	220477	159333
		(77.67)	(83.93)	(86.56)	(82.10)	(76.82)
Total fixed cost		48081	48081	48081	48081	48081
		(22.33)	(16.07)	(13.44)	(17.90)	(23.18)
Total cost (1+2)		215315	299183	357818	268558	207414
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Gross returns		781250	2125000	843750	632500	687500
Net returns	Over Cost B_1 or Total cost	565935	1825817	485932	363942	480086
	Over Cost C_3	236675	1455115	102749	30673	158575
Output-Input ratio Over Cost B_1		3.62	7.10	2.36	2.33	3.32
Output-Input ratio Over Cost C_3		1.43	3.17	1.14	1.05	1.30

Figures in parentheses indicate percentages

net returns over total cost were highest in pea (Rs 158575) followed by that of potato and cauliflower. The broccoli yielded comparatively higher output-input ratio (over Cost B_1) of 7.10 as against 3.62 in case of lettuce followed by pea (3.32), potato and cauliflower. Even relative to cost C_3, the output-input ratio for broccoli was the highest (3.17), followed by lettuce (1.43). These observations indicate that even at cost C_3, farmers were able to generate profits, highlighting the profitability of these vegetables in the study area. Lal and Sharma (2006) reported an output-input ratio of 1.03 for potato in the same study area.

Key determinants of exotic vegetables production: The area under the crop and total labour employed had a significant positive effect on exotic vegetable production, whereas fertiliser had a negative effect (because usage was two to three times higher than recommended dosages), suggesting diminishing marginal returns. The adjusted coefficient of multiple determination (R^2 explained about 90 to 96 per cent variation in output of lettuce and broccoli, respectively (Table 3).

Marketing of exotic vegetables from Lahaul valley: There was no record of utilization of exotic vegetables in the form of consumption in the family, gifts and other purposes in the study area. Since there was no utilization, the marketable surplus was also same as total production of these vegetables realized by the farmers (Fig. 1). Lettuce was being grown by 57 growers in comparison to 42 growers of broccoli. The marketed surplus was calculated by deducing the losses from the marketable surplus. The losses due to spoilage in handling and damage by pests ranged between 8.50 per cent in lettuce and 12.35 per cent in broccoli. The marketable surplus of lettuce and broccoli was estimated to be 105.79 q/farm and 52.59 q/farm, respectively (the estimated sample farm size for lettuce was 0.37 ha and 0.24 ha for broccoli). The volume of total marketed surplus of lettuce and broccoli was estimated as 6030 q and 2209 q, respectively.

Market supply chain: The study area had two marketing channels for disposal of exotic vegetables from the farm to the consumer market. Channel-I consisted of a series of participants, including the producer, trader, retailer, and consumer, whereas Channel-II was composed of the producer, contractor-cum-trader, retailer and consumer. The main and only distinction between the two channels was that channel-II involved a mutual agreement with a trader at the time of transplanting, the crops which guaranteed the growers pre-determined prices for their produce and protected them against the market shocks of price fluctuations. Around 56 per cent of growers utilised channel-I to dispose of 3144 quintals of lettuce, while about 44 per cent used channel-II to dispose of about 2885.97 quintals. In broccoli 66.67 per cent growers disposed of their 1515.25 quintals of marketed surplus produce through channel-I and 33.33 per cent disposed of 693.53 quintals of marketed surplus produce through channel-II. This shows that channel-I was followed by a greater number of farmers in comparison to channel-II.

Marketing cost: The marketing cost borne by farmers in both the channels was almost same (Table 4). The grading/sorting cost of lettuce in both the marketing channels did not differ and it varied between Rs 26-27 per quintal. These costs in broccoli also revealed similar pattern, it ranged between Rs 39-41 per quintal. Broccoli and lettuce had a transportation cost of Rs 75 and around Rs 84 per quintal, respectively. For lettuce, grading/sorting and transportation costs varied between around 26.0-27.0 per

Table 3. Different factors influencing output of exotic vegetables

Particulars	Regression coefficients	Lettuce	Broccoli
Constant	b_0	4.9798	4.2825
		(1.1601)	(1.4941)
Area under crop 'X_1'	b_1	0.7252**	0.7072**
		(0.1855)	(0.2253)
Total labour 'X_2	b_2	0.3879*	0.5869**
		(0.1603)	(0.1626)
No. of land fragments 'X_3'	b_3	0.0741	0.0748
		(0.0576)	(0.0759)
Fertilizer 'X_4'	b_4	-0.2561*	-0.3774*
		(0.1094)	(0.1573)
Adjusted coefficient of multiple determination (R^2)		0.9040**	0.9611**
F- value		132.87	260.80

Figures in parentheses show standard errors of regression coefficients
** and * denote 1 and 5 per cent levels of significance

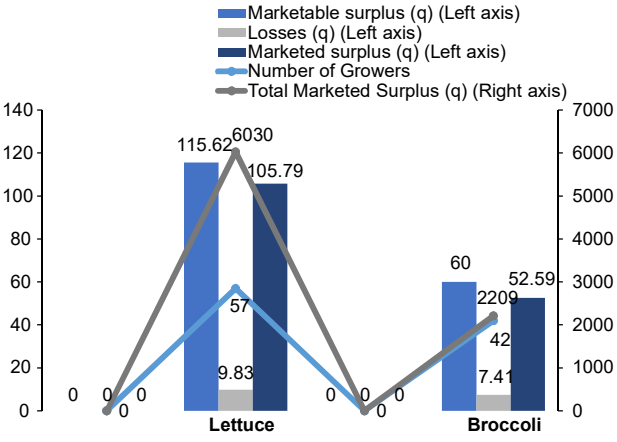

Fig. 1. Marketable and marketed surplus of exotic vegetables on sample farm

Table 4. Marketing costs incurred by producers

(Rs/q)

Particulars	Lettuce		Broccoli	
	Channel-I	Channel-II	Channel -I	Channel-II
Grading/Sorting	25.87	27.53	39.41	41.05
	(25.65)	(26.85)	(32.11)	(33.00)
Transportation cost	75.00	75.00	83.33	83.33
	(74.35)	(73.15)	(67.89)	(67.00)
Total	100.87	102.53	122.74	124.38
	(100.00)	(100.00)	(100.00)	(100.00)

Figures in parentheses indicate percentage

cent and 74.0-75.0 per cent of the total marketing expenses, respectively. In the case of broccoli, grading/sorting and transportation costs represented approximately 32.0-33.0 per cent and 67.0-68.0 per cent of the total cost.

CONCLUSIONS

The research findings indicate that cultivating exotic vegetables is more profitable compared to traditional crops like potatoes, cauliflower, and peas that have long been commercially grown in Lahaul valley. This transition not only boosts earnings from the same piece of land but also permits the land to be used twice during the cultivation season, due to the shorter growth cycle of exotic vegetables. This advantage is particularly pronounced in a region where snow covers the land for half of the year. The study recommends that state agricultural authorities should initiate efforts and implement policy measures to support the transition to exotic vegetables in Lahaul valley, aiming to replicate this success in other climatically suitable regions.

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REFERENCES

Anonymous 2021. *India at a glance*. Food and Agriculture Organisation. https://www.fao.org/india/fao-in-india/india-at-a-glance/en/

Anonymous 2023a. Department of Agriculture and Farmers welfare, MOA&FW, New Delhi, India. https://agriwelfare.gov.in/sites/default/files/2021-22%20_Final.xlsx

Anonymous 2023b. *District-wise area & production of different vegetables in Himachal Pradesh*. Agricultural information officer, Directorate of Agriculture, Government of Himachal Pradesh, p 3-4.

Chand R, Garg S and Pandey L 2009. *Regional variations in agricultural productivity: a district level study*. National Centre for Agricultural Economics and Policy Research, New Delhi. Discussion paper NPP01: p 23.

Kohli UK, Vikram A, Kumar M and Dohroo NP 2010. *Exotic Vegetables*. Westville Publishing House, New Delhi, p 120.

Lal H and Sharma KD 2006. Economics of potato production in Lahaul valley of Himachal Pradesh. *Potato Journal* **33:** 139-143.

Madhur G 2016. Making Indian agriculture more resilient: Some policy priorities. *Economic & Political Weekly* **51**(8): 24-27.

Rao SS and Mrunalinisasanka V 2015. Exotic Veggies: A practical utility of innovation-lured by the easy returns. *International Journal of Applied Research* **1**(12): 1038-1041.