



---

Research Article

## First Collection and Identification of Wild Mushrooms in Western Iraq

Mustafa Nadhim Owaid<sup>1,2\*</sup>, Mowafaq Mizban Muslat<sup>3</sup>, Wee Cheat Tan<sup>4</sup>

<sup>1</sup>*Al-Athar Secondary School, Heet Education, Ministry of Education, Heet, Anbar 31007, Iraq.*

<sup>2</sup>*Department of Biology, College of Science, University of Anbar, Ramadi, Anbar 31001, Iraq.*

<sup>3</sup>*Department of Horticulture, College of Agriculture, University of Anbar, Ramadi, Anbar 31001, Iraq.*

<sup>4</sup>*Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.*

---

**Abstract:** Fungi are found everywhere and affect our lives every day from mushroom to industrially important product, plant helpers, plant pathogens and to human diseases. Therefore, we concentrated our attention on fungi that can be grown in our environment, while maintaining an interest in their performance in nature. About fifteen different species were collected and identified from different villages of Heet district, Anbar province, Iraq. Out of the fifteen, two species, naming *Armillaria mellea* and *Coprinus disseminates* were identified as species level and others: *Pleurotus* spp., *Agaricus* spp., *Calvatia* sp., *Telephora* sp., *Fomes* sp., *Lepiota* sp. and *Morchella* sp. as genus level only. This study was aimed to collect and identify wild mushrooms that grow naturally in different orchards and gardens on 2009-2013 in Heet city. A total of 15 species in 9 genera, 9 families and 5 orders belong to woody and fleshy species were identified for the first time in Anbar province. The collected mushrooms were appearing from November to February of each year.

**Keywords:** Mushrooms, collection and identification, Heet city, Anbar Province, Iraq.

---

### 1. Introduction

Fungi affect human lives in many and varied ways like human diseases, plant pathogens, industrially product, human food (mushroom) and moreover that. They play very important roles in the ecosystem (Carlile *et al.*, 2001). Mushrooms have long regarded all over the world as the most delectable and succulent of food (Christensen, 1981). When the tree leaves change color, dew rises, and autumn mists descend, mushrooms begin to appear above the soil, and logs, stumps, and fallen branches come alive with “toadstools” and other mysterious protuberances (Hall *et al.*, 2003).

Anbar province area around 53,461 mil<sup>2</sup> (Lohman, 2002) and its desert are rich with truffles (Al-Rawiand Taha, 2010). The Heet city lies at north latitudes 33.64° and east longitudes 42.83° and 66 meters elevation above the sea level. Whereas, the climate of this district either dry or semi-dry climate characterized by less than

150mm of rain per year and high evaporation rates (MOE, 2012). Aziz and Toma (2012) isolated mushroom from mountain areas in Sulsaimani and Erbil province, especially in Soran, Joman, Sedakan districts Qandil and Zalm village Amad Hawa - Sulsaimani areas up to more than 3000 meters above sea level in the Iraqi Kurdistan region. A total of 34 species belongs to 23 genera of woody and fleshy species of basidiomycetes were identified.

Forty four species of mushrooms belonging to twenty nine genera were collected and identified from different localities in Erbil Governorate of Kurdistan region. *Agaricus* spp., *Clitocybe* spp., *Collybia* spp., *Coprinus* spp., *Cortinarius* spp., *Craterellus* sp., *Crepidotus* sp., *Exidia* sp., *Fomes* spp., *Galerina* sp., *Hebeloma* sp., *Helvella* sp., *Auricularia auricula-judae*, *Hygrocybe pratensis*, *Inocybe* sp., *Lactarius* spp., *Laccaria* sp., *Mycena* sp., *Peziza* sp., *Pluteus* sp., *Psathyrella* sp., *Panellus* sp., *Paxillus atrotomentosus*, *Russula fellea*, *Scutellinia scutellata*, *Trichloma* spp.,

\*Corresponding author:  
E-mail: mustafa@alheeti.com.

*Tyromyces* spp., *Lepiota* sp. and *Cystoderma* sp., the last two genera were the new record in Erbil, Kurdistan region-Iraq (Toma *et al.*, 2013). As a result, it can be very difficult to distinguish between a country's native fungi and those that have been introduced or have recently arrived from elsewhere (Hall *et al.*, 2003).

This study was aimed to collect and identify wild mushroom that grows naturally in different orchards and gardens in the Heet district, Anbar province, Iraq. This is the first article research was paper made in mushroom collection and identified in Anbar province western Iraq.

## 1. Materials and Methods

Different genera of wild mushrooms were collected from various locations in Heet district from the orchards and gardens are following: (Abdul-Salamia, Shaqufa, Basaar, Qenan, and Shakheslya) during the period from 2009 to 2013. Standard methods of collection and identification were followed. The texts (books) used for identification of fungi; depending on their taxonomic keys are followed; Christensen (1981); Hall *et al.*, (2003); Polese (2005); Fergus and Fergus (2003) and Telander (2012).

## 2. Results and Discussion

This article represents the first research paper made on mushroom collection and identified in Anbar province western Iraq. Wild mushrooms, which grew naturally in different orchards and gardens in Heet city, were collected from some villages (Fig. 1): Abdul-Salamia, Shakheslya, Qenan, Basaar and Shaqofaon 2009-2013. The soil of this district is loam sand.

Heet located in Anbar province in Iraq. Euphrates River enters the city, therefore; different gardens and orchards placed on sides of the river (Fig. 1). The collected mushrooms were appearing from Nov. to Feb. (Fig. 2) in winter season that due to the climate of this district. The climate of the Anbar zone of Iraq is a typical desert climate. This is an area of a high thermal energy. Generally, Rainfall occurs during the winter months, from December to February in most parts of the country and November to April in the mountains, with average day temperatures of 16°C dropping at night to 2°C with a possibility of frost. Summers are dry and hot to extremely hot; air temperature rises to a maximum of 45-50°C., with a shade temperature of over 43°C during July and August yet dropping at night to 26°C (Jaradat, 2002).

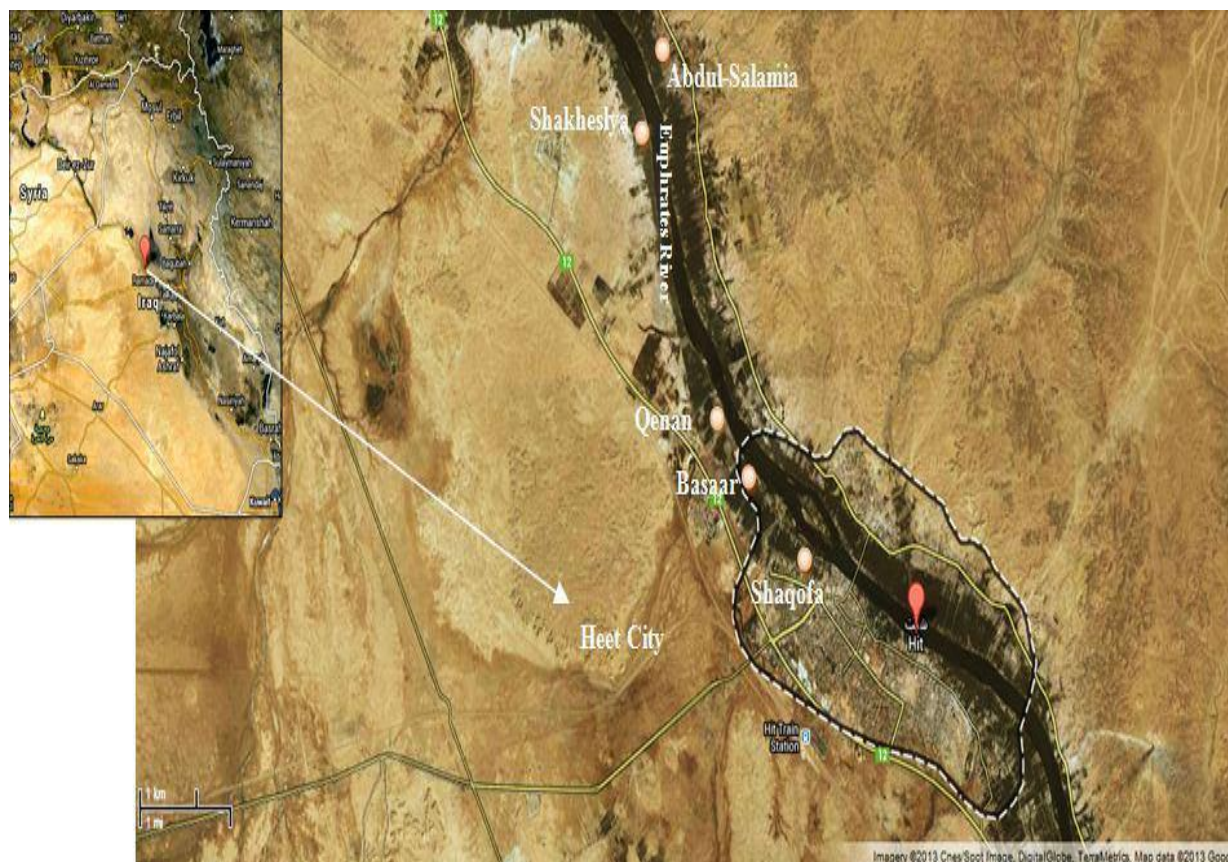


Fig. 1. Distribution of Villages in Heet City (Google, 2013).

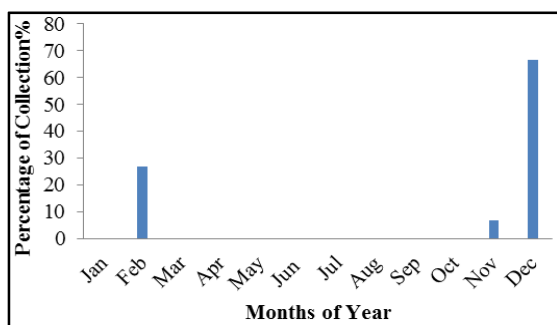


Fig. 2. Distribution of Collected Wild Mushrooms in Heet city monthly.

### *Armillaria* sp. and *Armillaria mellea*

*Armillaria* sp. was collected from Abdul-Salamia and Shakheslya villages with roots of trees as mycorrhizas on December 2011 (Table 1 and 2). This mushroom (Fig. 3A and 3B) is edible if cooked (Hall *et al.*, 2003). Also known as Honey Fungus which grow on decaying stumps and logs or on living trees, often forming large clusters. It is highly variable in shape but generally convex or flat. The surface is usually honey-colored, darker in the center. Gills are attached and descending down the stalk, white to brownish. Spore print is white (Telander, 2012).



### *Pleurotus* spp.

Edible brown oyster mushroom (Fig. 3C) was grown near root or on a stalk of dead tree in Basaar. Its cap is wavy, convex to flattened, shaped somewhat like an oyster shell, white to brownish or gray, and fleshy. The stalk is minimal or absent and usually off-center. Gills are white to yellowish, descending down to the base. Spore print is white or very pale purple. Oyster

Mushrooms grow in clusters, shelf-like, from the bark of trees or fallen logs (Telander, 2012).



### *Agaricus* spp.

*Agaricus* spp. (Fig. 3D, 3E and 3F) were collected from the soil of Basaar gardens (Table 1 and 2) and classified to genes level. It is called white button. Its cap convex, soon flattening, smooth or fibrillose, white or pale gray, splashed with ocher, often soiled with particles of earth. It grows on packed earth, even breaking through the asphalt, in parks, gardens, footpaths, around trees in cities (Polese, 2005).



***Calvatia* sp.**

Usually, nearly round to somewhat oval when young or egg-shaped (Fig. 3G) grown with grass in Basaar on December 2012 (Table 1), fruiting bodies tend to become more pear-shaped or top-shaped as they mature. The purple-spored puffball is most common in pastures, lawns, and other grassy and forest areas. Outer surface smooth, although sometimes slightly roughened, like chamois to the touch, white or whitish, later becoming yellow or brown. Inner substance is pure white at first, changing to yellowish, and finally becoming dingy olive (Fergus and Fergus, 2003).

***Telephora* sp.**

Fig. 3H was showed this mushroom on stalk of trees in Shaqufa on December 2009 (Table 1). It belongs to Basidiomycetes; Order: Thelephorales; Family: Telephoraceae (Flores, 2012).

***Fomes* sp.**

The wood-rotting fungus (Fig. 3I) was showed this mushroom on stalk of trees in Qenan on December 2011 (Table 1). It belongs to Basidiomycetes; Order: Polyporales; Family: Polyporaceae (Deacon, 2006).

***Coprinus* sp. and *Coprinus disseminates***

Most members of the genus *Coprinus* sp. (Fig. 3L) are characterized by fruiting bodies with gills that dissolve, producing an inky fluid, when the spores are mature. *Coprinus disseminates* (Fig. 3J, 3K) is an exception to this rule, as its gills do not become inky. The fruiting bodies occur in large groups (often several hundred in a single fruiting) on well decayed stumps and other wood debris from broadleaf trees. The rather delicate pale buff to brownish gray caps are 0.5-1.5cm in diameter, have a deeply grooved margin, and are ovoid at first but expand to become a bell-shaped to convex. The stalk is 15-40mm high and 1-3mm thick. This mushroom is edible, but not worth eating because of its small size (Hall *et al.*, 2003).

***Lepiota* sp.**

*Lepiota* sp. (Fig. 3M) was collected from gardens near of and around pomegranate trees in a Shakheslya village on February 2013 in large amounts, but no mycorrhizas may be due to use decomposed leaves of these trees. The genus is characterized by white spores, free gills, a definite ring around the stem, and the fact that the stem separates readily from the cap-such

definite characteristics that it is ordinarily one of the easiest genera for a beginner to recognize (Christensen, 1981).



### *Morchella* sp.

It is called Common Morel (Fig. 3N, 3O), which belongs to Ascomycetes; Order: Pezizales; Family: Morchellaceae (Table 2). It was collected from the Shakheslya village in December 2012. The upper portion is a variable, elongated egg shape or bullet shape to 2" wide. The surface is like a sponge, honeycombed with irregular, pale to deep ochre ridges and dark brown pits. The stubby stalk is white, somewhat crinkly or bumpy, with a thick base. Spores in this group are produced not in the gills, but rather in structures known as asci, located in the pits (Telander, 2012). From all samples, only 11% from genera were Ascomycetes; 89% Basidiomycetes (Fig. 4).

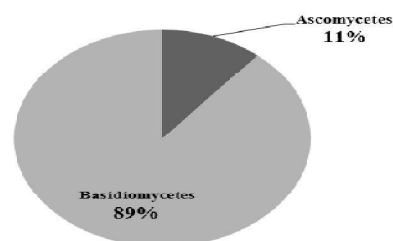


Fig. 4. Percentage of Mushroom Genera were collected in Heet city.

Table 1. Characterizations of Wild Mushrooms Collection.

No.	Scientific name	Edibility	Date	Habitat	Village	Family
A	<i>Armillaria mellea</i>	Edible	Dec 2011	Near roots of tree	Abdul-Salamia	Basidiomycetes
B	<i>Armillaria</i> sp.	Edible	Dec 2011	Logs of tree	Shakheslya	Basidiomycetes
C	<i>Pleurotus</i> spp.	Edible	Nov 2012	Near roots of tree	Basaar	Basidiomycetes
D	<i>Agaricus</i> spp.	Edible	Dec 2011	Under soil	Basaar	Basidiomycetes
E	<i>Agaricus</i> spp.	Edible	Feb 2013	Soil	Basaar	Basidiomycetes
F	<i>Agaricus</i> spp.	Edible	Feb 2013	Soil	Basaar	Basidiomycetes
G	<i>Calvatia</i> sp.	Edible	Dec 2012	Soil with grass	Basaar	Basidiomycetes
H	<i>Telephora</i> sp.	Unknown	Dec 2009	Soil	Shaqufa	Basidiomycetes
I	<i>Fomes</i> sp.	Unknown	Dec 2011	Died tree	Qenan	Basidiomycetes
J	<i>Coprinus disseminates</i>	Edible	Dec 2012	Soil	Shakheslya	Basidiomycetes
K	<i>Coprinus disseminates</i>	Edible	Dec 2012	Soil	Shaqufa	Basidiomycetes
L	<i>Coprinus</i> sp.	Unknown	Feb 2009	Soil	Basaar	Basidiomycetes
M	<i>Lepiota</i> sp.	Unknown	Feb 2013	Near Pomegranate tree	Shakheslya	Basidiomycetes
N	<i>Morchella</i> sp.	Edible	Dec 2012	Soil	Shakheslya	Ascomycetes
O	<i>Morchella</i> sp.	Edible	Dec 2012	Soil	Shakheslya	Ascomycetes

Table 2. Classification of Wild Mushrooms Collection.

Kingdom	Phylum	Class	Order	Family	Genus		
Fungi	Basidiomycota	Basidiomycetes	Agaricales	Agaricaceae	<i>Agaricus</i> spp.		
				Lepiotaceae	<i>Lepiota</i> sp.		
				Coprinaceae	<i>Coprinus</i> sp.		
				Tricholomataceae	<i>Pleurotus</i> spp.		
				Tricholomataceae	<i>Armillaria</i> sp.		
			Polyporales	Polyporaceae	<i>Fomes</i> sp.		
			Lycoperdales	Lycoperdaceae	<i>Calvatia</i> sp.		
			Thelephorales	Telephoraceae	<i>Telephora</i> sp.		
			Ascomycota	Ascomycetes	Pezizales	Morchellaceae	<i>Morchella</i> sp.

### Acknowledgment

Special thanks to Mr. Khalid Hamad, Mohammed Khalil and Mr. Ali Khalil for helping and collecting mushroom samples.

### References

- [1]. Al-Rawi, A.A. & Taha, A.M. (2010). Chemical study for three Iraqi truffles types. *Al-Anbar J. Agr. Sci.*, 8:33-41.
- [2]. Aziz, F.H. & Toma, F.M. (2012). First observations on the mushroom in mountain area of Iraqi Kurdistan Region. *Journal of Advanced Laboratory Research in Biology*, 3(4): 302-312.
- [3]. Carlile, M.J., Watkinson, S.C. & Gooday, G.W. (2001). *The fungi*. Academic Press, Harcourt Science and Technology Company. London, UK. pp. 565.
- [4]. Christensen, C.M. (1981). *Edible mushrooms*, 2nd ed. University of Minnesota Press, Minneapolis. USA. pp. 118.
- [5]. Del Conte, A. & Laessoe, T. (2008). *The edible mushroom book*. Dorling Kindersley Publishers Ltd. United Kingdom. pp. 192.
- [6]. Deacon, J.W. (2006). *Fungal Biology*, 4th ed. Blackwell Publishing. England. pp. 371.
- [7]. Fergus, C.L. & Fergus, C. (2003). *Common edible and poisonous mushrooms of the northeast*. Stackpole Books. USA. pp. 90.
- [8]. Arzu, F.R, Comandi, O. and Rinaldi, A.C. (2012). A preliminary checklist of macrofungi of Guatemala, with notes on edibility and traditional knowledge. *Mycosphere*, 3(1): 1-21.
- [9]. Google Inc. (2013). Map date. Iraq.
- [10]. Hall, I.R., Stephenson, S.L., Buchanan, P.K., Yun, W. & Cole, A.L.J. (2003). *Edible and poisonous mushrooms of the world*. Colorcraft Ltd., Hong Kong. pp. 370.
- [11]. Jaradat, A.A. (2002). *Agriculture in Iraq: resources, potentials, constraints, and research needs and priorities*. Department of State-Middle East Working Group on Agriculture. pp. 83.
- [12]. Lohman, A.D. (2002). *Political geography*. In: Malinowski, J.C. *Iraq: a geography*, Department of Geography. United States Military Academy, West Point, NY. pp. 61.
- [13]. MoE (2012). *Climate change in Iraq*. Fact sheet, June 2012. Ministry of Environment (MoE), Iraq. pp. 1-2.
- [14]. Polese, J.M. (2005). *The pocket guide to mushrooms*. Tandem Verlag GmbH. Slovakia. pp. 381.
- [15]. Telander, T. (2012). *Mushrooms: A falcon field guide*. Globe Pequot Press. pp. 95.
- [16]. Toma, F.M., Ismael, H.M. & Abdulla, N.Q.F. (2013). Survey and identification of mushrooms in Erbil Governorate. *Research Journal of Environmental and Earth Sciences*, 5(5): 262-266.