

## IDENTIFICATION OF PATHOGENIC FUNGI ASSOCIATED WITH WATER HYACINTH IN SELECTED REGIONS IN THE MIDDLE AND SOUTH OF IRAQ

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### ABSTRACT

To identify the fungi associated with water hyacinth (*Eichhornia crassipes* [Mart.] Solms), an aquatic weed, which presents in Tigris river from Baghdad south ward. Five regions from middle and south of Iraq (Al-Noumanya, Saeid Bin-Jubier, Al-Azizia, Al-Reyfay and Al-Hay) were selected for this study. Twelve fungal species were isolated. *Alternaria alternata*, *Acremonium sp* and *Cladsporium herbarum*, were the most frequently species (91.66 % ,50 % and 25 %) respectively. The fungi *Alternaria alternata*, *Acremonium sp* and *Phoma eupyrena* were more aggressive to water hyacinth as (91.66%,83,33%, and 75%) in pathogenicity test.

### INTRODUCTION

Water hyacinth is one of tropical and semitropical plants, its first apperance in Iraq in the mid of eighties of the 20<sup>th</sup> century, and entered as ornamental plant in the some nurseries in Baghdad province, and had been taken from nurseries on the riverbank of (Kanat Al-Gaish) east of Baghdad, which drain in Diala river near of its firth in Tigris river south of Baghdad and then gradually transferred to Diala river and at last to the colum of Tigris river.

The plant is known as aquatic weed belonged to the monocotyledonous family Pontederiaceae (Alison, 2000). The Amazon Basin, indicated by many authors as the center of origin of this plant (Barreto,1991).It infested approximately 62,000 ha of water resources in Mexico, the chemical and mechanical control have been used in Mexico since 1958 to manage water hyacinth (Martnies *et al.* 1998). Several fungal pathogens have been reported to attack water hyacinth in various parts of the world (Alison,2000 Butt et al, 2001 El-Morsy, 2004 Martnies and Charuattan,1998 Naseema et al,2008 and Praveena&Naseema, 2004).

The aim of this study is to isolate and identify the fungi associated with water hyacinth (*Eichhornia crassipes* [Mart.] Solms) in the middle and south of Iraq and evaluate their pathogenicity.

### MATERIALS AND METHODS

Isolation: The isolation of fungal species from infected parts of the plant such as leaves, swollen leaf bases were collected from (Al-Noumanya, Saeid Bin-Jubier, Al-Azizia, Al-Reyfay and Al-Hay) in middle and south of Iraq, the plant samples stored in plastic tanks in the laboratory and then infected samples were subjected for isolation technique .Briefly; small pieces (2-3)mm<sup>2</sup> surface sterilized in 1.5% sodium hypochlorite solution for (1-2) minutes, rinsed with sterile water and then cultured on Potato Dextrose Agar (4 pieces/plate) and incubated at 27°C.Fungal growth checked for purity, the fungi were subculture to serve as inoculum source.

### Identification of Pathogenic Fungi Associated

Pathogenicity test: Based on Koch postulate healthy leaves of water hyacinth plants, cleaned spotless of similar size leaves were collected, washed with tap water and placed on surface of wet-cotton in petri-dish, a (5 mm diam.) inoculum's plugs of each fungi culture placed reversely on the bottom of the leaf, each fungus isolate was replicated three times and the control treatment used (PDA) plug only, and then left in room temperature until the symptoms were appeared, the data had been recorded, and the treated specimens were ranked on the basis of the disease severity and assessed as follows: 0= leaves healthy ,1= a few spots or slight necrosis as (1-25%) from leaf size, 2= the spotting take over (26-50%), 3= the spotting take over (51-75%), 4= blighting take over (76-100%) (El-Morsy, 2004).

$$\text{Disease index (DI)} = \frac{\text{no. leaves in degree 0} \times 0 + \dots + \text{no. leaves in degree 4} \times 4}{\text{No. of leaves all degree} \times \text{max. degree of infection}} \times 100$$

(Praveena and Naseema, 2004).

### RESULTS AND DISCUSSION

Identification: Twelve fungi were isolated and identified depending on the keys for each fungus, and depending on the morphology on conidia and conidiophores (Fig. 2) which formed on the pure fungal growth in Petri-dishes (Barnett *et al.*, 1972, Booth, 1971, and Ellis, 1971).

The most common known species were *Alternaria alternata*, *Acremonium* sp, *Cladosporium herbarum*, and *Fusarium oxysporum*. Of these fungi, *Alternaria alternata* (91.66% of colonies) in Al- Noumanya, (66.66%) in Al-aziza as represented in (Table 1.). This is the First survey for fungi associated with water hyacinth in Iraq.

Table 1. The fungi species isolated from leave blades and swollen leaf bases of water hyacinth from selected regions of middle and south of Iraq.

Localities	1		2		3		4		5	
	L	S	L	S	L	S	L	S	L	S
Fungal pathogen	(x)									
<i>Acremonium</i> sp	50.00	-	33.33	-	16.66	100	16.66	50	41.66	-
<i>Alternaria alternata</i>	91.66	100	16.66	100	50	-	33.33	50	66.66	100
<i>Cladosporium herbarum</i>	25	-	-	-	16.66	-	-	-	-	-
<i>Chaetomium</i> sp	25	-	-	-	-	-	0.33	-	-	-
<i>Phoma eupyrena</i>	-	-	-	-	0.33	-	-	-	-	-
<i>Thielaviopsis</i> sp	-	-	-	-	0.33	-	-	-	16.66	-
<i>Geotrichum</i> sp	0.33	-	-	-	-	-	-	-	-	-
<i>Nigospora</i> sp	0.33	-	-	-	-	-	-	-	-	-
<i>Rhizoctonia solani</i>	-	-	-	-	-	-	16.66	-	-	-
<i>Stemphyllium botryosum</i>	0.33	-	-	-	16.66	-	-	-	-	-
<i>Fusarium oxysporum</i>	0.33	25	-	-	-	-	41.66	-	-	-
<i>Rhizopus</i> sp	-	-	-	-	33.33	-	-	-	-	-

1=Al-Noamanya, 2=Saeid Bin Jubeier, 3=Al-Hay, 4=Al-Reyphay5=Al-Azizia. L =Leaf Blades, S=Swollen leaf blades.

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Pathogenicity test: The fungi *Alternaria alternata*, *Acremonium* sp and *Phoma eupyrena*, infected the inoculated leaves and showed the symptoms (Fig.3) and they are efficient agent as result of (DI), *Alternaria alternata* (91.66%), *Phoma eupyrena* (83.33%) and *Acremonium* sp (75%), in comparing with the rest Fungi (Table.2), and the yellowing and blighting of the leaves are more than others. According to (Butt *et al.*, 1971), fungi have damaged effect to water hyacinth and are considered to be as potential bioherbicide agent, and more extensive and wide researches needed to determine the best and more effective fungal pathogens economically and ecologically.

(x) = isolation frequency calculated according the following formula:

$$\frac{\text{The no. pieces colonized by the fungus} \times 100}{\text{Total no. cultured pieces}}$$

Table 2.Disease index of fungi on the leave blades invitro condition.

Species	(DI) %
<i>Alternaria alternata</i>	91.66
<i>Phoma eupyrena</i>	83.33
<i>Acremonium</i> sp	75
<i>Chaetomium</i> sp	50
<i>Stemphyllium botryosum</i>	50

$$(DI) = \frac{\text{no. leaves in degree 0} \times 0 + \dots + \text{no. leaves in degree 4} \times 4}{\text{No. of leave all degree} \times \text{max. degree of infection}} \times 100$$

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#### Identification of Pathogenic Fungi Associated

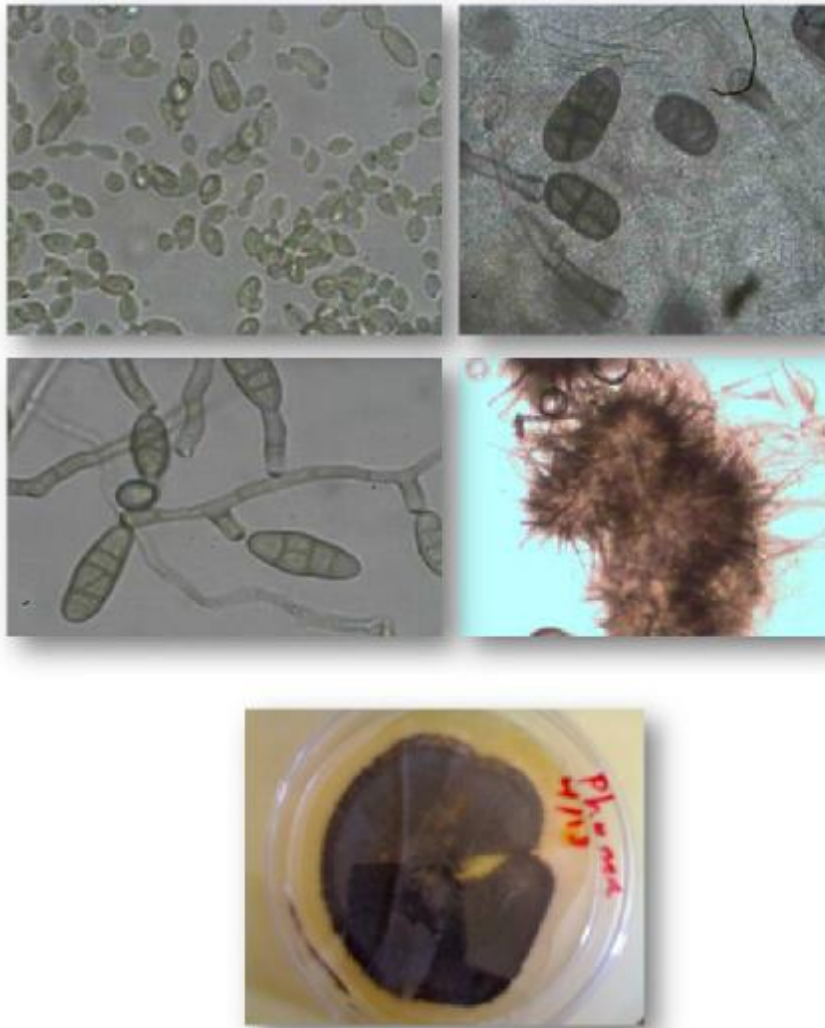
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Fig.1: The spotting symptoms on the leaf blades and swollen base leaves.

Identification of Pathogenic Fungi Associated



**Fig. 2:** The fungi from left to right, *Cladosporium*, *Stemphyllium*, *Alternaria*, *Chaetomium*, *Phoma* spp.

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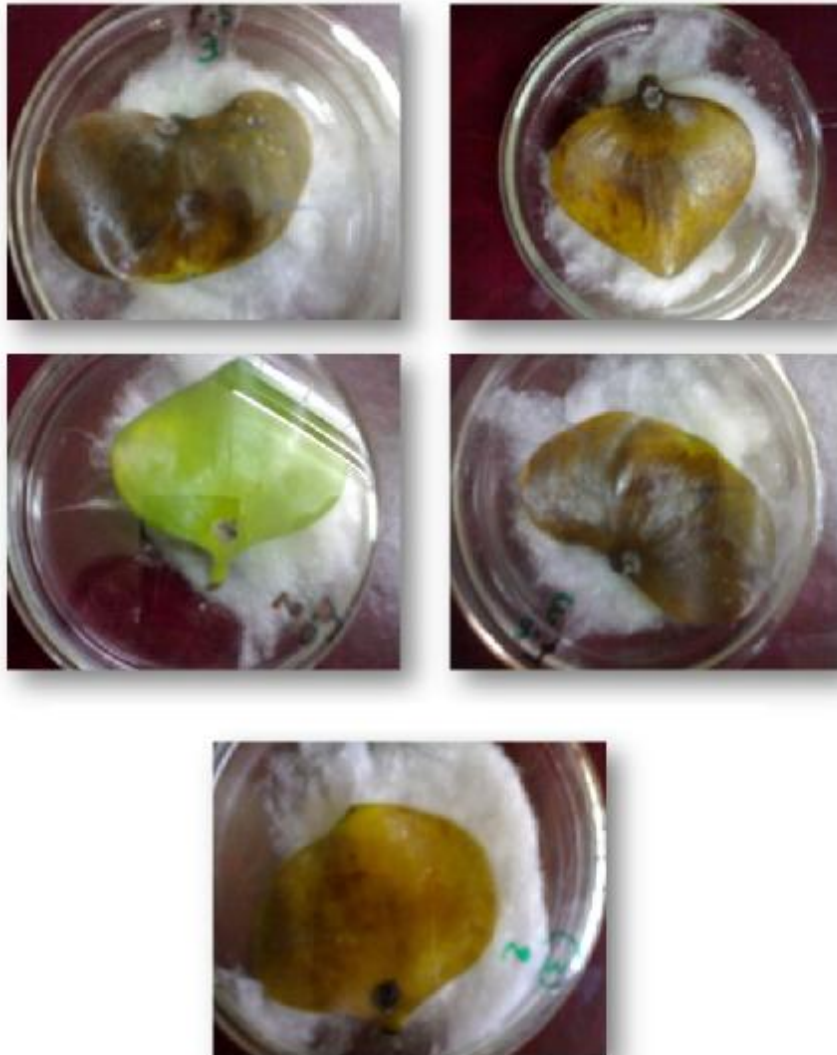


Fig.3. Disease symptoms on leaf blades induced by the tested fungi:

- 1- *Stemphylium*      2- *Alternaria*      3- *Phoma*  
4- *Chaetomium*      5- cont

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## تشخيص الفطريات التي تصيب عشب النيل في بعض المناطق من وسط وجنوب العراق

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### الخلاصة

اجري هذا البحث لتشخيص الفطريات التي تصيب نبات عشب النيل Water hyacinth (*Eichhornia crassipes* [Mart.] Solms) هو دغل مائي يتواجد في نهر دجلة باتجاه جنوب بغداد. اختيرت لهذه الدراسة خمسة مواقع من وسط وجنوب العراق (النعمانية، سعيد بن جبير، الحي، الرفاعي، العزيزية). تم عزل (١٢) فطر، وكانت الفطريات *Alternaria alternata*, *Acremonium* and *Cladsporium flvum*, هي الاكثر تكرارا (91.66 % و 50 % و 25 %) على التوالي. اظهرت الفطريات *Alternaria alternata*, *Phoma eupyrena*, *Acremonium* sp., *alternata*, امراضية اشد في نبات عشب النيل وبالنسب (٧٥، ٨٣.٣٣، ٩١.٦٦) على التوالي.