

Economics of Makhana Production and Socio-economic Profile of Makhana Growers in Bihar

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Authors' contributions

This work was carried out in collaboration among all authors. Author RA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SP and RKS managed the analyses of the study. Authors RD, SRC and SNS helped in questionnaire preparation. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2019/v38i630396

Editor(s):

(1) Dr. Orlando Manuel da Costa Gomes, Professor of Economics, Lisbon Accounting and Business School (ISCAL), Lisbon Polytechnic Institute, Portugal.

Reviewers:

(1) Michael Adejare Adegboye, Federal College of Land Resources Technology, Nigeria.

(2) V. Lourdes Dilakshini, Eastern University, Sri Lanka.

(3) Acaye Genesis, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/53053>

Original Research Article

Received 19 September 2019

Accepted 24 November 2019

Published 03 December 2019

ABSTRACT

The Bihar state produces more than 80 per cent of Makhana globally. Despite having monopoly production, the net profit earned by Makhana producers is relatively small as the cost of cultivation is high. In order to analyse the cost of cultivation and to identify major cost incurring operations, the present study was conducted in Purnea, Darbhanga and Saharsa districts of Bihar. A random sample of 120 Makhana growers and 60 processors was randomly selected from study area. Respondents' personal interviews were conducted with the help of semi structured interview schedule to collect the data. Findings of the study revealed that majority of the Makhana cultivators belongs to Mallah community. The average age of Makhana growers was 47 years (SD=10.3). The majority of Makhana growers (65.83%) belonged to the age group of 45-64 years. Further it was observed that 100 per cent of the sampled growers' and processors' households were headed by males. The average family size of Makhana grower was 9. The majority of the Makhana growers

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were living in joint family. It was found that, majority (76.66%) of the Makhana growers were having small and marginal holdings of which 34.16 per cent were small farmer and 42.5 per cent were marginal farmer. It was also observed that the average income of the Makhana growers was Rs. 224925 per year. Further it was found that cost of Makhana cultivation per acre was Rs. 48248/acre, The major cost component of Makhana cultivation was found to be the harvesting activity which contributed around 60 per cent of total cultivation cost. The revenue earned by sales of Makhana was Rs. 59299 per care. From each acre of Makhana cultivated farmers earned Rs. 11051. The B:C Ratio of Makhana production activity was found to be 1:1.22. Therefore it was concluded that, there exists ample scope for reduction of cost of cultivation through mechanization of harvesting activity.

Keywords: Makhana; cost of cultivation; socio-economic profile.

1. INTRODUCTION

Makhana (*Euryale ferox*) is a perennial aquatic plant belonging to the family of *Nymphaeaceae* and genus *Euryale* having its origin in Eastern and Southern Asia. In India, Makhana grows in all the parts of country having diverse agro-climatic conditions including Rajasthan, Jammu Kashmir and Madhya Pradesh. However, the commercial cultivation of Makhana crop is mostly limited to the Northern parts of Bihar as well as adjoining regions of West Bengal and Assam.

As per the estimates of the ICAR-National Research Centre for Makhana, Darbhanga [1], total area under Makhana cultivation in India is estimated to be around 15000 hectare producing 1,20,000 metric tonne Makhana seeds annually, which after processing yields 40,000 metric tonne Makhana pop. The estimated value of the production at farmers end is Rs. 2500 million and it generates revenue of Rs 5500 million at traders' level.

According to Kumar et al. [2], the Bihar state has almost gained monopoly in production of Makhana in the country and accounts for more than 80 per cent of the total production. Despite of that, it has been reported that the area under Makhana crop has declined sharply by 35 per cent in past few decades from 20,000 ha to 13,000 ha [3]. Makhana production is facing number of issues including inefficient marketing channels [4], high cost of harvesting [5], shortage of organized Makhana processing industry and related malpractices [6] etc. This study was conducted to understand the economics of Makhana production and processing and suggest suitable strategies to minimize the costs and increase profitability of Makhana production and processing enterprises.

2. MATERIALS AND METHODS

This study was conducted using descriptive research design during the year 2017-18 and

2018-19 in Purnea, Saharsa and Darbhanga districts of Bihar using a randomly selected sample of 120 Makhana growers. The respondents were selected using multistage random sampling. From each district two blocks were selected purposively on the basis of estimated area under Makhana cultivation. Subsequently from each block two villages were selected purposively with the same criteria of estimated area and production. Subsequently, from each village 10 Makhana growers were randomly selected. Thus a sample 120 Makhana growers was selected. The data was collected from respondents by personal interview method using pretested semi-structured interview schedule.

Deviating from standard procedure of dividing cost of production into fixed and variable cost an attempt was made in this study to identify and document the cost associated with each component of makhana production activity. The cost components studied were land preparation, nursery preparation, transplanting, irrigation, weeding, plant protection measures, fertilizer application and harvesting. The age was measured as number of chronological years; family size was measured as no. of members in given household; family type was categorized either as nuclear or joint; educational qualification was measured as number of formal schooling years completed; Makhana cultivation experience was measured in number of years; land holding was measured in hectares and cost of cultivation was measured as rupees per acre for each Makhana cropping cycle.

3. RESULTS AND DISCUSSION

The data in Table 1 showed that average age of Makhana growers was 47 years. Among Makhana growers, majority (65.83%) belonged to age group of 45-64 years followed by 30.00 per cent to 25-44 years age group and 4.17 per cent belonged to 65-79 years age group. None of the

respondent grower was found to be too young (i.e. 20-24 years age group) or too old (80 years and above). Study also revealed that, all the 120 households of Makhana producers as well as the 120 households of Makhana processors were headed by males. None of the sampled households were headed by females. Findings of the study are in line with that of Minten et al. [5] wherein it was reported that average age of household head was 49 years.

The size of Makhana growers' family was measured as the count of family members. It was observed that average family size was 8. The family size of large proportion (48.33%) per cent of the Makhana growers were having medium sized families. Further, 27.50 and 24.17 per cent of the Makhana growers were having small (3-6 members) and large (11 and more members) families, respectively. None of the families were found to be solitary. Analysis of family type of

Table 1. Socio-economic profile of Makhana growers

Age (Mean =47 , SD=10.30)			
Sl. No.	Age group	Frequency	Percent
1	20-24	0	0.00
2	25-44	36	30.00
3	45-64	79	65.83
4	65-79	5	4.17
5	80 and Above	0	0.00
Family size (Mean = 8, SD=4)			
Sl. No.	Family Size	Frequency	Percent
1	Solitary (1)	0	0.00
2	Very small (2)	0	0.00
3	Small (3-6)	33	27.50
4	Medium (7-10)	58	48.33
5	Large (11 and above)	29	24.17
Family type			
1	Nuclear Family	11	9.17
2	Joint Family	109	90.83
Education level			
1	Illiterate	0	0.00
2	Functionally literate (FL)	60	50.00
3	1-5 (Primary)	2	1.67
4	6-8(Upper Primary)	9	7.50
5	9-10(Secondary Education)	24	20.00
6	11-12(Senior Secondary)	19	15.83
7	UG(Under Graduate)	4	3.33
8	PG(Post Graduate)	2	1.67
Experience in Makhana cultivation			
Sl. No.	Category (Years)	Frequency	Percentage
1	1-10	48	40.00
2	11-20	19	15.83
3	20-30	18	15.00
4	30-40	24	20.00
5	>40	11	9.17
Land holding size			
Sl. No.	Land holding	Frequency	Percent
1	Marginal (below 1.00ha)	51	42.5
2	Small (1.00 – 2.00 ha)	41	34.16
3	Semi-Medium (2.00 – 4.00 ha)	12	10.00
4	Medium (4.00 – 10.00ha)	14	11.67
5	Large (10.00ha & above)	2	1.67

Table 2. Economics of Makhana production (n=120)

Sl. no.	Cost component	Mean cost(Rs.)/acre	Per cent
1	Land Preparation	877.89	1.82
2	Transplanting	521.57	1.08
3	Irrigation	7676.61	15.91
4	Weeding	2937.71	6.09
5	Plant Protection Cost	259.00	0.54
6	Fertilizer application	729.27	1.51
7	Harvesting	28622.93	59.32
8	Land rent	6623.25	13.73
9	Total Expenditure	48248.20	-
10	Gross Return	59299.30	-
11	Net Profit	11051.10	-
12	B:C ratio	1:1.22	-

Makhana growers revealed that large majority of Makhana growers (90.83%) were having joint families, whereas, only 9.17 per cent of the growers were having nuclear family. Findings of the study are similar to that of Kumar [2] wherein it was reported that 45 per cent of the Makhana growers were having medium sized families.

Education was measured as the number of formal years of schooling completed by the respondent at the time of interview. It was observed that half (50.00%) of the Makhana growers functionally literate having no formal schooling, whereas 20.00 per cent and 15.83 per cent of the respondents completed their Secondary Education and Senior Secondary education, respectively. It was also observed that 7.50 per cent of the growers studied up to Upper Primary, 3.33 per cent growers completed their graduation and only two respondents out of 120 were holding post graduate degrees.

As given in Table 1, it was observed that 40.00 per cent of the farmers had experience of Makhana cultivation between one to ten years, whereas 20 per cent were having Makhana cultivation experience of 30 to 40 years, 15 per cent and 15.83 per cent of them were found to be having Makhana cultivation experience of 10 to 20 years and 20 to 30 years, respectively. However, only 9.17 per cent of the respondents were having Makhana cultivating experience of more than 40 years. Findings of the study are in support of the findings of Kumar [2] where it was reported that large proportion of respondents were having no formal education.

It was observed that majority (76.66%) of the growers owned small and marginal land holdings. 42.50 per cent of the farmers were having marginal holdings, whereas 34.16 per cent were having small holdings followed by

11.67 per cent with medium land holding and 10.00 per cent were having semi-medium land holding. It was also observed that only 1.67 per cent of the respondents were having large land holdings. Findings of the study are in line with that of Bhutia et al. [7] where in it was reported that more than 90 per cent of the growers owned small and marginal land holdings.

3.1 Cost of Makhana Cultivation

The cost of cultivation associated with Makhana production was studied in the selected districts. The total cost of cultivation associated with Makhana production for one acre of land area was found to be Rs. 48248.20. Further it was observed that harvesting of seeds contributes major portion of total cost (59.32%) followed by irrigation (15.91%), land rent (13.73%), weeding operation (6.09%), land preparation (1.82%), fertilizer application (1.51%) transplanting (1.08%) and plant protection measures (0.54%).

The higher cost associated with harvesting could be attributed to the fact that harvesting was a laborious work involving specialized skill, especially in pond system of cultivation. The harvesting was done generally in 2 to 3 rounds. The average cost of harvesting per kg seed increase with every subsequent round of harvesting. The average cost of harvesting per kg of seed in first round was Rs. 23.71. For second round cost of harvesting per kg of seed was Rs. 50.29. For 3rd round cost of harvesting each kg of seeds was Rs. 90.42. Further it was observed that irrigation expenses contribute second highest cost component. The average yield of Makhana in the study was found to be 7.65 quintal/acre (SD= 2.59 q). With the sales of the product, farmers were earning Rs. 59299.30/acre as revenue. The net average

profit earned by the farmers per acre was Rs. 11051.10 and the benefit to cost ratio was found to be 1:1.22. Findings of the study are similar to that Sah [8] where it was reported that farmers earn Rs. 14, 362 from per acre of Makhana cultivation. The findings of study are also in support of the previous findings of Choudhary et al., (1998) wherein it was reported that cost of harvesting is a labour intensive activity demanding higher expenditure on harvesting operation.

4. CONCLUSION

It was observed that socio economic status of Makhana growers as well as that of processes was poor, which is indicated by the poor literacy rate, small land holdings and low profitability of Makhana production system. The analysis of cost components of Makhana cultivation revealed that manual harvesting of Makhana contributes to more than half (59%) of the total cost. Therefore it is recommended to undertake research and development work for mechanization of harvesting process so as to reduce the labour requirement and increase the Makhana production system profitability.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Anonymous. ICAR National Research Centre for Makhana, Darbhanga; 2010.
2. Kumar A. A diagnostic study of makhana production technology among the growers of Madhubani district (Doctoral dissertation, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur); 2018.
3. Singh A. Centre to boost 'makhana' cultivation. Times of India; 2014. Available: <https://timesofindia.indiatimes.com/india/Centre-to-boost-makhana-cultivation> [Accessed 31 August 2014]
4. Rahaman AA. Coordination and impact of agri food value chains on farm performance: PhD thesis. The Institute for Food Economics and Consumption Studies of the Christian-Albrechts-Universität Kiel Evidence from Small holder Rice Farmers in Northern Ghana; 2019.
5. Anonymous. ICAR Research Complex for Eastern Region Patna, Bihar; 2018.
6. Minten B, Singh KM, Sutradhar R. The Makhana value chain in Bihar: An assessment and policy implications. Article in SSRN Electronic Journal; 2010.
7. Bhutia TL, Kamal RK, Kumar SMU. Constraints analysis in the crop-livestock farming systems of small and marginal farmers of Bihar. SKUAST Journal of Research. 2017;19(1):92-96.
8. Sah NK. A study on production cost, processing cost and marketing channel efficiency of Makhana in Madhubani district of Bihar (Doctoral dissertation, Acharya NG Ranga Agricultural University); 2013.

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Peer-review history:

The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/53053>