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# Savory Diet Fungus *Morchella*

*Morchella* is a savory diet fungus. It is also known by the name Morel and is the world's most prized edible fungus. About 400 *Morchella* species have been reported from various parts including Asia, USA and Europe. True morel (*Morchella* spp.) which includes edible *Morchella* has health values because of presence of phytochemicals in its tissues besides phenolic compounds and vitamin D. It is the flavor of this mushroom which makes it savory and medicinal value as a perfect diet.

## INTRODUCTION

We are all well conversant with the savory diet fungus *Morchella* which is economically valuable fungus. Morels include edible mushrooms especially *Morchella* which is known not only for their savory flavor but also for anti-oxidative and anti-inflammatory properties. It is the flavor of this mushroom which makes it savory and medicinal value as a perfect diet. Few *Morchella* spp., I found to grow and fruit after lightening in coniferous forests during rainy season or prior in spring. Literature also cites four species viz., *M. tomentosa*, *M. sextelata*, *M. eximia* and *Mel-8* to fruit under similar conditions which are also have similar records (Du et.al 2016). Few of *Morchella* spp. have been successfully cultivated and marketed to nearby markets; however, there is further a need to prevent other important species from their danger of extinction. *Morchella* farming is thus an important endeavor especially for youths for large scale industrialization as also reported by Liu et al. (2017).

## DISTRIBUTION PATTERN AND ECONOMIC IMPORTANCE

*Morchella esculenta* (L.) Pers. is a true morel which belongs to order Pezizales and family Morchellaceae. *Morchella* species are well known as true morels and included in the genus *Verpa* and *Gyromitra*. These are widely found in India, Nepal, China, Canada, USA and Europe. In India, this mushroom is commonly known as Guchhi, Chhunchhru, etc. *M. esculenta* is known to contain beta carotene and linoleic acid. Anti-microbial properties of this fungus have also been studied against

*Escherichia coli*, *Enterobacter cloacae*, *Salmonella typhimurium*, *Staphylococcus aureus* and *Listeria monocytogenes*. In a powder form, it can be used for the treatment of wounds, nausea, arthritis and emollient. Besides, the fungus inhibits chronic inflammation. *Morchella* is rich in proteins, carbohydrates, vitamins and minerals. It can reduce fatigue and sleeping problems. Various human diseases can be cured by using *Morchella* directly or indirectly because of anti-microbial and anti-inflammatory chemicals present naturally in its fruiting body. In India, Guhhi values at around Rs.15,000-20,000/kg thus beyond the reach of a common man.



### SEASON

*Morchella* occurs in high altitude in a forest habitat at an elevation of 3500-4500m. In India, it is widely found in Kashmir, Uttarakhand and Himachal Pradesh. In Himachal Pradesh, *Morchella* is found in thick forests of districts of Kullu, Sirmaur, Shimla and Mandi districts. *Morchella* is also called and known by the name *Guchhi* in different markets of India.

### TAXONOMY

The fungus is included in order Pezizales of division Ascomycota under Kingdom Fungi. It appears like honeycomb in which upper portion is a network of ridges with pits in between them. There are about 60 species of *Morchella* while phylogenetic analysis of 600 collections revealed at least 40 phylogenetic

species. Black and Yellow morels are well known and reported. They include *M. deliciosa*, *M. vulgaris*, *M. crassipes*, *M. spongiosa*, *M. steppicola*, *M. angusticeps*, *M. elata*, *M. smithiana*, *M. umbrina* and *M. vulgaris*. *M. esculenta* clade is sister to *M. elata* and corresponds to yellow morels that has less vertically arranged pits. Based on morphology, the species of *Morchella* were initially placed into four groups. These are black morels, yellow morels, semi-free capped morels and blushing morels including *M. rufobrunnea*, *M. guatemalensis* and *M. rigidoides* distributed in the tropics and subtropics of the world. Identification of cultivated morels is based on morphological characters and molecular evidences, however, *M. rufobrunnea* and *M. anatolica* form a separate clade i.e., *Rufobrunnea* clade from the *Esculenta* and *Eлата* clades.

### LIFE CYCLE

Morels have both asexual and sexual reproductive phases. Fruiting body bears ascocarps having ascus and ascospores. Ascospores after their release from asci germinate to give rise to primary mycelium. It gives rise to conidia. The mycelia after plasmogamy form secondary mycelium and thereafter giving rise to sclerotia.

### CULTIVATION OF MORELS

The first report on the outdoor cultivation of morels occurred in France in 1882. Ower reported the successful cultivation of *Morchella*. As such, Ower was honored as Father of Morels (Ower et al., 1986). Studies demonstrated that exogenous application of nutrients is essential for outdoor cultivation of morels. Substrate comprising of 'peat + rice hulls + sawdust + wheat' can be tried for the cultivation of *Morchella*. For preparation of culture, malt extract agar medium is prepared at incubation temperature of 23°C. Besides, suitable concentration of minerals, heavy metals etc. also play an important role in culture maintenance and spawning. Some of the *Morchella* spp. has been successfully cultivated namely *M. rufobrunnea*, *M. importuna*, *M. sextelata* and *M. eximia* in different countries. White mycelia afterwards found to spread over the mushroom beds after culture inoculation. The optimum temperature for primordial differentiation is 6-10°C. Fruiting usually starts at a temperature of more than 20°C and these can be harvested when the ascocarp grows to approximately 10 cm height.

## CONCLUSION

There is a need to investigate the cultivation technique of other species of *Morchella*. Besides, exogenous supply of nutrients for growth of the ascocarps needs further research and in-depth study. Apothecium studies warrant further study in different *Morchella* spp. *Morchella* can be used in food diet as a delicacy only after thorough cleaning and processing. It is a low calorie mushroom fungus and its antioxidant properties, essential minerals and vitamins availability are of utmost importance to human health and can further be exploited in pharmaceuticals. This useful fungus after harvest and processing are stewed in main dishes and enjoyed with the addition of salt and spices. Besides, pieces of this fungus can also be used in pizza and pasta. Thus, there is a need to

undertake further research on its cultivation technology and post-harvest products.

## REFERENCES

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