



**Research Article**

**ECONOMIC FEASIBILITY OF POMEGRANATE PRODUCTION IN MARATHWADA  
REGION OF MAHARASHTRA STATE**

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**ABSTRACT**

The attempt has been made to estimate the cost of pomegranate production and return on the investment in pomegranate cultivation in Aurangabad and Jalna districts of Maharashtra. This study will help to the farmers to manage the cost of production and help to get a better return on minimum investment. The study revealed that, the cost of establishment per ha was found to be upto Rs.7,95,114.78 and Rs.6,86,040.75 of which material cost contributed Rs.3,77,739.34 (47.51%) and Rs.3,12,187.66 (45.51%) and maintenance cost shared upto Rs.4,17,375.45 (52.49%) and Rs.3,73,853.09 (54.49 %) in Aurangabad and Jalna districts, respectively. It was observed that total maintenance cost of pomegranate orchard in bearing period was found relatively higher in Jalna Rs.202720.9 as compared to Aurangabad district Rs.176781.48. The yield and income from pomegranate crop obtained in Aurangabad was 205.44 (Rs.9,57,324) and in Jalna district was 190.46 quintals (Rs.9,54,027) per ha. The study has confirmed the economic soundness of investment on pomegranate in both the districts, with NPV of Rs.32,694,58 and Rs.35,65,778 and BCR was 3.04 and 3.00 while IRR were 25.80 and 27.41 per cent in Aurangabad and Jalna districts, respectively which indicates the economic worthiness of investment. On the whole, the cultivation of pomegranate found economically feasible.

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**INTRODUCTION**

India is the second largest producer of fruits in the world and holds first position in production of fruits like mango, banana, sapota, pomegranate and aonla. Pomegranate is the fruit available throughout the year in Maharashtra due to its whole year production. In the recent years farmers turned towards pomegranate production due to its high returns. The total area under cultivation of pomegranate in India is 107.00 thousand hectare and production is around 743.00 thousand tonnes. Maharashtra is the leading producer of pomegranate followed by Karnataka, Andhra Pradesh, Gujarat and Tamil Nadu. In Maharashtra state, pomegranate is commercially cultivated in Sholapur, Aurangabad, Jalna, Sangli, Nasik, Ahmednagar and Pune. Cultivation of pomegranate in rural area is one of the fastest growing segments. Now a days pomegranate cultivation in rural areas has increased tremendously as many farmers view pomegranate as money machine because high income is generated from pomegranate. Pomegranate cultivation in rural areas gave helping hands to the educated and uneducated people who are unemployed. Due to cultivation of pomegranate farmers earn good profit because of which farmers are satisfied within their social & economic life. Study of the economics of pomegranate production is indispensable since there is no proper farm business data on its cost of

production. The accurate figures on establishment cost, operating cost and input requirement of pomegranate orchard could be of great help to the pomegranate growers of Aurangabad and Jalna districts in particular. Therefore, an attempt was made to study the investment pattern in pomegranate orchard and to compute the cost and returns in pomegranate cultivation in Aurangabad and Jalna districts. This study will help to the farmers to manage the cost of production and help to get a better return on minimum investment. The information generated about the cost of production of pomegranate will help to bankers to fix the scale of finance for pomegranate orchard.

**MATERIAL AND METHODS**

Pomegranate cultivation is practiced throughout the district. Multistage sampling method was used for selection of sample. The stages of sample selection are districts, talukas, villages and pomegranate growers. In first stage, two talukas from each Aurangabad and Jalna district were selected. Each district was selected purposively considering the area under pomegranate crop. In second stage, two talukas from each district were selected because these are well known pocket of pomegranate. With the same reason in third stage, four villages from each talukas were selected and at the final stage five pomegranate fruit growers were selected randomly from the selected villages. Thus, 40 pomegranate growers from each district and finally 80 pomegranate growers were selected for the purpose

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of the study. The survey method of economic investigation was adopted for the work of data collection. A specially designed questionnaire for getting the information on cost of cultivation, financial feasibility and other related aspects was used. Tabular analysis comprised of arithmetic means, percentages and ratios was used to determine the cost and returns of pomegranate cultivation.

In addition, to estimate the per hectare cost of pomegranate, an annual amortization of fixed cost was done by using the compounding cost formula and added it to maintenance cost, to estimate the total annual cost of cultivation.

$$a = P \frac{i(1+i)^n}{(1+i)^n - 1}$$

Where,

- a = Annual sum
- P = Present sum of the establishment cost (in rupee)
- i = Interest rate (10%)
- n = Economic life of the pomegranate orchard (in year)

For the estimation of economic viability, net present value (NPV), payback period, internal rate of return (IRR), and benefit-cost ratio (BCR) were worked out as follows:

$$\text{Net Present Value} = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

$$\text{Internal Rate of Return} = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t} = 0$$

$$\text{Benefit Cost Ratio} = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}}$$

$$\text{Pay Back Period} = \frac{\text{Initial Investment}}{\text{Cash inflow per year}}$$

Where,

- In mathematical formulations,
- B<sub>t</sub> = Benefit in t<sup>th</sup> year.
- C<sub>t</sub> = Cost in t<sup>th</sup> year.
- t = 1, 2, 3, ... n.
- n = Number of years
- i = Interest (discount) rate.

**Table 1** Investment pattern in pomegranate orchards (Rs/ha/year)

Sr.No	Particulars	Aurangabad		Jalna		Average	
		Value	%	Value	%	Value	%
A.	Fixed cost						
1	Rental value of Land	7500.00	0.94	9000.00	1.31	8250.00	1.11
2	Well	151303.32	19.03	180994.15	26.38	166148.73	22.44
3	Pump set	27831.75	3.50	40438.60	5.89	34135.18	4.61
4	pump house	0.00	0.00	0.00	0.00	0.00	0.00
5	Sprayer	16315.17	2.05	15877.19	2.31	16096.18	2.17
6	Plant material	21186.02	2.66	21295.85	3.10	21240.93	2.87
7	Investment in digging of pits and planting	16778.44	2.11	19581.87	2.85	18180.15	2.45
8	Staking	0.00	0.00	0.00	0.00	0.00	0.00
9	Fencing	20000.00	2.52	25000.00	3.64	22500.00	3.04
10	Drip irrigation	116824.64	14.69	82534.85	12.03	99679.75	13.46
	Total	377739.34	47.51	312187.66	45.51	344963.50	46.58
B.	Maintenance cost up to bearing period						
	I year	130435.09	16.40	139069.68	20.27	134752.39	18.20
	II year	140633.58	17.69	117264.51	17.09	128949.04	17.41
	III year	146306.78	18.40	117518.89	17.13	131912.84	17.81
	Subtotal (I+II+III)	417375.45	52.49	373853.09	54.49	395614.27	53.42
	Total establishment cost (A+B)	795114.78	100.0	686040.75	100.0	740577.77	100.00

**Table 2** Maintenance cost of pomegranate orchard during gestation period in Aurangabad district (Cost Rs/ha)

Sr.No.	Particulars	I year	II year	III year	Total	%
I	<b>Fixed cost</b>					
	Rental value of land	7500.00	7500.00	7500.00	22500.00	5.39
	Interest on fixed capital @ 10%	750.00	750.00	750.00	2250.00	0.54
	Depreciation	4727.77	4924.76	5346.67	14999.21	3.59
	<b>Total fixed cost</b>	12977.77	13174.76	13596.67	39749.21	9.52
II	<b>Variable cost</b>					
A.	<b>Labour cost</b>					
1	Interculturing	8830.43	8985.78	8514.22	26330.43	6.31
2	Manure application	4443.53	4289.10	4097.16	12829.79	3.07
3	Fertilizer and pesticide application	10029.62	10471.56	10220.38	30721.56	7.36
4	Pruning and training	9924.48	10278.44	10071.09	30274.00	7.25
5	Tillage	6713.36	4087.87	3931.56	14732.80	3.53
	<b>Total Labour cost (A)</b>	39941.42	38112.75	36834.41	114888.58	27.53
B.	<b>Material cost</b>					
1	Irrigation	20379.93	22009.15	22524.62	64913.70	15.55
2	Fertilizers + pesticides	36896.94	46279.62	51883.89	135060.45	32.36
3	Manure	10540.71	10533.18	10509.48	31583.36	7.57
	<b>Total material cost (B)</b>	67817.58	78821.94	84917.99	231557.51	55.48
	<b>Total cost (A+B)</b>	107759.00	116934.69	121752.39	346446.09	83.01
C.	Interest on working capital @ 9%	9698.31	10524.12	10957.72	31180.15	7.47
	<b>Total variable cost (A+B+C)</b>	117457.32	127458.81	132710.11	377626.24	90.48
	<b>Total cost (I+II)</b>	130435.09	140633.58	146306.78	417375.45	100.00

**Table 3** Maintenance cost of pomegranate orchard during gestation period in Jalna district (Cost Rs/ha)

Sr.No	Particulars	I year	II year	III year	Total	%
I	<b>Fixed cost</b>					
	Rental value of land	9000	9000	9000	27000	7.22
	Interest on fixed capital @10%	900	900	900	2700	0.72
	Depreciation	3574.91	3723.87	4032.59	11331.37	3.03
	<b>Total fixed cost</b>	13474.91	13623.87	13932.59	41031.37	10.98
II	<b>Variable cost</b>					
A.	<b>Labour cost</b>					
1	Interculturing	6536.37	4608.19	3760.23	14904.80	3.99
2	Manure application	5801.67	2885.96	2508.77	11196.40	2.99
3	Fertilizer and pesticide application	8808.48	9751.46	10872.26	29432.20	7.87
4	Pruning and training	6887.81	4339.18	3692.98	14919.97	3.99
5	Tillage	7868.54	4345.26	3824.91	16038.71	4.29
	<b>Total Labour cost (A)</b>	35902.87	25930.06	24659.16	86492.08	23.14
B.	<b>Material cost</b>					
1	Irrigation	21579.91	19650.18	17537.69	58767.78	15.72
2	Fertilizers + pesticides	39913.77	41988.30	45745.81	127647.89	34.14
3	Manure	17828.01	7514.62	7090.64	32433.27	8.68
	<b>Total material cost (B)</b>	79321.70	69153.10	70374.14	218848.94	58.54
	<b>Total cost (A+B)</b>	115224.56	95083.16	95033.30	305341.02	81.67
C.	Interest on working capital @9%	10370.21	8557.48	8553.00	27480.69	7.35
	<b>Total variable cost (A+B+C)</b>	125594.77	103640.64	103586.30	332821.72	89.02
	<b>Total cost (I+II)</b>	139069.68	117264.51	117518.89	373853.09	100.00

**Table 4** Maintenance cost of pomegranate orchard in bearing period (4<sup>th</sup> year onwards) in Aurangabad district (Cost Rs/ha/year)

Sr.No	Particulars	Unit	Qnt.	Value	Per cent
I	<b>Fixed Cost</b>				
	Rental value of land			7500.00	4.24
	Interest on fixed capital @ 10%			750.00	0.42
	Depreciation			19775.00	11.18
	<b>Total fixed cost</b>			28025.00	15.85
II	<b>Variable cost</b>				
A.	<b>Labour cost</b>				
1	Ploughing & Harrowing	Hrs.	4.22	3229.65	1.82
2	Interculturing (Earthing up + Pruning + Weeding)	MD	45.67	18514.53	10.47
3	Manure application	MD	19.27	3191.86	1.80
4	Fertilizers application	MD	25.29	5694.77	3.22
5	Pesticide application	MD	35.47	7950.58	4.49
6	Watching	MD	14.10	4229.65	2.39
7	Harvesting	MD	55.41	16622.09	9.40
	Miscellaneous			1000.00	0.56
	<b>Total Labour Cost</b>			60433.14	34.18
B.	<b>Material cost</b>				
1	Irrigation	Hrs.	65.76	18694.77	10.57
2	Fertilizers			32180.23	18.20
3	Pesticides			15610.47	8.83
4	Manure	Qtl	10.00	9555.23	5.40
	<b>Total material cost (B)</b>			76040.70	43.01
	<b>Total cost (A+B)</b>			136473.84	77.19
C.	<b>Interest on working capital @ 9%</b>			12282.65	6.94
	<b>Total variable cost (A+B+C)</b>			148756.48	84.14
	<b>Total cost (I+II)</b>			176781.48	100.00

(Note: MD- mandays)

**Table 5** Maintenance cost of pomegranate orchard in bearing period (4<sup>th</sup> year onwards) in Jalna district (Cost Rs/ha/year)

Sr.No	Particulars	Unit	Qty	Value	Per cent
<b>I Fixed Cost</b>					
	Rental value of land			9000.00	4.43
	Interest on fixed capital @ 10%			900.00	0.44
	Depreciation			15765.00	7.77
	Total fixed cost			25665.00	12.66
<b>II Variable cost</b>					
<b>A. Labour cost</b>					
1	Ploughing& Harrowing	Hrs.		3671.36	1.81
2	Interculturing (Earthing up + Pruning+ Weeding)	MD	64.13	16103.29	7.94
3	Manure application	MD	27.32	5845.07	2.88
4	Fertilizers application	MD	29.25	6981.22	3.44
5	Pesticide application	MD	40.75	9220.66	4.54
6	Watching	MD	14.32	4295.77	2.11
7	Harvesting	MD	53.73	16119.72	7.95
	Miscellaneous			1000.00	0.49
	<b>Total Labour Cost</b>			63237.09	31.19
<b>B. Material cost</b>					
1	Irrigation	Hrs.	88.83	21490.61	10.60
2	Fertilizers			39187.79	19.33
3	Pesticides			21267.61	10.49
4	Manure			17253.52	8.51
	<b>Total material cost (B)</b>			99199.53	48.98
	<b>Total cost (A+B)</b>			162436.62	80.12
<b>C. Interest on working capital @ 9%</b>					
				14619.30	7.21
	<b>Total variable cost (A+B+C)</b>			177055.92	87.33
	<b>Total cost (I+II)</b>			202720.92	100.00

(Note: MD- mandays)

**Table 6** Per hectare cost and return from pomegranate orchard (Rs/ha/year)

Sr. No.	Particulars	District		Overall
		Aurangabad	Jalna	
1	Amortized cost	37563.01	38490.59	38026.80
2	Maintenance cost	139125.15	124617.52	131871.34
3	Total cost	215228.00	215255.00	215241.50
4	Yield (Quintal)	153.35	149.65	151.50
5	Gross return	723763.54	748217.13	735990.33
6	Net return	508535.54	532962.13	520748.83

**Table 7** Sensitivity analysis of economic feasibility of pomegranate cultivation in Aurangabad district

Sr. No.	Combination	NPV (Rs./ha.)	BCR (Rs.)	IRR (%)	PBP	
					Y	M
1	With normal cost and return	3269458	3.04	25.80	4	2
2	10% increase in cost	3108822	2.75	25.62	4	10
3	10% decrease in return	2781876	2.73	25.60	4	9
4	10% increase in cost and 10% decrease in return	2621239	2.48	25.37	4	11
5	10% increase in return	3874679	3.33	25.96		35

(Note: Y- year and M- month)

**Table 8** Sensitivity analysis of economic feasibility of pomegranate cultivation in Jalna district

Sr. No.	Combination	NPV (Rs./ha)	BCR (Rs.)	IRR (%)	PBP	
					Y	M
1	With normal cost and return	3565778	3.0	27.41	3	7
2	10% increase in cost	3387253	2.7	23.85	3	5
3	10% decrease in return	3030675	2.69	27.29	4	7
4	10% increase in cost and 10% decrease in return	2852149	2.45	17.68	4	3
5	10% increase in return	4100882	3.29	27.49	3	3

(Note: Y- year and M- month)

## RESULT AND DISCUSSION

### Establishment cost of Pomegranate Orchard

The investment in pomegranate orchards were the costs incurred in establishing the orchard. The establishment costs in pomegranate orchards were classified into material costs and maintenance costs. The material costs were the costs incurred during zero year and they include the rental value of land, costs of well, pump set, pump house, sprayer, plant material and planting operation etc. The maintenance costs were the costs incurred in the maintenance of the orchard till the time of bearing. This included expenditure on labour, fertilizers, manures, plant protection chemicals, irrigation etc. The results of the analysis on cost of establishment of pomegranate orchard per ha are presented in Table 1. The total cost of establishment per ha found upto Rs.7,95,114.78 and Rs.6,86,040.75 in Aurangabad and Jalna districts, respectively. In which material costs constituted 52.49 and 54.49 per cent and maintenance costs 47.51 and 45.51 per cent in Aurangabad and Jalna districts, respectively. Similar results were obtained by Ravikumar *et al.* (2011) in his study on the investment pattern and maintenance cost in pomegranate orchards in Chitradurga district of Karnataka.

### Maintenance cost During Gestation Period of Pomegranate Orchard

It was observed from the Table 2 that in Aurangabad district, per ha average maintenance cost incurred by pomegranate growers during gestation period was Rs.4,17,375.45. Out of this, fixed cost, labour cost and material cost accounted for 9.52, 27.53, and 55.48 per cent, respectively. The total fixed cost accounted for Rs.39749.21 (9.52%) of which major item was imputed rental value of land i.e. 5.39 per cent followed by depreciation 3.59 per cent and interest on fixed capital 0.54 per cent of total maintenance cost. Among the various labour cost, labour used for fertilizer and pesticide application constituted the highest share i.e. Rs.30,721.56 (7.36%) followed by pruning and training (Rs.30,274.00), interculturing (Rs.26,330.43), cost of manure application (Rs.12,829.79) per ha. of the total maintenance cost, respectively. The total material cost amounted to Rs.2,31,557.51 (55.48%), out of which cost of fertilizers and pesticides was 32.36, cost of irrigation was 15.55, cost of manure was 7.57 per cent of total maintenance cost.

In case of Jalna district, it was observed from the Table 3 that per ha average maintenance cost incurred by pomegranate growers during gestation period was Rs.3,73,853.09. Out of this, fixed cost, labour cost and material cost accounted for 10.98, 23.14 and 58.54 per cent, respectively. The total fixed cost accounted for Rs.41,031.37 (10.98%) of which major item was imputed rental value of land i.e. 7.22 followed by depreciation 3.03 and interest on fixed capital 0.72 per cent respectively. Among the various labour cost, labour used for fertilizer and pesticide application constituted the highest share 7.87 per cent. The labour cost of pruning and training was of Rs.14,919.97 which formed 3.99 per cent of total maintenance cost followed by interculturing (Rs.14,904.80), cost of manure application (Rs.11,196.40) and cost of tillage (Rs.16,038.71). The total material cost amounted to Rs.2,18,848.94 (58.54%), out of which cost of fertilizers and pesticides was 34.14, cost of irrigation was 15.72, cost of manure was 8.68 per cent to total maintenance cost.

### **Maintenance cost of Pomegranate Orchard During Bearing Period (4<sup>th</sup> year Onward)**

Maintenance costs were the recurring costs incurred after the establishment of the orchard i.e., from 4<sup>th</sup> year onwards for upkeep of the plants so that good yield can be obtained over the economic lifespan of the plants. The maintenance cost included the expenditure towards the use of labour and other material inputs per year along with fixed cost for different age group of orchards. It is observed that total maintenance cost of pomegranate orchard in bearing period was found relatively higher in Jalna (Rs.202720.9) as compared to Aurangabad district (Rs.176781.48). In both the districts, the major items of costs were irrigation, fertilizers, pesticides, interculturing and harvesting. In total maintenance cost per ha, the fixed cost was found higher in Aurangabad (15.85%) as compared to Jalna districts (12.66%). Total variable cost found higher in Jalna (87.34%) as compared to Aurangabad district (84.15%). Table 4 and Table 5 represent the maintenance cost of pomegranate orchard in bearing period in Aurangabad and Jalna districts, respectively.

### **Annual cost of Pomegranate Cultivation**

Per hectare annual cost, consisted of amortizes cost and maintenance cost and returns are presented in Table 6. It can be seen from the table that on an average, in pomegranate orchard, total cost incurred per annum was Rs.37,563.01 and Rs.38490.59 in Aurangabad and Jalna districts, respectively. Thus, the total cost was found nearly same in both the districts. The maintenance cost was quite higher in Aurangabad district (Rs.1,39,125.15) than that of Jalna district (Rs.1,24,617.52). The yield was also found higher in Aurangabad district (153.35 quintal/ha) than the Jalna district (149.65 quintal/ha) but the gross return found higher in Jalna district. This indicated that pomegranate growers of Jalna district fetched higher price than that of Aurangabad district. In nutshell, pomegranate cultivation found highly economically viable.

### **Year Wise Yield and Income**

The year wise yield and income from pomegranate crop for both districts are given in Table 4.8. It can be seen from the data that bearing of fruits started from the age of second year. It was also observed that the average quantity of pomegranate fruits produced per ha per year in case of Aurangabad and Jalna districts were 153.35 and 149.65 quintals, respectively. The yield rate of pomegranate orchard varied with the size of the orchard as well as the age of pomegranate tree. During the initial year (4<sup>th</sup> to 8<sup>th</sup> year) the yield was relatively less. The increasing trend of yield and income was observed and reached to maximum level in 19<sup>th</sup> year i.e. in case of Aurangabad and Jalna districts upto 205.44 (Rs.9,57,324) and 190.46 quintals (Rs.9,54,027) per ha, respectively. After the attaining the peak in respects of yield and income at the age of 19<sup>th</sup> year, in both the districts, the continuous declining in yield and income from the pomegranate orchard has been observed and the degree of decline found high during age between 20<sup>th</sup> to 25<sup>th</sup> years. 20<sup>th</sup> year onward, the yield starts declining due to the replacement of dead trees which are rarely carried out by the farmers, as well as the decline in yield with age of the orchard. Also poor management and inefficient use of inputs might have attributed to lower the yield. Similar results were recorded from the studies conducted by Ravikumar *et al.* (2011) that per ha.

### **Economic Evaluation of Investment**

The estimated values of various parameters used to test the economic worthiness of investment on pomegranate orchard of Aurangabad and Jalna districts are presented in Table 7 & 8. The sensitivity of investment examined in varying cost and return situation is also given in the table. It is evident from the results that in normal cost and return situation, the net present value (NPV) found positive (Rs.3269458/ha) and (Rs.3565778/ha) in Aurangabad and Jalna districts, respectively at 10 per cent rate of discount indicated the financial soundness of the investment on pomegranate orchard. The value of benefit cost ration (BCR) was found higher than unity (3.04) and (3.0) in Aurangabad and Jalna districts, respectively also indicated the economic worthiness of the investment. The value of internal rate of return (IRR) found more than normal bank rate of interest i.e. 25.80 and 27.41 per cent in Aurangabad and Jalna districts, respectively. The payback period (PBP) was of 4 year and 2 months in Aurangabad district and in case of Jalna district 3 year and 7 months. In varying situations of cost and returns NPV found positive in all the situations. The same trend was observed in case of BCR and IRR parameters.

On the whole, considering the values of all the feasibility parameters in normal and varying cost and returns situations, the investment on pomegranate in Jalna district found comparatively more economically viable rather than in Aurangabad district.

### **References**

- Khunt, K.A.; Gajipara, H.M.; Gadhi, B.K. and Vekariya, S.B. 2003. Economics of production and marketing of pomegranate. *Indian Journal of Agricultural Marketing*. **17(1)**: 100-107.
- Naphade, S. A. and Tingare, A. S. 2008. Economics of production and marketing of guava in Buldhana districts of Maharashtra. *Indian Journal of Agricultural Marketing*. **22(2)**: 33-41.
- Rane, A. A. and Bagade, S.R. 2006. Economics of production and marketing of banana in Sindhudurg district of Maharashtra. *Indian Journal of Agricultural Marketing*. **20(1)**: 38-45.
- Ravikumar, K. T.; Hosamani, S. B.; Desai, N. R.; Ekbote, S. D. and Ashalatha, K. V. 2011. Investment pattern and maintenance cost in pomegranate orchard: An economic analysis. *Karnataka Journal of Agricultural Science*. **24(2)**: 164-169.
- Shukla, R. and Srivastva, P.K. 2009. Economics of production and marketing of rose flowers in rose growing pocket of Rajasthan. *Indian Journal of Agricultural Marketing*. **23(2)**: 1-14.