



Bihar's Makhana Production Scenario

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ABSTRACT

A Bihar produces 90% of the world creation of fox nut. There has been adapted to India's tropical climate and found in its natural, wild form in different pieces of north-east India and dissipated pockets of focal and northern India. The states of Bihar, West Bengal, and Assam are the primary locations for the cultivation of gorgon nut, sometimes referred to as fox nut or Makhana. The main regions for gorgon nut (also known as fox nut or Makhana) cultivation are the states of Bihar, West Bengal, and Assam. Bihar is the leading producer of makhana in India, accounting for about 85% of the country's total output. Madhubani, Darbhanga, Sitamarhi, Saharsa, Katihar, Purnia, Supaul, Kishanganj, and Ariaria are the state's principal districts for the production of makhana. Hand-picking the seeds, drying, roasting and popping, storage, and grading are just a few of the labour-intensive and time-consuming processes involved in makhana cultivation and processing. Given that it accounts for 20% of the state GDP, agriculture plays a significant role in the state's economy. A significant obstacle to the state's agricultural industry is the fragmented land holding situation, with 91.2 percent of farm families in Bihar having marginal holdings (less than one hectare), which accounted for 57.7 percent of the state's total land area in 2015–16 (Agriculture Census, 2016). Over 85% of Bihar's total cropped land is planted with cereals, making cereals the

main component of the state's agricultural economy. Wheat, rice, and major cereal crop of the state.

INTRODUCTION

The Nymphaeaceae Family of water crops, including makhana (*Euryale ferox*), is a godsend to the rural poor, particularly in north Bihar, Bengal, and lower Assam, where cultivators have mastered the skill of makhana cultivation. The Makhana seeds are used to make a variety of desserts and cuisines, as well as popped and consumed roasted. This crop has significant export potential and possesses both nutritional and therapeutic qualities. One of the significant plants that may be grown is makhana, which is said to have originated in China and South-East Asia and some other country of the world before spreading to various International Journal of Current Microbiology and Applied Sciences. The districts of Darbhanga and Madhubani in north Bihar were specifically chosen for the study because they have a greater region of Bihar that is used for makhana cultivation. Based on the area of the Makhana pond, a list of Makhana growing blocks was created and placed in increasing order. Thousands of farming families, most of whom are located in Bihar's Makhana producing areas, operate this primary processing as a family business. They procure seeds from growers or acquire them from nearby distributors and do contract processing, foundation. Processors with limited resources and Makhana producers are exploited because they borrow money in advance at higher monthly interest rates of 3-5% from local wholesalers or private money lenders.

BIHAR'S MAKHANA PRODUCTION SCENARIO

Bihar is a state in eastern India that shares borders with Jharkhand to the south, West Bengal to the east, Nepal to the north, and Uttar Pradesh to the west. Despite supporting 12.63% of India's population, its 93.6 lakh hectares of land only make up 3% of the nation's total land area (Bihar Economic Survey, 2018–19). The state of Bihar is divided into two halves, North Bihar and South Bihar, by the powerful Ganga river. In general, North Bihar is prone to flooding, but South Bihar is more likely to experience drought. Approximately 74% of Bihar's labor force is employed in agriculture or related industries. This industry makes around 20% of the state GDP, highlighting the role that agriculture plays in the state economy. A significant obstacle to the state's agricultural industry is the fragmented land holding situation, with 91.2 percent of farm families in Bihar having marginal holdings (less than one hectare),

which accounted for 57.7 percent of the state's total land area in 2015–16 (Agriculture Census, 2016). Over 85% of Bihar's total cropped land is planted with cereals, making cereals the main component of the state's agricultural economy. The state's principal grain crops include rice, wheat, and maize. There are four Agroclimatic Zones in the state.

Table 1: Agroclimatic Zones of Bihar

SI No.	Agro-climatic zones	Name of the Districts	Soil type	Rainfall (mm)	Principle crops
1	Zone-I, North Alluvial Plain	West Champaran, East Champaran, Siwan, Saran, Sitamarhi, Sheohar, Muzaffarpur, Vaishali, Madhubani, Darbhanga, Samastipur, Gopalganj, Begusarai	Sandy loam, loam	1040 – 1450	Rice, Wheat, Maize, Arhar; Horticultural crops including Litchi, Mango, Makhana , Water Chestnut
2	Zone-II North East Alluvial Plain	Purnea, Katihar, Saharsa, Supaul, Madhepura, Khagaria, Araria, Kishanganj.	Sandy loam, Clay loam	1200 – 1700	Maize, Mustard, Jute, Sugarcane; Horticultural crops including Mango, Banana, Bel, Papaya, Makhana , Cucurbit
3	Zone-III A South East Alluvial Plain	Sheikhpura, Munger, Jamui, Lakhisarai, Bhagalpur, Banka	Sandy loam, Clay loam,	990 – 1240	Rice, Gram, Wheat; Hort. crops including Mango, Guava, Banana, Bel, Jackfruit, Onion, Potato, Chilli, Marigold
4	Zone-III B South West Alluvial Plain	Rohtas, Bhojpur, Buxar, Bhabhua, Arwal, Patna, Nalanda, Nawada, Gaya Jehanabad, Aurangabad,	loam, Clay		

Source: Department of Agriculture, Government of Bihar

PRODUCTION SYSTEM OF MAKHANA

There are many of ponds in the districts of Darbhanga and Madhubani, almost in every block. According to secondary data from the District Fisheries Office, Darbhanga has 910 ponds overall, covering 2134.76 acres in area. These 77.25% of the ponds were government ponds. Similarly, there were 2111 ponds in the Madhubani district, totaling 2097.4 hectares of land. 83.4% of the ponds in this location were owned by the government sector. The majority of Makhana grown in these two districts is grown in ponds. Makhana is generally grown in low-lying areas in Purnea and Katihar, although there is also a sizable area used for pond farming. Farmers produce Makhana in the same field where they pick paddy in Purnea and Katihar.

Pond System Of Cultivation

A specific block's fishermen cooperative association was granted a lease on government ponds. Every year, the government ponds' leasing rate rises by around 5%. Then, the society secretary loaned these ponds. To a group of farmers for the yearly rent-basis cultivation of fish and makhana. Typically, the rent per unit space that the secretary collects is 8–10% more than the government rate. Additionally, the leasing fee differs between ponds according to Pond quality, water depth, etc. The majority of farmers (41.7%) were found to have received ponds for a lease of three to four years. But just 38.3% of respondents reported having a pond for a single year, indicating that there was no guarantee they would be able to lease a pond the following year. However, nearly 38.3 per cent of respondents got the pond for only one year which suggested that there was no certainty of getting pond on lease next year too. Nearly half of total ponds in study area were Government ponds followed by private owners' pond (31.7%). The average annual rent paid by farmers was Rs 13,270 per ha. While 43.3% of the farmers cultivated makhana in only one pond, 25% of the households reported to cultivate it in more than three ponds. The average pond area cultivated per household was 1.45 ha and the average production per ha varied from 1.7 to 1.9 tons of makhana seeds from pond system of cultivation. This yield level was very low as compared to yield of improved makhana varieties like Swarna Vaidehi or When compared to the upgraded makhana's yield, this yield level was extremely low. Nevertheless, almost 38.3% of respondents only had access to the pond for a single year, indicating that there was no guarantee they would be able to lease it for another year. Almost half of the ponds in research area were government ponds, which were followed by (31.7%) private owners' ponds. Farmers paid an average of Rs 13,270 in rent per hectare annually. Of the farmers, 25% reported growing makhana in more than three ponds, compared to 43.3% who farmed it in only one pond. A household's average pond area under cultivation was 1.45 hectares, and the average yield per hectare of makhana seeds produced from pond systems ranged from 1.7 to 1.9 tons. When compared to the yield of enhanced makhana, this yield level was quite low.

Field System of Cultivation

Makhana was grown by farmers in low-lying areas in Purnea and Katihar, where standing water up to one foot was kept during the crop season. Over two hectares of land were used by nearly half of the farmers who responded to cultivate Makhana. In these regions, just 25% of farmers leased land, while the remaining 75% farmed Makhana on their own property. An average of Rs 13,000 per hectare was

discovered to be the rent. In terms of fertilizers application, a significant contrast between the pond and field systems was seen. In field systems, farmers applied 90–100 kg of nitrogen, 80–90 kg of phosphorus, and 40–50 kg of potash in the form of DAP, urea, and MOP. Not many farmers reported using calcium as well. But when it comes to farmers using pond systems.

MAKHANA EXPORT: CURRENT STATUS AND FUTURE STRATEGIES

Owing to its high nutrient value and several health benefits, the demand for makhana has increased steadily in recent times. In India, makhana is now consumed across the country. Although, commercial production of makhana is limited to selected districts of North Bihar, West Bengal, Assam and Manipur; it reaches to all major cities of the country through a chain of traders which include producers, processors, local wholesalers, commission agents, distant wholesalers, retailers and consumers. As far as export is concerned, its export potential is still untapped. Currently, India is exporting only 1.0% of its total production. Nearly 100 tonnes of popped Makhana is exported to other countries.

Shakti Sudha Industries, Patna is one of the major players in export of Makhana from Bihar through its online marketing platform. Global Marketing companies like Amazon, Flipkart etc also play major role in export of Makhana. Several private firms active in big cities like New Delhi, Mumbai, Amritsar, Kolkata, Badodra, etc. are involved in export of Makhana. United States of America, United Kingdom, Australia, Banladesh, Pakistan and Gulf Nations like U.A.E, Qatar, Saudi Arabia, Kuwait, Oman are the major export destinations of Makhana from India. Being a minor crop, Government has not allocated a separate HS code for Makhana which is a major hindrance in its export.

Makhana falls under HS Code: 19041090 (Other prepared foods obtained by the swelling or roasting of cereals or cereal products) and it is exported with many other products. Therefore, data of makhana export from India is not available. However, export data from APEDA for HS Code 19041090 shows trends in its export During year 2019-20, India exported 11,777 tonnes of makhana along with related products worth Rs 13859 lakhs. USA was major destination with almost one third of total export was contributed by this country followed by UAE (11.54%), Nepal (9.73%), United Kingdom (5.39%) and Australia (4.81%). Gulf countries like Quatar, Saudi Arab, Oman, Kuwait, etc also listed in top destination for Makhana export.

STRATEGIES FOR EXPORT PROMOTION OF MAKHANA

Despite having high potential, the quantity of popped makhana exported outside the country is very small as compared to many other dry fruits like almond, cashew etc. Major reason for lack of export is low production of Makhana, lack of quality produce, lack of mechanization in harvesting and processing, near absence of value addition in Makhana etc. Following strategies can be adopted for promotion of export of Makhana in the country.

Expansion of area under Makhana:

Being an aquatic crop, Makhana requires ponds, chauras and low lying fields with standing water during crop season. Therefore, more such areas can be identified for its expansion. Moreover, Makhana can also be cultivated in field condition with recommended package of practices. Bihar Govt. is extending subsidy for makhana cultivation to the extent of Rs. 13400/ ha in pond system and Rs. 16000/ha in case of makhana cultivation in cropping system mode.

Adoption of high yielding varieties:

For increasing productivity, adoption of high yielding varieties and new technologies by farmers is required. Research Centre for Makhana, Darbhanga has developed Swarna Vaidehi variety having higher production potential of 3.0 tons per ha as compared to traditional cultivars (1.4 t/ ha). Similarly, BAU, Sabour also developed one variety called Sabour Makhana having yield potential of 3.5 tons per ha. Quality seeds of these varieties need to be made available to farmers in large quantity for their adoption. Farmers need to be trained on scientific package of practices for Makhana.

Mechanization for harvesting and processing:

Export of any product depends on its quality. Presently, majority of Makhana is harvested and processed manually by skilled labours. There is problem of maintaining hygiene during preparation of popped Makhana. Therefore, low cost machineries need to be developed for processing of Makhana seed.

Allocation of separate HS code and Specification of product for export:

Being a minor crop, Government has not developed quality specification for its export. Therefore, specification must be developed for its product. Moreover, Makhana still has no separate HS code and it falls in HS Code 19041090 which includes other products also. In order to promote its export, separate HS code should be allocated

Support to Makhana industries involved in value addition:

Lack of value added products of Makhana is a major issue in its export promotion. There is huge scope for marketing of value added makhana snacks in international market. Presently, small scale makhana processing industries are working as a highly unorganized sector. Some Makhana based Farmer Producer Companies (FPCs) should be formed for better realization of price.

Supporting Makhana growers using cluster approach:

Makhana cultivation requires areas having ample number of water bodies, chauras and low lying fields. So, a cluster based approach is required for support of Makhana growers. Such areas can be identified and promoted specially for Makhana. Farmers should be mobilised to form Farmer Producer Company for effective marketing and export. Promoting export through branding: Scope for makhana export can be enhanced by branding of value added products. There are some makhana companies which prepare value added products by using tomato, pudina, chilli, butter or other flavours. Branding of these products by large retail sector companies like Reliance, Haldiram, Bikaji, ITC, etc. will help in export of Makhana based products across the world.

SUMMARY AND CONCLUSION

Makhana is an aquatic cash crop mostly grown in ponds as well as low lying fields of North Bihar. Yield of makhana seed varies from 1.8 to 2.3 tonnes/ha which is far below the potential yield of improved varieties like Swarna Vaidehi and Sabour Makhana-1. Harvesting of makhana seed from bottom of water bodies is fully manual and it alone contributes around 40% of operational cost of cultivation. So, machine needs to be developed for harvesting which will significantly reduce cost borne by farmers. Makhana grown in ponds is almost free from any harmful chemicals since fertilizers and pesticides are not used. Therefore, these pockets can be identified and promoted for cultivation of organic makhana which can increase their profitability. Producers share in consumer rupees in the value chain was 27.6 per cent.

But net price received by farmers was only 10.8% of consumer price at distant market. Among intermediaries, market margin of distant retailers was highest (19.56%) followed by distant wholesalers (13.9%) and processors (8.63%). Makhana price in distant market is generally 60-70% higher than local

market. Processing cost contributed almost half of total marketing cost followed by commission agent charges to the extent of 16.6 per cent. Price spread through entire marketing channel from producer to consumer at national level is 72.4 per cent. Makhana pop is becoming very popular as healthy food among masses and its demand is increasing in the global market. Therefore, its production needs to be enhanced which is possible by both area expansion and adoption of high yielding varieties like Swarna Vaidehi and Sabour Makhana-1.

Price realization of popped makhana can be enhanced for farmers if they can be organized into Makhana producers group and involved in processing and sale of popped makhana instead of raw makhana seed. Efficient low cost popping machines are also required for primary processing. There is huge scope for marketing of value added makhana snacks in international market. Presently, small scale makhana processing industries are working as a highly unorganized sector. Recently, govt. of India has announced 10,000 crores for cluster-based approach for unorganised Micro Food Enterprises related to Mango, Makhana, Turmeric, Chilli, Saffron, Bamboo shoot etc.

This fund may be utilised for value added healthy snacks by creating global standard products of makhana and its branding “Vocal for Local” as suggested by Hon’ble PM of India. The correct information on production status, market arrival and weekly or monthly price and export data is not available for makhana pop. National Horticulture Board, Agricultural and Processed Food Products Export Development Authority (APEDA) or State Government should work together on providing correct information on these aspects.

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