Isolation and diagnosis of fungi caused the rotting of local and imported apples in the local markets of Al-Diwaniya city in Iraq

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Abstract. This study was conducted to estimate the percentage of damage caused by local and imported apple fruits caused by fungal infections in the markets of Al-Diwaniya city, where the fungi that cause the rotting of apple fruits were isolated and identified. The results showed that the fungi Penicillium sp., Aspergillus niger, Aspergillus terreus, Trichoderma harzianum, Fusarium solani, Fusarium oxysporum, and Alternaria alternata are responsible for rotting apples. The results of isolating explained that the fungus Penicillium was most frequent in rotting fruits followed by the fungus Aspergillus terreus followed by Trichoderma harzianum, while the lowest frequent fungus is Alternaria alternata.

Keywords: fungi, fruit rot, apple rot

1. Introduction

A lot of fungi cause a significant loss of fruit after the harvest (1). Where infections occur during the process of harvesting or mobilization, marketing and storage or during the presentation of the sale and even after the arrival homes and the losses are increasing significantly in developing countries, which are largely lack of interest in trading and storage and even access to the consumer. Infection starts often in wounds during the harvesting and trading (2). Fruit that are susceptible to fungal infections are apple fruits. The fruits of apples are exposed to many different pests during the course of their production, marketing and storage, including blue rot, brown and white rotations, etc. These factors cause a reduction in their marketing value. A lot of fungi that cause rotations were isolated from apple fruits such as Aspergillus niger, A.flavus, Rhizopus stolonifer, Penicillium (3). The following fungi expansum Cladosporium, Alternaria and Penicillium spp were the dominant fungi isolated from the fruits of apples stored under refrigeration (4). These fungi have also been isolated from different sources (5; 6).

These fungi produce toxic compounds in various foods known as Mycotoxins. The most important of these toxins are Aflatoxins, which are produced by some of species such as Aspergillus. The food that is contaminated with these toxins causes many diseases in humans and animals such as lower limb edema, liver cancer, fetal mutation and genetic mutations and inhibition of protein synthesis (7; 8).
Due to the openness of the Iraqi markets to the world markets, large quantities of commodities have been imported into the country, including fruits of apples and through the field observations, there were many fungal infections in those fruits. This research was conducted to identify the nature of these fungi and their toxic effects on public health.

2. Materials and methods:

1- Collecting samples (apples) from the local markets in the city of Al-Diwaniyah

2- Isolation and diagnosis of fungi from apples

A number of rotten fruits collected from the local markets were randomly taken from the infection area to small pieces. The pieces Sterilized with sodium hypochlorite solution with 0.5% concentration for 30 seconds and washt with sterilized water and left to dry on sterile blotting paper then the pieces are cultured in Sterilized petri dishes containing PDA (Potato Dextrose Agar) ,chloramphenicol was added to prevent the growth of bacteria. the dishes incubated at a temperature 25°c for 7 days (9). The fungi were purified by culturing on new prepared PDA medium. The isolates were identified based on the appearance characteristics of the colonies and under the microscopic. A microscopic examination of each fungal isolation was performed by placing a drop of Lactophenol in the middle of the slide and transferring a small portion of the colony mediated, then a sterile loop was added to this droplet. The lid of the slide was then placed with a little pressure through the thumb and the slides examined under the light microscope. The characteristics of each fungus were recorded, the color, nature of the spores, the shape of the Vesicle( its size and color) and the nature of the spherical structures

3. Results and discussion:

The results showed that the following fungi Penicillium sp, Aspergillus niger, Aspergillus terreus, Trichoderma harizanum, Fusarium solani, Fusarium oxysporium, Alternaria alternata were isolated and identified appearance and microscopically .The fungus Venturia inaequalis was isolated and identified for the first time in the region as shown in (Fig1) Three species of fungi belonging to the genus Penicillium and two species of Aspergillus,11 isolates of Penicillium sp were also isolated and subjected to microscopically identification based on the keys.(Fig2&3&8) while the number isolates was of P.italicum was (4) isolates, as shown in (Fig, 3,5,7), These results are more consistent with(10) which isolated Penicillium from the fruits of apples, where his presence was more than R.stolnifer in the rotten fruits displayed in the markets or stored.

Penicillium is one of the main causes of the rotting of apples after harvest in many countries (11; 1) and is a fungal infection, where infection occurs through wounds or through lenses, especially when mature or Through the ulcerated tissue. The spores of the fungus remain alive for a long time and remain from season to season in the contaminated boxes. The fungus can grow and produce a large amount of spores, and the contamination of these spores may come from other sources of orchard or rotting fruit or from the air.

The number of Aspergillus terreus isolates was (13), whereas Aspergillus niger (1). These results are in line with the findings of (3) confirming the ability of A. niger and A.flavus fungi to infect apples after harvest . The number of Trichoderma harizanum isolates was (2),while T. coniigi (1) whereas the number the others fungi were appeared with(1-3).

The reason for the fact that the fruits can be damaged quickly because of the high water content in the fruit that allows pathogens to cause infections as well as the wounds that get to the fruits during harvesting, packaging and the transfer and marketing.
Figure (1) shows the infections that appear on apples

Figure (2) Penicillium sp

Figure (3): Penicillium sp, T. harizanum Fusarium solani, A. alternata, A. terries
Figure (4) Penicillium sp & A. terreus

Figure (5) A. niger, A. terreus & F. oxysporium

Figure (6) Penicillium sp & Trichoderma harizanum

Figure (7) Fusarium solani & 2-Aspergillus terreus

Figure (8) Penicillium sp.
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