

Economic evaluation of pineapple cultivation in Manipur

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ABSTRACT

The present study was conducted in Thoubal, Bishnupur, Senapati and Churhandpur districts of Manipur. Pineapple cultivation was found to be economically feasible in the state. . In these districts area under pineapple happened to be the major fruit crop having more than 70 per cent of the total pineapple area of the state during 2013-14 (GoM, 2014). The investment in pineapple orchard has been found a profitable business. In overall category, the internal rate of return (IRR) has been found 32.53 and 67.33 per cent during summer and winter season. The net present value, Internal rate of return and Benefit-cost ratio at 8 per cent discount rate have been reported as `24857.80, 32.53 and 1.23, respectively for overall category of orchard during summer season and `10454.44, 67.33 and 1.24, respectively for overall category of orchard during winter season. The economic productive life of pineapple orchard in Manipur has been calculated upto 3 years.

Keywords: Net present value, internal rate of return, benefit-cost ratio, pineapple, orchard, manipur

The horticulture sector has been a driving force in stimulating a healthy growth trend in Indian agriculture. India is currently producing 277.40 MT of horticulture produce from an area of 24.20 million ha.

Over the last decade, the area under horticulture grew by about 45.78 per cent which boost production by 90.26 per cent, higher growth rate in horticulture was brought about by improvement in productivity of horticulture crops, which increased by about 30.68 per cent between 2001-02 and 2013-14 (GoI, 2014). India ranks second in fruits and vegetables production in the world, after China (GoI, 2014). The special thrust given to the sector, especially after the introduction of the Horticulture Mission for North East & Himalayan States (HMNEH) and the National Horticulture Mission (NHM) in the 10th Five Year Plan has borne positive results. Given

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the increasing pressure on land, the focus of growth strategy is on raising productivity by supporting high density plantations, protected cultivation, micro irrigation, quality planting material, rejuvenation of senile orchards and thrust on post harvest management, to ensure that farmers do not lose their produce in transit from farm gate to the consumer's plate. The Horticulture (fruits including nuts, vegetables including potato, tuber crops, mushroom, ornamental plants including cut flowers, spices, plantation crops and medicinal and aromatic plants) has become a key drivers for economic development in many of the states in the country and it contributes 30.4 per cent to GDP of agriculture during 2013-14 (<http://www.icar.org.in/en/horticulture.htm>). Pineapple occupied an importance in the horticultural wealth and economy of the country. India ranked seventh among the pineapple producing country in the world during 2013-14 (GoI, 2014). Among the leading state of pineapple production, Manipur is in the sixth rank in production and second highest state in terms of area coverage under pineapple cultivation; the state shares only 0.75 per cent of the total fruit area of the country (GoI, 2014). Area under pineapple production was observed to increase in Manipur, but the productivity is still low compare with the other state (GoM, 2014). The farmers are always interested in maximizing their profit and not merely production. Therefore, there is a need to carry out a benefit cost and returns analysis is carried out systematically and this study is an effort in that direction.

MATERIALS AND METHODS

The present study was conducted in four villages viz., Lisanmlok and Kaprang of Thoubal district, Maibamlokpa ching, Wainem and Bungchi Chiru of Bishnupur district, Khunyai, Khunjao and Khunou of Senapati district and Khouabung, Bunglon and Koirentak of Churhandpur district of Manipur during 2013-14. The primary data were collected from the respondents through personal interview method on pre-tested well structured questionnaire. Total 120 pineapple growers were selected randomly and categorised into three categories viz, small (up to 0.58 ha), medium (0.59 to 1.13 ha) and large (1.14 ha and above). For analysis of data, economic efficiency measures viz., Net Present

Value, Internal rate of return, Benefit-Cost Ratio, Break-Even point and Payback period were used.

Net present value (NPV)

Net present value of an investment is the discounted rate of all cash flow and cash inflow of the orchard during its life time. It was computed as

$$NPV = \sum_{t=0}^n \left\{ \frac{(B_t - C_t)}{(1+r)^t} \right\}$$

Where,

B_t = Gross return in time t

C_t = Variable cost in time t

r = Rate of interest

t = Time period (t = 0, 1, 2,.....)

Internal Rate of Return (IRR)

Internal rate of return is the rate of return at which the net present value of a stream of payments/ income is equal to zero. It was calculated as

$$IRR = \left[\text{lower discount rate} \right] + \left[\frac{\text{difference between the two discount rate}}{\text{absolute difference between the present worth of the cash flow at the two discount rate}} \right] \times \left[\frac{\text{present worth of the cash flow at the lower discount rate}}{\text{absolute difference between the present worth of the cash flow at the two discount rate}} \right]$$

Benefit Cost Ratio (BCR)

The benefit cost ratio (BCR) of an investment is the ratio of the discounted value of all cash inflow to the discounted value of all cash inflows during the life of the project. It was estimated as

$$BCR = \sum_{t=0}^n \left\{ \frac{(B_t / (1+r)^t)}{\sum [(C_t) / (1+r)^t]} \right\}$$

Where,

B_t = Gross return in time t

C_t = Variable cost in time t

r = Rate of interest

t = Time period (t = 0, 1, 2,)

Pay-back period

The pay-back period is defined as the length of time required to recover an initial investment through cash flow generated by the investment. It was estimated as

$$\text{Pay back period} = \frac{\text{Cost of investment}}{\text{Annual net cash flow}}$$

Break-even point

Break-even point is the point at which the two curves, total cost curve and total revenue curve intersect each other which indicate the level of production at which the producer neither loss money nor makes a profit. It was calculated by using the following formulae

$$\text{BEP} = \frac{\text{TFC}}{\text{ASP-AVC}}$$

Where,

TFC = Total fixed cost

ASP = Average sale price of pineapple

AVC = Average variable cost

RESULTS AND DISCUSSION

Economic viability of pineapple orchard

The economic feasibility indicators of pineapple orchard during summer season are presented in Table 1. The Net Present Value of pineapple orchard was estimated as

₹14999.04 for small, ₹39127.09 for medium, ₹57076.84 for the large and the overall was ₹24857.80, the net present value was observed high in large category farm as compared to small and medium farms. It may be due to better management practices and proper use of available resources at large farms. Internal rate of return ranging from 23.31 per cent in small to 49.94 per cent in large farm in indicated that pineapple growing was a profitable enterprise and average rate of return per year for the whole period of the orchard will be 23.31 per cent for small, to 46.34 per cent for medium and 49.94 per cent for large farm. Average internal rate of return for overall farm was estimated that 32.53 per cent. The B-C ratio was estimated as 1:1.16 for small, 1:1.34 for medium and 1:1.40 for the large category with an average ratio of 1:1.23. The benefit cost ratio was found to be more in the large category because of increase productivity of large farms. The B-C ratio analysis indicates that the investment in pineapple orchard is economically viable and on an average 1 investment brings 1.23 returns during summer season. The break-even point of small orchard was reached at 21.64 qtl, 28.69 qtl and 54.97 qtl in small, medium and large category of orchard. Overall, the average break-even point was worked out to be 26.29 qtl. Further, the payback period was estimated at 1.40 years in small orchard, 1.10 years in medium orchard and 1.05 years in large orchard from bearing year. Overall, it was found to be 1.27 years after fruiting to repay back the investment incurred in the orchard during summer season. Therefore, the pineapple cultivation was economical in the study area. Similarly, Kichu and Sharma (2014), and Rymbai *et al.* (2012) in which study reported that the pineapple cultivation was economically feasible.

Table 1: Net present value, Internal rate of return, Benefit-Cost ratio, Break-Even point and Payback period during summer season

Category	Net Present Value (₹)	Internal rate of return (%)	Benefit- Cost ratio	Break-Even point (Q)	Payback period (Year)
Small	14999.04	23.31	1.16	21.64	1.40
Medium	39127.09	46.34	1.34	28.69	1.10
Large	57076.84	49.94	1.40	54.97	1.05
Overall	24857.80	32.53	1.23	26.29	1.27

The economic feasibility indicators of pineapple orchard during winter season are presented in Table 2. The Net Present Value of pineapple orchard was estimated as ₹10515.11 for small, ₹12060.07 for medium, ₹16964.22 for the large and the

overall was ₹10454.44, the net present value was observed high in large category farm as compared to small and medium farms. It may be due to better management practices and proper use of available resources at large farms. Internal rate

of return ranging from 67.23 per cent in small to 87.02 per cent in large farm in indicated that pineapple growing was a profitable enterprise and average rate of return per year for the whole period of the orchard will be 67.23 per cent for small, to 79.65 per cent for medium and 87.02 per cent for large farm. Average internal rate of return for overall farm was estimated that 67.33 per cent. The B-C ratio was estimated as 1:1.27 for small, 1:1.27 for medium and 1:1.33 for the large category with an average ratio of 1:1.24. The benefit cost ratio was found to be more in the large category because of increase productivity of large farms. The B-C ratio analysis indicates that the investment in pineapple orchard is economically viable and on an average 1 investment brings 1.24 returns

during winter season. The break-even point of small orchard was reached at 12.81 qtl, 13.46 qtl and 14.33 qtl in small, medium and large category of orchard. Overall, the average break-even point was worked out to be 13.32 qtl. Further, the payback period was estimated at 0.81 years in small orchard, 0.81 years in medium orchard and 0.71 years in large orchard from bearing year. Overall, it was found to be 0.85 years after fruiting to repay back the investment incurred in the orchard during winter season. Therefore, the pineapple cultivation was economical in the study area. Similarly, Kichu and Sharma (2014) and Rymbai *et al.* (2012) in which study reported that the pineapple cultivation was economically feasible.

Table 2: Net present value, Internal rate of return, Benefit- Cost ratio, Break-Even point and Payback period during winter season

Category	Net Present Value (₹)	Internal rate of return (%)	Benefit- Cost ratio	Break-Even point (Q)	Payback period (Year)
Small	10515.11	67.23	1.27	12.81	0.81
Medium	12060.07	79.65	1.27	13.46	0.81
Large	16964.22	87.02	1.33	14.33	0.71
Overall	10454.44	67.33	1.24	13.32	0.85

CONCLUSION

The study has revealed that investment in pineapple orchards is an economically profitable, financially viable and socially acceptable business in both summer and winter season in Manipur. During summer season, the Net Present Value was work out to be ₹14999.04, ₹39127.09, ₹57076.84 and ₹24857.80 in small, medium, large and overall category. Internal rate of return was 23.31, 46.34, 49.94 and 32.53 per cent in small, medium, large and overall category. Benefit-Cost Ratio was at 1.16, 1.34, 1.40 and 1.23 in small, medium, large and overall category. Break-Even point was 21.64, 28.69, 54.97 and 26.29 qtl in small, medium, large and overall category. Payback period was at 1.40, 1.10, 1.05 and 1.05 year in small, medium, large and overall category. During winter season, the Net Present Value was work out to be ₹10515.11, ₹12060.07, ₹16964.22 and ₹10454.44 in small, medium, large and overall category. Internal rate of return was 67.23, 79.65, 87.02 and 67.33 per cent in small, medium, large and overall category. Benefit-Cost Ratio was at 1.27, 1.27, 1.33 and 1.24 in small, medium, large and overall category. Break-Even point was 12.81, 13.46, 14.33 and 13.32 qtl in small, medium, large and overall category. Payback period was at 0.81, 0.71,

1.05 0.85 year in small, medium, large and overall category. To enhance the pineapple production in the study area, there is a need to develop infrastructural facilities to reduce post-harvest losses and a suitable scientific package of pineapple in local dialect should be prepared for the pineapple orchardist.

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