A STUDY ON THE FUNGI CAUSING DECLINE OF DATE PALM TREES IN MIDDLE OF IRAQ

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ABSTRACT

This study was conducted in three farms of date palm tress: Al-Shamyia, Al-Mihanawyia and Al-Sanyia in Al-Qadisiya province - middle of Iraq during 1999-2000. The aim of the study was to evaluate and identify fungi attacking the roots and causing the decline and death of the trees. Results revealed that eight fungi affected date palm roots *Alternaria alternata, Chalaropsis radicicola, Diplodia phoenicum, Fusarium oxysporum, F .solani, Gliocladium* sp., *Phomopsis phoenicola, Thielaviopsis paradoxa.* Fungi were distinctly different in the different farms. The two species of *Fusarium* were the most frequent and most abundant in the roots of the date palm trees of the Al-Shamyia and Al-Mihanawyia farms, However, *Diplodia phoenicum* was most abundant in roots of date palm in Al-Sanyia farms. The other fungi showed lower abundant in all farms. Results also, showed that the number and density of fungi were higher in Summer and lower in Winter as compared to the other seasons.

INTRODUCTION

Date palm *(Phoenix dactylifera* L.) is one of the most important trees in Iraq, the demand of it's fruits has been increased in Iraq for local consumption and for exportation (Al-Ani et. al., 1971). Under local conditions, date palm trees are vulnerable to infection with some destructive diseases which are responsible for decline and considerable losses in the number of trees (Bliss, 1934 and Djerbi, 1983). Several soil-borne fungi attach date palm were causing root rot, wilt and decline diseases (El-Arosi et. al., 1983). The dominant fungi associated with date palm, death and decline were *Fusarium oxysporum, Diplodia phoenicum, Ceratocystis radicicola,* and *Phomopsis phoenicola* (Ellis, 1977; Rattan and Al-Dboon, 1980; Mousiri et. al., 2000). The present investigation was planned to throw some light on the soil-borne fungi causing date palm decline diseases in middle of Iraq.

MATERIALS AND METHODS

1. Isolation of the causal fungi:

Roots samples from naturally infected date palm trees were collected from three locations; Al-Shamyia, Al-Mihanawyia and Al-Sanyia in Al-Qadissiya province – middle of Iraq during different growing seasons, summer, autumn, winter and spring, 1999-2000. Infected roots were washed several times with tap water to remove the attached soil particles. The samples were then cut into small pieces, rinsed several times in sterilized distilled water, disinfected by 0.1% sodium hypochlorite solution for one minute, followed by washing in three changes of sterilized water and dried between folds of sterilized filter paper. The sterilized fragments were aseptically transferred to Peteri dishes containing 20 ml of Potato Dextrose Agar (PDA) medium, and incubated at 25°C for 5 days.

2. Identification of isolated fungi:

The isolated fungi were purified using the single spore technique and / or the hyphal tip method. Purified fungi were identified according to Ellis (1971), Booth (1971), and Domsch, et. al., (1980). The main fungi were isolated during the growing seasons from the trees of the three localities. Data was recorded as percentage of infected for different fungi.

RESULTS AND DISCUSSION

Field observations:

Declined date palm trees were found in all 22 fields inspected. The proportion of declined trees varied from 2% to a maximum of 66% (Table 1). In general, 12% of trees showed decline symptoms, with Al-Sanyia location was higher (18.8%) than the corresponding values for the location of Al-Shamiyia (10.2%) or Al-Mihanawyia (7.1%).

The proportion of declined trees in a field gives approximate estimation of the actual yield loss due to the disease. We may deduce an over all yield loss in middle of Iraq of about 10%.

Fungi isolated from roots:

The fungi isolated from roots of declined date palm trees belong to the gevera *Fusarium spp*. (*F. oxysporum* and *F. solani*), *Alternaria, Chalaropsis, Diplodia, Gliocladium, ohomopsis, Thielaviopsis* and other fungi (*Penicillium, Aspergillus, and Rhizopus*). From all these isolations,

the percentage of specific fungi in relation to the total fungi isolation is given in table (2). The results show the predominance of Fusarium spp. The two most commonly occurring fungi were Fusarium and Diplodia. Similar results were reported by Djerbi (1983), and Besri (1982).

Data in table (3) show that eight fungi were isolated from the three locations. The isolated fungi were identified as *Fusarium oxysporum, F. solani, Alternaria alternata, Chalaropsis radicicola, Diplodia phoenicum, Gliocladium sp., Phomopsis phoenicola and Thielaviopsis paradoxa*.

Data indicated that Fusarium spp. had superiority to other fungi in Al-Shamia and Al-Mihanawyia locations followed by *Diplodia phoenicum* in Al-Sanyia location. *Chalaropsis radicicola* and *Thielaviopsis paradoxa* were intermediate while *Phomopsis phoenicola*, *Alternaria alternata* and *Gliocladium* sp. appeared in less frequency. We note the existence of a relationship between the frequency of *Fusarium* spp., *Diplodia phoenicum*, and Thielaviopsis paradoxa and the fact that date palm trees are sick, decline or healthy. These results are in agreement with those obtained by Laville (1966) and Mousiri et. al., (2000).

Data in table (4) emphasized the importance of Fusarium spp. on the roots of date palm since it occupied the first class in all samples for the three locations, since *F. solani* occupied the 2nd class after D. phoenicum in Al-Sanyia location only in summer season and predominated in other seasons. It was interesting to observe that the highest level of occurrence was noted in samples 7, 8, 9 (Al-Sanyia location) at spring season , where a high degree of terminal bud rot infections have occurred. Similar findings were reported by Al-Hassan and Abbas (1987).

Results in table (4) also showed that the number and the density of fungi isolated from date palm roots higher in summer season and lower in winter season as compared to the other seasons. The fungi caused decline of date palm trees were clearly affected by some factors like temperature, humidity and light period which differ from season to other. The disease is often part of complex in which other pathogens are involved.

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Table 1 . Summary of field observations of decline of date palm trees in middle of Iraq

Location	**Number inspected of fields**	**Average field area**	**Declined trees (%)**	**Range of declined trees (%)**
Al-Shamyia	11	2.8	10.2	2-34
Al-Mihanawyia	7	1.6	7.1	5-66
Al-Sanyia	4	1.1	18.8	3-15

Table 2. Identity and frequency of fungi isolated from declined root trees collected from 22 fields in middle of Iraq

Fungi (geuara)	Number of fields	% of isolates
Fusarium	16	46.2
Alternaria	5	3.7
Chalaropsis	3	2.3
Diplodia	8	17.4
Gliocladium	2	2.2
Phomopsis	5	5.8
Thielaviopsis	1	1.8
Other fungi wnidenfifed	22	20.6

Table 3. The percentage of pathogenic fungi isolated from roots of diseased date palm from three locations in middle of Iraq

Fungi *	% frequency of fungi locality,			Average
	Al-Shamyia	Al-Mihanawyia	Al-Sanyia	
**Fusarium oxysporum*	24.2	29.1	11.5	21.6
**Fusarium solani*	38.3	22.0	17.1	25.8
Alternaria alternata	1.9	3.8	2.3	3.6
**Chalaropsis radicicola*	4.1	6.2	8.0	5.1
**Diplodia phoenicum*	10.5	8.8	22.4	13.9
Gliocladium sp.	1.6	0.0	2.4	2.0
Phomopsis phoenicola	2.2	1.6	2.9	2.2
**Thielaviopsis paradoxa*	0.0	0.0	15.8	15.8
Other fungi **	1.7	13.4	14.9	10.0

* these collections were done in summer.

** some species of *penicillium, Aspergillus*_ and *Rhizopus* were isolated.

Table 4. Percentage of the main fungi associated with roots of declined date palm trees during different growing seasons

Sample no.*	Sample location	Summer					Autumn					Winter					Spring				
		**Fo	Fs	Cr	Dp	Tp	Fo	Fs	Cr	Dp	Tp	Fo	Fs	Cr	Dp	Tp	Fo	Fd	Cr	Dp	Tp
1	Al-Shamyia	24.2	46.0	4.8	11.2	0.0	20.0	28.1	2.2	8.8	0.0	15.8	20.8	1.9	6.5	0.0	19.5	35.1	3.8	10.1	0.0
2	=	25.1	42.2	5.0	11.1	0.0	21.2	27.7	3.8	7.2	0.0	16.2	22.1	2.1	6.3	0.0	18.6	36.2	4.1	12.8	0.0
3	=	23.5	44.6	3.6	10.8	0.0	18.3	29.3	3.1	8.5	0.0	16.8	20.9	2.3	5.8	0.0	18.1	33.8	4.0	10.2	0.0
4	Al-Mhnawyia	23.3	35.8	4.0	9.9	0.0	21.0	30.4	2.0	7.2	0.0	17.3	23.1	1.2	4.6	0.0	20.1	30.3	3.7	8.3	0.0
5	=	26.1	34.4	4.6	8.5	0.0	22.1	31.2	2.1	6.3	0.0	17.0	24.2	1.5	4.8	0.0	23.3	31.0	3.3	8.0	0.0
6	=	20.2	32.2	3.8	8.1	0.0	19.2	31.6	2.9	6.0	0.0	16.8	26.3	1.6	5.1	0.0	20.2	31.8	3.6	7.5	0.0
7	Al-Sanyia	19.1	28.8	10.1	23.8	20.1	15.1	20.1	6.6	18.5	17.1	10.8	15.5	4.1	12.4	12.1	17.1	22.4	7.2	20.5	26.0
8	=	15.0	30.2	8.8	22.5	21.8	13.3	20.8	6.3	18.0	17.9	10.2	15.8	4.7	13.1	11.3	14.2	28.1	8.5	21.6	28.5
9	=	16.2	28.0	8.2	26.7	19.2	11.0	21.3	5.3	17.5	16.2	10.7	16.2	4.0	12.2	11.9	16.1	26.3	8.6	24.1	28.8
Mean		21.4	35.8	5.9	14.7	20.4	17.9	26.7	3.8	10.9	17.1	14.6	20.5	2.6	7.9	11.8	18.6	30.6	5.2	13.7	27.8

* Three places were selected from each location

** Symbols of the isolated fungi: Fo= *Fusarium oxysporum* ; Fs= *F. solani*; Cr= *Chalaropsis radicicola* ; Dp= *Diplodia phenicum* and Tp= *Thielaviopsis paradoxa*.

دراسة حول الفطريات المسببة لتدهور اشجار النخيل في وسط العراق

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الملخـــــص

نفذت هذه الدراسة في ثلاث مناطق لبساتين النخيل وهي: الشاميه، المهناوية، الـسنيه في محافظة القادسية – وسط العراق، خلال الفترة 1999 – 2000، كان الهدف منها معرفـة وتشخيص الفطريات التي تهاجم جذور النخيل وتسبب تدهور وموت الأشجار وتقدير أعـداد الفطريات. لقد تم عزل وتشخيص ثمانية فطريـات مـن جـذور اشـجار النخيـل وهـي: ***Alternaria alternata, Chalaropsis radicicola, Diplodia phoenicum, Fusarium oxysporum, F. solani, Gliocladium*** **sp.,** ***Phomopsis phoenicola, Thielaviopsis paradoxa.*** . وجد بان هذه الفطريات تتواجد باسـتمرار وبأعداد متفاوتة في جذور النخيل من بستان إلى آخر، وكان نوعي الفطر ***Fusarium*** اكثـر تكرارا ووفرة في جذور اشجار النخيل في جميع البساتين مقارنةً بالفطريات الأخـرى، فقـد وجدت أعلى معدلات لنوعي هذا الفطر في بساتين الشامية ثم المهناوية، بينمـا كـان الفطـر ***Diplodia phoenicum*** اكثر غزارة في بساتين السنية. أظهـرت الفطريـات الأخـرى بمعدلات منخفضة في جذور اشجار النخيل في البساتين الثلاثة كما أظهرت النتائج بان أعـداد وكثافة الفطريات كانت عالية في جذور اشجار النخيل في أشهر فصل الصيف فيمـا وصـلت أقل كثافة لها في أشهر فصل الشتاء مقارنة بالفصول الأخرى من السنة.