

Article

Detection and Investigation of Bayoud Disease in Imported Date Palam Tissue

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Abstract: This research investigated a specific issue affecting date palms, surveying palm groves showing symptoms similar to Bayoud disease. The death and wilting of tissue palms have become a worrying and determinant issue for palm propagation and cultivation in Iraq. *F. solani*. It had the highest ability to colonize date palm leaflets, 62.67%, followed by *F. oxysporum* f. sp. *albedinis*, 22.12%. Although *F. proliferatum* is a serious pathogen of date palm, 14.16%, a study confirmed that fungal strains from the previous species have a highly toxic effect on tissue culture.

Keywords: Investigation, Bayoud disease, Date palm tissue, *Fusarium* specie

1. Introduction

The cultivation of palm tissues, which are imported from neighboring countries, has gradually increased over the past few years, especially the Majhool, Barhi, and Maktoum varieties, which have been associated with the emergence of a new disease. The pathogen produces typical microconidia, macroconidia, and chlamydospores, which enable it to survive in adverse environmental conditions (I. Booij et al.1995.) There are no signs of the bayoud disease in Iraq, but rather signs of fungi that cause yellowing and wilting of palm seedlings. *F. oxysporum* and *F. verticillioide*. *Fusarium proliferatum* *Fusarium solani*, *F. proliferatum*, *F. branchy gibbosum* were found associated showing symptoms of wilt and dieback (Armengol, J.2005)(Armengol, J.2005)The study aimed to conduct a survey of palm groves in which imported tissue culture shoots are abundant and to identify the causes of palm wilt.

2. Materials and Methods

The field survey of Alwaniyah 5 district of Al-Diwaniyah Province and Al-Jawthariyyah District in Babil Province on imported palm varieties, Al-Majhool, Al-Barhi, and Al-Maktoum.

Symptoms initially appear on the lower outer leaves of the central crown, and the color usually changes from pale green to yellow at the base of the palm fronds and moves upward. As the disease progresses, the leaves turn white on one side before developing on the other side of the leaf. These symptoms also lead to wrinkles at the edges of the leaves, and the leaves become dry and eventually die. The process of death can take a few days to several weeks. In addition to the fungus, similar symptoms appear on young leaves. Once the symptoms of sudden death disease appear, it becomes difficult to stop its development. Samples were taken from soil, trunk and roots of imported tissue palm cultivation in Babylon and Diwaniyah, and then planted on PDA after sterilizing them with 0.05% chloric acid., dilutions of soil (1/1000, w/v) also were cultivated on (PDA), The isolates were purified by taking part of the fungi growth in to petri dishes containing

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the culture medium (PDA) characteristic of fungus isolates were diagnosed and studied depending on the fungi colony characteristic using the approved taxonomic key Alexopoulos and Benke, 1962)

Pathogenicity Test

Fifty samples of date palm varieties Maktoum, Barhi and Majhool were taken and planted in nylon bags for six months. Then three fungal culture discs were placed and grown on PDA medium for 14 days. After covering them with soil, symptoms were recorded at the beginning of infection and fungi were isolated from palm trees infected with fungal infection.



Figure 1. Symptoms disease on different varieties of tissue culture date palm

3. Results

The study showed that *Fusarium solani* is a prevalent fungus in the root zone and causes yellowing, death of fronds, and yellowing of leaves. *Fusarium oxysporium* has been detected on the root surface and within the root tissues of date palms. Also, *F. proliferatum* strains with their abilities to produce their toxin production (fig.1). *F. oxysporium* f. sp. *albinism* was not found in soils in Diwinia and Babylon in this survey (Zaid, 2002; Sedra, 1998 and Djerbi, 1983.)

Pathogenicity Tests

Fusarium solani, *F. oxysporium*

F. proliferatum, *F. pseudoeircinatum* were tested for pathogenicity *F. solani* had the highest severity with 62.67%, while *Fusarium.pseudoeircinatum* had the lowest percentage of severity with 1.05%.(Table 1)

Table (1) Severity of *Fusarium* species on date palm -tissue

Figure 2 shows a difference in the morphological characteristics of the fungal isolates.

NO.	<i>Fusarium</i> sp	Severity %
1	<i>Fusarium solani</i>	62.67
2	<i>Fusarium .oxysporium</i>	22.12
3	<i>F. proliferatum</i>	14.16
4	<i>Fusarium.pseudoeircinatum</i>	1.05
L.S.D =4.353 (p≤0.05)		



Figure 2. Characteristics of isolated A(*Fusarium solani*) B(*Fusarium.oxysporum*)C (*F. .pseudoeircinatum*)D *F.pseudoeircinatum*)

4. Discussion

The findings of this study highlight the presence of *Fusarium solani* as a dominant fungal species in the root zone of date palms, causing severe symptoms such as frond yellowing and leaf chlorosis. The detection of *Fusarium oxysporum* on the root surface and within the root tissues suggests its potential role in early-stage infections, possibly acting as a secondary invader or an endophytic pathogen. Moreover, the presence of *F. proliferatum* strains with their ability to produce toxins raises concerns about their impact on the overall health of date palms, as mycotoxins can contribute to plant stress and disease progression. Interestingly, *F. oxysporum f. sp. albinism* was absent from the surveyed soils in Diwinia and Babylon, indicating regional variations in *Fusarium* species distribution, which may be influenced by climatic factors, soil composition, or agricultural practices.

Pathogenicity tests confirmed that *Fusarium solani* exhibited the highest severity among the tested species, with a disease severity percentage of 62.67%. This suggests that

F. solani is a major pathogenic threat to date palms and should be a primary target for disease management strategies. In contrast, *Fusarium pseudoircinatum* had the lowest severity at only 1.05%, indicating its limited role in causing substantial damage. The differences in pathogenicity levels among *Fusarium* species highlight the need for targeted control measures, as not all isolates pose equal risks to date palm health. Additionally, the observed variations in severity may be attributed to differences in fungal virulence, host susceptibility, or environmental conditions that favor specific pathogen proliferation.

The morphological variations among the fungal isolates, as illustrated in Figure 2, provide further insights into the diversity of *Fusarium* species affecting date palms. The distinct characteristics of *F. solani*, *F. oxysporum*, and *F. pseudoircinatum* suggest that their identification through traditional morphology-based methods can be challenging and may require molecular techniques for precise classification. Understanding the pathogenic potential and morphological distinctions of these isolates is essential for improving early detection methods and developing effective disease management strategies. Since *Fusarium* species are known to spread through contaminated soil, infected plant materials, and agricultural tools, quarantine measures should be enforced for imported date palm tissues to prevent the introduction of aggressive pathogens like *F. solani* into non-endemic regions.

5. Conclusion

Fusarium species are a major problem for tissue-cultured date palms. In this research, imported tissue culture palm groves, especially Medjool, Maktoum, and Barhi, were detected and investigated by private sector companies. We are in dire need of mapping in all survey areas for more efficient management of the disease, as it was found that Medjool varieties are more susceptible to the disease, where the color of the infected fronds changes to a grayish-white color. However, the nature of the development of symptoms differs from Bayoud disease, where symptoms appear by changing the color of the leaflets on one side of the infected frond to a grayish-white color. Symptoms. After symptoms appear on one side of the infected frond, symptoms move to the opposite side, where the color of the leaflets starts to change from the base towards the top. The most important means of preventing the spread of this disease is agricultural quarantine. Uprooting infected and suspected palm trees, burning them, and then sterilizing them with fumigation and chloroquine. This research agrees with (Mansoori and Kord 2006) reported a serious disease of date palm caused by *F. solani* associated with yellowing and death of the fronds in Iran.

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