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Isolation of Wild Edible Mycorrhizal Mushrooms

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Abstract: Edible mycorrhizal mushrooms have been collected and consumed for centuries in indigenous communities and are part of the diet of its inhabitants. They have economic importance, as several communities supplement their income with the economic trade of these species in specific, in the state of Morelos in the community of Huitzilac these mushrooms are used for both self-supply and sale. Although these mushrooms have a great importance and potential in biotechnology, the collection of mycological strains HEMIM of the Mycology Laboratory of the CIB-UAEM still does not contain strains of wild edible mycorrhizal fungi. For this reason, the objective of this work was to isolate mycorrhizal fungi from the state of Morelos**.** The biological material was obtained from the community of Huitzilac in Morelos. Isolates from basidiomes were performed on potato dextrose agar (PDA) supplemented with malt; transfers were made to purify the strains, and isolates were incubated at 25 °C in the dark. Isolates were plated on PDA, malt extract agar (EMA) and whole wheat flour (HIT). Sixteen mycorrhizal fungi were isolated. Three mycorrhizal fungi isolates were successful (*Russula brevipes, Cantharellus cibarius and Amanita caesarea*), whose species will be later corroborated by identification tests. In general, a better mycelial growth of mycorrhizal fungi was observed when grown in EMA, followed by PDA and

finally on HIT. These results agree with previous work where PDA and malt extract were used for the growth of mycorrhizal fungi.

Keywords: Fungal collection, mycorrhizal, strains, wild edible mushroom.

INTRODUCTION

The handling, conservation and use of biodiversity should be a major concern of man today. Studies on global biodiversity, are usually based on higher species (plants and animals), and little or no about of the fungi. Is estimated that there are thousands of species of fungi and they are second in number after insects. The importance of fungi to the environment is its disintegrating organic matter capacity and parasitic or symbiotic associations established with many organisms[1]. Fungi have a high diversity, which makes them one of the largest groups of organisms in nature. Approximately exist in Mexico about 200,000 species of fungi, which are known[2, 3] about 7000. The mycelium is responsible for performing functions of nutrition, respiration, growth, exploration, defense and attack, actively participating in the maintenance of forest ecosystems. Within this type of symbiotic associations are found wild edible fungi. It has been reported that the mycelium of the mycorrhizal species increases with the age of the tree, there are some fungi that appear only when the trees have reached certain maturity, as species of the genus *Boletus*[4]. Other species have different hosts, such as the Amanitaceae family, often forming ectomycorrhizal associations is very common in forests of coniferous, birches and eucalyptus[5] and *Cantharellus* grows on leaves of deciduous forest, oak, beech, and pine.

Currently several foreign and domestic trading companies promoted intensive utilization for export of certain edible fungi such as tecomate (*Amanita cesarea*), pancitas (*Boletus edulis*), duraznillo (*Cantharellus cibarius*) and white fungus of ocote (*Tricholoma magnivelare*), which form mycorrhizae[6]. These fungi can reach high prices in the market[7], which have great economic importance. However, fungi are a diverse group that also have an important ecological role as decomposers of organic matter and symbionts of vascular plants. They contribute to soil formation and recycling of elements in ecosystems[8]. Fungi are lignocellulolytic organisms by excellence, both its hydrolytic capacity as their distribution, so it has great ability to be used in biotechnological processes. Edible mycorrhizal mushrooms have been collected and consumed for centuries in the indigenous communities and are part of the diet of their inhabitants. They have economic importance, as several communities supplement their income with the trade of these species[9] in specific, in the state of Morelos in the community of Huitzilac these mushrooms are used for both self-supply and sale.

Although these mushrooms have a great importance and potential in biotechnology, the collection of mycological strains HEMIM of the Mycology Laboratory of the CIB-UAEM still does not contain strains of wild edible mycorrhizal fungi. The objective of this work was to isolate mycorrhizal fungi from the state of Morelos.

METHODS

Study area: The municipality of Huitzilac, is located in the angle of north-western of State of Morelos, graphically between 19°00'00" and 19°07'20" of north latitude, between 99°10'20"99 and 99°20'00" of west longitude from the meridian of Greenwich (Fig.1).

Biological material: The biological material was obtained from the community of Huitzilac in Morelos. Visits were made during the months of June, July and August at the municipalities of Huitzilac, Tres Marias and Coajomulco. Edible mycorrhizal basidiomes, young and in good condition were purchased. They moved to the Laboratory of Mycology of IBC-UAEM on waxed paper to prevent dehydration. Common names given to the fungi by community vendors were registered.

Identification of fungal material: The same day of your purchase, the fresh fungi were recorded and photographed. The species identification was made with literature[10, 11] taking into account the morphological characteristics of the basidiomes.

Figure-1: Location Hiutzilac municipality and the state of Morelos in Mexico.

Isolates from basidiomes: From each basidioma, three isolates with the technique described by Wilkinson and Royse[12] were performed. The media used were potato dextrose agar (PDA) Bioxon, PDA supplemented with malt extract and integral wheat flour (HIT). Isolates and re-isolates (made to purify the strains) were kept in incubation at 25 °C in darkness.

Obtention of sporads: Some basidiomes were used to collect spores on sterile filter paper[12].

RESULTS

The fruiting bodies obtained from Huitzilac Morelos are shown in **Figure 2**. A total of 14 species and two genera were identified, 35 common names were reported **(Table 1**). Sixteen of mycorrhizal fungi were isolated. Most isolates showed contamination of molds, yeasts and bacteria. Three mycorrhizal fungi isolates were successful, *Amanita caesarea, Cantharellus cibarius* and *Russula brevipes* (Fig. 3). The strains were deposited in the culture collection of fungi (HEMIM) of Biological Research Center of the Autonomous University of the State of Morelos with the keys 141, 142 and 143.

However, testing is required to identify isolates to confirm species. Generally, better mycelial growth of mycorrhizal fungi grown was observed in HIT, which has been previously reported[13]. Garza *et al.*[14] isolated 27 ectomycorrhizal fungi associated with *Pinus culmicola* to 3650 msnm, using culture medium modified of

Melin Norkran, supplemented with streptomycin (100 ppm) from ectomycorrhizas and fruiting bodies, however no mentioned any species isolated.

Figure-2: Obtention of basidiomes in Huitzilac, Morelos

Table-1: Wild Edible Mycorrhizal Mushrooms

Scientific name	Some common names
Amanita caesarea (Scop.: Fr.) Quél.	Yema, yemita, chicala
Amanita vaginata (Bull.: Fr.) Vitt.	Becerro, sombrerillo
Amanita rubescens Pers.	Ajonjolinado, amantecado, tejamanilero
Russula cyanoxantha (Schaeff.) Fr.	Trompas, san juanero
Russula brevipes Peck.	Hongo blanco, trompa de cochino, trompas, madroño
Russula sp.	Coconita, trompas, San Isidro
Hypomyces lactifluorum (Schwein.) Tul. & C. Tul.	Enchilado, trompa roja, trompa de marrano, chicala naranja
Hypomyces macrosporus Seaver	Chical prieto, enchilado prieto, chicala gris
Clitocybe gibba (Pers.) P. Kumm	Señoritas
Lyophyllum decastes (Fr.) Singer	Clavito, clavo de encino
Cantharellus cibarius Fr.	Duraznillo, amarillo
Ramaria sp.	Escobeta, buche de guajolote
Boletus edulis Bull.: Fr.	Pancita
Boletus sp.	Hongo de conejo
Lactarius deliciosus (L.) Gray	Trompa de cochino, jarritas
Lactarius indigo (Schwein.) Fr.	Añil, oreja azul

Sporads were obtained from *Lyphyllum decastes, Russula* sp. *Lactarius indigo L. deliciosus, Cantharellus cibarius* and *Ramaria* sp. The color of the sporads varied depending on the species, with orange tones to

(*Russula* sp.), and between brown light and creamy for the rest of the species. The sporads duly registered are stored refrigerated at 4-5°C (Fig.4).

Figure-3: Basidiomes and mycelium: *Cantharellus cibarius* (a and b), *Russula brevipes* (c and d), *Amanita caesarea* (e and f), respectively.

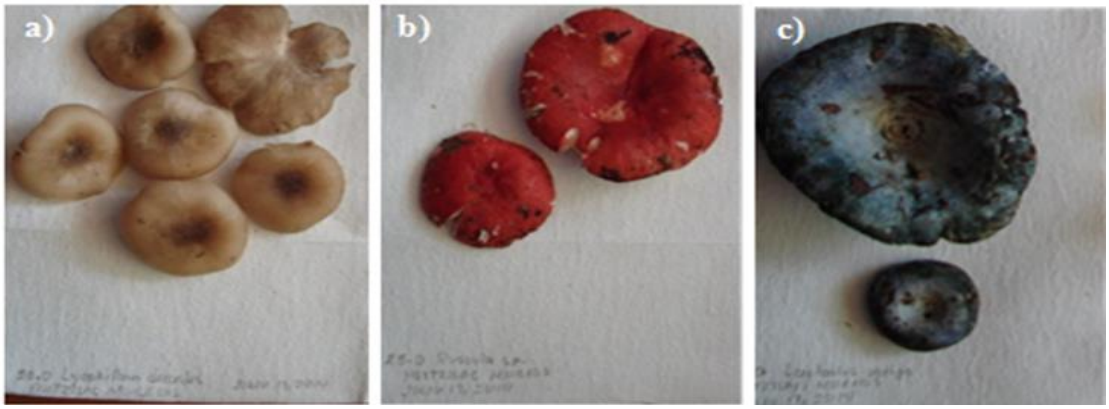

Figure-4: *Obtention of sporads:* a) *Lyophyllum decastes*, b) *Russula* sp., c) *Lactarius indigo*.

CONCLUSIONS

We managed to obtain the strains *Amanita Caesarea*, *Russula brevipes*, and *Cantharellus cibarius* which will useful to conduct research work on metabolites of biotechnological importance.

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