

Ethnic uses of Makhana (*Euryale ferox* Salisb.) in Mithila (north Bihar) and other parts of India

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Abstract

The paper provides a report on the ethnic uses of Makhana (*Euryale ferox* Salisb.) in different parts of India including Mithila area of North Bihar that is known for being a site of its organized cultivation over centuries. In major parts of northern India *E. ferox* is available in wild or semi-wild forms. A survey on the ethnic uses of Makhana in Mithila and other parts of India has revealed its about a dozen distinct uses. These include its specific association with (i) 'Kojaagaraa' (a marital ritual) (ii) 'Parikramaa' (for maintaining counts during ritualistic circumambulation around a temple or tree) (iii) 'Shraaddha Karma' (last Hindu rites) (iv) Devotional offering to deities or distinguished persons in the form of non-flower garlands (v) 'Prasaad' (edible offering to deities) (vi) Sacred thread 'Yajnopaveet' as stiffening item (vii) 'Makhaan Paagal' i.e., caramelised pops (during Navratri and other festivals). It is used as a 'Havan Saamagri' and as a component of 'Panchamevaa' (i.e., five auspicious dry fruits). 'Ghunes', a head gear ceremonially worn by the bridegroom on the occasion of wedding has streams of Makhana pops hanging downward. This practice is observed by the *Srotriyas* in this area. The paper further incorporates its other traditional and modern uses mostly in the form of culinary preparations. These are also in practice in other areas of the country and abroad in the form of (i) 2 forms of snacks (ii) Dessert (iii) Sweetened Makhana (iv) Porridge (v) Dal Makhani (vi) Makhana Kofta and (vii) Makhana Dum Aloo.

Keywords: Makhana, *Euryale ferox*, Mithila, India, Ethnic.

1. Introduction

Mithila in North Bihar and the Terai region of Nepal represents a distinct cultural zone. Interspersed by a large number of flowing and stagnant water bodies, this region is basically known for its *Paan* (betel), *Maachh* (fish) and *Makhaan* (gorgonut or foxnut) (as locally pronounced). *Euryale ferox* Salisb. growing in these waterbodies is a major aquatic cash crop that provides livelihood to the fishing and other related communities (Jha *et al.*, 1991 a, Verma *et al.*, 2008). The fishing community of this region has developed an expertise to perform the intricate job of harvest and post harvest operations through generations. This special

expertise of the community is being sought even now in areas of West Bengal and Assam where Makhana cultivation has been started during the last few decades.

Makhana is cultivated in 8 to 10 districts of Darbhanga, Kosi and Purnia divisions of northern Bihar. Makhana is used here as subsidiary food by popping its seeds like popcorn. It has significant nutraceutical values (Jha, 2016). Edible part of its seed is the perisperm that is full of carbohydrate, protein and other micro-nutrients. *E. ferox* has a high essential amino acid index that makes it comparable to fish and mutton in food value (Jha *et al.*, 1991b). It is almost fatless and raw seeds

are subjected to post harvest processing in order to bring it to consumable popped form. Seeds are dried, roasted, tempered, again roasted and then popped with the help of wooden appliances called "*Apharaa*" (base platform) and "*Thaapee*" (hammer) (Jha and Prasad, 2003). It is the popped form that is generally known as Makhana to the outside world. Quite a good number of people, who have not seen *E. ferox* plants generally believe Makhana pops to be a product of lotus (*Nelumbo nucifera*).

Makhana is intimately associated with Mithila culture and is often held synonymous with it. As such it forms an essential ingredient of Hindu rituals all over India and other social occasions related with both elations as well as sorrow. Its pop is used for maintaining the counts during various rituals like "Somavati Amaavaasyaa". It is deeply associated with the last rites performed under Hindu traditions. Makhana pops are showered over the dead body while being led to cremation ground. Its white colour signifies purity. In Mithila area all the recipes are made from its seeds, be it its full pop or its powdered form. Both sweet and salty dishes can be prepared from its pops. It has a number of traditional uses, many of which have not yet been properly documented.

2. Methodology

A survey was made for enlisting the indigenous uses of Makhana in Darbhanga and Madhubani districts of north Bihar. Villages like Behat, Sarisab Pahi, Ujan, Dhakjari, Narayanpatti, Keoti, Kharaj, Pindaruch, Jhonjhi, Tumaul and Madhepur which are considered citadel of traditional Mithila culture, were visited to gather firsthand information on the use of Makhana on normal and special occasions. The practices

observed on an exclusive basis in Mithila region *vis-à-vis* a wider association of Makhana with folklife in other parts of India were compared. Elderly knowledgeable persons were approached to decipher the relevance of these practices with distinct occasions. The findings are presented in two tables and six plates depicting 26 photographs.

3. Results and Discussion

Makhana is an indigenous crop of Mithila area. Wild populations of *E. ferox* are found in temperate lakes of Kashmir in the north-west (Kak, 1985) to the water bodies of north-eastern states including Odisha, Assam, Manipur, Tripura, West-Bengal (including Bangladesh) etc., Outside India *E. ferox* is also found in Japan, China, Korea etc., However, its cultivation is localized in the non-calcareous, lentic water bodies of north Bihar. A pond plot where Makhana is once cultivated needs no seeding in the subsequent years. The seeds left over at the bottom sprout during December-January to give rise to the next crop. Alternatively, young plants are also transplanted in a new pond till the month of April. The crop needs to be protected against a number of insect and fungal pests as well as the associated weeds. Availability of water in the ponds during summer months proves a major deterrent as the poor cultivators belonging to the fishing community find it difficult to support expenses on irrigation. The plant produces cleistogamous and chasmogamous fruits that mature to burst during May-June onwards. The arillated seeds float over the pond surface for a few days and fall to the bottom after the aril shrinks. Harvest is performed by fishermen virtually by sweeping the floor after destroying the plants full of pointed spines through cutting the leaves and petioles. The plant parts disintegrate within a

Plate-1



Young *E.ferox* plants during February- March



Makhana plants being transplanted in a new pond during April



Sparsely distributed mature *E.ferox* plants during



Another Makhana pond having open space in the middle to facilitate carp culture (May-June)



Fruits of Makhana taken out of pond after damaging the plants for disintegration before harvest (Aug-Sept.)



Freshly harvested Makhana seeds being weighed for distribution to the pop makers (Sept.-Oct.)

Plate-2



Fig. No. - 76

A groom being ceremonially felicitated with Makhana and other fruits during Kojagara

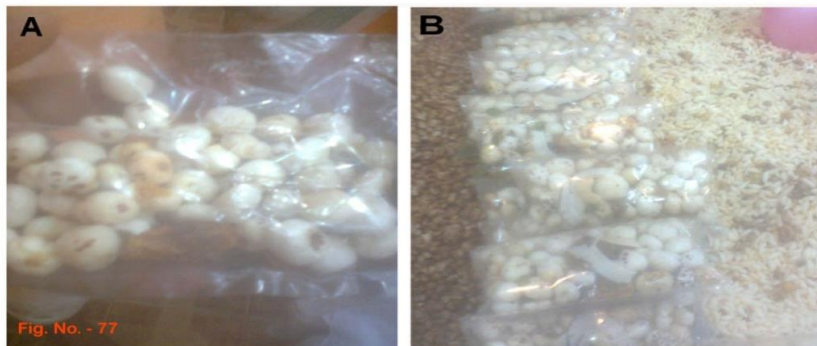


Fig. No. - 77

Polythene packings of Makhana as sold as "Prasad" at Vindhyachal Shrine in Uttar Pradesh



Fig. No. - 78

Makhana garlands offered to distinguished guests



Plate-3



Makhana in sacred thread preparation



Soaked Makhana starch being applied to the the sacred thread



A woman hardening the sacred thread with soaked Makhana starch

Plate-4



A woman performing "Parikarma" around a Pipal (*Ficus religiosa*) plant in her house with Makhana pops used for counting the turns on the occasion of "Somawati Amavasya"



Makhana as a component of items used during last Hindu rites



Makhana (1) as an ingredient of Shradha (last rites) items alongwith white flower (2), Kerao (3), Jau (4), white Yajnopavit (sacred thread) (5) and Til (6) - all placed over a banana leaf

Plate-5



Ingredients of "Makhana Kheer" preparation



Ingredients of "Makhana Halwa"



Salted (1) and sweetened (2) "Makhana" alongwith their ingredients

Plate-6



Fig. No. - 85
 Ingredients of a preparation called "Makhana Dum Aalu" - Makhana pop (1), Boiled Aalu (2), Haldi powder (3), Kaju (4), Mungfali (5), Garam Masala (6), Coriander powder (7), Salt (8) & Chilli powder (9)



Fig. No. - 86
 Ingredients of Makhana Kofta preparation - Makhana pop (1), Makhana powder (2), Coriander powder (3), Salt (4), Kaju Badam paste (5), Chilli powder (6), Garam Masala (7) and Haldi powder (8)

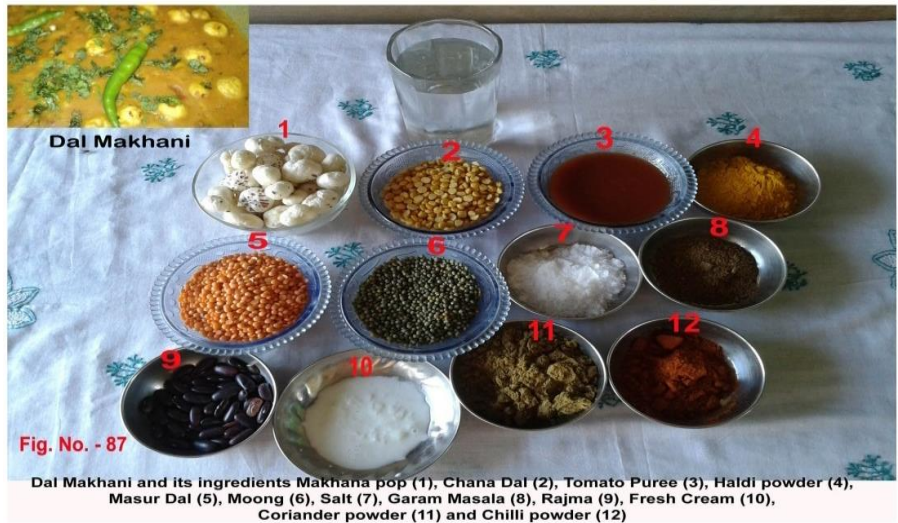


Fig. No. - 87
 Dal Makhani and its ingredients Makhana pop (1), Chana Dal (2), Tomato Puree (3), Haldi powder (4), Masur Dal (5), Moong (6), Salt (7), Garam Masala (8), Rajma (9), Fresh Cream (10), Coriander powder (11) and Chilli powder (12)

fortnight or so and settle to the bottom.

The organic detritus mineralizes during the next summer to provide nutrients to the crop. It is only the seeds that are taken out of the system. As such, Makhana crop has an indigenous fertility status. The rich organic mass at bottom makes Makhana system an ideal habitat for air-breathing fishes like *Anabas testudineus* (Kabai), *Clarias batrachus* (Mangur), *Heteropneustes fossilis* (Singhi) etc. In order to provide a boost to fish production trials are being made to incorporate culture fishery as well under the Makhana based integrated aquaculture. For this, open spaces are left either in the middle or side of the Makhana ponds, that otherwise remains over arched with the dense leaves. This causes a depletion in the amount of dissolved oxygen in the pond water and makes it unsuitable for carp fishes.

Of late, Makhana has attracted global attention in view of its nutritional and medicinal values. Its traditional recipes and the other ethnic uses need proper documentation. A large number of indigenous cuisines are made from Makhana pops on different occasions. All these items are prepared from both Makhana pop and its powder. This is as against its indigenous utility practices in the state of Manipur in north eastern India where the vegetative parts of the plant are used for preparing the subsidiary food items like *Thangjing Khayon Eronba* (young leaves), *Thangjing Soidon Eronba* (mature fruit, seeds), *Thangjing Pan Eronba* (mature fruit, seeds, placenta), *Thangjing Ametpa* (fruits, young leaves, petioles), *Thangjing Kangsoy* (petiole, young seed and placenta), *Thangjing Chamthong* (seed, placenta, petiole), *Thangjing Kanghou* (seeds), *Thangjing Singju* (petiole), *Thangjing Saag* (seeds of immature fruits) (Singh & Singh,

2011). There is a need to make people aware of the benefits and sustainable use of the same in Mithila area as well.

Since Makhana cultivation is localized in Mithila area, a large number of colloquial words are in use. These include- *Aukaa*, *Gaanj*, *Apharaa*, *Thaapee*, etc. These are related with appliances used in harvest and post harvest operations. Entire plant is heavily strewn with stout prickles and spines that can easily wound a person if one tries to touch it. It is on this count that the botanical name of this plant is christened as *E. ferox* after the name of Greek goddess Euryale, known for her dreaded look. Folk sayings related with the ferocious appearance of the plant are there in Maithili and Manipuri languages. A Maithili proverb “*Makhanak Paat San Muhn Pochhab*” is related with asking a person who boasts too much of himself to first get his face wiped with Makhana leaves. The inherent meaning of this proverb is that a person doing so could get hurt by the fine prickles over the Makhana leaves and that could lead his face bleed. This mild scolding could refrain him from taking up an unwelcome gesture (Jha et al., 2003). Another saying related with “Thangjing” in Manipuri language “*Kakwagi thangjigdi yamna chaoyee khutna tambadagi hanjallurabadi khutta tingkhang yurakkani*” means- Kakwapat’s Thangjing is of this much size, if you decrease the size while measuring with your hand you will feel the pain or scratch of the prickles of Thangjing fruit. Another Manipuri phrase “*Koroklaobi Khonglabadi Thangjing Loray*” refers to a bird called “*Koroklaobi*” whose cry may even break the fruit (=seed) of Thangjing. It is roughly around the maturity of Thangjing fruit that the bird cries (Singh, 2003).

In view of the fact that cultivation of Makhana is localised in Mithila area of north Bihar and adjoining regions of Terai Nepal, this zone is supposed to be the region where it has diverse indigenous usages.

Present survey has revealed as many as applications of Makhana with distinct occasions in Mithila area and other parts of India (Table-1)

People of Mithila use Makhana as an ingredient for the marital ritual called '*Kojagaraa*'. It is essential for a bride's parents to send a gift of popped Makhana to the groom's

house for distribution amongst their kin on the occasion of '*Kojagaraa*' in the first year of the marriage. Makhana pops are ceremonially distributed to all the guests/villagers who visit the groom's place on that day. A Makhana garland smeared with *sindur* (vermillion) is sent by the bride's parents to the groom that he wears at the time of *chumaon* (ceremonial felicitation by women amidst chanting of hymns by elder men). In order to remove a feeling of grief that is generally reflected by white colour some pops are coloured red and yellow, to be offered to Lakshmi and Ganesh, the two deities representing

Table 1: Ethnic uses of Makhana in Mithila and other parts of India

Sl. No.	Practices	Occasion	Details
1.	<i>Kojagaraa</i> (a marital ritual)	Aashwin Purnimaa (Full moon night in October)	(a) Makhana pops are gifted by bride party to the groom party, a practice exclusively observed in Mithila region. (b) offered as an ingredient of ' <i>prasaad</i> ' to goddess 'Lakshmi'
2.	<i>Parikramaa</i>	Somavati Amaavaasyaa (A Monday on a no moon day)	For maintaining counts of the circumambulation around a temple or a tree
3.	<i>Shraaddha Karma</i> (last rites)	Death rituals	Makhana pops form an item of offering during last Hindu rites.
4.	Non-flower garland (mala)	During worships and public meetings	Presented to deities and distinguished guests
5.	<i>Prasaad</i> (Edible offerings at holy places)	Throughout the year	Pops sold at Hindu religious shrines
6.	Sacred thread <i>Yajnopaveet</i>	Throughout the year	Hardening the thread through application of starch from Makhana pops soaked in cow milk.
7.	<i>Makhaan Paagal</i> (sweetened makhana) and <i>Makhaan Tasmai</i>	During Navratri	As a constituent of 56 <i>Bhog</i> (offerings to Goddess Durga on the 8 th instant of Navratri)
8.	Component of ' <i>hawan samagri</i> '	Throughout the year	It forms a component of ' <i>hawan samagri</i> ' along with sesame, barley, ghee, coconut, honey, etc.
9.	<i>Panchamewa</i>	During rituals	As ' <i>prasaad</i> '

auspiciousness. In Tumaal a village in Darbhanga district, a vegetable dish prepared from the roasted but un-popped kernel of Makhana seed is specially offered to the bride's father visiting his son-in-law's house on this occasion. *Ghunes*, a head gear ceremonially worn by the bridegroom on the occasion of wedding has streams of Makhana pops hanging downward. This practice is observed by the *Srotriyas* in this area.

Makhana pop is held sacred and is used for maintaining counts of '*Pheras*' (turns) during '*Parikramaa*' (moving circumferentially around either a tree or precincts of a sacred place) on a special occasion like *Somavati Amaavaasyaa*. Makhana pop forms an item of ritual offering during last rites in a Hindu family.

The garlands made of Makhana pops are offered to distinguished guests during public meetings. Makhana pops also form a component of the holy '*Prasaad*' sold at Hindu religious shrines almost all over the country.

An exclusive practice in relation to the utility of Makhana in Mithila region is its use as a hardening material for *sacred thread* (*yajnopaveet*). The use of starch from Makhana pops (soaked in cow milk) hardens the thread and provides it a luster. Alternatively the starch of soaked *chura* (flattened rice) is also used for this purpose. There was a practice of starching the cotton cloth with Makhana gruel, before ironing the same. A special practice prevalent in Mithila area was to apply '*Chunan*' to Mulmul cloth after starching with Makhana gruel. Makhana is known for its better quality of protein and starch

having a very minute size ranging between 1-3^µ (Nath and Chakraborty, 1985 a,b)

Mithila area is also known for *Tantrik* worship. Makhana forms an ingredient of the *Chhappan bhog* (sacred culinary offerings of 56 types) items on the occasion of *Nisha puja* (*i.e.* worship specifically performed in the night of Ashtami (8th instant of the *Navaratra*). Here Makhana is offered in two forms *i.e.* *Makhaan Paagal* (caramelised Makhana) as well as *Makhaan Tasmai* (kheer/dessert/paayas). Another distinct use of Makhana in Mithila is to make ceremonial offering called *Paatari* to family deity. It is generally cooked from Makhana powder, milk and sugar. It is then taken as '*prasaad*'.

Makhana forms a component of '*hawan samagri*' along with sesame, barley, honey, ghee, coconut, etc. A hawan performed with *E. ferox* and other ingredients was reported to bring down the ratio of microbes in the atmosphere (Nautiyal et al., 2008)

The word Makhana is basically derived from the Sanskrit name '*Makhanna*', refers it to be an edible item that is used during '*Yajna*'. Makhana also forms a component of '*Panchamevaa*' *i.e.* the five auspicious dry fruits used during ritualistic oblations. Makhana is a rooted-floating aquaphyte with gigantic leaves but ironically its popped seeds are enumerated as a dry '*Mevaa*'.

Table-2 shows the types of traditional and modern recipes of *E. ferox* and modes of their preparation as practiced in Mithila area and other parts of the country.

Table 2:- Widely Prepared Traditional and Modern Makhana Recipes

Sl. No.	Name of the recipes	Ingredients	Mode of preparation	Occasion
1.	Makhana Snacks	Makhana pop, ghee, salt & black pepper (<i>Piper nigrum</i>)	Makhana is fried in ghee and stirred continuously till it becomes crunchy/ crispy. Flame is put off and salt and black pepper are added to it.	Used as tea time snacks
2.	Fried Makhana	Makhana pop, rock salt & ghee	Makhana is fried in ghee. Flame is put off and powdered rock salt is sprayed over it.	Used during fasting
3.	Sweetened Makhana (<i>Makhana Paagal</i>)	Makhana pop, sugar, cardamom (<i>Elettaria cardamomum</i>) powder.	Makhana pops are fried in the pan, then some sugar is added. Sugar melts itself and it forms a white layer on pops. Flame is put off. This is followed by addition of cardamom powder.	Used during fasts/snacks also offered to the 'baratis' during marraige
4.	Makhana Kheer	Powdered Makhana, milk, sugar, cardamom powder, cashewnut (<i>Anacardium occidentale</i>), almond (<i>Prunus amygdalus</i>)	Powdered Makhana pop is mixed with boiled milk and stirred till it softens. Then the flame is put off and sugar is added. There after it is garnished with fine slices of cashew, almond and cardamom powder.	Used as non-cereal diet during fasting.
5.	Makhana Halwa (Porridge)	Powdered Makhana, ghee, cardamom, sugar, cashew nut almond & water	Powdered Makhana pop is fried in ghee till it becomes golden brown and then some water is added to it. The same is stirred continuously till it obtains a gel like form. Flame is put off and sugar is added to it. The same is garnished. with cardamom powder, sliced almond, cashew etc.	Used as non-cereal diet during fasting.
6.	Dal Makhani (Makhana cooked with pulses)	Chana dal, Rajma, Moong, lentil, tomato puree, salt, Garam masala, coriander powder, fresh cream, turmeric powder, chilli powder, Makhana pops, cooking oil & water	All the pulses are boiled with water. All the spices, salt, cream, tomato puree are fried and then boiled with pulses and some water is added. After mixing and boiling for some time Makhana pops are added and mixed properly. Then the flame is put off.	Common recipe during dinner parties.
7.	Makhana Kofta	Powdered Makhana, Besan, salt, Garam masala, coriander powder, turmeric powder, cashewnut, Badam paste, water, tomato	Powdered Makhana is mixed with besan (raw gram flour) salt, jeera and kneaded with water. Small balls are made out with this mixture and then deep fried in hot oil till they become golden brown in color. Fried balls are later added in the gravy made from the fried mixture of all spices, kaju-badam paste, tomatoes, salt and water. The same is boiled for some time and then the flame is put off.	Used as special dish.

8.	Makhana Dum Aloo (Makhana cooked in combination with potato)	Boiled potato, Makhana pop, Kaju, almond, salt, Moongaphali, coriander powder, Haldi powder, Garam masala, oil & water.	Boiled and diced potatoes are fried in hot oil. Then all spices, moongaphali, salt and, kaju badam are added in the mixture and fried. After some time, water is added and boiled for some time. Then makhana pops are added and mixed. The flame is put off.	During lunch/ dinner parties
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Makhana is generally used on special days like Deepaawali, Kojaagaraa etc. when it is taken in the form of dessert. Makhana powder obtained after crushing its pops keeps on floating over the water surface and mixes only after continued stirring. This property of *E. ferox* has been used in developing a drug delivery mechanism. A recent work by Negi *et al.*, (2011) has led to the development of a non-effervescent floating matrix tablet based on the principle of floatability in *E. ferox* seeds.

A high ground water level in Purnia-Katihar zone facilitates the process of Makhana cultivation through transplantation method. This is because of the bamboo- borings that underground water could be easily taken out. This system is more frequent in the Kosi basin of which Purnia - Katihar area is a major part. As such the farmers generally transplant Makhana plantlets in an arable plot during April. There is a general practice to take two crops from the same pond-plot under the rotational method in this area. Farmers take another crop, generally wheat, in the same plot during December to March. Both the crops support each other. The debris deposited under Makhana cropping supplies nutrients to the wheat crop. Similarly residual fertilizers applied to wheat crop are beneficial to the succeeding Makhana crop. Thus the process of rotational cropping of Makhana and wheat provides an example of sustainable agriculture comprising one arable and the other as an aquatic

crop (Mahto & Jha, 1998).

Issues are involved with intellectual property rights in relation to Makhana cultivation, harvest and post harvest operations. It is generally the "banpar" subcaste amongst the fishing community that is involved with the harvest of Makhana seeds from the pond bottom. They have been performing this through generations. Last few decades have witnessed an extension of its cropping area in states other than Bihar. Indian Council of Agricultural Research has set up a Research Centre for Makhana in Darbhanga. Farmers from several northern states have visited the Center with a view to start Makhana cultivation in their own areas. The first ever variety 'Swarna Vaidehi' has been recently released by the Centre. Makhana farmers in other states, however, are yet to adapt the acumen of the cumbersome process of Makhana harvest and popping. For this, a sustained training is required. As such they prefer to engage the fishing community from Mithila area for this purpose. Fishing community in Mithila area deserves a right under the intellectual property regime for developing and sustaining the process of Makhana cultivation, harvest and post harvest practices. They virtually sweep the floor by diving into the water. They have to hold deep breathes for the same. Raw seeds collected by sweeping the pond floor are brought ashore for post harvest operations. Some attempts made to remove the drudgery of Makhana harvest are yet

to be formalized (Khadatkar *et al.*, 2015). Recent decades, however, have witnessed some other castes also joining this vocation. Bangladeshi migrants could be seen performing the harvest operations in Purnia-Katihar area. However, it is generally the fishing community from Darbhanga and Madhubani districts that seasonally migrates to Purnia and Katihar districts in eastern Bihar and to states like Assam, Odisha and West Bengal to perform this job. Harda village near Purnia town is a major hub of Makhana processing. Fishing community from Dakhram village of Darbhanga district stays there till February to perform the popping business. Purnia/ Katihar zone is a major Makhana hub where raw seeds are also brought from the north eastern states for pop making.

Recent years have witnessed the coming up of processing units that produce a number of ready-to-eat Makhana products like Makhana kheer mix (Jha, 2009), roasted Makhana in different flavours like cream and onion. Makhana forms a significant component of breakfast items all over India and as such it attracts a wider attention as a nutrient diet (Prakash, 2013).

All efforts are being made to achieve the targets of food security in the country and for this, nutritional qualities of a number of hitherto unexploited or underexploited plant products are being investigated. Present work fills a gap in this direction.

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