



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(6): 1745-1748
© 2022 TPI

www.thepharmajournal.com

Received: 08-04-2022

Accepted: 11-05-2022

Ratika Kayastha

Department of Social Sciences,
Dr. Yashwant Singh Parmar
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Ravinder Sharma

Department of Social Sciences,
Dr. Yashwant Singh Parmar
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Nitin Sharma

Department of Social Sciences,
Dr. Yashwant Singh Parmar
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Neeraj Singh Parihar

Assistant Professor, MS
Swaminathan School of
Agriculture, Shoolini University,
Bajhol, Himachal Pradesh, India

Corresponding Author

Ratika Kayastha

Department of Social Sciences,
Dr. Yashwant Singh Parmar
University of Horticulture and
Forestry, Nauni, Solan,
Himachal Pradesh, India

Economic evaluation of litchi cultivation in Kangra district of Himachal Pradesh

Ratika Kayastha, Ravinder Sharma, Nitin Sharma and Neeraj Singh Parihar

Abstract

The sampled families in the current study, titled "Economic Evaluation of Litchi Cultivation in Kangra District of Himachal Pradesh," were chosen using a multistage random sampling methodology from three blocks in Kangra District. A sample of 60 households was drawn randomly. According to the economic analysis, the initial cost of investment in litchi plantation was estimated to be ₹ 32,157.43 per hundred plants. With a 19.14 percent internal rate of return, a benefit-cost ratio of 1.69, and a net present value of ₹ 48,089.56 per hundred plants, litchi cultivation was lucrative. Sensitivity analysis of litchi plantations revealed that the internal rate of litchi crop remained higher than the prevailing bank rates for long deposits even when costs or returns changed by 15 percent, demonstrating that the risks and uncertainties associated with price and costs are minimal in litchi crop. As a result, it is suggested that litchi cultivation be encouraged among orchards in the foothills of Himachal Pradesh. Orchardists should be educated on fertilizer application time and other better management practices. Raising producer awareness should stimulate the implementation of current processes.

Keywords: Households, investment, sensitivity analysis, internal rate

Introduction

Himachal Pradesh is recognized as the fruit bowl of the country. The state benefits from a diverse climate that ranges from subtropical to dry temperate. Himachal Pradesh has a large potential for cultivating sub-tropical and temperate fruits due to its diverse agro-climatic conditions and physical features. Different fruit kinds, such as mango and citron, have the potential to be grown. Litchi cultivation thrives in climates where the minimum temperature is 10 °C from December to February and 38 °C from April to June. During the flowering and fruiting seasons, the temperature in litchi-growing areas of India ranges from 21 °C to 37.8 °C (Anonymous, 2014) [2]. Litchi (*Litchi chinensis*), a subtropical tree fruit crop native to China, is one of the most environmentally sensitive subtropical tree fruit crops in the Sapindaceae family. Litchi is only grown commercially in the northern states, specifically the Himalayan foothills from Tripura to Jammu and Kashmir, and the Gangetic plains. Litchi cultivation is suited in Himachal Pradesh, making it a popular fruit crop among orchardists. Litchi is grown throughout Himachal Pradesh, with the Kangra district producing the most, followed by Mandi, Bilaspur, Sirmour, Hamirpur, Solan, Una, and Chamba, which produced approximately 3256, 701, 260, 204, 109, 28, 19, and 18 tonnes of litchi from an area of 3311, 590, 680, 125, 697, 61, 297, and 218 hectares, respectively (Anonymous, 2020) [2]. In Kangra, Litchi is mostly found in the lower hills of Kangra district in Himachal Pradesh, accounting for more than 80 per cent of the total area under litchi. Its cultivation can be expanded to other districts of the state, depending on the agro-climatic conditions. The current study was undertaken in light of the widespread appeal of the fruit and in order to popularize the fruit among local farmers by evaluating its financial returns. The main objectives of the study were to: workout the costs and returns from litchi orchards, to determine the profitability of litchi cultivation through different investment appraisal methods and to work out the economic productive life of litchi orchards in the study area.

Materials and Methods

The data for this study were collected using multistage random sampling technique. At first stage three blocks namely Bhawarana, Sulaha and Nagrota Bagwan out of fifteen blocks in the district were selected on the basis of area under Litchi cultivation. At the second stage a list of litchi growing villages from each selected block were prepared and two villages from each

block were selected randomly. Finally ten growers from each village were selected randomly forming a sample of sixty farmers. The required information was collected through personal interview with the help of a survey schedule. Cumulative cube-root frequency method of stratification (Singh and Mangat, 1975) [13] was used for classifying the litchi growers into two groups based on the number of trees viz. Group-I (<60 trees) and Group-II (>60 trees). The total age of litchi plantation was considered to be 40 years. The costs and returns for different groups of orchards were compiled from the survey data. The orchards were divided into non-bearing stages from 1 to 8 years and bearing stages into six groups, viz. 8-10 years, 11-16 years, 17-22 years, 23-28 years, 29-35 years and 36-40 years which were termed as operational and maintenance cost during these stages.

Estimating Returns and Economic Feasibility of Investment in Litchi Orchards

The amortized establishment cost could be used as a guideline to take decisions on replanting of the Litchi Orchards. The formula used was:

$$P = \frac{B}{(1+i)^n} \tag{1}$$

Where

- P = Amount of annual payment
- B = Initial amount
- N = Number of year (life period of plantation)
- I = Interest rate, decimal

Using it one can work out the absolute profit expected in a year by deducting amortized cost along with maintenance cost from gross returns. The investment criteria like benefit-cost (B-C) ratio can be derived as:

$$B - C Ratio = \frac{GR}{(AEC+MC)} \tag{2}$$

Where

- GR = Annual gross returns, per hundred plants
- AEC = Amortized establishment cost per hundred, and
- MC = Maintenance cost per hundred plants

Results and Discussions

Costs and Returns from Litchi orchards

The age wise cost and returns from the Litchi Orchard were worked out per hundred plant basis for Group-I, Group-II and overall. First bearing starts from 8th year onwards in the study area. The major operation and input requirement remains constant in the age group 8-10, 11-16, 17-22, 23-28, 29-35 and 36-40. The total economic life of Litchi plantation is 40 years. The gross and net returns of different age groups have been estimated and presented in Table 1. Perusal of the table shows that the gross income of ₹ 91,601.12 was recorded in 8-10 year which increased to ₹ 3,60,856.27 for 23-28 year old Litchi Orchard. The gross returns were observed to decline after 28 years of plantation and were ₹ 21,721.83 in 36-40 year old Litchi Orchard. Similar trends were observed in case of net returns from Litchi Orchards.

Table 1: Gross and net returns from different age groups of litchi orchards

Age	Gross returns (₹)			Net returns (₹)		
	Group-I	Group-II	Overall	Group-I	Group-II	Overall
8-10	89375.00	94512.20	91601.12	12567.38	14817.62	13542.49
11-16	261864.41	268253.97	264633.22	169058.42	172354.84	170486.87
17-22	311290.32	335087.72	321602.53	208325.06	227499.56	216634.01
23-28	348000.00	377668.31	360856.27	232594.64	256308.25	242870.54
29-35	268060.84	293229.17	278967.11	160114.55	179278.53	168418.94
36-40	214120.37	221263.74	217215.83	105078.42	110782.92	107550.37

The average costs and returns from the litchi orchards have been presented in Table 2. It was found that the establishment amortized cost over 40 years at 8 per cent discount rate was ₹ 28,904.05 per hundred plants. With the maintenance cost of ₹70,097.46. thus the total cost was estimated to be ₹ 98,191.54. The average gross returns were ₹ 25,581.68 with a net return of ₹ 1,57,621.14 on the average basis.

Table 2: Average costs and returns from litchi orchards

Sr. No.	Particulars	Amount (₹ per plant)
1	Establishment cost *	28,094.05
2	Average maintenance cost	70,097.46
3	Total cost per year	98,191.54
4	Average gross income per year	2,55,812.68
5	Net income per year	157621.14

*Amortized over 40 years @ 8 per cent per year

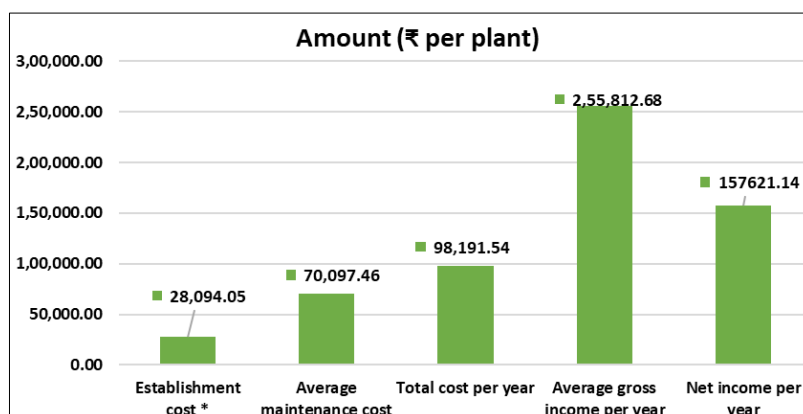


Fig 1: Distribution of different costs in litchi cultivation

Economic evaluation of Litchi cultivation

The economic productive life as well as profitability of litchi orchards were calculated with the help of different investment appraisal methods and project evaluation techniques. The pay-back period for plantation was estimated at 12 years for both groups. The discount rate 8 per cent was used to estimate the present worth of the future income. The analysis across groups revealed that NPV at 8 per cent discount rate was more for Group-II (₹ 5,02,690.51) and less for Group-I (₹ 4,64,221.78). The internal rate of return varied from 19.06 to 19.25 per cent which indicates the maximum paying capacity of litchi plantation implying hereby, that investing in the litchi

is financially desirable as long as the rate of interest on loan does not exceed 19 per cent.

Table 3: Group wise measures of investment per 100 plants

Particulars	Group-I	Group-II
Internal Rate of return (%)	19.06	19.25
Net Present Value (₹)	4,64,221.78	5,02,690.51
Benefit-Cost Ratio	1.67	1.70
Internal Rate of return (%)	19.06	19.25
Payback Period (Years)	12.00	12.00
Annuity (₹)	38929.71	42155.71

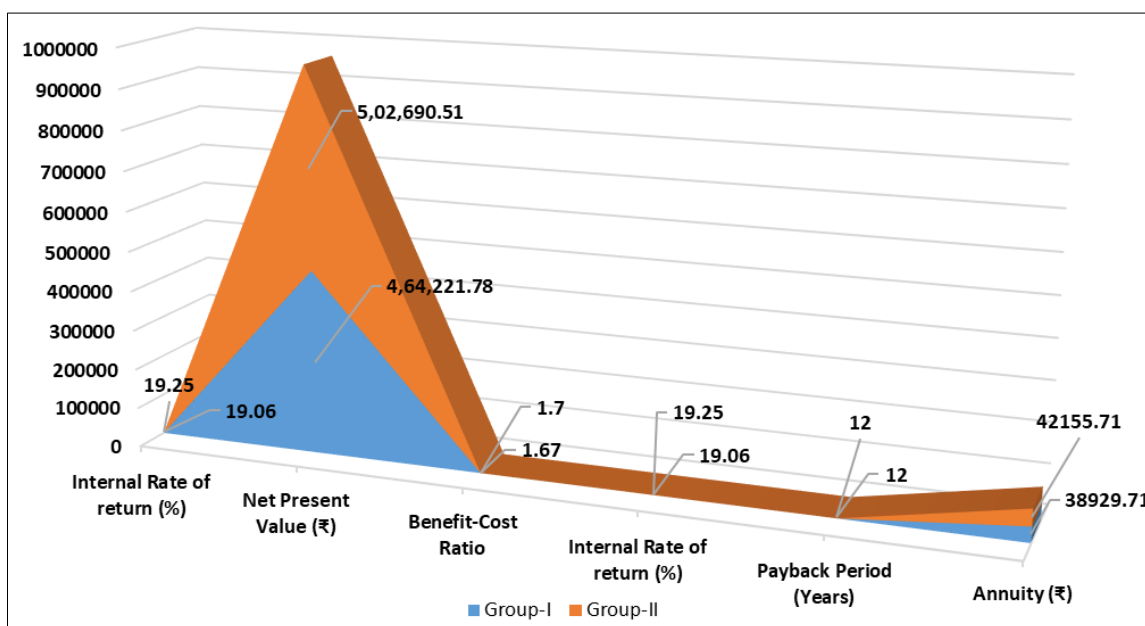


Fig 2: Comparison of Group I and Group II in terms of measure of investment

Comparison measures of investment

A comparison of the result obtained from the two appraisal methods reveal that the amortization method has slightly under estimated the benefit-cost ratio as compared to present value method; however the difference was not large (Table 4). There was a wide difference in income calculated under present value method and amortization method. The amortization method suggested an income of more than ₹ 28,094.05 over the maintenance cost for retaining the litchi orchards as this income was enough to meet the amortized establishment cost. The present value method required an income of more than ₹ 40,327.64 for retaining the old litchi orchard. Hence present value method appeared more realistic as litchi orchards have to compete with other crops.

Table 4: Comparative measures of investment worth estimated by Present value and Amortization methods

Particulars	Present Value Method	Amortization
Net Present Value (Rs.)	480891.56	326610.10
Benefit-Cost Ratio	1.69	1.39
Payback Period (Years)	12.00	15.00
Internal Rate of return (%)	19.14	-
Minimum income before replacement of orchard	40327.64	28094.05

Conclusions

Investment in litchi orchards is an economically beneficial, financially viable, and socially acceptable business, according

to the study. It has the potential to play a critical role in the development of on-farm primary processing based agro industry and the creation of jobs. The return on investment in a litchi orchard, excluding the rental value of the land, is 12 years. Litchi has a forty year productive life. The results demonstrate that the litchi plantation is worth keeping as long as it generates an income of ₹ 40,327.64 over the cost of maintenance. Due to its efficiency and closeness to real-world results, the annual amortization approach may also be preferred. In order to increase output in the study area, infrastructure facilities must be developed in order to reduce post-harvest losses.

References

1. Anchal D, Sharma VK. Price spread of litchi in Punjab. Indian Journal of Agricultural Marketing. 2009;23:147-153.
2. Anonymous. Package of Practices of Fruit Crops. Directorate of Extension Education, Dr. YS Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, 2014.
3. Bhat A, Kachroo J, Kachroo D. Economic appraisal of kinnow production and its marketing under North-western Himalyan region of Jammu. Agricultural Economics Research Review. 2011;24:283-290.
4. Chidambaram K, Haridoss K, Nandarajan S. Dynamics of costs and returns structure in agricultural farms, Agricultural Situation in India. 2005;62:179-184.

5. Dahiya P, Singh IJ, Rai KN. Cost benefit analysis of ber cultivation in Rohtak district of Haryana. *Indian Journal of Agricultural Marketing*. 2002;16:49-52.
6. Das SC. Studies of litchi cultivation and evaluation of different varieties and hybrids in Tripura *Asian Journal of Horticulture*. 2013;8:520-525.
7. Gangwar LS, Singh D, Mandal G. Production constraint and economics of peach in Punjab and Uttarakhand. *Agricultural Economics Research Review*. 2008;21:123-129.
8. Kareemulla K, Tewari RK, Singh B, Kuldeep K. Production and marketing of Indian gooseberry aonla (*Emblica officinalis*) in Pratapgarh district of Uttar Pradesh. *Indian Journal of Agricultural Marketing*. 2007;21:39-45.
9. Kaur H, Gupta M. Marketing of fruits and vegetables in India. *Indian Journal of Marketing*. 2008;16:13-19.
10. Lokesh GB, Muthapp PP, Chandrakanth MG. Economics of cultivation of passion fruit in Karnataka. *Agricultural Economics Research Review*. 2004;17:131-138.
11. Mair F, Tehmina M. Analysis of contracting system of vegetable supply chain in Sindh Province of Pakistan. *Indian Journal of Biological Sciences*. 2005;2:183-190.
12. Prasher RS, Chandel S, Thakur R. Economic appraisal of production and marketing of litchi in Himachal Pradesh. *Indian Journal of Agriculture Marketing*. 2013;27:1-13.
13. Singh R, Mangat NS. On optimum stratification for proportional allocation, sankhya. *Indian Journal of Statistics*. 1975;37:109-115.