Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2020; 9(1): 984-987
Received: 04-11-2019
Accepted: 06-12-2019

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A study on constraints of Makhana cultivation and suitable measures for its better development

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DOI: https://doi.org/10.22271/phyto.2020.v9.i1q.10580

Abstract
Euryale ferox is an important aquatic crop, belonging to family Nympheaceae. It is commonly known as Makhana, Gorgon nut or Foxnut and grown in stagnant perennial water bodies like ponds, Oxbow lakes, and swamps. Makhana cultivation provides livelihood to thousands of resource poor farmers, particularly in Bihar and Manipur. It is a cash crop and is marketed in the form of popped makhana commonly known as Makhana Lawa**.** In India, the cultivation of Makhana is distributed in Bihar, West Bengal, Assam, Manipur, Tripura, Eastern Odisha, Madhya Pradesh, Rajasthan, and Eastern Uttar Pradesh. India is the only country where Makhana is cultivated as crop and mainly in the state of Bihar and some Parts of Assam.

In Bihar, area under makhana cultivation is about 13,000 hectare and accounts to a total yield of 85 per cent of the total production in India. Major Makhana producing districts in Bihar include Darbhanga, Sitamarhi, Madhubani, Saharsa, Supaul, Araria, Kishanganj, Purnia and Katihar. Approximately, 80 per cent of the total production of processed Makhana comes from Darbangha, Madhubani, Purnia, and Katihar districts alone.

Constraints in production, processing and marketing of the makhana is studied by Garrett ranking method and also by the opinion of the respondents. The major production constraint were No ownership of pond, Labour intensive cultivation, Lack of improved variety, Lack of credit facility, Lack of scientific knowledge, Encroachment of pond by fewer powerful people and water scarcity in ponds. The major processing constraints were lack of processing machinery and equipment, lack of credit facility, dependence on climate and health risk of the processor. The major marketing constraints found were the price fluctuation, lack of transport facility and unorganised and inadequate market.

Tools/implements should be designed for harvesting. Smokeless Chulhas needs to be constructed with chimney and hand gloves should be provided in roasting process. There is need for large scale improvement in processing, value addition, grading, packaging, storage, and market infrastructure. Geographical Indication (GI) registration can be taken up for makhana, for protecting the traditional knowledge of the producers and processors of makhana in the state. Makhana farmers may be linked to a Micro Finance Institution (MFI), which would provide them timely micro credit.

Keywords: Production constraints, processing constraints, marketing constraints, garrett ranking method, suggestions

Introduction
Makhana is an organic, nutritional, non-cereal edible crop. Makhana is a good source of carbohydrate, protein and minerals. In recent years price of makhana has increased due to increase in demand from domestic as well as foreign markets. The crop has been recognized as an important crop in the state of Bihar and has the potential to alleviate the poverty of section of people involved in its cultivation.

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Cultivation of Makhana is highly cumbersome, labour intensive and involves human drudgery while sweeping bottom of the water body for seed collection. It is followed by processing of raw seeds, which is equally painstaking activity. Fishermen community (Mallah) belonging to the weaker sections of the society is mainly involved in makhana cultivation and processing. In traditional method is it is cultivated in ponds but now the cultivation has been started in the fields also. In field system it is cultivated in agriculture lands with one to two feet of water depth.

Materials and Methods

The present study was carried out in the Darbhanga district of Bihar. The study aims at understanding the socio-economic condition of farmers cultivating Makhana (*Euryale ferox*). The brief description of methodological aspects used in the sampling techniques, collection of data and method of enquiry, period of enquiry, tools and techniques used in analysis are applied in attaining specific objective of study.

Purposive and random sampling techniques were used to select district, block, village, and farmers. The present study was conducted in Darbhanga district of Bihar. Darbhanga district was purposively selected for the study, as makhana has always been the major crop of the district and Darbhanga is famous for the production of makhana in Bihar and as well as in India. Among total of 18 blocks of district Darbhanga, three block which are major in the production of the makhana namely; Darbhanga Sadar, Manigachhi, and Keoty block. A list of all the three major makhana producing block was prepared and among the list one block Darbhanga Sadar was selected at random process. A list of all the villages practicing the makhana crop of the selected block was prepared and out of which 5 villages were selected randomly, namely devari, sonki, chuna bhatti, sara and mohanpur.

The selection of farmer was also based on the random process. The list of makhana cultivators of all the selected villages was prepared with the help of the Secretary of Fisherman cooperative society of Darbhanga Sadar block. Among them 10 cultivators/makhana growers were selected randomly from each village. Thus a total of 50 makhana growers were selected randomly from the universe of five selected village.

The primary data are collected from the farmers, in the study area through survey method and the pre-tested schedule are prepared specially for the purpose of the study. The collected data are cross checked with the head of the village, and is found to be authentic. The tabular analysis was done by working out simple averages and percentages.

Garrett Ranking Method

The Garrett ranking technique was used to study the opinion of the farmers regarding the constraints faced by them in makhana cultivation.

The ranking given by the respondents to various attributes has been subjected to Garrett ranking. Garrett percentages were calculated by using the following formulae.

$$\text{Percent Position} = \frac{100\ (\text{Rij} - 0.5)}{\text{Nj}}$$

Where,

Rij = Rank given for the ith items by the jth individual.

Nj = Number of items ranked by the jth individual.

By using score card prepared by Garret, scores were allocated to the percentage values. Mean of Garret scores was calculated for each attribute. Attribute with highest mean score is considered as a major constraint faced by the farmers.

Results and Discussion

The constraints are has come up in production, processing and marketing stage. Following are problems whixh was found to be faced by the farmers in makhana cultivation.

Production constraints

Constraints in makhana cultivation were identified after discussion and interaction with the farmers. The five identified constraints were incorporated in the schedule for preferential ranking by the farmers. Garrett ranking technique has been used for quantification of rank and overall rank is presented in the table 1.

Table 1: Ranking of production constraints of makhana by farmers

S. No.	Constraints	Number of farmers giving different ranks				
		Rank I	Rank II	Rank III	Rank IV	Rank V
1	Lack of credit facility	8	9	9	4	20
2	Labour intensive cultivation	7	17	10	14	2
3	No ownership of land	26	6	8	5	5
4	Lack of improved varieties	6	9	14	16	5
5	Lack of scientific knowledge	3	9	9	11	18

As we have found out 5 constraints we have to find the percent position and its Garrett value for these 5 ranking from the Garrett ranking table:

Table 2: Percent position and their Garrett value

Rank	100 (Rij – 0.5)/Nj	Per cent position	Garrett value
1	100 (1 – 0.5)/5	10	76
2	100 (2 – 0.5)/5	30	60
3	100 (3 – 0.5)/5	50	50
4	100 (4 – 0.5)/5	70	40
5	100 (5 – 0.5)/5	90	25

Table 3: Now multiplying the Garrett value to their ranks.

Constraints	Rank I x 76	Rank II x 60	Rank III x 50	Rank IV x 40	Rank V x 25	Total value
C1	608	540	450	160	500	2258
C2	532	1020	500	560	50	2662
C3	1976	360	400	200	125	3061
C4	465	540	700	640	125	2470
C5	228	540	450	440	450	2108

Now we will find the average of the total value by dividing it by the total number of respondents:

Table 4: Overall rank of all the constraints

Constraints	Total value by no. of respondents	Average value	Rank
Lack of credit facility	2258/50	45.16	IV
Labour intensive cultivation	2662/50	53.24	II
No ownership of pond	3061/50	61.2	I
Lack of improved variety	2470/50	49.4	III
Lack of scientific knowledge	2108/50	42.16	V

The constraints No ownership of pond received the maximum Garret score of 61.2 and was ranked as the first constraint. Majority makhana growers cultivate makhana in leased in Government or private ponds. The pond owners or government do not care about the proper maintenance of pond and this makes cultivation of makhana difficult for the farmers. The lease of pond area varies as it when the lease period is over then it is possible that next time they get less leased area of pond.

The constraints Labour intensive cultivation received the second highest Garrett Score of 53.24 and was ranked as second constraints. As the makhana requires large number of the labours specially in harvesting. And at the peak time there is always scarcity of the labour, so the labour cost also rises at that time. So it is a problem for the cultivator to find labour as it labour intensive cultivation.

The constraint Lack of improved variety received third highest Garrett score of 49.4 and was ranked third constraints. The left out makhana seeds germinate in the next season and there is no released or improved variety. During survey it is found that NRC will be able to release soon a new variety of makhana seed. NRC has collected and evaluated 112 germplasms of makhana in which 24 pure lines have been isolated out of which six have been found most promising for higher productivity.

The constraints Lack of credit facility received the fourth highest Garrett score of 45.16 and ranked the fourth constraints. Many farmers are from weaker sections of society. And they always face the lack of credit at peak time of investment and at that time for credit requirement they have to depend on local money lenders.

The constraint Lack of scientific knowledge received the lowest Garrett score of 42.16 in all the five constraints and ranked fifth constraints. In this research I have found that all the respondent farmers of Darbhanga district cultivate makhana in the pond system. Many of them are unaware of newly developed cultivation practices of makhana in field system. Though NRC gives training to farmers to cultivate in field system most of the farmers in the study area have not undergone any training. As already makhana is costly cultivation and pond are available in Darbhanga district so farmers prefer to cultivate in ponds.

Apart from these constraints there are few more constraints which are not proved to be very serious but these problems also exist such as water scarcity in ponds, which leads to additional investment to maintain the water level in ponds. The illegal encroachment of government ponds by fewer powerful peoples due to which farmers cannot get more area on lease for cultivation of the makhana.

Processing Constraints

During the study period the problems associated with the processing were identified from the selected processor. The constraints of the processing are given below:

Lack of processing machinery and equipment: it was a major problem expressed by the processor. Processing of makhana seed is done by old traditional practices. Processing of makhana seeds is laborious, time-consuming process and causes pain or burns and injuries to the processors hands as it involves handling of hot roasted nuts manually. Processing machine developed by CIPHET and NRC was not successful due to less efficiency, as the size of the pop was not uniform and even less popped makhana were produced from the popping machine.

Lack of credit facility: It is also the serious constraints for the processing as the processing is laborious process and is done in various stage. And when they need money they have to depend on the money lender for the credit requirement.

Dependence on climate: Drying of makhana seed during processing is done in sun light which depends on climatic conditions. The processor believe that it is a constraint for processing as the harvesting started in the month of July-September and there is chance that any time rain can come.

Health risk: During popping season, a day for processors starts at 3 AM and ends at 11 AM usually. Continuous sitting in squatting posture leads to backaches, spine problems and inhaling smoke from the dingy kitchen leads to breathing related health problems. Burning occurs when they manually handle the roasted makhana from Iron pan to Aphra and Thapi for busting of makhana seed into makhana pop by hitting on them.

Marketing Constraints

During the study the problems associated with marketing were identified from the selected market intermediaries. Majorly three constraints were found which are as follows:

Price fluctuation: Market intermediaries considered high price fluctuation of makhana as major constraint. The price fluctuation varies greatly as in off season the price falls which effects market intermediaries as well as the cultivator and processor. Likewise in festival seasons like Deepavali, Dussehra and Eid the price rises.

Lack of transportation facility: it is also the serious constraints, as makhana is voluminous in nature per unit cost of transportation is high. Logistics to supply the makhana for distant market is also difficult due to space occupying nature of the makhana.

Unorganised and inadequate market: it is also proved to be important constraints of the makhana marketing, as there is inadequate facility for makhana marketing. Lack of marketing information and lack of well organised market structure. Government is also not so concerned about the marketing of the makhana.

Suggestions

- Tools/implements could be designed to collect the seeds efficiently and to remove seeds without diving into dirty water for long hours.
- Smokeless Chulhas needs to be constructed with chimney so smoke could directly released outside.
- Hand gloves should be used to provide necessary insulation and protecting hands of the processor during the Roasting Stage so that their hands get maximum protection.
- There is need for large scale improvement in processing, value addition, grading, packaging, storage, and market infrastructure.
- There is need to develop the efficient makhana processing machine.
- Geographical Indication (GI) registration can be taken up for makhana. Geographical indication is an important tool for protecting the traditional knowledge of the producers and processors of makhana in the state.
- Branding of makhana pop and value added products of makhana along with suitable advertising would improve the demand for makhana pop and its value added products.
- The project should be proposed to empower these growers/processors through training on improved cultivation practices, integrated fish - makhana culture with the help of Research Centre for Makhana, Darbhanga.
- Makhana farmers may be linked to a Micro Finance Institution (MFI), which would provide micro credit through formation of self-help groups, promote health insurance and mitigate risk.

Conclusion

Farmers not having the ownership of the pond is a major constraint for production of makhana. Lack of improved varieties of makhana, lack of credit facility is also the major constrants in makhana cultivation. Lack of processing machinery makes the role of human labour pivotal to the processing process. The drudgery involved in harvesting and inhaling of smoke continuously for long duration by the processing workers causes them many health problems. Hence, lack of processing machinery is a major constraint in processing of makhana. Makhana prices increase during the festive season (Deepavali, Dussehra and Eid) and decrease during the other period of the year. So high price fluctuation is a major constraint faced by market intermediaries. Water scarcity in ponds, leads to additional investment to maintain the water level in ponds. The illegal encroachment of government ponds by fewer powerful peoples due to which farmers cannot get more area on lease for cultivation of the makhana. Tool/implements can be developed for the collection of seed from makhana ponds, smokeless chulahs can be used to protect the processors from smokes and hand gloves should also be used in roasting process tp protect hands of the processos from burning.

Reference

1. Chaitanya A. GI portfolio analysis for enhancing income of makhana growers in Bihar, Project report PGDM, NAARM, 2011.
2. ICAR. Makhana report. 2003, 3-21.
3. Jain A, Singh HB, Kanjlal PB. Economics of fox nut (*Euryale ferox* Salisb.) cultivation: A case study from Manipur in North Eastern India. Indian Journal of Natural Products and Resources. 2010; 1:63-67.
4. Jha SN, Prasad S. Gorgon fruit or makhana- lts cultivation and processing. Indian Horticulture. 1996; 39(2):18-20.
5. Kumar A. A diagnostic study of makhana production technology among the growers of madhubani district of Bihar. Dr. RPCAU, M.Sc. Ag. (Extension Education) Thesis, 2018.
6. Mahawar HK. A report on Makhana (Fox nut) production, processing and supply chain. IIT, Mumbai, 2016. Technical Report available at (http://www.researchgate.net/publication/318960974, 3-27.
7. Mandal RN, Saha GS, Sarang N. Harvesting and processing of makhana (*Euryale ferox* Salisb.)- An unique assemblage of traditional knowledge. Indian Journal of Traditional Knowledge. 2010; 9:684-688.
8. Masram P, Patel KS, Kori VK, Rajgopala S. Makhana (*Eryale ferox* Salisb)- A Review. Int. J Ayu. Pharma. Chem. 2016; 4(2):69-76.