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ORIGINAL ARTICLE

IDENTIFICATION OF SOME EDIBLE MUSHROOMS FROM SALAH ALDIN PROVINCE, IRAQ

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ABSTRACT

A survey and identification were made of edible mushrooms from Salah Al Din Province, central of Iraq, were conducted. The species were identified according to macroscopic characteristics, such as the size, shape, color, and surface texture of the cap; the color of the gills and their attachment to the stipe, if any, the number of pores per millimeter; and the color, size , and surface texture of the stipe. Other features noted included the presence or absence of the annulus and volva; Microscopic characteristics were also examined, including the size of the basidium and the number of its spores; the color, size, and shape of the spores; the size, shape, and type of cystidia, and whether cystidia were present or absent. Nine basidiomycetous macrofungal species belonging to seven families were identified as Agaricaceae, Bolbitiaceae Coprinaceae, Hymenochaetaceae, Lyophyllaceae, Psathyrellaceae, Polyporaceae, and they were within three orders Agaricales, Polyporales, Hymenochatales, including: *Coprinellus disseminatus* (Pers.) J.E.Lange, 1938; *Ganoderma lucidum* (Curtis) P. Karst, 1881; *Trametes versicolor* (L.) Lloyd, 1921; *Leucocoprinus birnbaumii* (Corda) Singer, 1962; *Hypsizygus tessulatus* (Bull.)Singer, 1947 ; *Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq.Johnson, 2001; *Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo, 2001; *Phellinus igniarius* (L.) Quél, 1886; and *Panaeolina castaneifolia* (Murrill) Bon, 1979.

Keywords: Basidiomycota, Edible mushrooms, Fungi, Macrofungal, Macroscopic characters.

INTRODUCTION

Out of the estimated 140,000 mushroom species on Earth, only about 10% are well-documented (Heleno *et al.*, 2015). Wild mushrooms have been extensively consumed and included in the typical human diet, due to their high content of dietary fiber - such as chitin, hemicellulose, mannans, and β-glucans- and essential minerals. While low in calories and fat, Mushrooms are considered a healthy food source . They are defined as a source of both nutritional and biochemical properties. Because they are composed of 80–90% water and are rich in proteins proteins, fibers, and vitamins including vitamin D2, riboflavin, thiamine, and

ascorbic acid. Meanwhile, they are low in lipids including monounsaturated fatty acids, phospholipids, free fatty acids, triglycerides, and sterols (Waktola and Temesgen, 2018; Waqas *et al*., 2019).

The strong therapeutic qualities of wild mushrooms from their biological aspects, including antibacterial, antioxidant, antiviral, antithrombotic, anti-inflammatory, and anticancer activities, led to the study of numerous biologically active secondary metabolites they produce. (Toledo *et al*., 2016; Gebreyohannes *et al*., 2019). Consequently, antibacterial activity against both Gram- positive and Gram- negative bacteria has been demonstrated in extracts from 316 different mushroom species (Arenz and Wilson, 2016; Su *et al*., 2016; Risan *et al*., 2017; Waqas *et al*., 2019; Shafiq and Sahib, 2022).

Apart from the use of wild mushroom fruiting bodies in biological applications, fungal mycelium has been explored as a possible source of new natural medicines to create bioactive molecules with the aid of functional food or medicine (Su *et al*., 2016; Mohamed *et al*., 2018) Mushrooms contain all essential amino acids and possess larger amount of polyunsaturated fatty acids compared to saturated ones. The chemical profiles such as a variety of the bioactive substances with antioxidant, hypoglycemic, hypocholesterolemic, anticancer, antibacterial, and anti-inflammatory qualities. These compounds include polysaccharides, ergothioneine (an amino acid), terpenoids, sterols, physiologically active proteins (such as lectins, enzymes), vitamins (thiamine, riboflavin, ascorbic acid, niacin, and tocopherols), and antioxidants (Venturella *et al.*, 2021). According to Al Qaissi (2014), each mushroom was identified using its morphological features and characteristics, including size, color, texture, shape, and the presence or absence of rings on the cap, as well as the size, color, and base shape of the stem.

One of the most popular edible mushrooms consumed worldwide, *Agaricus bisporus* has a well-documented positive impact on human health. The mushroom is a common food item for people. It is frequently referred to as champignon, button mushroom or white mushroom. Among other physiologically active substances, *A. bisporus* is abundant in metabolites, complex carbohydrates, proteins, fatty acids, sterols, statins, indole, phenolic compounds, and simple sugars/saccharides. Overall, the fresh fruiting bodies of mushrooms contain an average weight of approximately 30% proteins and 35% carbohydrates (Muszy´nska *et al*., 2017; Eswari *et al*., 2019). The main aim of this study was to determine the species of edible mushrooms found in Salah Al Din Province.

MATERIALS AND METHODS

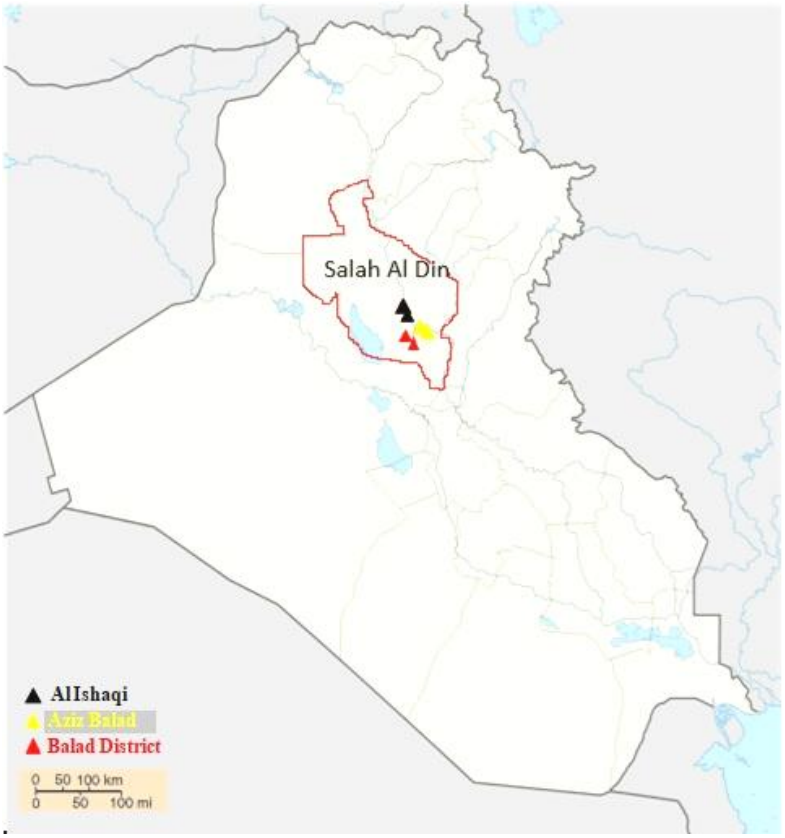
Sampling: The specimens were collected from Salah Al Din province from different places including grassland, gardens and deserts areas in the period between December and March, after rainfall when the soil was wet, from different areas such as Balad, Al Ishaqi, Aziz Balad Districts, which are located in the north of Baghdad in Salah Al Din as shown in Table (1).

The fungal specimens were photographed using a Sony ZV1 camera, in the natural environment and washed with distilled water for cleaning, and then specimens were preserved in clean and sterile containers for identification.

Microscopic features : included the size of the basidium and its spore number, spore size, color , shape and the presence or absence of cystidia including their type, shape and size - and macroscopic features- included the size of cap, color, surface texture, shape , gill colour, gill attachment to the stipe (if present) number of pores per millimeter, surface texture and color- were recorded. The diagnosis was made using the following features: gill color and attachment to the stipe (if present), number of pores per millimeter, stipe size, color, and surface texture, as well as the presence or absence of an annulus and volva (Schafer, 2010; Al-Khesraji *et al*., 2017, Chauhan *et al*., 2017; Hussain *et al*., 2018; Darshan *et al*., 2024). The distribution of the species mentioned in this study was determined according to the method of Al-Joboury and Zurgany (2024) and Al-Ashbal *et al*. (2025).

Table (1): Stations with the coordinates in the study areas.

No.	Coordinate of Stations	Stations
1	34°03'01.0"N 44°01'40.3"E	Ishaqi
2	34°02'51.5"N 44°01'42.8"E	Ishaqi
3	34°01'50.5"N 44°10'59.9"E	Aziz Balad
4	34°01'58.1"N 44°10'49.1"E	Aziz Balad
5	34°00'25.0"N 44°09'03.7"E	Balad
6	34°00'29.5"N 44°08'49.1"E	Balad



Map (1): The Sampling locations (Balad District, Al Ishaqi and Aziz Balad).

RESULTS AND DISCUSSION

During the survey, nine species of basidiomycetous macrofungi belonging to nine genera and seven families within three orders were identified. These species are: *Coprinellus disseminatus* (Pers.) J. E. Lange, 1938; *Ganoderma lucidum* (Curtis) P. Karst, 1881; *Trametes versicolor* (L.) Lloyd, 1921; *Leucocoprinus birnbaumii* (Corda) Singer,1962; *Hypsizygus tessulatus* (Bull.)Singer, 1947; *Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq. Johnson, 2001; *Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo, 2001; *Phellinus igniarius* (L.) Quél, 1886; *Panaeolina castaneifolia* (Murrill) Bon, 1979.The first order is Agaricales and contains five families (Coprinaceae, Lyophyllaceae, Psathyrellaceae, Agaricaceae, Bolbitiaceae), and six species *Coprinellus disseminates* (Pers.) J.E. Lange,1938; *Hypsizygus tessulatus* (Bull.) Singer, 1947; *Leucocoprinus birnbaumii* (Corda) Singer, 1962; *Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo, 2001; *Panaeolina castaneifolia* (Murrill) Bon, 1979; and *Coprinullus micaceus* (Bull.) Fr., 2001; the second order is polyporales that contains one family, Polyporaceae and two species: *Ganoderma lucidum* (Curtis) P. Karst, 1881 and *Trametes versicolor* (L.) Lloyd, 1921. The third order is

Hymenochatales, contains one family Hymenochaetaceae and one species: *Phellinus igniarius* (L.) Quél., 1886 (Tab. 2).

Table (2): The shape and colour of mushrooms.

Species	Order	Family	Shape of mushroom	Color of mushroom
Coprinellus disseminatus (Pers.) J.E.Lange, 1938	Agaricales	Coprinaceae	Oval,, bell-shaped,	Yellow in color, white till fully grown
Ganoderma lucidum (Curtis) P. Karst, 1881	Polyporales	Polyporaceae	Knobby when young, fan- or kidney-shaped	Brown
Trametes versicolor (L.) Lloyd, 1921	Polyporales	Polyporaceae	Fan -shaped fruiting bodies	From vivid blues and greens to white, brown, and gray
Leucocoprinus birnbaumii (Corda) Singer,1962	Agaricales	Agaricacea	Bell shaped or convex and sometimes flattening	Canary -yellow color
Hypsizygus tessulatus (Bull.)Singer, 1947	Agaricales	Lyophyllaceae	Dense cluster	White to buff or tan
Coprinellus micaceus (Bull.) Vilgalys, Hopple & Jacq. Johnson, 2001	Agaricales	Psathyrellaceae	Egg shape or oval	Tan to golden brown
Coprinopsis atramentaria (Bull.) Redhead, Vilgalys & Moncalvo, 2001	Agaricales	Psathyrellaceae	Upturned and dissolved the cap edges is curled	A whitish to grey or brown
Phellinus igniarius (L.) Quél, 1886	Hymenochae-tale	Hymenochae-taceae	Resupinate to pileate, annual to perennial, single or imbricate	Yellowish to rusty brown to grey to black
Panaeolina castaneifolia (Murrill) Bon, 1979	Agaricales	Bolbitiaceae	Delicate and slender appearance with relatively small cap	Light to medium brown

The classification of the studied species was adopted according Alexopolus (1996), as follows:

(A) Order: Agaricales

1. Family: Agaricaceae

Leucocoprinus birnbaumi Corda) Singer, 1962

Macroscopic characteristics: *L. birnbaumii* is bright yellow and has a delicate structure. Cap bell-shaped when young and flattens with age, measuring 2–5 cm in diameter, with a powdery surface. Gillsare free, crowded, and pale yellow; stem slender, hollow, and yellow, a small ring near the top. Produce a white spore print (Pl. 1). Microscopic Characteristics: spores are smooth, elliptical to almond-shaped with a visible germ pore and a dextrinoid reaction in Melzer's reagent (W: 4-7 µm L: 6-11 µm). Basidia club-shaped and four-spored. Cheilocystidia bottle-shaped. Clamp connections present in the hyphae.

Plate (1): *Leucocoprinus birnbaumii* in natural habitat**.**

2. Family : Bolbitiaceae

Panaeolina castaneifolia (Murrill) Bon, 1979

Macroscopic characteristics: Cap shape hemispherical to convex and flattens with age. Gap length 1–3 cm. Color: chestnut-brown to dark brown. Surface: Smooth and moist when fresh, pale when dry. Gills Attachment: adnate to slightly free from the stipe. Color: gray at first, becoming blackish as spores mature. Dark mottling due to uneven spore development is a key trait of *Panaeolus* species. Stipe (Stem), length: 5 cm. Thickness: 2–4 mm. Color: whitish to gray. Surface: smooth, sometimes with fine longitudinal fibers. Hollow interior (Pl. 2 B). Spore print black**.**

Microscopic characteristics: Spores are black, smooth, and elliptical (W: 11–14 × L: 6–8 µm); basidia club-shaped with 4-spored often flask-shaped. Gills composed of regular, parallel hyphae.

Plate (2): *Panaeolina castaneifolia*; (A) In natural habitat, (B) In laboratory.

3. Family Coprinaceae

Coprinellus disseminatus (Pers.) J. E. Lange , 1938

Macroscopic characteristics: Cap shape: initially conical or ovate, expanding to an umbrella-like shape with maturity. Size: ranges from 0.5 to 2 cm in diameter. Color: pale to light brown at the center, fading to white at the edges, often with a translucent, silvery sheen when moist. Smooth, glabrous texture surface, sometimes appearing moist or sticky (Pl. 3). Gills Attachment: free from the stem. with white to pale gray in colour when young, becoming black as they mature, undergoing "deliquescence" (self-digestion).Spore print black. Thin, slender stem slightly swollen at the base 3 to 5 cm long, white to off-white, turning darker near the base as it ages.

Microscopic characteristics: Spores shape ellipsoid to oval. Size: (W 8-10 x L: 5-6 µm). Color: black, with a smooth surface, dose not reactive to iodine stains (non-amyloid). Basidia: clavate (club-shaped). Four-spored, bearing basidiospores at the tips. Cystidia: present on gills, often thin-walled, and may be fusiform (spindle-shaped) or clavate. Function: help in spore dispersal and identification, though they are not always abundant. Clamp connection absent.

Coprinellus disseminatus with a small, saprotrophic species commonly found on decaying wood or plant debris. Its ability to undergo deliquescence (self-digestion of the cap) (Hussain *et al*., 2018).

Plate (3)*:* *Coprinellus disseminatus* in natural habitat.

4. Family : Lyophyllaceae

Hypsizygus tessulatus (Bull.)Singer, 1947

General characteristics: One of the primary edible saprophytes in temperate climates from the family Lyophyllaceae, *Hypsizygus tessellatus* (Agaricales), commonly known as the "has a cap that is tesselated oyster mushroom," convex to flat as it matures. It is commonly found and consumed in East Asia, Japan, China, Korea, and North America. It is a popular industrialized food and medicinal mushroom due to its nutritive, medication, and biological properties (Chauhan *et al* ., 2017). Often found on poplars or maples, but also on beech, birch, elm, or fir, *Hypsizygus tessullatus* can occasionally be seen alone or in dense clusters of seven or more individuals. It can also be found in smaller groups on dead stumps or logs, or in large groups high in the crotch of dead trees (Stamets, 2011). This mushroom is distinguished by its thick flesh, which gives it a comparatively crisp texture, and its clustered, dense texture.

Macroscopic characteristics: Cap length 3 cmin diameter , with a smooth, light brown surface that becomes more scaly or tessellated with age, which is where it gets its name. Cap texture velvety when young, but becomes more rugged and wrinkled as it matures. Gills white and closely spaced. Stipe (stem): white to light yellowish and cylindrical, 6 cm in length. with slight to moderate thickening at the base. Smooth slightly fibrous surface. Odor: mild, pleasant odor, somewhat like fresh vegetables or oysters. Taste: mild and pleasant, often described as slightly sweet (Pl. 4).

Microscopic characteristics: smooth, ellipsoid spores, measuring W:6–8 × L: 4–5 µm in size , colorless and non-amyloid. Clavate (club-shaped) basidia, 4-spored, and measuring approximately 25 µm in length. Hyphal System: monomitic hyphal system consisted of septate hyphae with clamp connections often present. Thin-walled smooth surface colorless hypha. Cystidia: absent or very rare in *Hypsizygus tessellatus*. Spore print: white in colour..

Plate (4)*: Hypsizygus tessellatus* collected from nature in sterile plastic.

5. Family: Psathyrellaceae

(1)*Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo, 2001

General characteristics: This species is a large, meaty species with a thin, connected veil that can be difficult to discern. It has a ring-shaped stem, a whitish to grey or brown cap that can occasionally be horizontally wrinkled but not plicate (pleated). The point where the bottom of the cap meets with stem is indicated by the ring-shaped line around the stem; cap's thin, flat scales located below it, and the area where the gills were in contact with the stem is delicately grooved above (Schafer, 2010). From spring to fall, clusters of mushrooms appear after rain, usually in urban and disturbed environments like lawns and empty lots, as well as grassy places (Heleno, *et al*., 2014).The common habitat of the ink cap mushroom *Coprinopsis atramentaria* includes Australia, Sydney, New Zealand, Europe, N. America and Asia.

Macroscopic characteristics: Gray to brown mushroom with a bell-shaped cap which becomes flat and dissolves into black ink as it matures; cap measures about 3–7 cm in diameter and often grooved or wrinkled; gills initially gray, then turn black and liquefy. White, hollow, and slender stem, 5–15 cm, with a slightly swollen base (Pl. 5)

Microscopic characteristics: smooth, elliptical, and dark brown spores, measuring around w:10–14 × L: 6–8 µm. Club-shaped basidia and four-spored. Cheilocystidia (located on the gill edges) present and variable in shape. Clamp connections present in the hyphae.

Plate (5)*:* *Coprinopsis atramentaria* in natural habitat.

(2) *Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq.Johnson, 2001
Microscopic characteristics: Reddish-brown spores and measure W: 3-5 × L: 5-7 µm, an oval, almond, or lentiform shape. Germ is located in the middle of spores.

Macroscopic characteristics**:** Grainy, convex or bell-shaped cap, 2.3 cm long, with a brown core, either light brown or yellowish-brown. Packed, sandy gills, linked to the stem, turn dark brown or black as they mature. Stalk: white, cylindrical, hollow, hollow granular granulate, length 4 cm (Pl. 6).

Plate (6)*:* *Coprinellus micaceus* in natural habitat.

(B) Order: Hymenochaetales

1.Family: Hymenochaetaceae

Phellinus Igniarius (L.) Quél**.** 1886

Macroscopic characteristics: Unlike many other fungi, this species lacks a traditional cap and instead forms a perennial, hoof-shaped fruiting body, measuring approximately 9 cm in width; upper surface dark and cracked upper surface and a yellowish-brown pore layer containing fine, regular pores (6 pores/mm), woody context tissue and rusty brown in color (Pl.7).

Microscopic characteristics: clavate basidia with four-spored. Brown spores, smooth, ellipsoid to subglobose, measuring: measuring approximately 5.2–6.8 µm in width × 3.5–4.5 µm in length. dark brown, pointed setae present in the hymenial layer. Clamp connections absent.

Plate (7)*:* *Phellinus Igniarius* in natural habitat

(C): Order: Polyporales
Family: Polyporacea
1.*Ganoderma lucidum* (Curtis) P. Karst, 1881
General characters: *Ganoderma lucidum* is one of the most widely used medicinal mushrooms worldwide, It is known by several names, including Mannentake, Lingzhi, and Reishi. The primary Asian countries where this mushroom is popular are China, Japan, Korea, and others. The large, black mushroom has a glossy skin and a texture similar to wood, it was found in earlier research that this species of mushroom could treat a wide range of illnesses (Pattanayak and Biswal, 2020). The main habitat for this fungus is on various dead deciduous plants, *Ganoderma lucidum* is a red mushroom cultivated exclusively for its therapeutic properties. The Agriculture and Food Organization (FAO) has reported on a global survey of wild edible and medicinal mushrooms (El-Wakil and Al-Gifri, 2020).

Macroscopic characteristics: Reniform to semicircular, varnished cap ranging from 5 to 30 cm in diameter and 1 to 3 cm in thickness; smooth, shiny cap surface and exhibits concentric zones of reddish-brown to dark brown coloration; pore surface, located on the underside of

the cap, is initially white, becoming yellowish to brownish with age, laterally with 4–6 pores per millimeter. Stipe tough, woody, and share with cap in the varnished appearance (Pl. 8) .

Microscopic characteristics: brown, double-walled, ellipsoid to almond-shaped basidiospores measuring approximately (W: 9–12 ×L: 6–8 µm), with the inner wall bearing fine echinulate ornamentations. Clavate basidia measure (W:20–30 × L:6–10 µm), and typically with four-spored. The species exhibits a trimitic hyphal system, comprising generative hyphae (thin-walled, with clamp connections), skeletal hyphae (thick-walled and unbranched), and binding hyphae (highly branched and thick-walled), contributing to the fruiting body's tough and durable texture. Cystidia rare or absent.

Plate(8): *Ganoderma lucidium*; (A) In natural habitat, (B) In laboratory

2. *Trametes versicolor* (L.) Lloyd, 1921

General characteristics: The polypore mushroom *Trametes versicolor* (L.) Lloyd is found all over the world. Turkey's tail. It is also known as Coriolus versicolor, and is an edible fungus with significant medicinal applications. This macrofungus belongs to the genus Trametes, phylum Basdiomycota, and class Agaricomycetes. It's frequently found in temperate regions of North America, Asia, and Europe and has a long history of use in traditional medicine (Lowenthal *et al*., 2023).Trametes versicolor is identified by variations in color , form , size and growth patterns. While the fruiting bodies of many species are fan-shaped and vary in color from bright blues and greens to white, brown, and gray, some may have more complex and unique shapes on the underside. For example, some species of Trametes have pores; while others have a smooth or serrated surface. Each mushroom develops a range of patterns as it grows from a primary attachment point. This species is identified by variations in size, form, color, and growth patterns (Darshan *et al* ., 2024).

Macroscopic characters: Thin, flexible, fan-shaped to semicircular fruiting bodies often grow in overlapping clusters. Cap measures 2–8 cm across and 0.5–1 cm thick, displaying a velvety surface with conspicuous, multicolored concentric zones ranging from brown, tan, and gray to white, orange. Thin, wavy, margin, lighter in color, the pore surface located on the underside,

white to pale yellow, bearing small, round to angular pores at a density of 3–8 pores per millimeter, sessile fruiting bodies and attach directly to the substrate without a stipe. Mild odor, With a taste that's mild to slightly bitter (Pl.9).

Microscopice characters cylindrical to ellipsoid smooth, thin-walled, hyaline spores measuring approximately (W: 4.5–7 ×L: 1.5–2.5 µm). Clavate four-spored basidia, about (w:15–20 × L:4–5 µm) in size,. Cystidia absent or rare, although cystidioles may be present. Trimitic hyphal system, composed of generative hyphae (thin-walled, septate with clamp connections), skeletal hyphae (thick-walled, unbranched), and binding hyphae (thick-walled and highly branched), contributing to the fungus's tough, resilient structure.

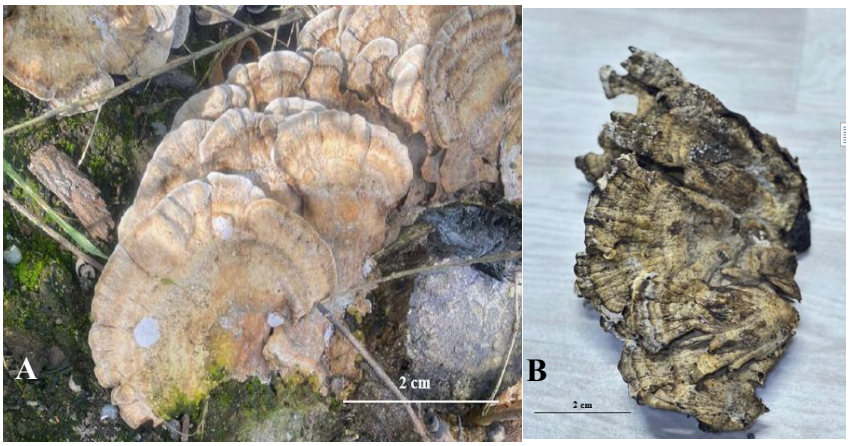


Plate (9): *Trametes versicolor*; (A) In natural habitat, (B) In laboratory.

CONCLUSIONS

This study successfully identified nine genera of edible fungi from Salah Al-Din Governorate, Iraq, which are classified into seven families and three orders. These results confirm the region's rich fungal biodiversity and provide a valuable addition to the limited mycological data available for Iraq. The applied methodology proved effective and may serve as a reliable model for future mycological research in similar ecological zones. The researchers conclude that Salah Al-Din is a promising area for further exploration of wild mushrooms, both for scientific study and economic purposes. The study also highlights the need for more comprehensive surveys using both morphological and molecular approaches to deepen our understanding of local fungal biodiversity. It is recommended that future research focuses on the biochemical and medicinal properties of the identified species, especially their potential use as natural antioxidants or antimicrobial agents. Additionally, efforts should be made to raise awareness regarding the safe consumption and sustainable use of wild edible fungi among local communities.

CONFLICT OF INTEREST STATEMENT

"There isn't any conflict of interest for the authors".

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تشخيص بعض أنواع العراهين القابلة للأكل من محافظة صلاح الدين، العراق

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الخلاصة

شخصت بعض انواع العراهين القابلة للأكل والتي جمعت من محافظة صلاح الدين/العراق على أساس الصفات المظهرية الخارجية لكل فطر التي تضمنت حجم القبعة والشكل واللون وقوام السطح للقبعة ولون الخياشيم ومدى ارتباطها بالساق ان وجد وعدد الثقوب وحجم الساق ووجود او عدم وجود الحلقة واللفافة علاوة على الصفات المجهرية التي شملت حجم البازيديوم وعدد السبورات وحجمها وشكلها ولونها ووجود او عدم وجود السستيديا مع حجمها وشكلها ونوعها وقد وجد ان هناك تسعة أنواع من الفطريات البازيدية تنتمي الى ثلاث رتب ضمت كل من Agaricales، Polyporales و Hymenochatales و سبع عائلات:

Agaricaceae, Bolbitiaceae Coprinaceae, Hymenochaetacea, Lyophyllaceae, Psathyrellaceae, Polyporaceae

و تسع انواع:

Coprinellus disseminatus (Pers.) J.E.Lange, 1938; *Ganoderma lucidum* (Curtis) P. Karst, 1881; *Trametes versicolor* (L.) Lloyd,1921; *Leucocoprinus birnbaumii* (Corda) Singer, 1962 *Hypsizygus tessulatus* (Bull.)Singer, 1947; *Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq.Johnson, 2001; *Coprinopsis atramentaria* (Bull.) Redhead, Vilgalys & Moncalvo, 2001; *Phellinus igniarius* (L.) Quél, 1886; *Panaeolina castaneifolia* (Murrill) Bon, 1979.