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Article

Investigating the Presence of some Fungi that Produce Toxins on some Medicinal Herbs in the City of Tikrit

Roaa Hassan Al-Tayef[1], Raad Abdalrazaq Hamdi[2]

1. M.D. / Tikrit University / College of Education for Women / Department of Biology Ministry of Education, Salah al-Din Education Directorate
2. Tikrit University / College of Education for Women / Department of Biology Ministry of Education, Salah al-Din Education Directorate

* Correspondence: roaahassan@tu.edu.iq

Abstract: This research included isolating, then diagnosing and studying some types of fungi in medicinal herbs in the city of Tikrit during the winter season 2023-2024. The research included a number of samples collected from stores in different areas of the city of Tikrit. Pathogenic fungi were identified in the laboratory as well as finding the percentage frequency Every mushroom. The results showed the presence of five types of fungi in these herbs that are used for medicinal purposes and to treat some diseases, as follows:

1. Aspergillus flavus
2. A. niger
3. A. terrus
6. Alternaria
7. Penicillium sp.
8. Curvularia sp.

We notice a variation in the frequency percentages of these fungi, the highest frequency being Aspergillus flavus, followed by Penicillium sp.

Keywords: medicinal herbs, pathogenic fungi, therapeutic purposest.

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1. Introduction

Medicinal herbs are accompanied by many fungi belonging to different groups, which include many types of Ascomycotina, Zygonycotina, and Deuteromycotina (Wilson and Ogawa, 2018). And yeasts, and some of these fungi may contaminate herbs during the harvesting and storage process (Muhamad and Mussa, 2003). The two scientists, Lkeda and Matushima, isolated a large group of fungi from 30 types of known medicinal herbs at different degrees of humidity and then diagnosed them (Criseo et al., 2001).

It has been observed that most fungi are found on these herbs that are exposed to many conditions, especially those used as medical treatments, which are vulnerable to fungal infections and contamination with their toxins. These toxins are characterized by their toxic effects on those who use them (Fall et al., 2022). Christensen, 1975, divided the fungi that infect crops into three Groups: The first group includes field fungi, the second group is known as storage fungi, and the third group is known as root fungi.

2. Literatures Review

As the use of medicinal herbs increases worldwide, safety issues related to contamination with microbial organisms have become a major concern (Limyati *et al.* , 1998). Most of fungi are toxigenic in nature, and some other non-toxigenic species may impart a mouldy odour and taste (Sekar *et al.*, 2008). In the pre-harvest stage, medicinal herbs are susceptible to indigenous fungi in the soil where they were grown. The dried part of medicinal herbs exposed to fungal contamination during post-harvest.

Different taxonomic groups of fungi were detected in medicinal plant samples collected from different regions, suggesting *Aspergillus* and *Penicillium* groups as the most predominant genera (Moort *et al.*, 2010). Many species of *Aspergillus* and *Penicillium* genera are known mycotoxin-producers, which may pose a great threat to public health (Sekar *et al.*, 2008).

Mycotoxigenic fungi could produce a wide variety of mycotoxins. Aflatoxins (B1, and G1) are a family of structurally related toxic secondary metabolites which mainly produced by certain strains of *Aspergillus flavus* (*A. flavus*) and *Aspergillus Parasiticus* (*A. parasiticus*) (Mateo *et al.* ,2011). Aflatoxin B1 (AFB1) was classified as a Group I carcinogen by the World Health Organization for Research on Cancer in 1993 (IARC, 1993). Sterigmatocystin (ST), the stable intermediate in the final steps of aflatoxin biosynthesis in the aflatoxin-producing fungi *A. flavus* and *A. parasiticus*, was proven to be another carcinogenic mycotoxin (Yu *et al.*, 1995). Some certain stains, e.g., *A. versicolor*, *A. sydowi*,*A. nidulans*, *Bipolaris*, *Chaetomium* and *Emericella* spp. could also produce ST (Versilovskis ,2 010) .

3. Materials and Working Methods

Fifty samples of medicinal herbs were collected from three types collected from the herbal market in the city of Tikrit, which are seeds, Trigon llafoenum - graecum (L), and Menthalogifolia - L.

Agricultural environment: SDA medium was used, and the samples were grown on saprod dextrose agar medium according to the method (Ellis *et al*., 2007).

Isolation and diagnosis of fungi: The direct plate method was used to isolate the fungi that accompany medicinal herbs, by weighing 8 grams of each plant sample and each one separately, then sterilizing the surface with 10% sodium bichlorate for 5 minutes, after which it was washed with distilled water, and 80 were transferred. A piece of leaves for each of cinnamon and thyme and 80 seeds of fenugreek onto sterilized filter paper to be dried. Then each piece of the plant was distributed on the surface of the growing medium that was used at a rate of 7 pieces/dish. After the process of planting the plant parts was completed, the dishes were incubated at a temperature of 25°C. For a whole week.

After 7 days of cultivation, the dishes were examined in order to diagnose the colonies growing on the culture media. The dishes were continued to be monitored for a period of 4 to 5 weeks, because cyst fungi delay growth after the incubation process. Then, the initial examination of the dishes was carried out, after which the fungi were isolated using... The needle is on the dishes containing the culture medium: Direct plate. An optical microscope was used to diagnose fungi and determine their characteristics by preparing samples on slides fixed with lactophenol, which contains the dye methyl blue.

4. Results and Discussion

The results of this study, which was conducted on a group of medicinal herbs in the city of Tikrit, showed the distribution of fungi on herbs throughout the year through different percentages of their presence, which showed the presence of pathogenic fungi in storage stores or warehouses, according to the methods of storage in the stores. The percentages of fungal frequency were different from one fungus to another, according to the different herbs, as well as according to the factors available to cause infection, and also according to the plant type (Fung and Clark, 2020). As for the distribution of the frequency of fungi over the months of the year, the lowest percentage was recorded in the month of January due to the decline of the second degree to a level close to zero, which is the degree that is lower than the minimum degree at which many of the vital activities of many fungi stop, and this condition does not encourage the occurrence of fungi. Fungal infections because environmental conditions are unsuitable and there are no fungi that can tolerate low temperatures and can cause infection (Hakobyan *et al*., 2022). In February, there were injuries to the weeds that were stored, which came from the impossible pollen due to unsuitable environmental conditions (Saito and Machida, 2019). When temperatures rose, fungal infections of the leaves were recorded in the month of March, when temperatures reached more than 25 degrees Celsius.

Table 1. Frequency rates of fungi in turmeric

	Isolated Fungi	Frequency Ratios
1	Aspergillus Flavus	3
2	a.niger	2
3	Alternaria alternate	2
4	Fusarium oxysporum	-
5	Penicillium	1.5
6	a.tesrrus	1.1

Table 2. Frequency rates of fungi in anise

	Isolated Fungi	Frequency Ratios
1	Aspergillus Flavus	5
2	a.niger	3.3
3	Alternaria alternate	2
4	Fusarium oxysporum	-
5	Penicillium	-
6	a.tesrrus	-

Table 3. Frequency rates of fungi in sagebrush

	Isolated Fungi	Frequency Ratios
1	Aspergillus Flavus	9.5
2	a.niger	7
3	Alternaria alternate	-
4	Fusarium oxysporum	4
5	Penicillium	1.5

6	a.tesrrus	1.8

Table 4. Frequency rates of fungi in cinnamon

	Isolated fungi	Frequency ratios
1	Aspergillus Flavus	4
2	a.niger	3.2
3	Alternaria alternate	-
4	Fusarium oxysporum	-
5	Penicillium	-
6	a.tesrrus	1

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