

# Economic Assessment of Lemon Production in Ukhrul District of Manipur

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## ABSTRACT

Lemon production is a profitable enterprise as it improves the economic life of the farmers. The study was conducted in three villages of Lungchong Maiphei block in Ukhrul district of Manipur. Samples of 90 respondents were selected randomly by using Proportionate Random Sampling method. The Compound Annual Growth Rate (CAGR) of area is positive for all the districts. The highest growth rate at 38.85% was recorded in Tamenglong followed by Senapati (23.68%) and Ukhrul (18.12%). Total cost of cultivation for lemon was ₹ 98301.31/ha. The total net farm income was ₹ 206886.67/ha. Net present value and payback period were found to be ₹ 61816.36 and 7.5 respectively. The Benefit Cost ratio (BCR) over total cost was equal to 1.23 indicating lemon production was economically viable.

**Keywords:** Growth rate, Net present value, Benefit cost ratio, Lungchong Maiphei and Ukhrul

Horticulture is an important component of agriculture and has gained commercial tone in recent years. India's varied agro-climatic condition allows it to produce a wide variety of horticultural crops such as fruits and vegetables, tuber, plantation crops, flowers, spices and condiments etc. This provides platform for the country to emerge as the second largest producer of fruits in the world producing 88,977 million tonnes. Amongst fruits, the country ranks first in production of mango, banana, sapota and acid lime. India tops the production list with about 28.35 lakh tonnes of the world's overall 116 million tonnes lemon and lime output (FAO, 2013). Among fruits production in India, citrus occupies a place of importance in the horticultural wealth and economy occupying an area of about 0.81 million hectares with production of 111.47 lakh tonnes which accounts for 12.53 per cent of total fruit production. Among the citrus fruits, lemon cultivation has gained momentum in addition to other, among the growers due to its profitability, less loss and good market value.

North East India is the native place of many citrus

species. Among the North Eastern Hill (NEH) states Manipur occupies the first position in production of lemon with an area of 5.85 thousand hectares and producing 52.65 thousand metric tonnes, (NHB, 2014). The soil and climatic condition of Manipur is suitable for growing of lemon and Ukhrul district is famous for lemon production in Manipur accounting 31.3 per cent of total lemon production. Ukhrul district leads both in area *i.e.*, 18.31 thousand hectares and production 16.48 thousand metric tonnes (GoM, 2014). Unlike the other lemon varieties grown in other parts, lemon in Ukhrul district which is commonly known as 'Kachai lemon' is considered to be unique and has got Geographical Indication (GI) as it contains 51 per cent ascorbic acid, the highest so far available in the realm of citrus fruits while other lemon varieties have only 20 to 30 per cent of ascorbic acid and the juice content is 36-56 ml per fruit. 'Kachai lemon', due to its unique nutritional quality and its high demand from outside the state, leads to increase in production which in turn improves the economic life of the farmers in Ukhrul district of Manipur. The

growers can also receive comparatively high profit. Hence, lemon production has been an alternative source of income. Considering lemon production as an important alternative source of income, lot of effort has been employed to increase the production but meagre work with respect to its economics has been carried out so far. The need of the hour is to boost its production as well as expand its area under production, which is possible only when the detail of production and cost analysis is carried out systematically. Keeping in view the above, the present study was taken up with the following objectives;

- (i) To examine the production performance of lemon
- (ii) To work out the economics of lemon production

**DATA AND METHODOLOGY**

Multistage sampling technique was applied for the selection of respondents in the study. Ukhrul district was selected purposively as it leads both in area and production. Lungchong Meiphai (LM) block was selected purposively based on the highest area and production of lemon in the district. Three villages, namely Kachai, Lamyim-phungdhar and Hoome Vokngayar, were selected randomly. Primary data were collected from the 90 lemon growers through personal interview with the help of pre-tested and well structured schedule during 2016.

The secondary data were collected from the publications of the Directorate of Horticulture and Soil Conservation and Department of Economics and Statistics, Government of Manipur.

**Analytical tools**

The pattern of growth in area, production and productivity of lemon, were calculated using the formula,

$$\ln Y_t = A + t\beta$$

Where,

$Y_t$  = Area/yield/ quantity of lemon for the year 't'

T = Time variable (1, 2... n) for each period

A = Constant

$\beta = (1 + r) = \text{constant}$

r = Compound Growth Rate

Compound Growth Rate was estimated as:

$$r = [\text{antilog}(\beta) - 1] \times 100$$

Prospect and scope for futuristic outlook of lemon production for livelihood in Ukhrul district were analysed through partial budgeting techniques and cost concepts given by Special Expert Committee 1979.

To examine the economic feasibility of lemon orchard while studying the economics of lemon three indicators were used viz. Net Present Value (NPV), Benefit Cost ratio (BCR), and Pay Back Period (PBP).

**RESULTS AND DISCUSSION**

**Table 1:** Compound Annual Growth Rate of Area, Production and Productivity of lemon in various districts of Manipur (2005-2006 to 2013-2014)

Districts	Area	Production	Productivity
Bishnupur	11.22	13.98	2.48
Chandel	15.40	19.37	3.44
Churachandpur	17.55	21.09	3.00
Imphal East	14.68	20.32	4.92
Imphal West	17.47	22.62	4.38
Senapati	23.68	28.93	4.25
Tamenglong	38.85	40.89	1.47
Thoubal	11.62	18.03	5.74
Ukhrul	18.12	18.85	0.62

Table 1 revealed that the Compound Annual Growth Rate (CAGR) of area is positive for all the districts. The highest growth rate of 38.85% was recorded in Tamenglong followed by Senapati (23.68%) and Ukhrul (18.12%). The CAGR for production also revealed that the growth rates were positive for all the districts which show that the trend towards diversification was in favour of horticultural crops. The highest growth rate has been observed in Tamenglong with 40.89 per cent followed by Senapati with 28.93 per cent and Imphal east with 22.62 per cent.

The initial cost (establishment cost) of cultivation consists of land preparation and layout. The total cost of establishment of lemon orchard per ha was observed to be ₹ 20904.77 (Table 2). The largest item of expenditure was incurred in digging and filling of pits which was worked out to be ₹ 7624.57 (36.47%)

followed by land preparation and layout accounted to ₹ 5182.3 (24.79%).

**Table 2:** Establishment cost of lemon cultivation

Particulars	Amount (₹/ha)	Percentage to total cost
Land preparation and layout	5182.3	(24.79)
Digging and filling of pits	7624.57	(36.47)
Cost of plants	4112.03	(19.67)
Plantation cost	3985.87	(19.07)
<b>Total</b>	<b>20904.77</b>	<b>(100.00)</b>

*Note:* Figures in the parentheses are percentage to the total.

The major share of investment in operational cost was found to be on harvesting that is 43.21 per cent, 41.66 per cent on intercultural operation and weeding and 15.13 per cent on pruning. The total operation cost was ₹ 24368.77 (Table 3).

**Table 3:** Operational Cost of lemon cultivation

Particulars	Total (₹/ha)
Intercultural operation & weeding	10151.64 (41.66)
Pruning	3686.41 (15.13)
Harvesting	10530.73 (43.21)
<b>Total</b>	<b>24368.77 (100.00)</b>

The total variable cost and fixed cost were calculated to be ₹ 11031.86 per hectare and ₹ 87269.46 per hectare respectively (Table 4). The share of the total fixed cost and total variable cost was found to be 88.78 per cent and 6.61 per cent to the total cost. Perusal of fixed cost reveals that the overall share of the rental value of owned land ₹ 35000.00 per hectare was the most important component contributing 35.60 per cent followed by the family labour with share of (35.27%), the wear and tear of farm implements contributing (10.76%) and interest on fixed capital (7.14%) to the total fixed cost respectively. The total cost of cultivation excluding family labour was calculated to be ₹ 63635.32 per hectare and total cost of cultivation including family labour was ₹ 98301.31 per hectare.

The results of item wise and concept wise operational costs of lemon (Table 5) indicated that overall per ha cost A, cost B and cost C were ₹ 21613.64, ₹ 63635.32 and ₹ 98301.31 respectively.

**Table 4:** Cost of cultivation based on variable and fixed cost

Particulars	₹/ha
<b>(A) Variable cost</b>	Total cost (1 to 10 years)
1. Hired labour	6495.52 (6.61)
2. Planting material (seedling)	4112.03 (4.20)
3. Interest on working capital @ 4%	424.30 (0.43)
<b>Total variable cost</b>	<b>11031.86 (11.22)</b>
<b>(B) Fixed cost</b>	
1. Rental value of own land	35000.00 (35.60)
2. Family labour	34666.00 (35.27)
3. Depreciation	10581.78 (10.76)
4. Interest on fixed capital at 8.75%	7021.68 (7.14)
<b>Total fixed cost</b>	<b>87269.46 (88.78)</b>
Total cost excluding family labour (A+B- family labour)	63635.32 (64.73)
Total cost including family labour (A+B)	98301.31 (100.00)

**Table 5:** Cost of lemon cultivation using cost concepts

Particulars	Total cost (1 to 10 years)
Hired labour	6495.52 (6.61)
Planting material (seedlings)	4112.03 (4.18)
Interest on working capital@ 4%	424.30 (0.43)
Depreciation	10581.78 (10.76)
Cost A <sub>1</sub>	21613.64 (21.99)
Rent paid for lease in land	- (0.00)
Cost A <sub>2</sub>	21613.64 (21.99)
Interest on value of owned fixed capital assets	7021.68 (7.14)
Cost B <sub>1</sub>	28635.32 (29.13)
Rental of owned land less land revenue+ rent paid for leased in land	35000.00 (35.60)
Cost B <sub>2</sub>	63635.32 (64.73)
Value of owned labour	34666.00 (35.27)
Cost C <sub>1</sub>	63301.31 (64.40)
Cost C <sub>2</sub>	98301.31 (100.00)

Return over costs for lemon cultivation for the study areas are presented in the Table 6. The total yield of lemon was estimated to be 76.30 quintal per hectare. The total Gross farm income was ₹ 305187.98 with the total net farm income of ₹ 206886.67 per hectare.

**Table 6:** Returns from lemon cultivation

Particular	Total (₹/ha)
Production (q/ha)	76.30
Gross farm income	305187.98
Net return including family labour	206886.67
Net return excluding family labour	241552.66
Farm business income	283574.34
Family labour income	241552.66
Net farm income	206886.67
Farm investment income	248908.35

### Economic viability of lemon orchard

The costs and returns estimates were discounted at an annual rate of 12 per cent. The results of economic viability of lemon orchard (Table 7) revealed that the Net Present value was ₹ 61816.36.

**Table 7:** Economic viability of lemon orchard

Particulars	Value
Net Present Value at (₹)	61816.36
Benefit- Cost ratio on the basis of total cost	1.23
Payback period (Years)	7.5

The Benefit Cost Ratio (BCR) calculated over total cost was equal to 1.23 indicating that the lemon orchardist could get good returns for each rupee they invested thus indicating that lemon production was economically profitable. The Payback period of 7.5 indicated that the orchardist could have their

investment back within a period of 7 years and 5 months which was in close conformity with the findings of Bhat *et al.* (2011) and Karegaonkar *et al.* (2011).

### CONCLUSION

The study concludes that investment in lemon orchards has provided favourable returns on capital investment. The growth rates for area, production and productivity were positive for all districts in Manipur. Total cost of cultivation including family labour was ₹ 98301.31 per hectare with the total net farm income of ₹ 206886.67/ha. The investment in lemon orchards is a profitable enterprise for the orchardists of Ukhrul district as the benefit cost ratio over total cost was 1.23.

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