

## **COST OF CULTIVATION AND PROFITABILITY OF KESAR MANGO CULTIVATION IN SAURASHTRA REGION OF GUJARAT, INDIA**

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**Abstract:** The present investigation was undertaken to analyze cost of cultivation and returns of mango cultivation in Saurashtra region of Gujarat, India. A multistage sampling technique was employed for selecting 144 Kesar-mango growers in the study area during May-June, 2015-16. The results of the study revealed that on an average, the total investment per hectare amounted to Rs. 95,097 which mainly consisted of investment on maintenance cost (36.20 %), planting materials (13.30 %) and rental value of land (10.39 %). The cost of cultivation details revealed that Kesar-mango was highly a capital intensive crop. On an average, the total cost per hectare was found to be Rs. 1,03,571 in which the human labour component alone accounted for 29.70 per cent. Further, the average yield was found to be 100.56 qtl / ha and the average farm harvest price realized was Rs. 2026/qtl. Overall, the study recommends that the mango growers should improve the adoption of existing package-of-practices along with proper utilization of resources in order to cut down the cultivation cost towards realizing higher net returns.

**Keywords:** Kesar-mango, Cost>Returns, Profitability, Saurashtra.

### **Introduction**

The cultivation of mango (*Mangifera indica* L.) accounts for approximately half of all tropical fruits produced worldwide. On a global scale, the aggregate mango production of the top ten countries roughly equal to 80 per cent of total production. India occupies the top position amongst the mango growing countries of the world and produces 40.48 per cent of the global mango production from about 22.67 lakh hectares with a production of 196.84 lakh tonnes during Triennium Ending (TE) 2016-17. As of Gujarat is concerned, mango is cultivated in an acreage of 1.52 lakh hectares with a production of 12.41 lakh metric tonnes during TE 2016-17, thereby, producing roughly a share of 6.30 per cent of the country. Gujarat happens to be the fifth largest mango producer in India preceded by Uttar Pradesh (23.72 %), Andhra Pradesh (22.42 %), Karnataka (11.71%) and Bihar (8.68 %) during TE 2016-17. In Saurashtra region of Gujarat state, mango is cultivated in 46,496 hectares with a production of 3.27 lakh tonnes in TE 2016-17 (Anon., 2018). Thereby, it can be seen that

though Saurashtra region occupies 31 per cent of mango acreage in Gujarat state, the share in the state's production is only 26 per cent. As a matter of fact, the per hectare mango productivity in Saurashtra region (6.17 tn / ha) is lesser than that of Gujarat (8.21 tn / ha) as well as India (8.72 tn / ha).

Despite the issue of low productivity, Saurashtra region is well known as the *Kesar* mango heartland – one of the most popular Indian mango varieties with export potential. But even after the overwhelming importance of *Kesar*-mango in the region, less number of systematic studies have been made over its cost of cultivation and profitability details in Saurashtra. The present study, therefore, attempts to fill this gap through an economic analysis of *Kesar*-mango cultivation in Saurashtra region and is expected to contribute significantly towards improving the net returns of mango farmers in the region as well Gujarat state and country as a whole. Besides, the study also presents the scope for the scale of institutional support like input subsidies to be recommended for mango farmers as such can act as a catalyst towards the adoption of better production technologies (Swaminathan *et al.*, 2013).

### Methodology

The study area comprised of Junagadh and Gir-Somnath districts in Saurashtra region and the total sample size was 144. From each district, two talukas (blocks) were selected and from each of the taluka three villages were selected. Thereby, a total of 12 villages with 12 farmers each constituted the sample size. The data collection was carried out during 2015-16. Cost concepts used widely in farm management studies such as Cost A, Cost B, Cost C<sub>1</sub> and Cost C<sub>2</sub> were adopted for computing the cost of cultivation of the *Kesar*-mango. The annual amortization cost was computed from the investment made on establishment of *Kesar*-mango orchard, assuming that the rate of interest 10 per cent per annum and the expected life of mango orchard to be 55 years. Thus, annual amortization was worked out by using the compounding cost formula and it was added to maintenance cost to estimate the annual cost of cultivation of mango orchard of respective farmers (Shivraj and Patil, 2016).

$$I = B \frac{i}{1 - (1+i)^n}$$

Where,

I = Annual cost (in Rs),

B = Present fixed cost (in Rs),

i = Interest rate (10 % per annum), and

n = Economic life of the orchard (in years).

**Cost of cultivation:**

The cost of cultivation of the mango farmers was worked out by using various cost concepts viz. Cost A, Cost B, Cost C<sub>1</sub> and Cost C<sub>2</sub> as defined below:

**Cost A:**

1. Value of hired human labour (Rs. / man-day)
2. Value of hired and owned bullock labour (Rs. / pair)
3. Value of hired and owned machine labour (Rs. / hour)
4. Value of seed (both farm seed and purchased) (Rs. / ha)
5. Value of manures (owned and purchased) and fertilizers (Rs. / ha)
6. Depreciation amount of implements/machineries used (Rs. / annum)
7. Irrigation charges (Rs. / man-day)
8. Land revenue (Rs. / annum)
9. Interest on working capital (Rs. / annum)
10. Miscellaneous expenses (Rs. / ha)

**Cost B:** Cost A + rental value of owned land + interest on fixed capital (excluding owned land)

**Cost C<sub>1</sub>:** Cost B + imputed value of family labour

**Cost C<sub>2</sub>:** Cost C<sub>1</sub> + 10 per cent of cost C<sub>1</sub> as managerial charges.

**Returns:**

Gross returns = value of main product + value of by-product (marble stage of fruits)

**Profitability:**

Profitability = VOP (Value of output) i.e. gross returns – Cost C<sub>2</sub>

**Farm income measures:**

1. Farm business income = Gross returns - Cost A
2. Owned farm business income = Gross returns – Cost B
3. Family labour income = Gross returns – Cost C<sub>1</sub>
4. Net income = Gross returns – Cost C<sub>2</sub>
5. Farm investment income = Farm business income – Value of family labour

**Results and Discussion:****Establishment cost of *Kesar*-mango orchard:**

The findings of the analysis on cost of establishment of *Kesar*-mango orchard in Saurashtra region are presented in Table 1. The findings are furnished as farmer-wise classification such as marginal farmers (< 1 ha); small farmers (1-2 ha); medium farmers (2-4 ha) and large farmers (> 4 ha). The results revealed that total cost of establishment per hectare was found to be Rs. 70,273 for marginal, Rs. 71,900 for small, Rs. 73,165 for medium, and Rs. 74,544 for large farmers, respectively and overall establishment cost in

Saurashtra region was found to be Rs. 72,471/ ha. The planting material accounted the major share (17.46 %) of establishment cost followed by maintenance cost (16.29 %), rental value of land (13.63 %) and deepening of tube-well/well (13.28 %) in overall farms. Among the farmer groups, large farms accounted higher share in case of planting material, irrigation, plantation cost and maintenance cost. On the other hand, marginal farms accounted higher share in rental value of land, manure and fertilizer, tube-well/well and electric motors in the total establishment cost.

**Table 1: Per hectare establishment cost of Kesar-mango growers in Saurashtra (n=144)**

Cost item	Farm-wise establishment cost (Rs./ha)				
	Marginal (n = 36)	Small (n = 36)	Medium (n = 36)	Large (n = 36)	All Farms
Land preparation	3075 (4.38)	3190 (4.44)	3215 (4.39)	3283 (4.40)	3191 (4.40)
Planting material	12058 (17.16)	12626 (17.56)	12771 (17.45)	13149 (17.64)	12651 (17.46)
Rental value of land	9692 (13.79)	9789 (13.61)	9957 (13.61)	10063 (13.50)	9875 (13.63)
Manure and fertilizers	5043 (7.18)	5117 (7.12)	5221 (7.14)	5278 (7.08)	5165 (7.13)
Deepening of tube-well/well	9491 (13.51)	9579 (13.32)	9677 (13.23)	9738 (13.06)	9621 (13.28)
Electric-motors	6361 (9.05)	6375 (8.87)	6522 (8.91)	6589 (8.84)	6462 (8.92)
Pump set	3701 (5.27)	3798 (5.28)	3748 (5.12)	3868 (5.19)	3779 (5.21)
Fencing	6099 (8.68)	6269 (8.72)	6306 (8.63)	6353 (8.52)	6256 (8.63)
Irrigation	1319 (1.88)	1389 (1.93)	1457 (1.99)	1537 (2.07)	1428 (1.97)
Plantation cost	2093 (2.97)	2187 (3.04)	2294 (3.13)	2371 (3.18)	2236 (3.08)
Maintenance cost	11341 (16.13)	11581 (16.11)	11997 (16.40)	12315 (16.52)	11807 (16.29)
Total	70273 (100)	71900 (100)	73165 (100)	74544 (100)	72471 (100)

Note: Figures in parentheses indicate per cent to total.

#### Items of fixed cost and variable cost:

The findings of Table 2 revealed that the per hectare total cost of *Kesar*-mango in the study area was found highest Rs.1,07,230 in the large farms and lowest Rs. 97,517 in marginal farms with an overall total cost of Rs. 1,03,571. The results also revealed that highest variable cost was found in the human labour component (29.70 %) followed by plant protection cost (14.72 %), amortized cost (11.56 %), fertilizer cost (6.80 %), manure cost

(6.43 %), machine power cost (4.27 %), growth regulator cost (3.54 %), irrigation charges (3.45 %), and interest on working capital (3.06 %). The major fixed cost items included in the total cost were rental value of land with 9.02 per cent and interest on fixed capital with 2.70 per cent. Overall, the major items of cost such as human labour, plant protection, amortized cost and rental value of land contributed nearly by 65 per cent of the total cost on an average. The present discussions refurbish the findings of Banerjee (2011) and Jaggaiah (2015) who revealed that human labour and rental value of land as the major sources of total cost.

**Table 2: Breakup of the total cost of cultivation of *Kesar*-mango in Saurashtra**

Cost Item	Farm size-wise variable and fixed cost (Rs./ha)									
	Marginal (n = 36)		Small (n = 36)		Medium (n = 36)		Large (n = 36)		All Farms (n = 144)	
	Rs.	%	Rs.	%	Rs.	%	Rs.	%	Rs.	%
<b>(i) Variable cost:</b>										
Hired labour	28843	29.58	30981	29.91	31654	29.88	31582	29.45	30765	29.70
(a) Family	9671	9.92	10722	10.35	10833	10.23	10332	9.63	10389	10.03
(b) Hired	19172	19.66	20259	19.56	20821	19.65	21250	19.82	20376	19.97
Bullock labour	1281	1.31	1457	1.41	1451	1.36	1433	1.34	1405	1.35
Machine power	4163	4.27	4280	4.13	4518	4.26	4732	4.42	4423	4.27
Manures	6131	6.29	6571	6.34	6885	6.50	7048	6.57	6659	6.43
Fertilizers	6638	6.81	7018	6.77	7233	6.83	7283	6.79	7043	6.80
Irrigation	3277	3.36	3597	3.47	3665	3.46	3764	3.51	3575	3.45
Plant	14407	14.77	15360	14.83	15646	14.77	15572	14.52	15246	14.72
Growth regulator	3276	3.36	3662	3.53	3765	3.55	3961	3.70	3667	3.54
Miscellaneous	2638	2.70	2971	2.87	3099	2.93	3081	2.87	2948	2.85
Depreciation	509	0.52	556	0.54	579	0.55	637	0.59	570	0.55
Working capital Interest	2992	3.07	3178	3.07	3206	3.03	3282	3.06	3165	3.06
<b>(ii) Fixed cost:</b>										
Rental value of owned land	9164	9.40	9299	8.98	9407	8.88	9481	8.84	9338	9.02
Interest on fixed capital	2575	2.64	2781	2.68	2785	2.63	3049	2.85	2797	2.70
Amortized cost	11623	11.92	11889	11.47	12044	11.37	12325	11.49	11970	11.56
<b>Total cost</b>	<b>97517</b>	<b>100</b>	<b>103600</b>	<b>100</b>	<b>105937</b>	<b>100</b>	<b>107230</b>	<b>100</b>	<b>103571</b>	<b>100</b>

**Estimation of farm cost concept:**

The findings of Table 3 indicated that the overall per hectare Cost A of *Kesar*-mango in Saurashtra region was found to be Rs. 71,092 which in turn varied from Rs. 66,402 on

marginal farms to Rs. 74,159 on large farms. The study also showed that Cost B and Cost C<sub>1</sub> accounted for about 77.52 per cent and 90.90 per cent of the total cost, respectively. To be particular, Cost C<sub>2</sub> was worked out to be Rs. 1,03,571 which varied from Rs. 97,517 on marginal farms to Rs. 1,07,230 on large farms. Higher costs on large farms were associated with intensive use of family labour, bullock labour, manure, plant protection chemicals, fertilizers and irrigation.

**Table 3: Estimation of different costs of Kesar-mango in Saurashtra region  
(n = 144)**

Farm size	Farm Cost Concept (Rs/ha)			
	Cost A	Cost B	Cost C <sub>1</sub>	Cost C <sub>2</sub>
Marginal	66402 (68.09)	74545 (76.44)	88653 (90.91)	97517 (100)
Small	70677 (68.22)	79987 (77.20)	94177 (90.90)	103600 (100)
Medium	73129 (69.03)	82640 (78.00)	96291 (90.89)	105937 (100)
Large	74159 (69.15)	84124 (78.45)	97471 (90.89)	107230 (100)
All Farms	71092 (68.62)	80324 (77.52)	94148 (90.90)	103571 (100)

Note: Figures in parentheses indicate per cent to Cost C<sub>2</sub>

#### **Returns from *Kesar*-mango:**

The findings of Table 4 showed that returns from *Kesar*-mango in the study area showed variability in yield level, farm harvest price, value of by-product and gross output. The farm level productivity varied from 97.19 quintal per hectare in marginal farms to 102.87 quintal per hectare in large farms and the average farm harvest price received by the mango growers was Rs. 2,026 per quintal. It varied from Rs. 2,015 per quintal on small farms to Rs. 2,039 per quintal on large farms. The variation in prices was mainly on account of time of sale, size of fruits, agencies to whom the produce was sold and quality of the produce. Average gross income realized from one hectare of *Kesar*-mango was Rs. 2,07,281. Among the different farm size groups, gross income was lowest (Rs. 1,99,217) in marginal farms, while large farm size farmers realized highest gross income (Rs. 2,13,379) per hectare. Overall, *Kesar*-mango cultivation was found to be a profitable proposition to the farmers in the study area. The overall input-output ratio over cost i.e. gross returns over cost C<sub>2</sub> ranged from 1:1.98 for large farmers to 1:2.04 for marginal farmers in the study area. When only variable cost items are considered i.e. Cost A, the input-output ratio over cost was found to be

the highest for marginal farms (1:3.00); followed by small farms (1:2.92); medium farms (1:2.86); large farms (1:2.87) and for the overall farms the input-output ratio over cost was found to be 1:2.91 i.e. for the every one rupee of investment in the form of variable cost, the mango farmers were found to be getting back Rs. 2.91 in the study area.

**Table 4: Yield level, farm harvest price and gross income per hectare  
(n = 144)**

Farm size	Yield (quintal)	Farm harvest price (Rs. per quintal)	Value of by-product (Rs.)	Value of gross output (Rs.)
Marginal	97.19	2015	3380	199,217
Small	100.58	2022	3559	206,932
Medium	101.63	2029	3622	209,830
Large	102.87	2039	3628	213,379
All Farms	100.56	2026	3547	207,281

#### Farm income measures:

The results indicated that the overall per hectare farm business income, family labour income and farm investment income (Table 5) of *Kesar*-mango in Saurashtra region was Rs. 1,36,189, Rs. 1,13,133 and Rs. 1,31,102, respectively. The data further revealed that overall owned farm business income and the profitability per hectare (over Cost C<sub>2</sub>) was found to be Rs. 1,26,957 and Rs. 1,03,710 among farmers in the study area.

**Table 5: Farm income measures of *Kesar*-mango in Saurashtra (Rs. /ha)  
n = 144)**

Income measures	Farm size				
	Marginal	Small	Medium	Large	All
Farm business income	132,815	136,259	136,701	139,220	136,189
Owned farm business income	124,672	126,949	127,190	129,255	126,957
Family labour income	110,564	112,759	113,539	115,908	113,133
Net income	101,700	103,332	103,893	106,149	103,710
Farm investment income	123,109	130,972	131,499	133,828	131,102

#### Conclusion

The present study revealed that the average yield of *Kesar*-mango in Saurashtra region was found to be 100.56 quintal per ha and farm harvest price per quintal received by mango growers was Rs. 2026 and the price variations were minimal from Rs. 2,015 per ha in marginal farmers to Rs. 2,026 per ha among large farmers. The gross income per hectare was

highest on large farms (Rs. 2,13,379) and lowest on marginal farms (Rs. 1,99,217) with an average of Rs. 2,07,281 on sample farms. Looking to the input-output ratio, it could be clearly indicated that investment on *Kesar*-mango orchard was found remunerative (1:2.04) in the study area. For further enhancement of income prospects, the study suggests that there is a need of adoption of improved technologies along with proper utilization of resources like manures and fertilizers, irrigation, and better management practices for improving both yield and net returns among the mango growers in the study area.

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