Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 06, Issue: 03 (MAY-JUNE, 2026)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Morchella esculenta: A Health Promoting Functional Food

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Morchella esculenta Fr., (Morel) a member of the *Ascomycota* group of edible mushrooms, is referred to as Guchi in India. It has economic, scientific, and nutritional value. They are distinguished by their peculiar morphology, which includes a sub-cylindrical, hollow stipe and a nearly spherical or oval-shaped cap with characteristic pits. The intricate interactions between temperature, humidity, light, pH, and microbiome dynamics have historically made morel cultivation difficult (Tietel and Masaphy, 2018). As a result, for ages, morels have mostly been collected from the wild. Morchella are highly prized culinary fungus species because of their distinct texture, umami taste, and appealing flavour (Belbase *et al*., 2025).

Nutritional value

This mushroom is delicious and healthy. With smaller quantities of vitamins A, C, and D, it is high in protein, and vitamins, particularly those in the B-complex. Important minerals like calcium, iron, copper, zinc, magnesium, manganese, sodium, phosphorus, potassium, and selenium are also provided by it. Its composition is roughly 38% carbs, 32.7% protein, 17.6% fibre, 9.7% ash, and 2.0% fat, with few calories and low fat. Additionally, it has been reported to contain approximately 195 mg/g of iron, 98.9 mg/g of zinc, 62.6 mg/g of copper, 54.7 mg/g of manganese, 23.5 mg/g of potassium, 3.49 mg/g of phosphorus, 1.82 mg/g of magnesium, 0.85 mg/g of calcium, and 0.18 mg/g of sodium (Raman *et al*., 2018). A variety of aromatic substances, including phenols, alcohols, acids, esters, aldehydes, ketones, and terpenes, have also been found in *M. esculenta* in earlier research. Alcohol (15.55%), carbamic acid (11.37%), phenol (50.88%), and esters are the primary aromatic compounds found (Genccelep *et al*., 2009). *M. esculenta* has also been shown to contain a variety of aromatic chemicals, including phenols, alcohols, acids, esters, aldehydes, ketones, and terpenes. Alcohol (15.55%), carbamic acid (11.37%), phenol (50.88%), and esters are the primary aromatic compounds found.22 Like the proteins in the fruiting body, proteins from *M. esculenta* mycelium can also be a helpful protein supplement (Duncan *et al*., 2002).

Health benefits

Morel mushrooms are not only a culinary delicacy but also pack a powerful nutritional punch. Incorporating morel mushrooms into your diet can be both a flavourful and health-conscious decision.

a) Rich in Antioxidants: Boosts immunity and shields cells from free radicals.
b) Vitamin D source: boosts immunity and encourages healthy bones.
c) Rich in Fibre: Enhances digestion and encourages sustained fullness.
d) Mineral Supplier: Gives the body vital minerals like zinc and iron.
e) Cholesterol-Free: A healthy option free of dangerous cholesterol.
f) Low Calorie Content: Ideal for mindful eating without compromising flavour.
g) Vegan and gluten-free: A flexible choice for a range of dietary requirements.

h) Blood Sugar Regulation: Assists in keeping blood sugar levels steady.
i) Anti-Inflammatory: The body's natural defence against inflammation.
j) Energy Booster: Provides the body and mind with natural energy.

Value addition

Fresh edible fungus have a shelf life of only one to three days at ambient temperature and five to seven days when refrigerated (Jiang, 2013). They are extremely vulnerable to quick water loss, enzymatic browning, and microbial spoiling due to their highly perishable nature, absence of a protective outer cuticle, and delicate honeycomb structure. As one of the priciest gourmet fungus in the world, their premium market status is maintained by proper management. This suggests that using efficient preservation techniques is essential to preserving edible fungi's post-harvest quality.

Drying/Dehydration

The most dependable long-term preservation method for morels is drying, which enhances their distinctive smokey scent (Belbase *et al*., 2025).

Sun/Solar Drying: Conventional but very effective. Morels are arranged in solar tunnels or on elevated mesh screens in direct sunlight. This technique uses UV exposure to naturally raise vitamin D levels.

Cabinet Hot-Air Drying: To reduce moisture to 3% to 5%, mushrooms are placed in a cabinet dryer set at 50°C to 60°C for 6 to 8 hours.

Lyophilization, or freeze-drying: involves freezing and sublimating fresh morels under vacuum. This is the best method for maintaining the original honeycomb's nutritious components, form, and texture.

Ready to Eat products

Mushroom Pickles: To extract extra moisture, drained and blanched morels are salt-cured overnight. They are then completely immersed in heated mustard oil after being seasoned with spices including fennel, turmeric, and mustard powder. At normal temperature, this procedure increases shelf life by up to a year.

Canning: Cleaned morels are snugly packed into cans after being blanched for two minutes. Before being hermetically sealed and autoclaved, they are completely filled with a boiling brine containing 2% salt, 2% sugar, and 0.3% citric acid.

Formulations with Powder and Fortification

Morel powder can be increasingly incorporated into immune-boosting pharmaceutical supplements, soup powders, functional baking mixes, biscuits, and wheat flours, because of its high concentrations of bioactive polysaccharides like beta-glucans (Singhal *et al*., 2019).

Gourmet Infusions

High-end finish culinary oils are made by steeping fragmented or tiny dried morels in premium olive or avocado oils. To create high-end seasoning salts for upscale dining establishments, coarse sea salt is mixed with ground dehydrated morels.

Conclusion

Valued for their distinct sensory qualities and nutritional content, morels are a rich source of bioactive substances with a variety of health advantages. In order to minimise market volatility, minimise perishability, and optimise revenue, the *Morchella* supply chain must strategically integrate post-harvest management and value-addition approaches. Stakeholders can turn seasonal harvests into a year-round, high-margin, sustainable sector by putting sophisticated dehydration and development of functional foods or processed products into practice.

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