

Water Chestnut (*Trapa spp.*) An Emerging Aquatic Cash Crop of Indian Wetlands

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Abstract

Water chestnut (*Trapa spp.*) is an important aquatic nut crop of India, cultivated mainly in freshwater wetlands, ponds and shallow lakes. The crop is valued for its high carbohydrate content, medicinal properties and its role in sustaining the livelihoods of small and marginal farmers in wetland-dominated regions. In India, water chestnut cultivation is concentrated in Bihar, Uttar Pradesh, West Bengal, Madhya Pradesh, Odisha and Assam, where traditional

wetland farming systems are prevalent. The nuts are consumed fresh, boiled or roasted and are also processed into flour, which has high demand during religious fasting periods. The present article discusses the scope of water chestnut cultivation in India, cultivation methodology, nutritional and medicinal importance, results obtained under Indian conditions, economic relevance and future prospects for sustainable wetland agriculture.

Introduction

Water chestnut (*Trapa natans*) is an annual floating aquatic plant belonging to the family Lythraceae. It is a rooted aquatic plant with a long, flexible and spongy stem anchored in the muddy bottom of ponds and lakes. The plant produces two distinct types of leaves: (i) submerged leaves, which are finely dissected and feathery in appearance (ii) floating leaves that form a compact rosette on the water surface. The petioles of floating leaves are swollen and spongy, enabling buoyancy. Flowers are white, solitary and axillary, appearing above the water surface. The fruit is a hard nut with two or four sharp spines, which protect the seed from predation. Inside the hard pericarp, a white starchy kernel develops, which is the edible portion of the nut. Water chestnut is commonly known as Singhara in India and has been

cultivated since ancient times as a food and medicinal crop. The crop is well adapted to stagnant or slow-moving freshwater bodies and forms an integral component of wetland agriculture. In Eastern India, particularly in Bihar and Uttar Pradesh, water chestnut cultivation supports thousands of farming households and provides seasonal employment during harvesting and processing periods. In recent years, the importance of water chestnut has increased due to its suitability for waterlogged conditions, rising demand for gluten-free foods and its potential role in climate-resilient agriculture. Several Indian studies have highlighted that productive use of wetlands through aquatic crops like water chestnut can enhance farmer's income while maintaining ecological balance (Singh et al. 2016; Kumar et al. 2020).

Nutritional and Medicinal Importance

Water chestnut is considered as highly nutritious and easily digestible food. It was found during the studies that the kernels contain high amounts of carbohydrates (23.3 g/100g), moderate protein (4.7 g/100g) and very low fat (0.3 g/100g), making them an excellent energy source in dry fruit (339 kcal/100g). The dried nuts are rich in

minerals such as calcium (205 mg/100g), potassium (583 mg/100g), phosphorus (205 mg/100g) and iron (4.4 mg/100g). Due to the absence of gluten, water chestnut flour is widely consumed during religious fasting and is suitable for people with gluten intolerance. In traditional medicine, water chestnut is valued for its cooling

effect on the body and its role in improving digestion. It has been used in the treatment of diarrhoea, dysentery and urinary disorders. It has

also antioxidant and phenolic compounds, which contribute to its health-promoting properties (Singh et al. 2024 Jana et al. 2020).



Economic and Ecological Importance

Water chestnut cultivation plays a significant role in rural economies of wetland-rich states like Bihar, Uttar Pradesh and West Bengal. The crop provides income opportunities through fresh nut marketing, flour processing and value-added products such as sweets and snacks. It has high

demand during festive and fasting seasons ensures remunerative prices for farmers. As an ecological perspective, water chestnut helps in productive utilization of wetlands, reduces soil erosion in ponds and supports aquatic biodiversity.

Climatic and Soil Requirements

Water chestnut thrives best under warm and humid climatic conditions. It shows optimum growth at temperatures ranging between 25-30°C, with adequate sunlight and continuous availability of freshwater. The crop prefers shallow water bodies with a water depth of 0.5 to

previous season are selected for propagation. Sowing is generally done during June and July by broadcasting nuts into the water, where they sink and germinate from the pond bottom. Nutrient management mainly relies on organic sources. Application of farmyard manure at the rate of 5–10 t/ha has been reported to improve vegetative growth and nut yield (Verma et al., 2018). Water depth is maintained uniformly throughout the crop period, as sudden fluctuations adversely affect flowering and fruit set. Weed infestation is managed manually and pest and disease incidence is generally low in well-managed water bodies. Harvesting is carried out between October and December when nuts mature and sink to the bottom. Nuts are collected manually, often using nets or by hand, which is labour-intensive but ensures minimal damage to the produce.

1.5 m. Clay to clay-loam soils rich in organic matter are ideal for anchorage and nutrient availability. Slightly acidic to neutral soil reaction with pH 7.2 has been found most suitable for better growth and nut development under Indian conditions (Kundu and Joshi, 2012).

Cultivation
Cultivation of water chestnut in India is largely traditional, though improved management practices are gradually being adopted. Ponds and shallow lakes are prepared before the onset of monsoon by removing excess weeds, silt and debris. Healthy and mature nuts from the

Yield under Indian Conditions

Under Indian wetland conditions, water chestnut yields vary depending on water quality, nutrient availability and management practices. Research conducted in Bihar and Uttar Pradesh has reported fresh nut yields ranging from 3 to 5 t/ha (Singh et al. 2016). Improved pond management and organic nutrient

supplementation have been found to increase nut size, kernel weight and overall marketable yield. Uthappa et al. (2015) reported that better nutrient availability enhances carbohydrate accumulation in kernels, resulting in improved quality of nuts suitable for fresh consumption and flour preparation. Farmer harvesting water chestnut.

Conclusion

Water chestnut is a valuable aquatic crop with immense potential for enhancing farmers' income and ensuring sustainable use of wetlands in India. Its high nutritional value, medicinal importance and adaptability to waterlogged conditions make it an ideal crop for wetland agriculture. Adoption of improved cultivation

practices, organic nutrient management and value addition can further enhance productivity and profitability. Strengthening research and extension efforts will help in promoting water chestnut cultivation as a climate-resilient and economically viable cropping system in India.

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