

MAKHANA PROCESSING

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Characteristics of Makhana Seeds

Makhana Plant (*Euryale ferox*) is an aquatic herb having elliptical or oval leaves floating on the surface of water. The diameter of leaves varies from 300 mm to 1220 mm. Flowers are large, solitary, violet-blue, rose or red coloured usually floating with long pedicels. Fruits are spongy covered with stout prickles. Each fruit contains 20 to 25 seeds having black colour, spherical shape and their size varies from pea to cherry. As soon as the fruits open, the pedicels and petioles along with the leaves begin to rot, leaving the fruits to float. After some days even the fruits also begin to rot and seed with hard seed coat, enveloped in a thin membrane, separates and settles down in the bottom of the pond. The seeds are subsequently collected and processed.

Harvesting and Handling

The collection of makhana seeds from the pond starts in the month of August and is usually completed by the end of November. Small boats or rafts are used for collection and handling. Fishermen, dive into the pond and sweep the muddy floor by specially prepared broom sticks to collect the seeds in several heaps. These heaps remain marked with sticks and finally they are collected with the help of nets. A group of 20 to 25 trained persons normally spend about a week in harvesting one hectare of pond. During the process of harvesting some lighter and smaller seeds float on the surface which are also later collected with the help of a small net. Sweeping, making heaps and collecting seeds through small nets require several dives, thus making the operations tedious. The yield of seeds varies from 2.5 to 3.0 tonnes per hectare of pond.

Processing

Processing of seeds is tedious and requires utmost care, and timely

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operations. Makhana is normally processed at domestic level. The various operations involved in the traditional method of processing are cleaning and washing, drying, storage, size grading, preheating and tempering, roasting and popping of seeds and polishing, grading and packaging of popped makhana. (Fig. 1)

a) **Cleaning and Washing**

Seeds are brought ashore and through rubbing action among themselves by feet the membranous coverings are removed from the seeds. Then the seeds are thoroughly washed with clean water once or twice for removal of mud traces etc. and brought home for further processing.

b) **Drying**

The cleaned seeds are spread on a cemented or paved yard in the sun to remove the surface moisture. The extent of drying is decided by experienced workers engaged in processing. The dried seeds are stored in tubs in bulk for processing in different batches.

c) **Storage**

During storage a small amount of water is sprayed on the seeds at suitable intervals in order to maintain their freshness. The freshness of seeds is very important to maintain the quality of the final product.

d) **Drying and Size-grading**

Stored seeds are dried in the sun for 1.0 to 1.50 h in small lots for removal of free moisture. Drying of seeds is done to the extent that the hard seed coat is separated out easily by hitting with a wooden hammer without damaging the kernel. After drying, the seeds are graded according to size. Generally, 5 to 7 grades are maintained. This is achieved by different sizes of sieves. Size grading facilitates the quality of the end product.

e) **Preheating and Tempering**

The dried seeds are then heated in an earthen pitcher or cast iron pan by placing it over the fire and stirring them continuously. This operation is normally carried out by women. The time of heat treatment of seeds is important and is based solely on the experience of workers. After heating, the seeds are stored in baskets for 40 to 50h till they are equilibrated with ambient temperature. It is believed that this treatment results in tightening of the kernel within the seed coat and improves the popping characteristics of the same.

f) **Roasting and Popping**

This is the most important but laborious operation. About 300g of

conditioned seeds are taken and roasted over the fire in an open pan at high temperature with continuous stirring. After 3 to 4 minutes, a crackling sound is heard from the seeds being roasted which is the indication of the required level of roasting. The hot roasted seeds, 5 to 7 in number, are scooped from the pan and kept on a hard surface and sudden impact force is applied with the help of a wooden hammer. As soon as the hard seed coat breaks, the kernel of seeds pops out in expanded form. These popped kernels have white colour, very low density and is known as makhana. Further makhana and seed coats are separated manually. The yield of popped makhana varies from 35 to 42% on seed weight basis.

g) Polishing, Grading and Packing

Makhana are polished by providing rubbing action among themselves. This is done by taking a few in hand and rubbing them vigorously. This operation improves the brightness and luster of makhana and fetches higher price. This operation is normally done at the traders level. Makhana is finally graded into two or three grades depending upon the size, shape and whiteness. The size and degree of whiteness are the main criteria for grading of the final product. The graded makhana is then packed in gunny bags.

Utilization

Makhana, being rich in carbohydrate, protein, minerals etc. is used for various purposes. The proximate analysis is given below:

CONSTITUENTS	PER 100 g	CONSTITUENTS	PER 100 g
Moisture	12.8 g	Carbohydrate	76.9 g
Protein	9.7 g	Calcium	20.0 mg
Fat	0.1 g	Phosphorous	90.0 mg
Minerals	0.5 g	Iron	1.4 mg
		Energy	347.0 Kcal

Makhana is utilized for milk based food preparations like kheer, puddings and curry. Fried makhana with salt or sugar are very widely used as snack foods. Makhana has medicinal value and is used as an important ingredient in preparation of indigenous tonics. It also serves as an important source of starch for textile industries.

Conclusion

Makhana cultivation supports the livelihood of fishermen community and is considered a cash crop in certain regions. Little effort has so far been made to improve the collection, handling and processing techniques. There is need to mechanize and improve the processing techniques.

References

1. David L.J. and Mishra U.N. (1976). The Aquatic Crop of Mithila. Indian Farming, vol.XXVI(3), pp.23-25.
2. Gopalan C.; Ramasastri B.V. and Balsubramanian S.C. (1987). Nutritive Value of Indian Foods. National Institute of Nutrition. Indian Council of Medical Research, Hyderabad, p.112.
3. Lakhmani A.K. (1978). A Study on Makhana Economy in District Darbhanga, Bihar. Unpublished M.Sc.(Agri) Thesis. R.A.U., Pusa, Bihar.
4. Singh B.K. (1988). The Multi-dimensional 'Makhana'. The Hindustan Times, Patna, Monday, May 23, p.8.

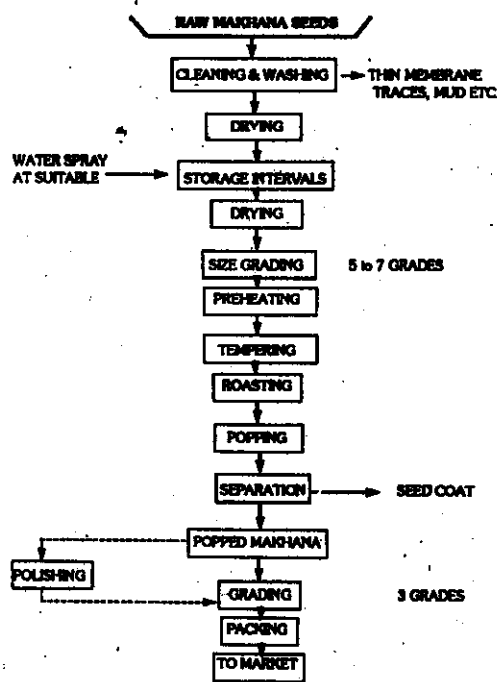


Fig. 1 Flow diagram of makhana processing