

RESEARCH ARTICLE

Isolation and Identification of Fungi Caused Data Palms Inflorescence Rot Disease in Some Area of Diyala- Iraq and Control of Disease by Sodium Chloride Salt

Rabab Majeed Abed, Gassan Radam Idan, Roqia Ahmed Abbas and Nagham Thayir Salman

Department of Biology, College of Pure Science and Education, Diyala University, Diyala, Iraq.

Abstract

This work was carried out in Diyala Province, North of Baghdad, Iraq during 2016-2017 to isolation and identification the fungi caused Inflorescence rot on data palm and try to combat the disease by using sodium chloride salt. 32 infected samples were collected from 8 varieties of data palm which has been isolated 60 isolates of fungi belong to 6 genus and species of fungi which were *Mauginiella scattae*, *Fusarium proliferum*, *Penicillium chrysogenum*, *Rhizopus* spp., *Mucor* spp. and *Aspergillus niger*, the number of isolates for each one were (20,12,10,6,6,6) respectively. *M. scattae* showed highest percentage of frequency and occurrence that (33.33, 65.63) %, while *F. proliferum* recorded the lowest percentage of frequency and occurrence which were (6.66 , 18.75)%. Treatment with the sodium chloride salt gave significant reduction in Inflorescence rot on all data palm varieties. Disease incidence and percentage of Infection, which were 0% in all data palm varieties excepting khistawi variety which recorded (22.22, 33.33)% respectively for while control treatment recorded (100, 100)% respectively for Disease incidence and percentage of Infection. This confirms the possibility of using sodium chloride salt as a substitute for chemical fungicides.

Keywords: Inflorescence rot, sodium chloride, Disease incidence, frequency, *Mauginiella scattae*.

*Correspondence: rabab.majeed81@gmail.com

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INTRODUCTION

In Iraq the main problems of data palm (*Phoenix dactylifera* L.) are exposed to many diseases and pests that effect on fruit production but nature and severity The problems vary by cultivar, location, weather, and cultural practices, These diseases caused by different type of pathogens like fungi , insect , nematode. (Zaid et al. 2002; Al-Jboory 2007).

Inflorescence rot is one of these disease which transmission during the infection season occurs through the contamination of male inflorescences during the pollination period and the first symptoms occur at the external surface of unopened spathes especially if emerges early in the spring season with typical brownish or rusty color lesion, Infected inflorescences remaining on palms from the previous season or infected leaf bases may serve to spread the disease (Abdullah et al. 2005).

The first recorded of it in Iraq in 1949 by Hanford this disease caused by *Mauginiella scattae* fungus (Al-Ani et al. 1971). Some studies recorded another fungi along with *Mauginiella scattae* such as *Thielaviopsis paradoxa* and *Fusarium moniliforme* (Dherbi 1983) , in some area of Thi-Qar in Iraq The main reason of this disease was *Mauginiella scattae* and another fungi which were *Fusarium* spp., *Aspergillus* spp., *Penicillium* spp., *Acremonium* spp., and *Mucor* spp. (Al Ghilan 2012), In Hameed (2012) study found that the causal organism of data palm inflorescence rot disease in southern part of Iraq is *Fusarium proliferatum* .

For development of novel, more effective, safe and environmental friendly antifungal agents as an alternative to the chemical fungicides used for combating a variety of crop diseases is currently an environmental challenge. In Diyala – Iraq there were few and old studies That looked at this disease and its pathogenical causes there for the current study aimed to isolation and identification of fungi which caused inflorescence rot disease on data palms *Phoenix dactylifera* L. and using Sodium Chloride salt to fight disease on the trees.

MATERIALS AND METHODS

Sample collections

Several visits to some palm date orchards in Al-Migdadiyah in Diyala, Iraq In the flowering

season of the data palm in 2016-17, were carried out to collect samples. A total of 32 samples were collected from 8 varieties of data palm that infected with inflorescence rot disease, each sample was placed in plastic bags and data were recorded in terms of the variety and number of infected palm, then the samples were stored in a laboratory refrigerator at 5-7°C until the isolation.

Isolation of the pathogen

Small pieces from each infected inflorescence (2 cm long) were surface-sterilized with 10% sodium hypochloride for 5 min, then wash with sterilized distilled water and dried on filter paper than 3 pieces were placed onto plates containing potato dextrose agar (PDA) Added to it chloramphenicol 200mg/L and each sample with 3 replicates. All plates were incubated at 25 ± 1°C until the fungus started growth. A hyphal tip for each isolate was excised on to a PDA plate to establish its colony. Single spore technique was used to ensure the purity of cultures. Isolated fungi were identified based on the morphological characters in culture. The identification was based on (Ellis 1971; Alexoplulos et al. 1996; Barnett and Hunter 1998). Percentage of appearance for each isolated fungi are calculated according to the following formula (Krebs 1978):

The Percentage of occurrence (%) = N. of sample which has the same genera or species /N. of total samples of genera or species.
Percentage of frequency calculated according to formula (Krebs 1978)

The Percentage of frequency (%) = No. of isolate for fungus / No. of total isolates for all fungi

Treatment with Sodium Chloride salt

The infected data palm trees were treated with Sodium Chloride ascoarse salt at 1 Kg / tree, the salt was sprayed on the sites of infection in the trees and the control treatment was left without salt spray. The spraying was carried out in two stages the first of January 2016 and the second in March 2017. After the completion of the exit and cracking all the spathes on all the palm the Disease incidence and Infection percent was scored according to the formulas:

Disease incidence = (No. of infected date palms / No. of total date palms) x 100

% Infection= (No. of Infected spathes / No. of total spathes) x 100

Statistical Analysis

For statistical analysis SPSS version 17.0 was used, The comparison between the averages using Less Significant Difference test (LSD) Least Significant Deference at the level of probability of 0.05.

RESULTS AND DISCUSSION

Six genus and species of fungi were isolated and identification from Infected spathes of data palm *Phoenix dactylifera* L. which collected from fields of Al-Migdadiyah in Diyala, Iraq, These fungi include *Mauginiella scattae*, *Fusarium proliferum*, *Penicillum chrysogenum*, *Rhizopus* spp., *Mucor* spp. and *Aspergillus niger*. The number of fungal isolates was 60 isolates from 32 infected samples, *M. scattae* (20) isolate, *Mucor* spp. (12) isolate, *A. niger* (10) isolate and *F. proliferum*, *P. chrysogenum*, *Rhizopus* spp. recorded (6) isolate for each one (Table 1).

In (Figure 1) showed the percentage of frequency and occurrence of isolated fungi, *M. scattae* showed highest percentage of occurrence which was (65.63) % Followed by fungi *A.niger*, *P. chrysogenum* , *Mucor* spp., *Rhizopus* spp. and *F. proliferum* which were recorded (56.25, 37.5, 37.5, 28.13, 18.75) % Respectively. for percentage of frequency, *M. scattae* showed highest percentage of frequency which was (33.33) %, then *A.niger*, *Mucor* spp., *Rhizopus* spp., *P. chrysogenum*, *F. proliferum* which were (20, 20, 13.33, 6.66, 6.66) % Respectively.

The results of isolating the fungi showed a difference in the causes of inflorescence rot disease this agree with Al-Ghilan (2012) study which showed more than one cause of inflorescence rot and which were *Mauginiella scattae*, *Fusarium* spp., *Aspergillus* spp., *Penicillium* spp. *Acremonium* spp. and *Mucor* spp. some studies showed that only *Mauginiella scattae* fungi caused this disease (Hameed 2005; Hassen 2010), another study found that the main caused of this disease in Southern Iraq was *Fusarium proiferatum* (Hameed 2012). Al-Sharidi and Al-Shahwan. (2003) recorded two caused of inflorescence rot disease that *Mauginiella scattae* and *Thielaviopsis paradoxa*.

The results in (Table 2) Showed the possibility of using salt effectively to reduce inflorescence rot disease on all data palm

Table 1. Isolated fungi from infected spathes of data palm *Phoenix dactylifera* L. that caused inflo-rescence rot disease in Diyala, Iraq.

Isolated fungi	Number of isolates
<i>Mauginiellascatta</i>	20
<i>Fusariumproliferatum</i>	6
<i>Rhizopus</i> sp.	6
<i>Mucor</i> sp.	6
<i>Penicillumchrysogenum</i>	12
<i>Aspergillusniger</i>	12
Total	60
L.S.D at 0.05	1.155

Table 2. Percentage of infection and disease indicated on some varieties of data palm *Phoenix dactylifera* L. after traded with coarse salt.

Variety	Total No. of palms	Total No. of spaths	Total No. of spaths after treatment%		% disease infection	indicated
			Infected	Healthy		
Zahdi	6	10.33	0	10.33	0	0
Khistawi	4	9	2	7	22.22	33.33
Tberzal	6	6.66	0	6.66	0	0
Khodry	2	5	0	5	0	0
Sukkari	6	4.33	0	4.33	0	0
Dhenh	4	10.66	0	10.66	0	0
Breen	2	8	0	8	0	0
Basrawe	2	4	0	4	0	0
Control	8	6.33	6.33	0	100	100
L.S.D at 0.05	3.197	3.127	3.702	N.S.	3.702	3.702

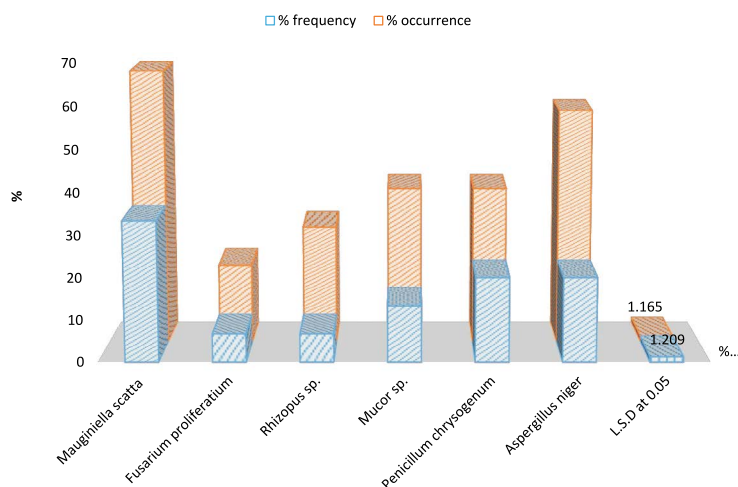


Fig. 1. The percentage of frequency and occurrence for isolated fungi from infected spathes of date palm *Phoenix dactylifera* L.

varieties, there were significantly reduced in Disease incidence and percentage of Infection Which were 0% in all date palm varieties excepting khistawi variety which recorded (22.22, 33.33)% respectively for disease incidence and percentage of Infection compared with control treatment which was (100, 100) % respectively.

The reduction in disease in current study was attributed to reduction in the growth of fungal pathogens as a result of salt treatment, in Stock-well *et al.* (2012) study showed the negative effects of sodium chloride on growth of some pathogenic fungi. The result of current study agree with Hassen (2010) study that found the high effective of salt against inflorescence rot disease. There was a significant decrease in percentage of Infection which was (21.5)% compared with control treatments that (53.7) %. Some laboratory studies confirmed showed the Inhibitory effect of NaCl salt on fungi growth like *Aspergillus niger*, *Penicillium roqueforti*, *Alternaria alternate*, *Fusarium oxysporum* (Reid *et al.* 2001; Yigit and Korukuoglu 2007).

The exact mechanisms of how NaCl amendments suppress disease are still unclear, but two areas where it could affect disease are those that have direct effects against the pathogen and those that have effects on the resistance of the plant (Fixen 1993). Sodium chloride may have caused a fungistatic effect in these soils and prevented the onset of pathogenesis. They suggested NaCl could reduce competitive saprophytic ability of the

pathogen while increasing antagonistic microbes (Amir *et al.* 1996).

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CONFLICT OF INTEREST

The author declares that there are no conflict of interest.

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