P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 10; October 2024; Page No. 246-249

Received: 26-08-2024
Accepted: 02-10-2024

Indexed Journal
Peer Reviewed Journal

Economics of production and disposal of Aonla in Sindhudurg district of Maharashtra

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DOI: https://doi.org/10.33545/26180723.2024.v7.i10d.1218

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Abstract

Present study was focus on cost, returns, production and profitability of Aonla. Data was collected from 30 farmers of 3 tehsils of Sindhudurg district. 30 farmers were selected for establishment and production cost information. Cost of establishment of Aonla was ₹215458.62. Cost and returns of Aonla orchard were ₹ 211038 /ha and ₹421000 respectively. Information regarding physical input used in Aonla cultivation was provided. B:C ratio of these Aonla was 1.99.Per farm total production of Aonla was 2609.52 kg.

Keywords: Costs, returns, profitability, establishment cost

1. Introduction

Minor fruit crops are those that are currently being grown on waste land, homestead land beside roadways, and in an erratic and unattended manner. Aonla is one of the minor fruit crop in India. India ranks first in production of Aonla. It is an important fruit crop in India. It's cultivated across various regions due to its adaptability to diverse climatic conditions. India is one of the leading producers of Aonla globally, with states like Uttar Pradesh, Maharashtra, Gujarat, and Rajasthan being major contributors. The fruit is having medicinal value. It has acrid, cooling, diuretic and laxative properties. Dried fruits are useful in hemorrhages, diarrhea, dysentery, anemia, jaundice, dyspepsia and cough. Aonla is used in the indigenous medicines (Aurvedic system) *viz*. trifle and chavanprash. (Sing *et al*., 2019) [9] Fruits are commonly used for preserve (murabbas), pickles, candy, jelly and jam. Besides fruits, leaves, bark and even seeds are being used for various purposes. The productivity of Aonla in India can vary depending on factors such as geographical location, climate, soil quality, and agricultural practices10 to 15 tones per hectare annually. It occupies an area of 103.55 thousand hectares with a production of 1221.25 thousand metric tons. Area under production of Aonla in Maharashtra 4000 ha and productivity is 1.4 MT/ha. Uttar Pradesh highest in both are under production and productivity (Hazarika *et al.*, 2009) [4]. The tree is small to medium sized, growing to a height of 1-6 meters. The bark has specks. The branch lets are typically deciduous, 10-20 centimeters (4-8 inches) long, and finely pubescent (not glabrous). Simple, sub sessile, light green leaves that resemble pinnate are tightly clustered along branch lets. The blossoms have a yellow-green tint. The fruit is almost spherical, smooth, rigid and pale greenish-yellow in appearance. It has six vertical furrows or stripes. The fruit can reach a diameter of up to 26 mm (1 inch) and while wild plants yield fruit that weighs around 5.5 gm cultivated fruits typically weigh between 28.4 g and 56 g (Patil *et al*, 2020) [5]. As this fruit crop have high economics importance study was taken under following objectives.

1. To estimate establishment cost and maintenance cost and returns Aonla
2. To identify disposal pattern of Aonla

2. Methodology and Source of data

The list of farmers having Aonla plantation was obtained from taluka agriculture officer and agriculture assistant of respective tehsil for the study. A sample of 30 farmers was drawn from 3 villages of 3 tehsil in Sindhudurg district. Total 30 farmers data were collected for study purpose.

The data was collected by survey method, with the help of specially designed schedule by personal interview. The information regarding inputs used, labor utilization and disposal pattern and constraints of selected farmers was obtained. The data and information for the present study was relevant to the agricultural year 2022-23. The selected minor fruit crop growing farmers were interviewed and data were recorded during the month of February and March 2023.

2.1 Amortization cost

The establishment cost of Aonla was calculated for 5years. Amortization cost was calculated by using given formula.

Amortization cost (A) = $P\left(\frac{r(1+r)^n}{(1+r)^{n-1}}\right)$

Where,
P= Establishment cost (Rs.),
R= Rate of interest (%),
N= Economic life of plantation (Years).

A) Cost A

It includes actual paid out costs by owner cultivator, inclusive of both cash and kind expenditure done on:

1 Hired human labor (Male and Female)
2 Manures (Owned and Purchased)
3 Fertilizers
4 Land revenue, cesses and other taxes
5 Depreciation on capital assets
6 Interest on working capital
7 Transportation and marketing

B) Cost B

Cost B plus interest on fixed capital plus rental value of owned land plus amortization cost was to be included in Cost B.

C) Cost C

It includes Cost B plus imputed value of family labor. Family labor charges are to be calculated at the rate of prevailing wage rates for daily paid hired labor in the locality plus supervision charges.

2.2 Depreciation on tools and implements

Generally, small tools and implements were used in Aonla plantation. Hence, considering the average life of these implements and tools, the depreciation was worked out by using given formula.

Annual depreciation= $\frac{purchase\ value - Junk\ value}{Expected\ working\ life\ of\ asset\ (years)}$

2.3 Interest on working capital

Interest on working capital was worked out at the rate of 6 per cent per annum on working capital, i.e. input cost.

2.4 Interest on fixed capital

Interest on fixed capital was calculated at the rate of 10 per cent per annum on the fixed investments which are made on farm.

2.5 Rental value of land

Rental value of owned land was calculated by using the formula given below.
Rental value of owned land = (1/6th of gross returns) - land revenue.

2.6 Supervision charges

Supervision charges were taken as 10 per cent of cost of inputs used.

2.7 Gross returns

Gross returns were worked out by multiplying total quantity of Aonla obtained with price received per kg.

2.8 Benefit to Cost Ratio

B:C Ratio = $\frac{Gross\ returns}{Cost\ C}$

To find out the extent of profitability in Aonla farming, B:C ratio was calculated with the help of above formula.

3. Results and Discussion

3.1 Per hectare physical input utilized for establishment of Aonla orchard

The table 3.1 provided showed the physical input utilized for establishing an Aonla orchard over a period of five years. The data is categorized into various inputs such as labour (male and female), fertilizers, seedlings and fencing materials and it covers number of inputs used each year. A total of 360.52 labour days of male labour were utilized over five years. The highest amount of male labour was used in the first year (131.86 units), followed by a gradual decline in subsequent years (74.4 in the 2nd year, 63.36 in the 3rd, 53.7 in the 4thand 37.2). In the 5th years a total of 78.62 female labour days were utilized over five years. Like male labour, the highest amount was used in the first year (27.5 units). A total 439.14 labour days were used over the five years, with the highest utilization in the first year (159.36 units) and a gradual reduction in subsequent years. A total 1486 kg of SSP were utilized over the five years. The amount used increased steadily each year, 204 kg in the 1st year, 250 in the 2nd year, 300 in the 3rd year, 332 in the 4th year and 400 in the 5th years. This shows a consistent increase in fertilizer utilization. A total of 263 seedlings were planted during the five years, with 200 seedlings planted in the 1st year, 34 in the 2nd year and 29 in the 3rd year.

Table 1: Per hectare physical input utilized for establishment of Aonla orchard

Sr. No	Particulars	Units	1st	2nd	3rd	4th	5th	Total
1	Male	Labour days	131.86	74.4	63.36	53.7	37.2	360.52
	Female	Labour days	27.5	10.53	10.69	14.4	15.5	78.62
	Subtotal		159.36	84.93	74.05	68.1	52.7	439.14
2	FYM.	MT	1.05	0.07	0.09	-	-	1.21
3	Fertilizers	-	-	-	-	-	-	-
	ii) Single Super Phosphate	Kg	204	250	300	332	400	1486
4	Seedlings	NO	200	34	29	-	-	263

3.2 Per hectare cost of establishment of Aonla

Table 3.2 shows that cost incurred on male labour was the major expense in establishing Aonla. Costs were highest in the 1st year at Rs.52,546.21 (59.82% of the total for that year) and gradually decrease over the years to Rs.14,824.2 (59.44% of total cost for that year) in the 5th year. Male labour consistently forms a significant part of the total costs, averaging 66.68% of the overall expenditure. Female labour costs are much lower than male labour, starting at Rs.9,075 (10.33%) in the 1st year and fluctuating slightly over the years, ending at Rs.5,115 (20.51%) in the 5th year. Total labour costs (male and female) make up a substantial portion of the total costs each year, peaking at 86.43 per cent in the 4th year. Costs for farmyard manure are significant only in the 1st year (Rs.7,350, accounting for 8.37% of the total) and reduce drastically from the 2nd year onwards, with minimal costs of Rs.500 in the 2nd year and Rs.650 in the 3rd year.

The expenditure on single super phosphate fertilizer started at Rs.2,550 (2.90%) in the 1st year and increases each year, reaching Rs.5,000 (20.05%) by the 5th year. This showed an increasing investment in soil fertility over time, with a total cost of Rs.18,575 over the five years. Seedling costs are present mainly in the early years, with the highest cost of Rs.6,120 (6.97%) in the 1st year, reducing to Rs.900 by the 3rd year, with no further costs thereafter. Fencing is a one-time expense in the 1st year, Costing Rs.10,200 (4.73%) .The highest establishment Cost is in the 1st year (Rs.87,841.21), driven by labour and fencing. Costs decrease progressively each year, reaching the lowest in the 5th year (Rs.24,939.20). The overall total Cost for establishing Aonla over five years was Rs.215,458.62.

Table 2: Per hectare cost of establishment of Aonla, (in Rs)

Sr. No	Particulars	1st	2nd	3rd	4th	5th	Total
1	Labour-Male	52,546.21(59.82)	29648.40(78.44)	25248.96(73.63)	21399.45(69.96)	14824.2(59.44)	143667.22(66.68)
	Female	9075.00(10.33)	3474.90 (9.19)	3741.50(10.91)	5040.00(16.48)	5115.00(20.51)	26446.40(12.27)
	Subtotal	61621.21(70.15)	33123.30(87.63)	28990.50(84.54)	26439.45(86.43)	19939.30(79.95)	170113.62(78.95)
2	FYM.	7350.00(8.37)	500(1.32)	650(1.90)	-	-	8500(3.95)
3	Fertilizers	-	-	-	-	-	-
	Single Super Phosphate	2550.00(2.90)	3125.00(8.27)	3750.00(10.94)	4150.00(13.57)	5000.00(20.05)	18575.00(8.62)
4	Seedlings	6120.00(7.00)	1050.00(2.78)	900.00(2.62)	-	-	8070.00(3.75)
6	Fencing material	10200.00(11.61)	-	-	-	-	10200.00(4.73)
	Total	87841.21(100.00)	37798.30(100.00)	34290.46(100.00)	30589.45(100.00)	24939.20(100.00)	2,15,458.62(100.00)

Figures in parentheses indicate the percentage to total respondents

3.3 The item wise per hectare Cost of cultivation of Aonla

Table 3.3 provides information about cost of cultivation of Aonla /ha/yr.101 days of male labour at a rate of Rs.399 per day, totaling Rs.40299, which constitutes 19.10 per cent of total costs. 88 days of labour at a rate of Rs.330 per day, totaling Rs.29040 contributing 13.76 per cent of total cost. 1.56 MT FYM were used at a rate of Rs.7000 per MT, costing Rs.10920 (5.17% of total cost). Single Super Phosphate used 929 kg at Rs.12 per kg, totaling Rs.11248 (5.28%). Total input cost was Rs.91407, constituting 43.31 per cent of the total cost.

Depreciation on implements and machinery was Rs.650 (0.31%). Cost paid for land revenue and other cesses was Rs.100 (0.05%). Interest on working capital was Rs.5,488 (2.60%). Cost A which includes sum of input and other costs was Rs.97641 (46.27% of total Cost). Fixed Costs includes interest on fixed capital, rental value of land, amortization value was Rs.750 (0.36%), Rs.70,066.7 (33.20%) ,15241(7%) respectively. Cost B includes cost A plus fixed costs which was Rs.1,83,774 (87.05% of total cost). Cost C include male and female family labours among which male labour required 32 at Rs.348 per day, totaling Rs.11136 (5.28%). Female family labour days required were 22 at Rs.321 per day, totaling Rs.7062 (3.35%). Total family labour cost was Rs.18198 (8.62%). Supervision charges were considered 10% of input costs, which was totaling Rs.9141 (4.33%). So total Cost C was Rs.211038. From 1 hectare of Aonla orchard 84.20 qtl Aonla was harvested and sold at a rate of Rs.5,000 per quintal, resulting in a gross return of Rs.4,21,000. The ratio of gross return to total Cost i.e. Cost C, which was 1.99 which shows that Aonla is profitable crop for Sindhudurg. Cost per quintal was calculated as the total cost divided by the yield, which is Rs.2506 per quintal.

Table 3: The item wise per hectare cost of cultivation of Aonla

Sr. No	Particulars	Unit	Quantity	Rate	Amount
1	Hired labour-Male	days	101	399	40299(19.10)
	Hired labour-Female	days	88	330	29040(13.76)
2	FYM	MT	1.56	7000	10920(5.17)
3	Fertilizers				
	ii) Single Super Phosphate	kg	929	12	11148(5.28)
	INPUT COST				91407(43.31)
4	Depreciation on implements and machinery				650(0.31)
5	Land revenue & other cesses				100(0.05)
6	Interest on working capital (@ 6%)				5484(2.60)
	COST A				97641(46.27)
7	Interest on fixed capital (@10%)				750(0.36)
8	Rental value of land				70067(33.20)

9	Amortization value				15241(7.22)
	COST B				183699(87.05)
10	Family labour				
	Male		32	348	11136(5.28)
	Female		22	321	7062(3.35)
	Total				18198(8.62)
11	Supervision charges 10% input Cost				9141(4.33)
	COST C				211038(100.00)
	Yield	Qtl	84.20	5000	421000
	Gross return				421000
	Benefit Cost ratio				1.99
	Cost per quintal				2511

Figures in parentheses indicate the percentage to total respondents

Table 4: Per farm disposal of produce

Crop	Units	Quantity sold	Home consumption	Gift to relative	Waste on farm	Processing	Total production
Aonla	Kg.	1289.10(49.40)	67.80(2.60)	36.50(1.40)	41.80(1.60)	1174.32(45.00)	2609.52(100.00)

Figures in parentheses indicate the percentage to total respondents

Table 4 shows that for Aonla, the total production was 2,609.52 kg. About 49.40 per cent (1,289.10 kg) was sold, 2.60 per cent (67.80 kg) was consumed at home, 1.40 per cent (36.50 kg) was gifted to relatives, 1.6 per cent (41.80 kg) was wasted on the farm and 45 per cent (1,174.32 kg) was processed.

4. Conclusion

Study of this research is based economics of production of Aonla crop in grown in Konkan region of Maharashtra. Information regarding returns from Aonla, cultural practices followed by them, yield, cost of cultivation of Aonla were collected from respondent farmers by interviewing them personally with specially designed schedule in month of March-April 2024. The amortization cost was calculated based on the establishment cost for 5years.

Cost of cultivation of Aonla grower was include all expenses similar to previous crops and highest weight gained by labour cost which was ` 40299 (19.10%) and 29040 (13.76%) for male and female labour respectively. Cost A contributes to 46.27 per cent (` 97641) to total cost and cost B contributes to 87.05 per cent (` 183699) and cost c which is total cost incurred on cultivation of Aonla was 211038. Gross return per hectare was 421000.B:C ratio of Aonla was 1.99 Which shows that Aonla is highest profitable crop among all four crop.

Per farm total production of Aonla was 2609.52 kg. Highest percentage of Aonla had sold directly (49.40%) on farm but still almost equal quantity of Aonla used for processing (45%) i.e. used to made various juices, Aonla candies, Syrup.

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