



## The Most Popular Edible Wild Mushrooms in Vezirköprü District of Samsun Province

Sanem Bulam<sup>1\*</sup>, Nebahat Şule Üstün<sup>2</sup>, Aysun Pekşen<sup>3</sup>

<sup>1</sup>Department of Food Engineering, Faculty of Engineering, Giresun University, 28200 Giresun, Turkey

<sup>2</sup>Department of Food Engineering, Faculty of Engineering, Ondokuz Mayıs University, 55139 Atakum/Samsun, Turkey

<sup>3</sup>Department of Horticulture, Faculty of Agriculture, Ondokuz Mayıs University, 55139 Atakum/Samsun, Turkey

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\*Corresponding Author:

E-mail: sanem.bulam@giresun.edu.tr

### ABSTRACT

Edible wild mushrooms are becoming more and more important in our diet for their nutritional and pharmacological properties. The aim of this study was to gather information about edible wild mushroom species existed in mycobiota of Vezirköprü district of Samsun province that are economically important and are collected from nature by the villagers and sold in the local markets. The mushroom samples were identified based on their macroscopic and microscopic features. The information, obtained on the collecting time, local names and habitats of the mushrooms was inquired from the sellers, consumers and traders. *Cantharellus cibarius*, *Morchella* spp. and *Boletus edulis* species are not only sold in the Vezirköprü market but also exported. *Amanita caesarea*, *Cantharellus ferruginascens*, *Craterellus cornucopioides*, *Clitocybe geotropa*, *Hydnum repandum*, *H. rufescens*, *Lactarius deliciosus*, *L. semisanguifluus*, *L. vellereus*, *L. vinosus*, *Macrolepiota procera*, *Ramaria* spp., *Russula delica* and *Tricholoma terreum* are species of mushrooms with high edible quality and economical importance.

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## Samsun İlinin Vezirköprü İlçesindeki En Popüler Yenilen Doğa Mantarları

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\*Sorumlu Yazar:

E-mail: sanem.bulam@giresun.edu.tr

### ÖZET

Yenilen doğa mantarları besinsel ve farmakolojik özellikleri açısından beslenme düzenimizde giderek daha da önem kazanmaktadır. Bu çalışmanın amacı, Samsun ilinin Vezirköprü ilçesinin mikobiyotasında bulunan ekonomik açıdan önemli olan, köylüler tarafından doğadan toplanan ve yerel pazarlarda satılan yenilen mantar türleri hakkında bilgi toplamaktır. Mantar örnekleri makroskopik ve mikroskopik özelliklerine dayanılarak teşhis edilmiştir. Mantarların toplanma zamanı, yerel isimleri ve habitatları hakkındaki bilgiler satıcılar, tüketiciler ve tüccarlardan edinilmiştir. *Cantharellus cibarius*, *Morchella* türleri ve *Boletus edulis* mantar türleri yalnızca Vezirköprü yerel pazarında satılmamakta aynı zamanda ihraç edilmektedir. *Amanita caesarea*, *Cantharellus ferruginascens*, *Craterellus cornucopioides*, *Clitocybe geotropa*, *Hydnum repandum*, *H. rufescens*, *Lactarius deliciosus*, *L. semisanguifluus*, *L. vellereus*, *L. vinosus*, *Macrolepiota procera*, *Ramaria* türleri, *Russula delica* ve *Tricholoma terreum* yenilen kalitesi yüksek ve ekonomik önemi olan mantar türleridir.

## Introduction

Recently, mushrooms have become attractive as a functional food and also as a source for the development of medicines and nutraceuticals due to their antioxidant, antitumor and antimicrobial properties. In addition to their pharmacological properties, mushrooms are becoming increasingly important in our diet in terms of their nutritional value due to their high protein and low fat content (Khatun et al., 2012).

Many taxonomical studies to identify mycobiota have been carried out, but the macrofungi biodiversity of Turkey are not determined fully yet (Allı and Şen, 2016). Macrofungi taxa number of Turkey reported by researchers are about 2400 (Sesli and Denchev, 2014; Solak et al., 2015). Many of these taxa are edible (Allı and Şen, 2016). Some of edible mushrooms are collected for consumption and sold in local market or exporter companies, but most of them are not known by local people.

Some researches were carried out to identify edible and economically important mushroom species in the Black Sea Region. The results of these studies showed that wild edible mushroom consumption in Black Sea Region is very widespread (Pekşen and Karaca, 2000; Okan et al., 2013; Yılmaz and Zencirci, 2016; Pekşen et al., 2016; Pekşen and Kaplan, 2017).

78 edible wild mushroom species were noted in Samsun province. 20 of these species have already been known by the people and sold in the local or metropolitan markets (Pekşen and Karaca, 2000). Pekşen and Karaca (2003) recorded a total of 169 species of macrofungi of which 51 are edible in Samsun. In another study, 44 edible wild and medicinal mushroom species of the Middle and East Black Sea Regions have been reported by Özçelik et al. (2004). Nevertheless, these studies are not enough. More ethnomycological and biodiversity studies are needed in order to move into a place of global recognition of economically and culturally valuable mushrooms of the Black Sea Region.

A large number of edible wild mushrooms grow in Vezirköprü district of Samsun province, where the climate and vegetation are different from the coastal zone of Samsun. The aim of this study was to determine the economically important edible wild mushroom species in Vezirköprü district of Samsun that are sold in local markets by collecting from the nature.

## Materials and Methods

### Collection and Identification of Mushrooms

The mushroom samples collected from the local markets and nature of Vezirköprü district of Samsun province during 2014-2015 years were identified based on their macroscopic and microscopic features by using procedures described by Phillips (1981), Pacioni (1987), Garnweidner (1994), Courtecuisse and Duhem (1995) and Bessette et al. (1997). Collecting times, local names and habitats of the mushrooms supplied from nature and bought from the local markets were asked to the sellers, consumers and traders and answers were noted.

### Study Area

Vezirköprü is located at latitude of 41°08'37.00" N and a longitude of 35°27'16.99" E in the Middle Black Sea Region of Turkey (Anonymous, 2017a). Map of the study area is given in Figure 1. In Vezirköprü, the winters are cold (average temperature of January is 2.5°C) and the summers are warm (average temperature of August is 22.3°C). The annual average rainfall is over 500 mm. At higher altitude of Vezirköprü, higher snowfall has been observed. The area covered by forests is 40.000 ha approximately. In the district covered by chestnut-colored soil, birch and willow trees are existed on the alluvial soils. Generally, maki is observed at heights up to 400 m. Above 400 m altitude, red pine, oak, hornbeam and beech trees are seen. The slopes of Kunduz and Tavşan Mountains which surround the district are covered by frequent wooded areas (Anonymous, 2017b).



Figure 1 Vezirköprü district of Samsun province (Anonymous, 2017c, d)

## Results and Discussion

According to the results of identification of the mushrooms gathered from nature and bought from the local markets in Vezirköprü, 19 edible wild mushroom species belonging to Russulaceae (5), Cantharellaceae (3), Gomphaceae (2), Hydnaceae (2), Morchellaceae (2), Tricholomataceae (2), Agaricaceae (1), Amanitaceae (1) and Boletaceae (1) families were determined. The mushroom species with high edible quality and economic importance were *Amanita caesarea*, *Boletus edulis*, *Cantharellus cibarius*, *C. ferruginascens*, *Clitocybe geotropa*, *Craterellus cornucopioides*, *Hydnum repandum*, *H. rufescens*, *Lactarius deliciosus*, *L. semisanguifluus*, *L. vellereus*, *L. vinosus*, *Macrolepiota procera*, *Morchella* spp., *Ramaria* spp., *Russula delica* and *Tricholoma terreum*.

The mushroom species identified in the study area were as follows:

Ascomycota

1. *Morchella elata* Fr.: Fr. (Family: Morchellaceae)  
*Local name:* Kuzu Göbeği Mantarı  
*Collecting time and location:* During May in Kunduz Forest  
*Habitat:* It is found in the spring in open forested or meadow areas. Black Morels appear on rich, well-drained soil under trees often beneath hedges or on disturbed soil at the edge of a garden.
2. *Morchella esculanta* (L.: Fr.) Pers. (Family: Morchellaceae)  
*Local name:* Kuzu Göbeği Mantarı  
*Collecting time and location:* During May in Kunduz Forest  
*Habitat:* It is seen in the spring on the soil, in forest openings, on the edges of roads and rivers and in the vegetation of burnt lands. It is found individually under deciduous trees particularly maple, nuts, beech, ash and elm trees.
5. *Clitocybe geotropa* (Bull.) Quel. (Family: Tricholomataceae)  
*Local name:* Kurtkulağı Mantarı  
*Collecting time and location:* During October-November in Kunduz Forest and Belalan Village  
*Habitat:* They are arranged in broad-leaved forests in groups of circles, mostly in late summer or autumn.
6. *Craterellus cornucopioides* (L.: Fr.) Pers. (Family: Cantharellaceae)  
*Local name:* Borazan Mantarı  
*Collecting time and location:* During July in Kunduz Forest and during October in Duruçay areas.  
*Habitat:* It is found under broad-leaved forests in summer and late autumn.
7. *Hydnum repandum* L.: Fr. (Family: Hydnaceae)  
*Local name:* Sığır Dili Mantarı, Dana Dili Mantarı  
*Collecting time and location:* During October in Kunduz Forest  
*Habitat:* It occurs as a large number of clusters and witch rings in mixed forests, sometimes among fir, pine, spruce and beech trees and the leaves on the soil.

Basidiomycota

1. *Amanita caesarea* (Scop.: Fr.) Pers. (Family: Amanitaceae)  
*Local name:* Yumurta Mantarı, Gelingöbeği Mantarı  
*Collecting time and location:* During November in Kunduz Forest  
*Habitat:* It grows under deciduous trees especially oak, chestnut and walnut, rarely around the conifer trees.
2. *Boletus edulis* Bull. Fr. (Family: Boletaceae)  
*Local name:* Bolet Mantarı, Ayı Mantarı  
*Collecting time and location:* During November in Kunduz Forest  
*Habitat:* It is often seen in large numbers and sometimes one by one under and around the deciduous trees of oak, birch, especially beech, coniferous pine, especially young spruce trees and on the rotten leaves.
3. *Cantharellus cibarius* Fr. (Family: Cantharellaceae)  
*Local name:* Sarı Mantar  
*Collecting time and location:* During July in Kovalı Village and Tavşan Mountain Plateau Forest  
*Habitat:* It is common and very abundant in the forests of both broad-leaved and coniferous trees, especially among beech, marshland and birch trees, in mossy fir forests and in pine-covered lands in large clusters or witch rings among the algae, fallen leaves and meadows.
4. *Cantharellus ferruginascens* P. D. Orton (Family: Cantharellaceae)  
*Local name:* Sarı Mantar  
*Collecting time and location:* During July in Kunduz Forest and during month of September in Asatderesi areas  
*Habitat:* It is common and very abundant in the forests of both broad-leaved and coniferous trees, especially among beech, marshland trees and birch trees, in mossy fir forests and in pine-covered lands, in large clusters or witch rings among the algae, fallen leaves and meadows.
8. *Hydnum rufescens* Pers.: Fr. (Family: Hydnaceae)  
*Local name:* Sığır Dili Mantarı, Dana Dili Mantarı  
*Collecting time and location:* During September in Asatderesi areas  
*Habitat:* It occurs as a large number of clusters and witch rings in mixed forests, sometimes among fir, pine, spruce and beech trees and the leaves on the soil.
9. *Lactarius deliciosus* (L.: Fr.) Gray (Family: Russulaceae)  
*Local name:* Kanlıca Mantarı, Kırmızı Kanlıca Mantarı, Çam Mantarı  
*Collecting time and location:* During October-November in Kunduz Forest and Belalan Village; during December in Kızılibik Forest and Devalan Village  
*Habitat:* It is usually seen in autumn under the pine or spruce trees, in coniferous woodland.
10. *Lactarius semisanguifluus* R. Heim & Leclair (Family: Russulaceae)  
*Local name:* Kanlıca Mantarı, Kırmızı Kanlıca Mantarı, Çam Mantarı  
*Collecting time and location:* During June and August in Asatderesi areas and during October in Kunduz Forest  
*Habitat:* It is usually seen in autumn under the pine or spruce trees, in coniferous woodland.
11. *Lactarius vellereus* (Fr.) Fr. (Family: Russulaceae)  
*Local name:* Acı Mantar  
*Collecting time and location:* During August in Duruçay areas  
*Habitat:* It grows in broad-leaved and mixed woodland, under oak and birch trees on the edges of spruce woodlands.
12. *Lactarius vinosus* (Quel.) Bat. (Family: Russulaceae)  
*Local name:* Kara Kanlıca Mantarı, Kara Çam Mantarı  
*Collecting time and location:* During November in Kunduz Forest, Belalan Village  
*Habitat:* It is usually seen in autumn under pine or spruce trees, in coniferous woodland.

13. *Macrolepiota procera* (Scop.: Fr.) Singer (Family: Agaricaceae)  
**Local name:** Şemsiye Mantarı, Dede Mantarı  
**Collecting time and location:** During August in Asatderesi areas  
**Habitat:** They are usually found one by one, sometimes in clusters and rings in leafy tree forests, in the openings of the woods, on the outer sides of the trees, sometimes in the meadows, in the spruce forests and in the dry places of the other woods, especially on their sunny sides.
14. *Ramaria aurea* (Schaeff.: Fr.) Quel. (Family: Gomphaceae)  
**Local name:** Halı Saçağı Mantarı  
**Collecting time and location:** During October-November in Kunduz Forest and Belalan Village  
**Habitat:** It is found in old mixed wood areas, dominant beech mixed with fir and spruce trees; locally almost on flat terrains, in shade, relatively in cold and humid places, partly protected from direct rain by tree canopies.
15. *Ramaria flava* (Schaeff.: Fr.) Quel. (Family: Gomphaceae)  
**Local name:** Halı Saçağı Mantarı  
**Collecting time and location:** During September in Asatderesi areas  
**Habitat:** It grows mainly in deciduous forests, often in larger groups of several specimens or beech woodlands. It can also be found in coniferous woods.
16. *Russula delica* Fr. (Family: Russulaceae)  
**Local name:** Koç Mantarı  
**Collecting time and location:** During October-November in Kunduz Forest and Belalan Village  
**Habitat:** It grows in coniferous and broad-leaved woodlands.

17. *Tricholoma terreum* (Schaeff.) P. Kumm. (Family: Tricholomataceae)  
**Local name:** Karacaoğlan Mantarı  
**Collecting time and location:** During November in Oymağaç Village  
**Habitat:** It grows under the softwood trees, particularly pines. It grows in the roadsides, in the chewed grasslands and in the parks. Although it often grows under larch trees, it does not show any loyalty and can be found under other trees.

Photos of the mushrooms sold in Vezirköprü local markets by mushroom sellers are given in Figure 2 and 3.

*Amanita caesarea* has been a precious food since Roman times (Phillips, 1981). While collecting *A. caesarea* the people must be very careful, because it might be confused with *A. muscaria*, which is a deadly poisonous mushroom. *A. caesarea*'s lamellae and ring are yellow. *A. muscaria*'s cap is orange red and covered with white scales, the lamellae and ring are white (Phillips, 1981; Sümer, 1987).

*Boletus edulis* is the best known species, regularly collected and sold and majorly exported from outside and within Europe (Boa, 2004). *B. edulis* is a very suitable species for cooking and drying. It is dried and used as a flavoring in dried soup mixes in the world market (Öder, 1988; Pekşen et al., 2016). *Cantharellus cibarius* is sold in markets in many countries and consumed as fresh or pickled. *C. ferruginascens* is sold domestically and abroad mixed with *C. cibarius* (Pekşen and Karaca, 2000). *Clitocybe geotropa* is preferred because of its durability and tastiness. *Craterellus cornucopioides*, one of the species exported, can be used in soup by drying or grinding into flour.



Figure 2 Photos of the mushrooms sold in Vezirköprü local markets. a) *Morchella* spp., b) *Amanita caesarea*, c) *Russula delica*, d) *Boletus edulis*, e) *Cantharellus cibarius*, f) *Clitocybe geotropa*, g) *Craterellus cornucopioides*, h) *Hydnum repandum*, i) *Lactarius* spp., j) *Lactarius vellereus*, k) *Ramaria* spp., l) *Macrolepiota procera*



*Tricholoma terreum*

Figure 3 Views from Vezirköprü local markets and mushroom sellers

*Hydnum repandum*, which is suitable for drying, is also exported. *H. rufescens* has some morphological differences compared to *H. repandum* (Pekşen and Karaca, 2000, 2003). *Lactarius deliciosus*, *L. semisanguifluus* and *L. vinosus* are consumed as fresh or pickled. *L. vellereus* is consumed as fresh. Young samples of *Macrolepiota procera* are suitable for frying but can also be eaten as a raw food (Sümer, 1987).

*Morchella* samples collected from Vezirköprü were identified using molecular techniques as *Morchella tridentina*, *M. eximia*, *M. exuberans*, *M. importuna*, *M. dunalii*, *M. pulchella*, *M. esculenta* and *M. purpurascens* species (Taşkın et al., 2012, 2016). Except *M. esculenta* (yellow) species, the other *Morchella* species are within the Elata (black) clades. *Morchella* spp. is the most exported species with a very high eating quality (Pekşen and Akdeniz, 2012). These species are also recognized by the public and consumed as fresh or dried. Morels (*Morchella* spp.) have antioxidants with therapeutical properties such as anti-inflammatory, liver tonic, blood purifiers, antitumor and a remedy for digestive disorders, cold, fertility issues and diabetes (Sher and Shah, 2014). It was reported that *Ramaria* spp. may have laxative effect (Phillips, 1981). *Russula delica* is not sold in the local markets but is consumed by the public as fresh and pickled. *Tricholoma terreum* adds flavor, especially to the soups, and has an important advantage to be found in periods when other edible wild mushrooms are diminished (Sümer, 1987).

In an ethnomycological study carried out in the Western Black Sea Region, it was determined that 33 edible wild and cultivated macrofungi species belonging to 14 families were used for food (55.4%), income (43.8%), or medicine (0.8%). In addition, 169 different Turkish folk names were registered, and five marketing channels were

identified for the mushrooms (Yılmaz and Zencirci, 2016). Twenty two edible wild mushroom species belonging to 13 families have been identified in Giresun local markets (Pekşen et al., 2016). Pekşen and Kaplan (2017) reported that edible wild mushrooms such as *A. bisporus*, *B. edulis*, *P. ostreatus*, *F. velutipes* and *T. aestivum* existed in Ordu province are important gene sources for developing of new varieties. There is a great similarity between the mushroom species sold in local markets and/or collected by local people of Vezirköprü and of Ordu and Giresun (Pekşen et al., 2016; Pekşen and Kaplan, 2017). *C. cibarius*, *C. ferruginascens*, *L. deliciosus*, *L. semisanguifluus*, *L. vinosus*, *Morchella* spp., *Ramaria* spp. and *T. terreum* are the species that are locally known and the bestselling edible wild mushrooms at Vezirköprü local markets. These wild mushrooms are an important source of income as well as being a source of food for the local people. Furthermore, the presence of many mushroom species exported from the Vezirköprü district is an important milestone for the local people. Turkey is one of the leading countries in the export of wild mushrooms. Most commonly exported wild edible mushrooms from Turkey are *A. caesariae*, *Boletus* spp., *C. cibarius*, *C. cornuciooides*, *H. repandum*, *Morchella* spp., *Lactarius* spp., *T. anaticum* and *Terfezia* sp. (Pekşen and Akdeniz, 2012; Ak et al., 2016; Allı and Şen, 2016). *Morchella* spp., *C. cibarius* and *B. edulis* mushroom species growing in Vezirköprü are exported as fresh, frozen or dried at different times of the season.

## Conclusion

In conclusion, 19 edible wild mushroom species that have already been consumed by the local people in Vezirköprü district of Samsun were identified. Some of them are exported by the companies. In view of the importance of these edible wild mushroom species, further ethnomycological studies should be carried out in order to raise the public awareness of the sustainability of biodiversity of different species and their chemical composition, nutritional and medicinal value.

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