

## Makhana – The Ancient Superfood with Modern Health Benefits

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### SUMMARY

Makhana, or fox nuts, comes from *Euryale ferox*, an aquatic plant mainly cultivated in India and China. Rich in antioxidants, protein, fiber, and essential minerals, it undergoes harvesting, drying, roasting, shelling, and puffing to create a crunchy, nutritious snack. Known for benefits like heart health, weight management, and blood sugar control, it is ideal for diabetics, pregnant women, athletes, and the elderly. Gluten-free and low in calories, makhana is a healthier alternative to processed snacks, used in traditional and modern cuisine. Growing global demand is driving innovations in processing, flavoring, and product development.

### INTRODUCTION

Makhana, or fox nuts, comes from the seeds of the lotus plant (*Euryale ferox*), mainly found in India, China, and Southeast Asia. A traditional superfood in Ayurvedic medicine and Indian cuisine, it is valued for its high nutrition, antioxidants, and health benefits. Processing involves manual harvesting, drying, roasting, and puffing, making it labor-intensive but economically significant. With rising demand in the health food industry, makhana is gaining popularity as a gluten-free, high-protein, low-fat snack. Its versatility in food and medicine makes it a key agricultural product, with Bihar as India's leading producer.

### Taxonomic Classification

Category	Details
Kingdom	Plantae (Plants)
Sub-Kingdom	Tracheobionta (Vascular plants)
Super Division	Spermatophyta (Seed plants)
Division	Magnoliophyta (Flowering plants)
Class	Magnoliopsida (Dicotyledons)
Order	Nymphaeales
Family	Nymphaeaceae (Water Lily family)
Genus	<i>Euryale</i>
Species	<i>Euryale ferox</i>

### Botanical Features

**Growth Habit:** Aquatic herb

**Leaves:** Large, circular, floating with spiny margins

**Flowers:** Purple, showy, emerging above the water surface

**Fruits:** Spiny, containing black seeds (raw form of makhana)

**Seeds:** Hard-coated, requiring processing (roasting & puffing) for consumption

This classification places makhana within the Nymphaeaceae family, which includes various water plants like water lilies. Unlike the common lotus (*Nelumbo nucifera*), *Euryale ferox* is unique due to its spiny fruit and nutritional seed value.

### Processing of Makhana (Fox Nuts) from Lotus Seeds

The processing of **makhana** involves several labor-intensive steps, starting from the collection of **raw seeds from water bodies** to the final **puffed edible makhana**.

#### 1. Collection of Raw Seeds

**Harvesting Season:** The seeds of *Euryale ferox* are harvested between August and October in India.

**Collection Method:** Seeds are collected manually by farmers using nets, bamboo baskets, or floating devices. The seeds sink to the bottom of ponds, lakes, or wetlands, so farmers dive into water or use scooping tools to gather them.

**Initial Cleaning:** Seeds are washed in freshwater to remove mud, debris, and unwanted impurities. They are then sun-dried for 2–3 days to reduce excess moisture.

## 2. Storage & Preliminary Drying

After collection, the seeds are stored for several months to allow natural aging, which helps in improving the popping quality.

**Sun Drying:** Seeds are spread on mats and dried for 2–3 days under the sun to reduce moisture content. The drying process prevents fungal growth and enhances shelf life.

## 3. Roasting Process

This is one of the most crucial steps in makhana processing, responsible for the final crunchy texture.

### Traditional Roasting Method (Sand Roasting)

**Heating in Hot Sand:** The dried seeds are placed in a large iron pan (kadhai) filled with hot sand (heated up to 250–300°C). The seeds are constantly stirred to ensure even heating.

**Partial Puffing:** The seeds swell slightly, but the outer shell remains intact. Once heated adequately, they are removed from the sand and cooled.

### Mechanical Roasting (Modern Method)

**Use of Rotary Roasters:** Some industries use **automatic roasting machines** with controlled temperature settings. Uniform heating, less manual labor, and better efficiency.

## 4. Cracking & Splitting the Shell

After roasting, the outer hard shell must be broken to extract the inner white kernel (the edible part).

**Manual Shelling:** Workers hit the roasted seeds with a wooden hammer to break open the shell. This requires skill to avoid breaking the soft inner puffed kernel.

**Machine Shelling (Modern Approach):** Some commercial units use automated cracking machines for large-scale production.

## 5. Final Puffing (Expansion Process)

The extracted white kernel undergoes a second roasting step at a lower temperature to achieve full expansion and crispiness.

**Puffing Temperature:** 100–150°C.

**Outcome:** The kernels expand into soft, light, and crunchy fox nuts (makhana).

## 6. Grading & Sorting

**Size-Based Sorting:** The makhana is classified into different sizes (large, medium, small). Bigger makhana fetches a higher market price.

**Quality Inspection:** The final product is checked for defects, broken pieces, or burnt seeds.

**Packaging:** Makhana is packed in moisture-proof, airtight bags to maintain crispness.

## 7. Value Addition & Flavouring (Optional)

**Flavoured Makhana:** Roasted with salt, spices, caramel, chocolate, or cheese to create different snack varieties.

**Powdered Makhana:** Makhana is ground into flour and used in making healthy foods like energy bars, kheer, and baby food.

## 8. Storage & Distribution

**Shelf Life:** Properly processed makhana has a shelf life of 6–12 months when stored in cool, dry conditions.

**Market Distribution:** Sold in retail stores, supermarkets, online platforms, and exported worldwide.

## Health Benefits of Makhana (Fox Nuts)

Makhana (*Euryale ferox*), also known as fox nuts or gorgon nuts, is a superfood packed with nutrients, antioxidants, and medicinal properties. It has been used in Ayurvedic and Traditional Chinese Medicine (TCM) for centuries and is now gaining global recognition as a healthy snack.

### 1. Rich Source of Antioxidants

Makhana is loaded with flavonoids, polyphenols, and alkaloids, which help fight oxidative stress and reduce inflammation. These antioxidants prevent cell damage, reducing the risk of aging, cancer, and chronic diseases. Kaempferol, a flavonoid found in makhana, is known to slow aging and repair damaged cells.

**2. Supports Heart Health**

Low in cholesterol, saturated fat, and sodium, making it heart-friendly. Helps regulate blood pressure due to its high magnesium and potassium content. Reduces bad cholesterol (LDL) and improves good cholesterol (HDL), preventing heart disease. Anti-inflammatory properties help prevent artery blockages and heart attacks.

**3. Aids in Weight Loss**

Low-calorie and high-fiber content helps control appetite and keeps you full for longer. Boosts metabolism, aiding in fat burning and digestion. Being gluten-free, it's an excellent alternative for people with gluten intolerance or celiac disease.

**4. Regulates Blood Sugar (Diabetes Management)**

Low glycemic index (GI) makes it diabetes-friendly, preventing sudden blood sugar spikes. High fiber content slows carbohydrate absorption, stabilizing blood glucose levels. Magnesium content helps improve insulin sensitivity, reducing diabetes risk.

**5. Improves Digestive Health and enhances kidney function**

High fiber content aids in smooth bowel movement, preventing constipation and bloating. Acts as a natural detoxifier, helping remove toxins from the digestive system. Promotes a healthy gut microbiome, improving nutrient absorption. Acts as a natural diuretic, promoting urine production and flushing out toxins. Prevents kidney stones and urinary tract infections (UTIs). Reduces excess water retention and bloating by balancing electrolytes.

**6. Strengthens Bones & Joints**

Rich in calcium, magnesium, and phosphorus, essential for bone strength and development. Helps prevent osteoporosis and arthritis, especially in older adults. Reduces joint pain and stiffness due to its anti-inflammatory properties.

**8. Boosts Brain Function & Mental Health**

Rich in thiamine (Vitamin B1), which improves cognitive function and memory. Reduces stress, anxiety, and depression, promoting mental well-being. Contains neuroprotective compounds, which may help prevent neurodegenerative diseases like Alzheimer's and Parkinson's.

**9. Improves Reproductive Health & Fertility**

Known as a natural aphrodisiac, improving sexual health in both men and women. Enhances sperm quality and motility, supporting male fertility. Helps regulate hormonal balance in women, aiding in menstrual health. Reduces symptoms of PMS (Pre-Menstrual Syndrome) and menopause.

**10. Boosts Immunity and excellent for pregnant women**

Rich in protein, zinc, and antioxidants, strengthening the immune system. Fights infections, reducing the risk of colds, flu, and other illnesses. Supports wound healing and tissue repair. Nutrient-dense and easy to digest. Provides essential vitamins and minerals for fetal growth and development. Supports breast milk production due to its high protein and calcium content.

**11. Skin & Hair Benefits**

Slows aging by preventing wrinkles, sagging, and pigmentation. Improves skin elasticity and hydration. Strengthens hair roots, preventing hair fall and premature graying. Rich in protein, essential for hair growth and shine.

**Comparison of Makhana with Other Snacks**

Nutrient	Makhana (Per 100g)	Popcorn	Chips	Nuts (Almonds, Cashews)
Calories	347 kcal	375 kcal	550 kcal	600+ kcal
Protein	9.7g	9.4g	6g	18-22g
Fiber	14.5g	5g	2g	7-10g
Fat	0.1g	4.5g	35g	40-50g
Antioxidants	High	Low	Very Low	Moderate

**Makhana is a better alternative to unhealthy snacks like chips and fried foods**

**CONCLUSION**

Makhana from lotus is a nutritious, eco-friendly, and economically significant crop that has potential for value-added product development. If you're considering fisheries waste utilization, you might explore combining makhana with fishery-based proteins or bioactive compounds to create functional food products. Makhana is a

nutrient-rich, super healthy, and versatile snack that benefits the heart, brain, digestion, skin, bones, and overall well-being. Its low-calorie, high-antioxidant, and gluten-free properties make it an excellent alternative to processed snacks.

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