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Financial Viability of Persimmon Cultivation In Kullu District of Himachal Pradesh

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Financial Viability of Persimmon Cultivation In Kullu District of Himachal Pradesh

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Abstract

The agriculture sector is backbone of the Indian economy and major portion of rural India's livelihood. The return per unit area of fruit crops increases, which makes more important in farm diversification. Persimmon is well suited to this change in the state of Himachal Pradesh where mid-hill areas are suitable for cultivation and the area under orchards has increased steadily during the last decade. This present work "Economic Analysis of Persimmon Cultivation in Kullu district, Himachal Pradesh" was conducted in the Kullu district, the state's top producer, using data from 128 farmers chosen through multi-stage random sampling. Costs were analysed from establishment to harvest in the non-bearing years (1–5) and over three bearing categories: 6-12, 13-20, and greater than 20 years. The cost of establishing an orchard was Rs. 1,23,315.11 per hectare. Bearing cost varied from Rs. 1,68,678.14 to Rs. 1,72,597.14 per hectare. The orchards of 13-20 years old age performed best with 129.18 quintals per hectare and gross returns were 6,45,898.44, which decreased significantly behind the 20-year trend. The farmers' average yield stood at 123.21 quintals per hectare along with total gross returns for all age groups are 6,16,041.67. A BCR of 2.19 means each rupee invested returned Rs. 2.19. NPV came to Rs. IRR was 17,42,403.62 per hectare, recovery period was 7.8 years and IRR was 29 per cent. Sensitivity analysis confirmed that persimmon cultivation remains profitable even under moderate cost increases or return reductions. This makes it an economically rewarding and financially resilient enterprise in Kullu district.

Key words: Multistage Sampling, Persimmon, Establishment, Net Present Value, Pay Back Period, Sensitivity Analysis

1. Introduction

The agriculture sector is an integral part of the Indian economy accounting for approximately 17.7 per cent of the gross value added at current prices (FY24) (Economic Survey of India, 2023-24) and is spread across fifteen diverse agro-climatic zones, which is a unique combination of crops grown in agriculture and horticulture. Agriculture in general, and horticulture in particular, has been a major contributor to the recent growth of agriculture, increasing the productivity of land, creating jobs, enhancing the income of farmers and entrepreneurs, increasing the export value and improving the nutritional security of the population. India grows second most fruit and vegetables in the world after China (Ministry of Agriculture & Farmers Welfare, 2021), and a substantial share of the population — cited at 42.51 per cent by Statista (2024), though more recent estimates put it closer to 45 per cent — depends on farming and allied work for a livelihood. Mango, banana, citrus, guava, grapes, pineapple and apple together account for more than 75 per cent of the country's fruit-growing area. The total area under horticulture was 28.44 million hectares with the production of 355.48 million tonnes, which is 8.30 million tonnes or 2.39 per cent higher than 2021-22, according to the Final Estimates for 2022-23 released by the Department of Agriculture & Farmers' Welfare. In addition to these known crops, exotic fruits, including avocado, durian, kiwi fruit, loquat, longan, mangosteen, passion fruit and persimmon are also being cultivated throughout the country, and fruit types that are compatible with certain local environments have the potential to be grown more widely. (Nath et al., 2018).

Persimmon, or *Diospyros kaki* L., is a deciduous tree native to China, Korea and Japan, though it is now cultivated widely across East Asia and southern Europe. Known locally as Japani phal, it produces fruit ranging in colour from a mild yellow-orange to a deep red-orange (Nazir et al., 2013). . Global output has been climbing every year, increasing to 4,436,475 tonnes, 2.08 per cent more than the previous year and 2.71 per cent higher than 10 years previously. Output peaked at 4,547,892 tonnes in 2017 and hit its lowest point, 836,286 tonnes, back in 1971. (FAOSTAT, 2022).

The crop is dominated by China, which accounts for 76.6 per cent of the world's supply, and South Korea, Brazil, Japan, Spain and the United States make up the bulk of the rest. The cultivation of persimmon is still relatively small but expanding in India as favourable climatic and soil conditions are available in twelve districts of India with the state of Himachal Pradesh leading the way, with Kullu being the most notable of the two. (Mhetre et al., 2024).

Fruit cultivation across Himachal Pradesh covers 2,36,466 hectares and yields 6,37,299 metric tonnes (Department of Economics and Statistics, Government of Himachal Pradesh, 2023); persimmon alone accounts for 528 hectares and 990 tonnes of this. Kullu contributes the largest share, with 840 tonnes from 167 hectares (Thakur et al., 2023). As temperatures rise, persimmon looks increasingly attractive compared to other cash crops, since it tolerates heat better and resists disease more effectively. It also needs fewer synthetic inputs, keeps cultivation costs down, and still delivers strong returns. Against this backdrop, the present study looks at the cost structure, profitability and financial performance of persimmon cultivation in Kullu district, Himachal Pradesh.

2. Methodology

2.1 Study Area and Sampling

The present study was conducted in Kullu District of Himachal Pradesh . Multistage sampling technique was used.

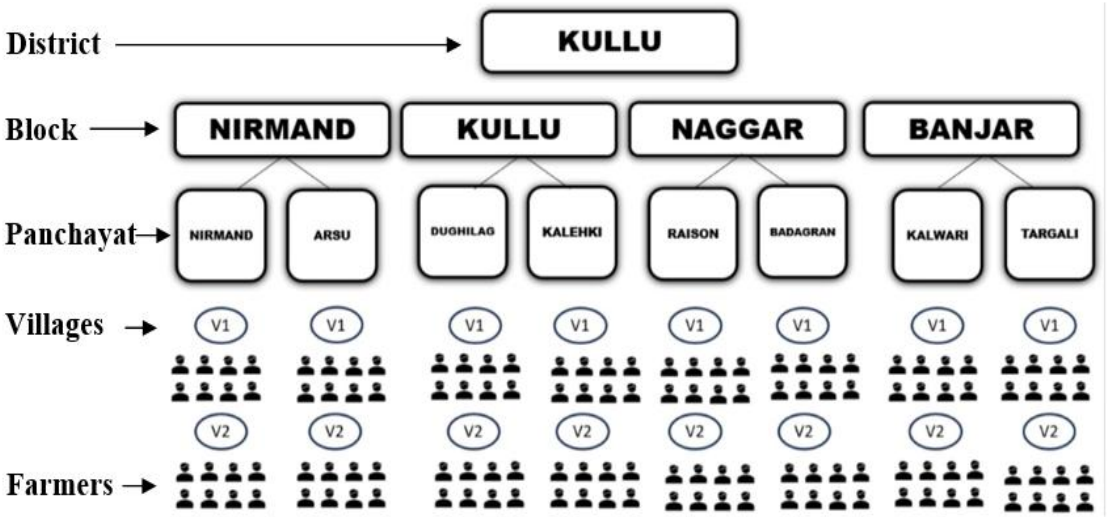


Fig.3.2: Pictorial representation of selection of sample size

The primary goal of the research was to investigate the cost analysis, production, financial aspects of persimmon and describe the various facts of persimmon farming in the study area. The mid-hill zone of Himachal

Pradesh (1200-1800 m amsl) has comparative advantage in persimmon cultivation because of the favourable climate for their growth.

The Kullu district of Himachal Pradesh has been selected for the present study as it contributes the largest area and persimmon production and is the production hub of the State. During the first phase, 4 blocks namely Kullu, Banjar, Naggar and Nirmand out of 6 blocks in Kullu district has been selected. In second stage two panchayats were randomly sampled from each block. In the third stage two villages were chosen randomly from each panchayat. Finally, 128 farmers were finally sampled, eight farmers from each village..

Cost Analysis

The persimmon plants were further categorized based on the age of the plants. The first group represents the year of plantation, considered the initial establishment cost. The second group includes non-bearing plants aged 1 to 5 years, representing the non-bearing stage. The third group encompasses the bearing stage, which is further subdivided into three categories: early bearing 6–12 years, main bearing 13–20 years and late bearing over 20 years.

Net Present Value (NPV): -

The net present values of the project have been estimated using the following equation that assumes all returns arise on the last day of each year. (George, 1974; Subrahmanyam and Mohandas, 1982; Lee et al., 1988; Gangwar and Singh 1998; Padmanaban and Ramasamy, 1999, Gangwar et al., 2005).

$$NPV = \sum_{t=1}^{n} \frac{B_t - C_t}{(1+r)^t}$$

Where,

NPV = Net present value in period
B_t = Benefit from persimmon in each year
C_t = Cost of persimmon cultivation in each year
r = Discount rate
n = Number of years

Benefit-Cost Ratio: -

Benefit-cost ratio of an investment is the ratio of the discounted value of all cash inflows to the discounted value of all cash outflows during the life of the project.

$$\text{B-C ratio} = \frac{\sum_{t=1}^{n} \frac{B_t}{(1+r)^t}}{\sum_{t=1}^{n} \frac{C_t}{(1+r)^t}}$$

Where, BCR = Benefit-Cost Ratio

B_t = Benefit from persimmon cultivation in each year *t*

C_t = Cost of persimmon cultivation in each yea

r = Discount rate

n = Number of years

t = Respective year of the project life

Internal Rate of Return (IRR): -

The internal rate of return (IRR) is the annual rate of growth that an investment is expected to generate. IRR is ideal for analyzing capital budgeting projects to understand and compare potential rates of annual return over time.

$$\text{IRR=LDR + (Difference between 2 discount rates) x } \frac{NPV\ OF\ LDR}{Absoulte\ difference\ between\ NPV\ of\ two\ discount\ rates}$$

Where,
LDR = Lower Discounted Rate
NPV = Net Present Value

Discount Factor (df)

The discount factor converts future values to present values.

$df = 1 / (1 + r)^n$

Where,

r = discount rate

n = year number

The discount rate of 10 per cent was chosen to reflect the prevailing institutional lending rate for agricultural investment in India.

Discounted Cost (dc)

The total cost of cultivation in each year (including establishment cost, maintenance cost, labour, inputs, and depreciation on fixed assets) was multiplied by the corresponding discount factor to obtain the present value of costs.

dc = Cost × df

Discounted Return (dr)

dr = Return × df

Gross returns from persimmon sale in each productive year were multiplied by the discount factor.

3. Results

3.1 Cost and Returns from Persimmon Cultivation

Cost of plantation (initial investment)

Persimmon orchardists in the study area spent an average of Rs. 1,233,15.11 per hectare at the initial stage overall. Material input costs constituted approximately Rs. 48380.63 of the total expenditure, while investment in human labour accounted for around Rs.36849.20. Managerial cost and risk margin, each calculated

at 10 percent of working capital, amounted to Rs. 6,882.82 individually, together accounting for Rs. 13,765.64 of the total initial investment. The rental value of land made up Rs. 19190.63 of the total expenses.

Cost of non-bearing stage

The total maintenance cost for non-bearing persimmon plants showed a positive correlation with plant age, amounting to Rs. 113027.26, Rs.116433.69, Rs.118752.08, Rs .123040.43 and Rs 125794.34 per hectare in the first, second, third, fourth and fifth year. Total labour cost constituted approximately Rs. 46484.08, Rs. 47906.60, Rs. 48317.01, 49835.01, Rs. 50673.15 in the first year to fifth year. Managerial costs and the risk margin @10% vary between Rs. 9855.69 to Rs. 11269. to the overall cost. As persimmon plants got older, the cost of important inputs like FYM and fertilizers increased with the age of the plants. At the same time, the percent share of costs like depreciation and interest on fixed capital decreases. The interest on pre-establishment costs kept increasing with the age of the plants during the non-bearing years. This rising interest became the biggest part of the fixed costs. This trend was observed across all types of farms.

Cost of cultivation during the bearing stage of persimmon

The total productive life of persimmon plants was divided into three age groups. For the overall farm category farmers, the cost of cultivation per hectare was estimated at Rs. 1,71,469.31 and Rs. 1,72,597.14 for the age groups of 6–12 and 13–20 years and then declined further to Rs. 1,68,678.14 in the above 20-year age group. . The total value of input costs of the material was about Rs. 27,204.85 to Rs. The total expenditure varied from Rs.26484.89 of which Rs.6,82,64.83 was invested in human labour and Rs. above 20 years was on investment in human labour. 66512.84 all age groups. The managerial cost and risk margin were Rs. each at 10 percent of working capital. 7,967.14 in the 6–12-year age group, Rs. 8,085.02 in the 13–20-year age group, and Rs. The total Orchard above 20 years (7,839.06) contributes a total of Rs. 15,934.28, Rs. 16,170.04, and Rs. 15,678.12, respectively. The total fixed cost is variable with respect to: 57240.53 between Rs .57240.53 in all age groups. A downward trend in costs was observed across all farm categories in the above 20-year age group.

Table 3.1 Combined Cost of Cultivation of Persimmon of initial, non-bearing and bearing stages (Rs./ha)

Sr. No.	Particulars	Initial Investment (Overall)	Non-Bearing Stage (Overall)					Bearing Stage (Overall)		
			1st Year	2nd Year	3rd Year	4th Year	5th Year	6-12 Years	13-20 Years	>20 Years
	Material Cost									
i)	FYM	36914.06	10240.42	10457.42	10819.96	11351.40	11489.82	20028.91	20406.25	19604.54
ii)	Fertilizer	2052.23	2753.89	2909.80	2924.88	3039.43	3108.21	4501.95	4513.87	4200.20
iii)	Plant protection chemicals	-	962.26	1054.85	1103.23	1220.38	1306.43	2673.99	2716.99	2680.15
	Sub Total (Material)	48380.63	13956.58	14422.07	14848.07	15611.20	15904.45	27204.85	27637.11	26484.89
2)	Family labour	16401.66	20715.36	21733.27	21416.51	23043.37	22986.25	32696.28	32838.63	31625.34
3)	Hired labour	20447.54	25768.72	26173.33	26900.59	26791.65	27686.90	35568.55	35853.74	34887.50
	Sub Total (Labour)	36849.20	46484.08	47906.60	48317.10	49835.01	50673.15	68264.83	68692.38	66512.84
4)	Interest on working capital @4.5%	3097.27	1787.64	1826.79	1878.69	1908.13	1961.61	2824.80	2857.09	2761.76

Sr. No.	Particulars	Initial Investment (Overall)	Non-Bearing Stage (Overall)					Bearing Stage (Overall)		
			1st Year	2nd Year	3rd Year	4th Year	5th Year	6-12 Years	13-20 Years	>20 Years
5)	Risk Margin @10%	6882.82	9855.69	10200.70	10489.53	11024.55	11269.59	7967.14	8085.02	7839.06
6)	Managerial cost @10%	6882.82	9855.69	10200.70	10489.53	11024.55	11269.59	7967.14	8085.02	7839.06
	Sub Total	16862.90	21499.01	22228.20	22857.75	23957.23	24500.79	18759.09	19027.13	18439.88
7)	**Total Variable Cost**	**102092.72**	**81939.67**	**84556.87**	**86022.92**	**89403.44**	**91078.40**	**114228.78**	**115356.61**	**111437.61**
	Fixed Cost									
i)	Land revenue	31.25	31.25	31.25	31.24	31.25	31.24	31.25	31.25	31.25
ii)	Depreciation @10%	1341.38	1341.38	1341.38	1341.38	1341.38	1341.38	1341.38	1341.38	1341.38
iii)	Interest on fixed capital @7%	659.13	659.13	659.13	659.13	659.13	659.13	659.13	659.13	659.13
iv)	Rental value of land	19190.63	19190.63	19190.63	19190.63	19190.63	19190.63	19190.63	19190.63	19190.63
9)	**Total Fixed Cost**	**21222.39**	**31087.60**	**31876.81**	**32729.16**	**33636.98**	**34715.94**	**57240.53**	**57240.53**	**57240.53**
10)	**Total Cost**	**123315.11**	**113027.26**	**116433.69**	**118752.08**	**123040.43**	**125794.34**	**171469.31**	**172597.14**	**168678.14**

Figures in parentheses are percentages of the total cost.

3.2 Returns from persimmon cultivation

Table 3.3.1 Production and Gross Return from Different Age Groups of Persimmon per Hectare

Metric	6-12 Years	13-20 Years	>20 Years	Average
Production (quintal/ha)	121.96	129.18	118.48	123.21
Gross Return (Rs. /ha)	6,09,804.69	6,45,898.44	5,92,421.88	6,16,041.67

The average production of persimmon was 123.21 quintals per hectare and the average gross return was ₹6,16,041.67 per hectare. The 13–20 years age group recorded the highest production 129.18 q/ha and gross return

₹6,45,898.44/ha. The 6–12 years age group produced 121.96 q/ha with a gross return of ₹6,09,804.69/ha**.** The lowest production 118.48 q/ha and gross return ₹5,92,421.88/ha were observed in orchards older than 20 years.

Table 3.3.2 Measures of investment worth in the plants of persimmon.

Measures of investment worth	**Present Value**
Benefit -Cost Ratio	2.19
Net Present Value (Rs.	1742403.62
Internal Rate of Return (%)	29%
Pay Back period	7.8

The BCR was calculated to be 2.19, suggesting that for every rupee invested, farmers can expect a return of Rs 2.19. The payback period for persimmon plantations was estimated at 7.8 years across all farm categories. A discount rate of 10 percent was applied to calculate. NPV was found to be Rs. 1742403.62 per hectare. This positivity measures reflects the profitability and financial viability of persimmon cultivation in the study area.

3.3 Discussion

The findings revealed that persimmon cultivation demands a substantial initial investment, primarily driven by material inputs and labor—a trend consistent with Sharma's (2018, 2021) observations in Himachal Pradesh apple orchards. During the non-bearing stage, maintenance costs progressively increased with orchard age, attributed to rising expenditure on Farm Yard Manure (FYM), fertilizers, labour, and interest on pre-establishment costs, mirroring Vaibhav's (2022) findings. In the bearing stage, labour remained the largest cost component. However, the total cost of cultivation saw a slight decline in orchards older than 20 years, a pattern also noted by Tassang (2022) in kiwi cultivation. The 13–20-year age group recorded the highest production (129.18 q/ha) and gross return (₹6,45,898.44/ha), identifying this as the most productive stage for persimmon orchards, which aligns with research by George et al. (1982) and Jadhav et al. (2022).An investment analysis further affirmed the economic viability of persimmon cultivation, demonstrating a benefit-cost ratio of 2.19, a net present value of ₹17,42,403.62 per hectare, an internal rate of return of 29 percent, and a payback period of 7.8 years. These results are comparable to those reported by Bali et al. (2022) for cherry and Kharayat et al. (2026) for plum cultivation, underscoring persimmon as a profitable perennial fruit crop within Himachal Pradesh's agro-climatic conditions.

Conclusion

The cultivation of a hectare of persimmon orchards costs Rs. The cost of establishing the orchards, as well as the cost of the non-bearing years is included. The variable costs of the orchards established are 82.77 per cent and the fixed costs are 17.23 per cent of the total cultivation cost of the orchards established. The non-bearing period labour costs for the orchards established were 41 per cent of the amount of labour required to establish those orchards. After the orchards have been established, the expense for the upkeep of growing the orchards varied from Rs. 1,68,678.14 to Rs. This may be as much as 172,597 per hectare, depending on the age of the established orchards. The costs of human labour needed to cultivate established orchards account for 39.4 to 39.8 per cent of the costs while the costs of materials needed for the cultivation of those orchards account for 15.7 to 15.9 per cent of the costs to cultivate those established orchards. The average yield of persimmon fruits among orchards differed with the stipulated orchard age. Orchards older than 12 years of age harvested 121.96 quintals per ha of persimmon, while 13–20-year-old orchards harvested 129.18 quintals per ha of persimmon and orchards older than 20 years of age harvested 118.48 quintals per ha of persimmon. Gross returns of the various farms based on age ranged from Rs. 6,10,000 to Rs. 6,28,333.33 per hectare. The payback period of the established orchards is 7.8 years, the benefit cost ratio of established orchards is 2.19 and the internal rate of return on

established orchards is 29 per cent and the net present value of established orchards is Rs. 1,74,203.62 per hectare. The overall costs and returns have shown that growing persimmon orchards in Kullu district is a profitable and viable business.

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