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Chandrasen Chaurasia
Research Scholar, Department of Agricultural Economics, SHAUTS, Naini, Prayagraj, Uttar Pradesh, India

Sanjay Kumar
Assistant Professor, Department of Agricultural Economics, SHAUTS, Naini, Prayagraj, Uttar Pradesh, India

Vikas Singh
Research Scholar, Department of Agricultural Economics, SHAUTS, Naini, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Chandrasen Chaurasia
Research Scholar, Department of Agricultural Economics, SHAUTS, Naini, Prayagraj, Uttar Pradesh, India

Study the cost of cultivation of Aonla in Pratapgarh district of Uttar Pradesh

Chandrasen Chaurasia, Sanjay Kumar and Vikas Singh

Abstract
The study was conducted in Pratapgarh district of Uttar Pradesh. Random sampling technique was used for the selection of blocks, villages and proportionate random sampling for selection of growers. From the list, 200 growers were selected using proportionate sampling method i.e. 90 small, 70 medium and 40 large farmers respectively. The primary data were collected from the respondents by using interview schedule, while secondary data were collected from the official records, published data, magazines etc. Total cost was high on small farms (Rs.73698.8/ha) followed by the medium and large size farms (Rs.72708/ha and Rs.71912/ha**)** respectively. The average per hectare cost A_1 cost A_2 and cost B and cost C in different size of farm groups were Rs.54632.8, Rs.64632.8, Rs.66021 and Rs.722747.1 respectively. Average cost of production per quintal and price per quintal in different size of farm groups were Rs.72772.00 and Rs. 454.83. Average per hectare gross returns and net returns obtained on different farm size groups were Rs. 320000 and Rs. 247227.10. Per hectare farm business income was found higher on large farms, followed by medium, and small farms groups (Rs.214713.60, Rs.255423.60 and Rs. 295934.60) respectively.

Keywords: Aonla, cost, respondents, production, net return

Introduction
Aonla (*Emblica Officinalis*. Gaertn. Syn. *Phyllanthus emblica* L.), a native of tropical South-East Asia, has been below cultivation in India on the grounds that time immemorial. Aonla or Indian gooseberry (*Emblica Officinalis* Gaertn) is an outstanding fruit and one of the treasured presents of nature to man. It is generally referred to as Amla (Hindi), Adiphal (Sanskrit), Amalaki (Bengali) and Nelli (Malayalam). The Aonla fruit is globular, small, round, six lobed fruit thick and rough inconsistency. It is light yellow in coloration and is sort of 1.5 cm to two.5 cm in diameter. Aonla is indigenous of India. It is full of Vitamin 'C' and used for preparation of several Ayurvedic medicine. Commercial Aonla orchards of indigenous cultivars are established particularly on calcareous and slightly saline soils where other fruit crops generally do not survive. Aonla because of its specific nature has much scope for commercial cultivation. Horticultural crops cover 6.1 per cent of the country's area. The area, production and productivity of fruits have increased, 3.0, 6.2 and 2 times respectively from 1961 to 1999. Creditability of horticultural crops established because of improving the productivity of land, generating employment and improving the economic condition of the farmers. Like green, blue and yellow revaluation, we have another revaluation called the "Golden revolution" with the advancement made in the horticultural sectors.

Aonla (*Emblica officinalis* Geartn) is the king of arid fruits, popularly known as "Indian gooseberry", is a small-sized minor subtropical fruit grown widely in North India. India ranks first in the world in Aonla area and production volume. It is considered to be a "wonder fruit for health" because of its unique properties. Uses Aonla fruit is very useful in treating many diseases such as diabetes, cough, asthma, bronchitis, headache, dyspepsia, colic, flatulence, skin diseases, leprosy, jaundice, scurvy, diarrhea and cancer. In order to obtain a good income from Aonla, it must be sold immediately in the market; if not, to make profit, proper storage facilities should be available (Kore, *et al*. 2013) [2].

India's ranks IInd in fruits production in the world with the production of 97358.00 thousand MT from 6506.00-thousand-hectare area. Contribution of Aonla in fruit production is 1075.00 thousand MT from 93.00-thousand-hectare area (National Horticulture Board 2017-18). Uttar Pradesh accounts for nearly 60 per cent of this production. Pratapgarh district of U.P. is a major Aonla producing district covering 7000.90 hectares with the production 31064.30 MT. (Aonla Development Office, Pratapgarh U.P. 2017-18). It is ascertaining from above discussion that Aonla cultivation can certainly help to raise the income and employment of the farming community taking marginal land under utilization.

Material and Methods

Methodology was used for the study under following heads:

1. Sampling technique
2. Methods of enquiry and collection of data
3. Period of enquiry
4. Analytical tools used

1. Sampling technique

Various sampling techniques were used as per need.

A. Selection of district

Pratapgarh district has higher concentration of area under aonla, thus district was selected purposively for the study.

B. Selection of block

Out of 16 blocks of Pratapgarh district, two blocks namely Sadar and Sandawa Chandrika having highest area under Aonla crop was selected purposively.

Selection of villages

A list of all villages of the selected blocks was prepared along with area under Aonla Cultivation. Then, list of the villages was arranged in descending order according to area under Cultivation. Thereafter, 5-10% villages were selected purposively.

Selection of aonla growers/orchardist

A complete list of all the growers/orchardists was prepared. Therefore, the grower were arranged in ascending order of area under Aonla cultivation and then growers were classified into three groups on the basis of area under Aonla cultivation in all the selected villages *viz.*, First farms group (Small Farmer, 0-1 hectare), Second farms group (Medium Farmer 1-2 hectare), and Third farms group (Large Farmer 2ha or more than 2ha). Out of this list 200 growers were selected randomly.

Table 1: Number of sample households under different categories in the study area

Sl. No.	Villages	Total no. of households				Total no. of selected samples			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1	Gore	130	100	60	290	13	10	6	29
2	Sonawa	140	110	50	300	14	11	5	30
3	Saraydali	120	90	50	260	12	9	5	26
4	Jaitipur	110	80	60	250	11	8	6	25
5	Adharpur	120	90	50	260	12	9	5	26
6	Arjunpur	140	120	60	320	14	12	6	32
7	Kolbajardeeh	140	110	70	320	14	11	7	32
	Total	900	700	400	2000	90	70	40	200

1. Methods of enquiry and collection of data

The enquiry was conducted by survey method. The primary data were collected for a period of one year by personal interview with the selected Aonla growers on well prepared schedule and secondary data was collected from the records available at district head quarter, Block level, Village level officers and Lekhpal.

2. Period of enquiry

The data was pertained for the agriculture year 2019-20.

3. Analytical tools

Suitable tabular as well as functional analysis as per need was applied to analyses the data and presentation of the results.

Descriptive statistics

Tabular presentation was adopted to compile the general characteristics of the different size of farm respondents, determine the resource structure, cost structure, returns, profits and opinion of respondents regarding the problems in production. Simple statistical tools like averages and percentages were used to compare, contrast and interpret the results properly.

Financial analysis

The techniques used for the financial analysis are:

Benefit-cost ratio

The benefit cost ratio (BCR) was worked out by using following formula:

$$\text{B: C ratio} = \frac{\text{present worth of benefit}}{\text{present worth of cost}}$$

Measures of cost concepts

The different costs items are that are included under each cost concept are detailed below with their procedures.

1. **Cost- A_1: It includes the value of:**
   - Imputed value of machine charges (hired and owned)
   - Bullock charges (hired and owned)
   - Cost of Seeds
   - Cost of Manures and fertilizers
   - Cost of Plant protection chemical
   - Cost of Irrigation charges
   - Miscellaneous charges
   - Interest on working capital
   - Depreciation on fixed resources
   - Land revenue paid to government
   - The total of all these cost items make up Cost A_1

2. **Cost A_2 =** Cost A_1 + Rent paid for leased-in land, if any.

3. **Cost B =** Cost A_2 + Imputed rental value of owned land + interest on owned fixed capital.

4. **Cost C =** Cost B + Imputed value of family labor. Cost C is the total cost of cultivation or gross cost.

Measures of farm profitability

1. Gross income = Per quintal price * yield per hectare in quintal
2. Farm business income = Gross income – Cost A_2
3. Net income = Gross income – Cost C
4. Family labor income = Gross income – Cost B
5. Input output ratio (cost benefit ratio) = Cost C- Gross income

Result and Discussion

Table 2: Study cost, return & Benefit-cost ratio (Input-output ratio) per hectare in different farm group
Number of respondents = 200
SML = 90 + 70 + 40 = 200 (Value in Rupees)

Sl. No.	Particulars of farm operations	Size of farms groups			Sample average
		Small	Medium	Large	
1	Hired Human Labour Charges	7750 (10.53)	8000 (11.00)	8250 (11.47)	8000 (10.99)
2	Machinery charges	2650 (3.60)	2800 (3.86)	3000 (4.19)	2816.6 (3.87)
3	Cost of Seed	5750 (7.81)	5420 (7.48)	5200 (7.26)	5456.6 (7.49)
4	Cost of Farm yard manure	7500 (10.19)	7350 (10.14)	7200 (10.05)	7350 (10.09)
5	Cost of Fertilizers	10000 (13.59)	9850 (13.59)	9760 (13.63)	9870 (13.56)
6	Cost of Irrigation	12000 (16.31)	12050 (16.63)	12150 (16.97)	12066.6 (16.58)
7	Cost of Plant Protection charges	3800 (5.16)	3600 (4.97)	3350 (4.68)	3583.3 (4.92)
8	Interest on Working Capital @8%	2996 (4.07)	2945.6 (4.06)	2909.6 (4.06)	2950.4 (4.05)
9	Depreciation on Fixed Capital	2840.4 (3.86)	2560.8 (3.53)	2245.8 (3.13)	2549 (3.50)
10	Land Revenue paid to Govt	0	0	0	0
11	Rental Value of Owned Land	10000 (13.59)	10000 (13.80)	10000 (13.97)	10000 (13.74)
12	Interest on Fixed Capital @11%	1412.4 (1.92)	1381.6 (1.90)	1347.0 (1.88)	1380.3 (1.89)
13	Family Labour Charges	7000 (9.49)	6750 (9.28)	6500 (9.03)	6750 (9.27)
14	Total Cost of Cultivation	73698.8 (100)	72708 (100)	71912 (100)	72772.9 (100)

The table 2 reveals that among different size of farms, total cost incurred by the small farms were high (Rs.73698.8/ha) as compared to medium and large size farms (Rs.72708/ha and Rs.71912/ha). Sample average for total cost was Rs.72772.9/ha in different size of farms group. The cost of human labour, fertilizers, seeds were the items for the cost with major share in the variable costs, because most of the operations like harvesting and weeding were human labour intensive operations and the other operations like land preparation and inter culture were bullock labour cost of human labour intensive. The distribution of pattern of operational cost under various inputs revealed that cost of human labour was highest in small size farms (Rs.7750 /ha), as compared to medium size farms (Rs.8000/ha) and lowest in large size farms (Rs.8250/ha). Machinery cost was Rs.2650/ha in small size farms and for medium size farms was (Rs.2800/ha) and large size farms (Rs.3000/ha). The cost of seeds was highest in small size farms (Rs.5750/ha), as compared to medium size farms (Rs.5420/ha) and lowest in large size farms (Rs.5200/ha). As Aonla would respond well with chemical fertilizer so the cost of farm yard manure used was ranged from Rs.7200/ha in large size farms, Rs.7350/ha in medium size farms and 7500 in small size farms. Whereas, the expenditure on fertilizers was highest in small size farms (Rs.10000/ha), as compared to medium size farm (Rs.9850/ha) and lowest in large size farms (.9760/ha) respectively. Sample average for depreciation on fixed resources was Rs.2549. Interest on working capital Rs.2950.4, interest on fixed capital was Rs.1380.3, labour charges for different size of farms group is Rs.6750. The cost rental value of own land was Rs.10000/ha in large, medium and large size of farms group respectively. Sample average for rental value of own land was Rs.10000/ha for different size of farm groups.

Cost of production per quintals

Table, below reveals the average cost of production for the different farm size groups (small, medium and large). It was obtained by dividing the total cost of production per hectare by the total yield obtained in quintals per hectare from each of the different size farm groups in the study area. Hence, the result as seen on table 4.4 below reveals that the cost of Aonla production per quintal in the small, medium and large farm size groups was Rs. 526.45/qts, Rs. 454.42/qts and Rs.399.51/qts respectively, with a total sample average of Rs. 454.83/qts for all the size farm groups. This implies that the total average cost of Aonla production per quintal is higher in the small group followed by medium and large group respectively.

Table 3: Cost of production of aonla per quintal in the study area
(In Rs.)
Number of farm grower = 200
SML = 90 + 70 + 40 = 200

Concept	Small	Medium	Large	Sample average
Total yield (Q)	140	160	180	160
Total cost of cultivation (Rs/ha)	73698.8	72708	71912	72772.9
Cost of production (Rs/q)	526.45	454.42	399.51	454.83

Table 4: Cost concepts in aonla crop per hectare in different size of farms group

Number of respondents = 200
SML = 90 + 70 + 40 = 200, (Value in Rupees)

Sl. No.	Cost concepts	Size of farms group			Sample average
		Small	Medium	Large	
1	Cost A_1	55286.4	54576.4	54065.4	54642.7
2	Cost A_2	65286.4	64576.4	64065.4	64642.7
3	Cost B	66698.8	65958	65412	66022.9
4	Cost C	73698.8	72708	71912	72772.9

Table 4, reveals that cost concepts on different size of farms group per hectare. Cost A_1 was highest in small size farms (Rs.55286.4/ha) followed by medium size farms (Rs.54576.4/ha) and large size farms (Rs.54065.4/ha) respectively. Cost A_2 in small, medium and large size of farms group was Rs.65286.4/ha, Rs.64576.4/ha and Rs.64065.4/ha respectively. Cost B was highest in small size farms (Rs.66698.8/ha) and lowest in large size farms (Rs.65412/ha) as compared to medium size farms (Rs.65412/ha) respectively. Cost C was highest in small size farms (Rs.73698.8/ha) and lowest in large size farms (Rs.71912/ha) as compared to medium size farms (Rs.72708/ha) respectively. Sample average for Cost A_2, Cost B and Cost C was Rs.64642.7/ha, Rs.66022.9/ha and Rs.72772.9/ha in different size of farms group.

Measure of farm income

Table 5, below reveals ha the gross income generated for Aonla production per hectare was higher in large size (Rs..360000 /ha) groups followed by medium (Rs.320000 /ha) and small (Rs.280000 /ha) farm size group respectively. An average output or yield in quintals per hectare was also higher in large size group 180qts. Followed by medium 160qts, and 140qts/ha respectively in the study area, with a total sample average yield quantity of 160qts/ha respectively. The result also reveals a total sample average of all incomes i.e. net income, farm business income, and family labour income was also higher in large size group followed by medium and small size group respectively. With their sample average, Rs.247227.1 /ha Rs. 255357.3/ha and Rs 253977.1/ha. The Aonla production in the area is highly profitable as it indicates a benefit-cost ratio of 1:3.79, 1:4.40 and 1:4.39 for small, medium and the large groups respectively. With a total sample average of 1:3.08 and this also indicates that benefit-cost ratio was also higher in the large groups of a farmer than the medium and small groups respectively.

Table 5: Measures of farm income across different size farm groups in the study area.

Number of farm grower = 200
SML = 90 + 70 + 40 =200

Income measures	Small	Medium	Large	Sample average
Yield (qts/ha)	140	160	180	160
Rate (Rs/qts)	2000.00	2000.00	2000.00	2000.00
Gross income (Rs. /ha)	280000	320000	360000	320000
Net income (Rs./ha)	206301.2	247292	288088	247227.1
Farm business income (Rs./ha)	214713.6	255423.6	295934.6	255357.3
Family labour income (Rs./ha)	213301.2	254042	294588	253977.1
Total cost	73698.8	72708	71912	72772.9
Cost benefit ratio	1: 3.79	1: 4.40	1: 4.94	1: 4.39

Summary and Conclusion

The study was conducted in Pratapgarh district of Uttar Pradesh. For this study, the random sampling technique was used for the selection of blocks, villages and proportionate random sampling for selection of respondents/growers. From the list, 200 growers were selected using proportionate sampling method i.e. 90 small, 70 medium and 40 large farmers respectively. The primary and secondary data was required for the study. The primary data was collected from the respondents by using interview schedule and observation, while secondary data were collected from the official records, published data, magazines, journals and other documents. Total cost of different farms size was high on small farms (Rs.73698.8/ha) followed by the medium and large size farms (Rs.72708/ha and Rs.71912/ha**)** respectively in different size of farms. The sample average for cost A_1 cost A_2 and cost B and cost C in different size of farm groups were Rs.54632.8/ha, Rs.64632.8/ha, Rs.66021/ha and Rs.722747.1/ha respectively. Average cost of production per quintal and price per quintal in different size of farm groups were Rs.72772 Rs/ha and Rs. 454.83. Average gross returns and net returns obtained on different farms size groups were Rs.320000/ha and 247227.1 Rs/ha. Farm business income in small, medium, and large were Rs.214713.6/ha, Rs.255423.6/ha and Rs. 295934.6/ha respectively in different size of farm groups.

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