

## Foxnut (Makhana): A Superfood

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### Introduction

Aquatic nut crop *Euryale ferox* Salisb also known as foxnut, gorgon nut or prickly water lily, belongs to the Nymphaeaceae family of water lilies, however it is also referred to as Euryalaceae. It is a member of the Nymphaeaceae family and is also referred to as "Makhana" or "Phool Makhana" in the local languages of the Indian Subcontinent. Other common names for it include "fox nut," "gorgon nut," and "prickly water lily." Because of their black exterior seed coat, makhana seeds have earned the nicknames "Black Diamonds" and "Black Gems of Wetlands" by certain experts. Dry fruits are sold as a cash crop known as pop makhana, sometimes known as makhanalawa. Approximately 80 per cent of the whole production of processed Makhana is produced in just the districts of Darbhanga, Madhubani, Purnia, and Katihar. The area used for makhana farming is roughly 13,000 hectares Makhana farming is a source of income for Numerous farmers have limited resources, particularly in Bihar and Manipur. The popped form of makhana seeds is where their commercial value lies. The starchy white puffs are promoted as a premium dry fruit product of makhana and are both very wholesome and delicious.

### Taxonomy of Foxnut

The word "foxnut" can apply to a variety of plant species, although it is most frequently connected to the water lily *Euryale ferox*. The taxonomy of *Euryale ferox* is shown below:

Kingdom: Plantae

Phylum: Angiosperms (flowering plants)

Class: Eudicots

Order: Nymphaeales

Family: Nymphaeaceae (water lily family)

Genus: *Euryale*

Species: *Euryale ferox*

### Nutritional Value of Foxnut

Foxnut (*Euryale ferox* Salisb) has a lot of carbs, protein, and minerals but little fat. Raw seeds have a calorific value of 328 kcal per 100g, whereas puffed seeds have a calorific value of 362 kcal per 100g.

According to nutritional research, the edible component of the seed has a healthy quantity of sugar, phenol, and ascorbic acid along with 12.8% moisture, 9.7% protein, 0.1% fat, 76.9% carbohydrates, and 0.5% mineral contents. It also contains 1.45% iron. Its distinctive dietary quality is shown by the amino acid index, which is greater than that of staple foods (Francis et al., 2018). They also have significant amounts of magnesium, potassium, and phosphorus. Makhana also contains a few vitamins, but in smaller amounts (Vipul et al., 2021). In terms of sugar, proteins, phenol, and ascorbic acid content, foxnuts outperform other dry fruits like walnut, almond, cashew nut, or coconut (Shankar et al., 2010). The makhana is rich in macro as well as micronutrients as well as a good source of minerals. Cu, Na, Ca, Fe, and Mg these trace metals have been reported by different researchers. The vegetative part of the makhana contains a good amount of N, P, and K. The high content of the P, Fe, and Zn is due to the muddy field condition. The makhana also contains a high number of vitamins such as vitamin A and vitamin C ranging from 62.23 to 63.84 IU/g and 0.18 per cent to 0.20 per cent respectively (Khadatkar et al., 2020)

### Cultivation of Makhana:

Makhana is grown either in field systems or perennial water bodies with 4-6 feet of water depth.

**Pond System:** This is how Makhana farming has always been done. Old Makhana growing ponds do not require seed sowing since leftover seeds from one crop are used to plant seeds for the following crop. However, neither direct seed sowing nor transferring the plantlets into fresh bodies of water are acceptable ways to begin makhana cultivation. In the conventional technique, air-breathing fish are added to ponds as wild fish along with floodwater and gathered by farmers as a supplemental crop, in addition to Makhana.

**Field system:** This is a novel method of Makhana farming that the research centre has standardised. According to the system, Makhana is grown in fields of crops at a water depth of 1 foot (Kumar et al., 2011). This technology is relatively simple to use

and offers the chance to farm the same fields for cereals and other field crops each year. The Makhana seedlings are initially grown in a nursery before being transferred at the right time into the main field. The transplanting might take place anywhere from the first week of February to the third week of April, depending on the availability of the field and nursery. By using this approach, the Makhana crop may be harvested for as little as four months (Kumar et al., 2011b).

### Uses of Foxnut

Seeds and Makhana Pop are the two ways that makhana is kept. It is primarily consumed in popped form in India, whereas it is used as food or medicine in China. The foxnut or gorgon nut's swollen kernel, known as makhana, is popped. The edible starchy kernel of the nuts is removed by popping them after being pulled from water. The popped kernel, also known as Makhana in India, is the inflated nut kernel created by this technique. There are various uses for makhana pop. It is a delicious cuisine that is eaten as namkeen, kheer, curry, and other dishes. Traditional uses for makhana pop include usage in traditional medicine and as a high-protein, low-fat, sweet snack. A variety of delectable and filling sweet meals, including Makhana kheer, vermicelli, halwa, flour, puddings, and other sweet dishes, are made using popped makhana. Rather than using arrow root, Makhana flour is utilised instead. Delicious meals like sweet meat, soups, Makhana kheer, and other culinary preparations are also made using the flour. The non-cereal meal makhana is ingested by worshippers during their fasts. Thus, it accomplishes the religious goal. Makhana is revered as a holy and heavenly meal in all religions (PMFME - Foxnut: Makhana).

### Benefits of Foxnut

Foxnuts offer several potential health benefits, including:

**1. Nutrient-Rich:** Essential elements including protein, fibre, vitamins (particularly B vitamins like folate and riboflavin), and minerals (such as magnesium, potassium, and phosphorus) are all present in sufficient amounts in foxnuts. They have little fat and few calories.

**2. Antioxidant Properties:** Flavonoids and polyphenols, which help fight oxidative stress and lower the risk of chronic illnesses, are found in foxnuts. Cells can be shielded from free radical damage with the aid of antioxidants.

**3. Weight Management:** Foxnuts might be a healthy snack option for people trying to control their

weight because of its low calorie and fat content. By encouraging feelings of fullness, the fibre level may also help people consume less calories overall.

**4. Blood Sugar Control:** Due to their low glycemic index, foxnuts have a negligible effect on blood sugar levels. For individuals who already have diabetes or are at risk of acquiring it, this may be helpful.

**5. Heart Health:** Foxnuts include the minerals magnesium and potassium that are crucial for heart health. They can lower the risk of cardiovascular illnesses and assist control blood pressure.

**6. Digestive Health:** Dietary fibre, which supports digestion and helps avoid constipation, is included in foxnuts in good amounts. Additionally, fibre supports a balanced gut microbiota.

**7. Low in Allergens:** Foxnuts are a great snack for anyone with gluten sensitivity or allergies because they are naturally gluten-free and devoid of common allergens.

**8. Rich in Protein:** Foxnuts are a good plant-based protein source since they have a respectable quantity of protein. Vegans and vegetarians may especially benefit from this.

**9. Amino Acid Content:** The body's proteins are composed of necessary amino acids, which are found in these seeds.

**10. Versatile Ingredient:** There are several culinary uses for foxnuts. They frequently offer a distinctive crunch and flavour to both savoury and sweet meals when roasted, fried, or otherwise prepared.

### Current Status of Makhana

Makhana has a high nutritional content and several health advantages, thus demand has been steadily rising recently. The modern makhana in India is devoured all across the nation. nonetheless, commercial makhana production is only permitted in a few parts of West Bengal, Assam, Manipur, and North Bihar, and through a network, reaches all of the country's largest cities including producers, processors, local vendors and other dealers, commissions, remote wholesalers, wholesalers, both customers and retailers. Farmers in production areas are estimated to receive about 55 per cent of the final retail price in the local market. However, when it comes to makhana, its share declines rapidly. Due to the high price of pops, they are sold in distant markets receive.

**References**

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