

## Survey and Identification of Mushrooms in Erbil Governorate

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**Abstract:** Forty four species of mushrooms belonging to twenty nine genera were collected and identified from different localities in Erbil Governorate of Kurdistan region. The identified species and varieties spread over in following genera viz., *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., *Tyromyces* spp., *Lepiota* sp. and *Cystoderma*, the last two genera were the new record in Erbil, Kurdistan region-Iraq. The objective of this study is to survey and identification of wild mushroom that grow naturally in different area and different season in Erbil Governorate, Kurdistan region-Iraq. This is the first documented research was made for mushroom collection and identification in Erbil governorate/Iraq Kurdistan region.

**Keywords:** Basidiomycota, erbil, *Exidia glandulosa* and *Scutelliniascutellata*, *Lepiota* sp., mushroom, *Panellus mitis*

### INTRODUCTION

Mushrooms are cosmopolitan heterotrophic organisms that are quite specific in their nutritional and ecological requirements. As such, they have been generally divided into humicolous, lignicolous, coprophilous, fungicolous, parasitic or saprophytic or may show some mycorrhizal associations with both broad-leaved forest trees and gymnospermous taxa. They constitute the most relished food commodities amongst the number of non-conventional foodstuffs primarily because of their unique flavor and texture. Wild edible mushrooms have been collected and consumed by people since thousands of years. Archaeological evidences reveal edible species associated with people living 13000 years ago in Chile (Rojas and Mansur, 1995). But it is in China where the eating of wild fungi was first reliably noted several hundred years before birth of the Christ (FAO, 2004). Many cultures, especially in the Orient, identified that certain mushrooms could have profound health-promoting benefits (Hobbs, 1995). Mushrooms have been exploited commercially world over and may be cultivated or gathered from the wild (Boa, 2004). The rate of consumption of fleshy fungi in many countries has increased in recent years and hence it becomes imperative to explore the treasure of wild mushroom (Pandey and Singh, 1978).

Mushrooms as a group are found all over the world. The individual organism (the "body" of the fungus) consists of an extensive network of very finely branched microscopic threads called hyphae.

Collectively, the hyphae making up such a network are referred to as a mycelium. The structure we recognize as a mushroom is in reality just a highly organized system of hyphae, specialized for reproduction, that develops from the otherwise vegetative mycelium inhabiting soil, leaf litter, or decaying wood. The individual hyphae obtain the nutrients and water the fungus needs to grow. After a period of growth and under favorable conditions of temperature and moisture, the mycelium gives rise to one or more fruiting bodies, or mushrooms. Long-distance dispersal is achieved by the many millions of microscopic spores produced by the fruiting body. These spores can be carried by wind currents to very distant places. A few of the mushrooms seen in one place may have arrived from another part of the world as mushroom spores borne on wind currents. Others may have arrived in a very different way, perhaps on soil adhering to plants, shipping containers, or boots, or even within the bodies of plants carried from one country to another by early settlers. 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). Mushrooms are found every where, in front yards, on shade trees, in parks, fields and forests. Many species of mushrooms form slowly just beneath the surface of the soil, developing over a period of weeks or even months. When they are almost completely formed, if there is enough moisture present, the stem elongates rather suddenly and raises the cap up into the air, the cap expanding as it is raised. Evidence that mushrooms have been formed below the

surface of the ground can be seen in the pieces of dirt and debris that cling to the tops of freshly expanded specimens. These soft and delicate mushrooms can exert a surprising force when expanding in this way; they sometimes rise up rocks of several pounds' weight and have been known to force paving blocks up out of the street (Christensen, 1970). In late autumn, late winter and early spring are very good time to see many of the mushrooms. The natural Oak forest especially under or at the base of oak trees are actually the best places to see common edible and rare mushrooms. However, in the grassland and at the edge of streams and rivers the best are seen on the old dead wood and veteran trees Laessoe and Lincoff (1998) Fomes and Tramets mushroom found mainly living on old dead trunks in forests Oaks.

The objective of this study is to survey and identification of wild mushroom that grow naturally in different area and different season in Erbil Governorate, Kurdistan region-Iraq.

## MATERIALS AND METHODS

**Survey of mushrooms:** Different genera of wild mushrooms were collected from various locations in Erbil Governorate (Erbil city center, Bley, Barzan, Shaqlawa, Hiran, Aquaban, Khoran, Khalefan and Tawska) during the period from February-2011 to April-2012. Standard methods of collection, preservation and identification were followed.

Samples were found in damp places of public gardens or in shade trees on the decayed roots of the dead trees were photographed and collected from their natural sites and kept for laboratory identification. The collected fruiting bodies were identified according to text books. Slides were made to detection basidia and basidiospore, also to observation ascus and ascospore and measure the diameter of spores by ocular lens.

The texts (books) used for identification of fungi, depending on their taxonomic keys are as follows; Chang and Miles (2004), Christensen (1981), Hall *et al.* (2003) and Laessoe and Lincoff (1998).

The samples are preserved in Formal-acetic Alcohol solution (FAA): consist of 13 formalin, 5ml of glacial acetic acid and 200 ml of ethyl alcohol (50%). The photographs were made by digital camera and portable Olympus zoom camera measurements were made according to Hawksworth *et al.* (1995) and Laessoe and Lincoff (1998). The descriptions, habitats are mentioned in description section of recorded genus.

## RESULTS AND DISCUSSION

The data presented in Fig. 1 illustrates the distribution and frequency of wild mushrooms which were collected from Erbil Governorate. A total of 44 species, 30 genera, 19 families, 9 orders, 2 classes of

mushroom were identified in Erbil Governorate in Iraqi Kurdistan region. As many as 150 collections of wild mushrooms were made and worked out for their macro- and micro-morphological and ethnomycological features. A total of 95 taxa of wild mushrooms belonging to 30 genera were identified. The identified species and varieties spread over in following genera viz., *Agaricus bernardii*, *Agaricus* sp., *Clitocybe geotropa*, *Clitocybe metachroa*, *Collybia dryophila*, *Collybia fusipes*, *Coprinus comatus*, *Coprinus micaceus*, *Coprinus niveus*, *Coprinus picaceus*, *Coprinus plicatilis*, *Cortinarius bulbosus*, *Cortinarius* sp., *Craterellus* sp., *Crepidotus variabilis*, *Cystoderma*, *Exidia glandulosa*, *Fomes fomentarius*, *Fomes* sp., *Galerina autumnalis*, *Hebeloma mesophaeum*, *Helvella* sp., *Auricularia auricula-judae*, *Hygrocybe pratensis*, *Inocybe geophylla*, *Lactarius* sp., *Lactarius deliciosus*, *Lactarius decipiens*, *Laccaria amethystea*, *Lepiota*, *Mycena acicula*, *Peziza echinospora*, *Pluteus cervinus*, *Psathyrella piluliformis*, *Panellus mitis*, *Paxillus atrotomentosus*, *Russula fellea*, *Scutellinia scutellata*, *Tricholoma* sp., *Tricholoma sculpturatus*, *Tricholoma ustale*, *Tyromyces* sp., *Tyromyces stipticus*.

Some of these species were reported before by several workers. In Egypt, Assawah (1991) reported *Agrocybe* spp., *Hebeloma* spp., *Lepiota* spp. and *Tricholoma* spp. Also Abu El-Souod *et al.* (2000) reported thirteen species of mushrooms belonging to ten genera, these genera were *Agrocybe*, *Armillaria*, *Coprinus*, *Drosella*, *Hebeloma*, *Hygrophorus*, *Lepiota*, *Leptonia*, *Panaeolus* and *Tricholoma*. In Spain, Garcia *et al.* (1998) and in Poland Falandysz *et al.* (1994), identified *Coprinus campatus* while in USA. Richards (1997) reported *Tricholoma* spp. Gray (1997) reported that *Agaricus campestris* is common wild mushrooms in Europe and America. Hayes (1976) reported that natural geographic areas of mushrooms extend all over the northern Hemisphere outside the tropic and the arctic. Chin (1988) recorded that twenty species of edible and poisonous mushrooms were collected from forests in Sarawak of the poisonous mushrooms were *Amanita excelsa*, *A. Phalloides*, *A. Pantherina*, *Clitocybe* sp. and *Nathopanus* sp. were included.

Our result also were in agreement with those found by 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 upto more than 3000 meter above sea level in Iraqi Kurdistan region. A total of 34 species belong to 23 genera of woody and fleshy species of basidiomycetes were identified. Abou-Zeid and Altalhi (2006) were isolated Fourteen species of mushrooms belonging to nine genera were collected and identified from seven localities in Al-Taif Governorate of Saudi Arabia includes: *Agaricus arvens*, *Agaricus bisporus*, *Agaricus augustus*, *Lepiota procera*, *Lepiota rhacodes*, *Lepiota*



(a) *Tricholoma ustale*



(b) *Coprinus micaceus*



(c) *Agaricus ber'nardii*



(d) *Pluteus cervinus*



(e) *Cortinarius bulbosus*



(f) *Crepidotus variabilis*



(g) *Fomes fomentarius*



(h) *Hygrocybe pratensis*



(i) *Tricholoma scalpturatum*



(j) *Clitocybe metachroa*



(k) *Lactarius sp.*



(l) *Paxillus atrotomentosus*



(m) *Lactarius deliciosus*



(n) *Coprinus plicatilis*



(o) *Hirneola auricular-judae*



(p) *Galerina autumnalis*



(q) *Psathyrella piluliformis*



(r) *Scutellinia scutellata*



(s) *Clitocybe geotropa*



(t) *Panellus mitis*



(u) *Mycena acicula*



(v) *Tyromyces stipticus*



(w) *Lepiota sp.*



(x) *Pluteus cervinus*



(y) *Peziza ecluinospora*



(z) *Coprinus picaceus*



(A) *Exidia glandulosa*



(B) *Inocybe geophylla*



(C) *Hebeloma mesophaeum*

Fig. 1: Represent all the identified species of mushrooms

*cristata*, *leurotus ostreatus*, *Pleurotus cornucopiae*, *Coprinus comatus*, *Agrocybe cylindracea*, *Podaxis pistillaris*, *Inocybe splendens*, *Phaeolepiota aurea* and *Boletus edulis*.

**List (1): Represent all the identified species of mushrooms:**

**Kingdom:** Fungi:

**Phylum:** Basidiomycota:

**Class:** Basidiomycetes:

**Order:** Agaricales:

**Family:** Agaricaceae:

*Agaricus ber'nardii* (Fig. 1c)

*Agaricus* sp.

*Lepiota* sp. (Fig. 1w)

**Family: Tricholomataceae:**

*Clitocybe geotropa*(Fig. 1s)

*Clitocybe metachroa* (Fig. 1j)

*Collybia dryophila*

*Collybia fusipes*

*Cystoderma* sp.

*Mycena acicula* (Fig. 1u)

*Panellus mitis* (Fig. 1t)

*Trichloma* sp.

*Trichloma scalpturatum* (Fig. 1i)

*Tricholoma ustale* (Fig. 1a)

**Family: Coprinaceae:**

*Coprinus comatus*

*Coprinus micaceus* (Fig. 1b)

*Coprinus niveus*

*Coprinus picaceus* (Fig. 1z)

*Coprinus plicatilis* (Fig. 1n)

*Psathyrella piluliformis* (Fig. 1q)

**Family: Cortinariaceae:**

*Cortinarius bulbosus* (Fig. 1e)

*Cortinarius* sp.

*Hebeloma mesophaeum* (Fig. 1C)

*Inocybe geophylla* (Fig. 1B)

**Family: Crepidotaceae**

*Crepidotus varialilis* (Fig. 1f)

**Family:Strophariaceae:**

*Galerina autumnalis* (Fig. 1p)

**Family:Hygrophoraceae:**

*Hygrocybe pratensis* (Fig. 1h)

**Family:Hydnangiaceae:**

*Laccaria amethystea*

**Family:Pluteaceae:**

*Pluteus cervinus* (Fig. 1d and x)

**Order Tremellales:**

**Family: Tremellaceae:**

*Exidia glandulosa* (Fig. 1A)

**Order: Auriculariales:**

**Family: Auriculariaceae:**

*Hirneola auricular-judae* (Fig. 1o)

**Order: Polyporales:**

**Family: Polyporaceae:**

*Fomes fomentarius* (Fig. 1g)

*Fomes* sp.

*Tyromyces stipticus*. (Fig. 1v)

*Tyromyces* sp.

**Order: Cantharellales:**

**Family: Cantharellaceae:**

*Craterellus* sp.

**Order:Russulales:**

**Family:Russulaceae:**

*Lactarius* sp. (Fig. 1k)

*Lactarius delicious* (Fig. 1m)

*Lactarius decipiens*

*Russula fellea*

**Order:Boletales:**

**Family: Paxillaceae:**

*Paxillus atrotomentosus* (Fig. 1l)

**Order: Lycoperdales:**

**Family: lycoperdaceae:**

*vascellum pretense*

**Phylum: Ascomycota:**

**Class: Ascomycetes:**

**Order: Pezizales:**

**Family:Helvellaceae:**

*Helvella* sp.

**Family:Pezizaceae:**

*Peziza echinospora* (Fig. 1y)

**Family:Otideaceae:**

*Scutellinia scutellata* (Fig. 1r)

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