

## ECONOMICS OF LAVENDER (*LAVANDULA OFFICINALIS* L.) IN HIMACHAL PRADESH\*

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**Abstract:** The present study depicts the economics of nursery raising, cultivation and essential oil distillation of Lavender (*Lavandula officinalis*) produced in Himachal Pradesh. Cost components were calculated on the basis of prevailing market prices of inputs and outputs. Cost of raising rooted cutting in nursery worked out to be Re 0.70/plant. Cost of cultivation for producing an average spike yield of 35 q/ha/annum worked out to Rs. 54,049.25/ha/yr. Cost of essential oil production and net returns were calculated as Rs. 1,894.37/kg oil and Rs. 32,247.25/ha/yr, respectively. Lavender oil production is a remunerative venture with Rs. 50,310.00 as net present value (NPV), 12.72 per cent as internal rate of return (IRR) and benefit cost ratio (BCR) as 1.58 and break even production of oil at 12.33 kg as found out from the compiled data of Lavender production in Himachal Pradesh.

### INTRODUCTION

Lavender is a perennial shrub cultivated primarily for its inflorescence which produces high value essential oil. Essential oil of Lavender (*Lavandula officinalis*) is produced by steam distillation of its flower spikes. The oil is mainly used in cosmetics, fragrance and perfumery industry. But there is an increasing interest for its use in aromatherapy. The *Lavandula* genus consists of about 20 species (Allaby, 1992). The "true" Lavender oil comes from *L. officinalis* syn. *angustifolia* which is the most highly priced among all the lavender oils. Lavender is cultivated in Mediterranean countries such as Italy, Spain, North Africa, Switzerland and France. The world production of this oil is estimated at about 200 tonnes/year.

True Lavender oil is highly fragrant, superior, typical, sweet, balsamic herbaceous with floral, woody, undertones. During British period an abortive attempt was made for commercial cultivation of Lavender in India followed by another failure by Sir Col. R. N. Chopra in 1957. During early 80's Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow has introduced this plant in Kashmir. However, no commercial cultivation could be established due to changing political

scenario in Jammu and Kashmir. During 2000, Institute of Himalayan Bioresource Technology, Palampur has successfully introduced this plant on a semi-commercial scale in District Chamba of Himachal Pradesh, which was assessed to be an alternate location for its cultivation in India.

Keeping in view of the new crop introduction and increasing importance of the Lavender oil, it became imperative to work out cost and return involved in this enterprise. These estimates, in turn, will help in motivating the farmers to take up large-scale cultivation. So far, no such study was conducted to pinpoint the extent of profitability of this crop under agro-climatic conditions of Western Himalayas. The present study on Lavender is an attempt in this direction with objectives to know different cost components of (i) nursery, (ii) plantation on per ha per annum basis, (iii) oil distillation, and (iv) to workout overall economics of oil production.

### MATERIALS AND METHODS

The primary data of Lavender oil production which covers nursery raising, cultivation and distillation were collected from demonstration fields of Institute of Himalayan Bioresource Technology,

Palampur and from Mountain Agriculture Research and Extension Station, Salooni (Chamba, Himachal Pradesh). A schedule containing detailed information on various components of Lavender cultivation, prices of various inputs used and output produced were prepared. Similarly, the schedule containing detailed information about oil distillation, price of various inputs used and outputs obtained were prepared. Data was collected for nursery raising, cultivation and distillation of oil, as these were the integral components of Lavender oil production. Cost components were divided into variable cost and fixed cost. For nursery raising, variable cost includes harvesting charges for planting material, bed preparation charges, farm yard manure (FYM), sand and interest on total working costs etc. The fixed cost includes rate of interest on initial investment and rental value of land etc. Similarly, cost component of cultivation include variable cost such as land preparation, planting material cost, transplanting cost, FYM, fertilizers and interest on variable cost etc., whereas, fixed cost include rental value of land and interest on initial investment. In case of Lavender oil distillation, the variable cost includes electric motor charges, fuel cost (as the processing plant is a direct fired field distillation unit which requires fuel wood), labour cost per batch etc. The fixed cost includes imputed value of land (in which the unit is installed), depreciation charge, interest charge, repair and maintenance, shelter cost etc. The data was analyzed and presented as per the procedure adopted by the Commission for Agriculture Costs and Prices (CACP), Govt. of India (Reddy *et al.*, 2004).

In order to know the feasibility of Lavender oil production, the following components were calculated on the basis of prevailing market prices of oil and agri-inputs.

1. Cost of planting material (Rs./plant)
2. Cost of cultivation (Rs./ha/yr),
3. Cost of herb material (Rs./kg),
4. Cost of distillation (Rs./batch),
5. Cost of distillation (Rs./kg oil),
6. Cost of essential oil production (Rs./ha/yr),

7. Net returns (Rs./ha/yr),
8. Net Present Value (NPV) (Rs./ha/yr):

It is the present value of net benefits that the project will generate over and above that would be available, if the amount proposed to be invested in the project is invested at the current rate of interest elsewhere (Gittinger, 1972).

9. Benefit–cost ratio (BCR):

It is the ratio of sum of discounted benefits to the sum of discounted costs (Gittinger, 1972).

10. Internal rate of return (IRR):

It is defined as that rate of discount, which equals the present value of stream of net benefits with the initial investment outlay (Gittinger, 1972).

11. Break even production (BEP):

It indicates the level of production at which the producer neither loses nor makes profit (Reddy *et al.*, 2004).

## RESULTS AND DISCUSSION

Agronomic practice followed for establishment and management of Lavender crop and production of its essential oil was analysed. About 500 m<sup>2</sup> area under nursery was required to produce 25,000 rooted plants, from 30,000 cuttings after taking the mortality factor into account, were sufficient to plant 1 ha area. Major expenditure (41.5%) in nursery raising was incurred on black alkathene sheet. Different cost components of nursery were analysed. Total nursery cost, including working cost (Rs. 15,552) and fixed cost (Rs. 2,150) for raising Lavender plantation in 1 ha area worked out to be Rs. 17,702. The rooted plants in the nursery were taken after 10-11 months for transplanting in field for commercial cultivation. Production cost for raising 1 plant in nursery in 3 months was Re 0.70 only. This pricing was further used for calculating the production cost of spikes on commercial scale.

Economics for cultivation of Lavender crop for 1 ha area was worked out. Major share of the total cost was accounted for rental value of land i.e., Rs.

52,500/ha/4yrs i.e., 24.28 % in 1 ha followed by cost of raising rooted planting material i.e. Rs. 20,000 (9.25%). The total variable cost and fixed cost for raising 1 ha plantation for 4 years was calculated as Rs. 94,659 and Rs. 69,039 respectively. Flower spike yield was 30 q for 2<sup>nd</sup> year, 50 q for 3<sup>rd</sup> year and 60 q for 4<sup>th</sup> year. Average flower spike yield of 4 years was 35 q/ha/year which produced 35 kg of lavender oil (average oil recovery 1.0%). Cost of producing 140 q flowers per ha during 4 years comes out to Rs. 2,16,197. Hence, the cultivation cost for producing 1 kg of fresh flowers was Rs. 15.44.

Other cost details in calculating the economics of Lavender oil are given in Table-1. Economics of oil distillation per batch was also estimated. Total fixed cost for oil distillation per annum was added up to Rs. 62,905. This amount was divided by the number of working (2160) hrs of distillation unit per annum to give total fixed cost per batch i.e., Rs. 116.50. The variable distillation cost was added up to Rs. 1285/batch. Therefore, the total cost of distillation was Rs. 1401.50/batch, which was used in further calculations. It was assumed that the unit having 4 q capacity runs for 6 months (2160 hrs) for distillation of lavender and other aromatic crops like geranium, Damask rose etc. This was required to run the distillation unit with full-batch capacity for getting better oil yields with minimum operational costs. Cost incurred by the farmer for distillation of 1 kg Lavender oil is given in Table-2. Cost of raw material used in the economic analysis of Lavender oil distillation i.e., Rs. 6,176.00/batch was calculated on the basis of the cost incurred in the production of 1 kg flower spikes i.e., Rs. 15.44. Total cost incurred by the farmer for distillation of 4.0 kg oil was Rs. 7,577.50 which includes cost of raw material used/batch (Rs. 6,176.00) and distillation cost/batch (Rs. 1401.50). Hence, the cost incurred by the farmer for distilling 1 kg of Lavender oil was calculated as Rs. 1,894.37 per kg oil.

Costs of cultivation and distillation, benefits and discounted cash flow for different years are depicted in Table-3. These figures are further used in calculating net present value (NPV), benefit cost ratio (BCR) and internal rate of returns (IRR). Gross,

net returns, benefit cost ratio (BCR) and break even production (BEP) for output of oil (kg) were calculated and are given in Table-4. According to the market price information, gross returns/ha/year worked out to be Rs. 87,500.00 by selling 35 kg oil @ Rs. 2,500.00/kg at prevailing market price of oil. Net returns from this venture were Rs. 32,247.25 after deducting the total production cost incurred by the farmer for distilling 35 kg of lavender oil from average yield of 35 q flowers (spikes) from 1 ha plantation per annum. Net present value calculated using 9 per cent as the discount rate was Rs. 50,310.00 whereas the benefit cost ratio (BCR) was recorded as 1.58 and internal rate of return (IRR) was noted as 12.72 per cent much higher than discount rate (9 per cent). Break even production (BEP) of oil was at 12.33 kg.

**Table-1:** Detail of parameters used in calculating the economics of Lavender oil distillation.

S.No.	Particulars	Parameters
1	Capacity of distillation unit	400 kg
2	Life of distillation unit	15 years
3	Initial investment on pilot plant	Rs. 4.5 Lakh
4	Salvage value of distillation unit	Rs. 45,000
5	Average oil recovery/batch @ 1.0%	4.0 kg
6	Distillation time/batch	4.0 hr

**Table-2:** Cost incurred by the farmer for the distillation of 1kg Lavender oil

S. No.	Particulars	Value (Rs.)
1	Cost of raw material used/batch (4 q/batch @ Rs. 15.44/kg.	6176.00
2	Total cost of distillation/batch	1401.50
3	Total cost incurred by the farmer for distillation of 4 q raw material to get 4.0 kg of oil @1.0% (1 + 2 )	7577.50
4	Total cost incurred by the farmer for distillation to get 1 kg of oil.	1894.37

**Table-3:** Costs, benefits and discounted cash flow @ 9 % during different years

Year	Costs		Total costs	Total benefits	Discounted cash flow
	Lavender cultivation costs	Distillation cost			
1	77408.27	0.00	24908.27	0.00	-71016.76
2	45252.80	10511.25	55764.05	75000.00	16190.56
3	46533.50	17518.75	64052.25	125000.00	47062.85
4	47002.25	21022.50	68024.75	150000.00	58073.33

**Table-4:** Economics of Lavender oil produced from 1 ha plantation/annum (average over 4 years)

S.No.	Particulars	Value (Rs./ha)
1	Total cost incurred by the farmer for extraction of 35 kg oil @Rs. 1894.37/ kg	55,252.75
2	Gross returns from 35 kg oil @ Rs. 2500/kg	87,500.00
3	Net returns from 35 kg oil (2 - 1)	32,247.25
4	Net present value (NPV)	50,310.00
5	Internal rate of return (IRR)	12.72
6	Benefit cost ratio (BCR)	1.58
7	Break even point (BEP) for output of oil in kg.	12.33 kg

Note: Fixed cost /ha/year = Rs. 19213.50, Variable cost / year/kg oil = Rs. 941.50, Price/kg oil = Rs. 2500.00

## CONCLUSION

From this analysis, it is concluded that growing of Lavender in Chamba District of Himachal Pradesh is a profitable venture since the net present value is positive, benefit cost ratio is more than 1 and internal rate of return is higher than discount rate. However, high (16%) plant mortality due to diseases, low herb yield and oil recoveries are the problems that need to be immediately addressed. This venture can earn high profits only when farmers adopt good

agronomic management practices including mechanisation of farm operations, intercropping with other crops during first year of its plantation and by following optimum processing parameters on efficiently designed distillation units without compromising on the quality of the oil. This analysis will be helpful for (i) the growers to increase area under cultivation of lavender, (ii) industrialists to establish efficient oil distillation units and (iii) policy makers/Government agencies/NGOs to evaluate strategic plan for betterment of the region not only by providing stable support price but also creating proper infrastructural facilities, which can earn more foreign exchange to the country. Since the world wide consumption of this oil is increasing, owing to increasing demand in the industry, there is an urgent need to augment lavender oil production in India through large scale cultivation of the crop for which the Government and the industry should strongly join and support the farmers.

## REFERENCES

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