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The Effective Concentration of the Crude Extract of *Mentha picata* and *Eucalyptus* against the Growth of *Fusarium oxysporum*

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Abstract

This research aims to evaluate The effect of plant extract concentration as antifungal. Fusarium fungus was isolated from the eggplant and cucumber plants that infested them. These were tested for concentrations of the pathogenic fungus *Fusarium oxysporum* according to the food poisoning method. The inhibition rate was calculated by measuring the diameter of the colony compared to the control. The results showed that in the crude extract of Eucalyptus at a concentration of 12%, the percentage of growth inhibition was 100% on *Fusarium oxysporum*, compared to the crude extract of *Mentha spicata* where the percentage of inhibition was 80.11%. At the same concentration, and the percentage of inhibition of Eucalyptus extract At concentrations 3,6, and 9% ranged between (35.33-79.55) while the inhibition of *Mentha spicata* extract ranged between (17.20 - 80.11) at the same concentrations.

Keywords: Antifungal activity, Crude extracts, *Mentha spicata*, *Eucalyptus*, *Fusarium oxysporum*,

1. Introduction

Fusarium is considered to be the most important harmful fungi to field crops and even stored fruits, and it has economic importance because of the damage it causes to crops and plant resources [1]. The use of agricultural pesticides has had negative effects in many environmental problems such as pollution of water and soil, the elimination of living organisms, poisoning of farmers and others [2]. The using plant extracts and oils from medicinal plants is considered to develop the agricultural pesticides, as it is regarded as a safe biological control that is environmentally friendly and does not lead to collateral damage [3]. One of the features and recipes of these plant products used as fungicides is that they decompose quickly and do not take a few days, most of which have a selective role against some fungi that cause plant diseases [4]. Medicines use medicinal plants to combat pathogenic fungi is that these plants contain many effective active compounds that work synergistically against these fungi. This characteristic is not present in industrial materials or industrial pesticides [5]. Compounds target the membranes of the cells, causing a disturbance in the metabolism because the metabolism depends on the integrity of all the membranes of the cell organelles. For example, any change in the mitochondrial membrane can cause an imbalance in the energy circulation inside the cell. The presence of such compounds affecting the membranes leads to a defect in the vital processes of the cell [6], compounds in the plant extract cause irregular

branching in the apical regions of the fungal junction and the appearance of barrel-shaped structures from which a fibrous substance emerges [7]. In addition, [8] said that these plant compounds lead to a change in the natural assembly of the components of the fungal wall, which leads to the disarrangement of the apical region, and thus, causes the degeneration of the fungal hypha.

2.Materials and Methods

2.1. Samples isolation and identification

Samples of plants infected with *Fusarium* fungus were collected from greenhouses in Baghdad, 20 samples of eggplant, and 20 samples of cucumber plants. The samples were put in bags marked with the date of collection and the location, samples transferred to the laboratory for isolation and diagnosis of the fungus causing the disease, then washed under running water for half an hour to get rid of the remnants of dust stuck to it. The root and crown were cut into 5 mm pieces, sterilized by soaking in 1% sodium hypochlorite solution for 3 minutes, washed with distilled water after sterilization, placed in PDA dishes, and incubated for four days at a temperature of 27 °C. The growth isolates were diagnosed as Fusarium based on morphological characteristics [9]. *Fusarium oxysporum* isolates were cultured on sterile PDA medium supplemented with 100 mg chloramphenicol and incubated for seven days at a temperature of 27 °C [10].

2.2. Preparation of the Crude Extract

Ten grams of dried leaves and stems of *Eucalyptus* and *Mentha* were placed in a Soxhlet device with a solvent of 200 ml of 80% ethanol. After that, the solvent was removed by placing it in an oven at 50 ° C for two days, after which the remainder was extracted by scraping and kept in the refrigerator until use [11].

2.3. Evaluation of the Activity of Plant Extracts as Antifungal

Different volumes of *Eucalyptus* and *Mentha spicata* extract were prepared, and these volumes were mixed with 100 ml of PDA to prepare 0, 3, 6, 9, and 12%. The mixture was shaken well, poured into Petri dishes, and left in sterile conditions to freeze according to the food medium's method. A 5 mm piece was taken from a 5-day-old growing *Fusarium oxysprum* colony that was planted in the middle of these extract-treated dishes and incubated at a temperature of 27 °C for seven days, with three replicates for each concentration. The growth diameter was measured using the following mathematical formula: [12].

Growth inhibition % = [(control growth –treatment growth) / control growth] ×100

3. Results and Discussion

The percentage of *Fusarium oxysporum* growth inhibition was different according to the concentrations and the plant used in general. All concentrations showed an effect on the growth of *Fusarium*.

The results of **Table 1.** and **Figure 1** showed that 12% concentration was significantly better than others in reducing the growth of the *Fusarium oxysporum*, where it was recorded as 100%, while the *Mentha spicata* recorded at the same concentration of only 79.90 %

Table 1. The percentage of fungal growth inhibition using the crude extract of Eucalyptus at concentrations 3, 6, 9, and 12%.

Fungus	***E. camaldulensis***			
F. oxysporum	**3%**	**6%**	**9%**	**12%**
	35.33	66.90	79.55	100

The results in **Table 2.** and **Figure 2.** Showed that the 12% concentration of the mint extract was significantly better in inhibiting the growth of *Fusarium*, where the percentage was 80.11 while the concentration of 3% was much lower than others, where it was recorded only 17.20.

Table 2. The percentage of fungal growth inhibition using the crude extract of *Mentha spicata* at concentrations 3, 6, 9, and 12%.

Fungus	*Mentha spicata*			
	3%	**6%**	**9%**	**12%**
F. oxysporum	17.20	35.22	55.33	80.11

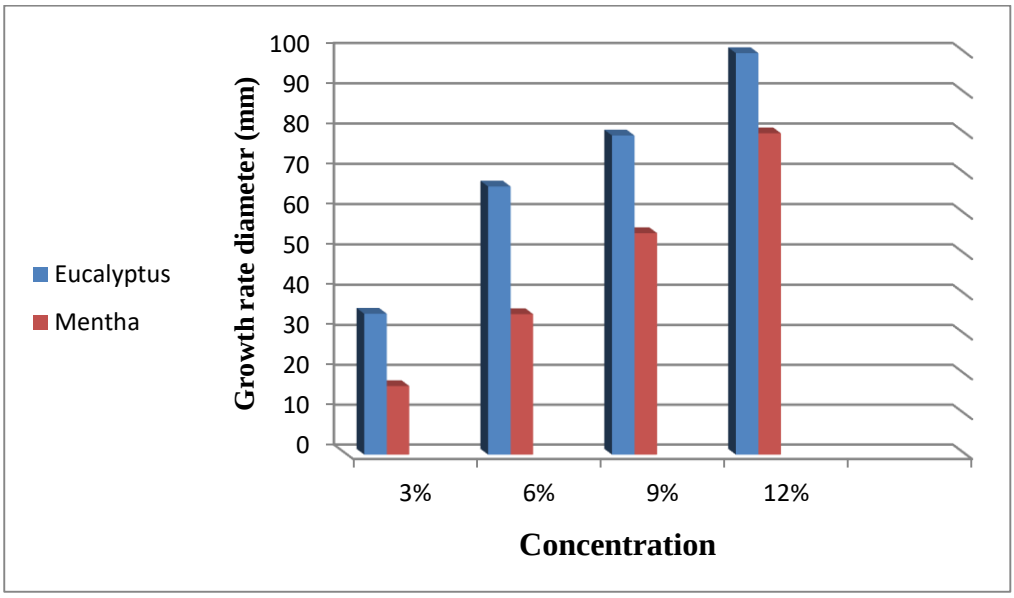
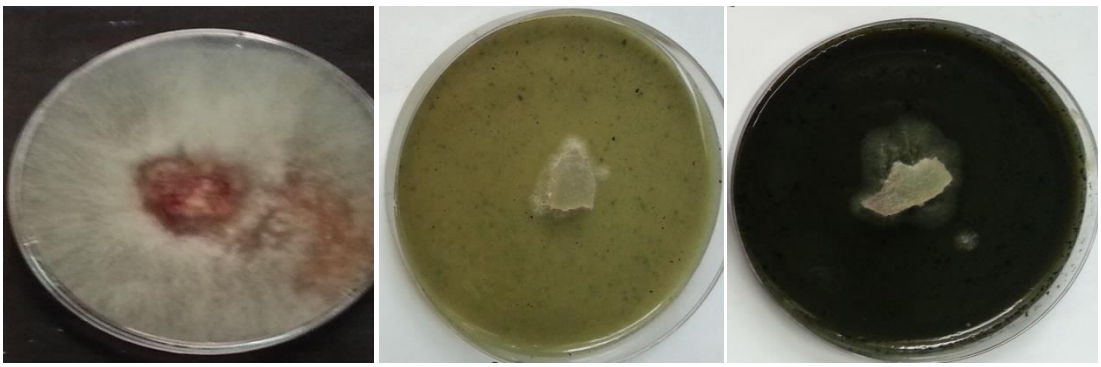


Figure 1. Effect of crude extract of *Eucalyptus camaldulensis* and *Mentha spicata* plant on the growth of *Fusarium oxysporum*.

The crude extract has a high inhibitory effect due to the synergy of several compounds [13] by inactivating lipoproteins or denaturing the protein and inactivating the enzymes of pathogens, and also losing the metabolism of those pathogenic fungi and destroying their effective transporter [14].

The difference in the concentration of the crude extract has an influential role, at a low concentration, its effected on the activity of fungal enzymes. Still, the effect greater at high concentrations as it caused protein denaturation [15].



F.C F.E F.M

Figure 2. Showing the effect of crude extract of *Eucalyptus* and *mentha* on the growth of *Fusarium* at a concentration of 12%, C. control F. *Fusarium* E. *Eucalyptus* M. *Mentha*

4.Conclusion

The Eucalyptus plant's crude extract can destroy pathogens' growth as *Fusarium* fungus, and its effect is higher than that of mint so that it can be used as a safe fungicide for the environment.

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