

# Root Rot and Wilting of Date Palm in Dutse Nigeria

Eziashi Emmanuel Ifechukwude<sup>1\*</sup>, Adekunle Adedotun<sup>2</sup>, Chidi Nnamdi Ifechukwude<sup>1</sup>  
Hamza Abdulhamid Muhammed<sup>1</sup>, and Omoregie Kelvin Omo<sup>1</sup>

021. | Eziashi et al.

<sup>1</sup>Nigerian Institute for Oil Palm Research (NIFOR), Plant Pathology Division, P.M.B. 1030 Benin City, Edo State, Nigeria.

<sup>2</sup>Department of Botany and Microbiology, University of Lagos, Akoka, Yaba, Lagos State, Nigeria

Corresponding author: : Eziashi EE: Received: 2/11/2022 | Accepted: 11/11/2022

**Abstract:** *The study was carried out to evaluate the root rot, wilting and the causal agents of date palm disease. The survey was conducted in nurseries, genepool I, genepool II, genepool III, genepool IV, genepool V, by-Pass I, II, III and sucker seed garden. The diseased palm fronts were found to be overcrowded and overlapped on healthy palms which resulted to infections and adjoining on other healthy palms. Some of the date palms at chronic and acute stages were left unremoved which led to collapse and decapitation of the canopies. They became a reservoir for disease spread. Similarly, Pestalotia leaf spots were predominantly isolated from young seedlings. The dilution methods revealed that *F. oxysporium* f. sp. *albedinis* species were predominantly isolated from the bole, roots, fronts and soil. Genepool III NCRP 2B-08, planted in 1984 had the highest number of dead palms with 695 while the least were NCRP 2B-09 with 6 dead, planted in 1997 and by pass III planted in 2003 also with 5 dead. The sucker seed garden field planted in the year 2005 with the spacing of 8 x 8m did not record any dead palm. More time is needed to observe the field if they will develop similar symptoms of root rots and wilting of date palm observed in genepool I-V and by-pass I-11I. The male date palms were more susceptible with the isolation of *F. oxysporium* f. sp. *albedinis* species when compared with the female.*

**Keywords:** Date Palm, Root Rot, Wilting, Overlap, Overcrowd

Published: X/11/2022 by IJMBI

## 1. INTRODUCTION

Attention has been drawn to the current incidence of root rot and wilting of date palm at the Nigerian Institute for Oil Palm Research (NIFOR) Substation Dutse. Date palm (*Phoenix dactylifera* L.) is an important fruit crop in Nigeria. Date palm is the major fruit crop of arid, deserts in tropical and subtropical areas. According to FAO report, world date-fruit production reached up to 16.7 million tons from about 100 million tree, distributed in 30 countries. In Saudi Arabia, date palm is the most important cash and fruit crop grown in the different regions covering approximately 72% of the total area under permanent crops represent 161.975 ha where 23 million trees produce 991.660 tons of dates (Anonymous, 2009).

Date palm infected with several fungi resulting in decline of the growth and production have been

reported. Several fungal diseases of date palm trees have also been reported from many date producing countries. The most common disease of date palm was Bayoud disease caused by *Fusarium oxysporum* f. sp. *albedinis*. This disease is the most serious date palm disease especially in Morocco and Algeria (Elarosi, 1989; Arafat, 2015). The Inflorescence rot (Khamedj), Black scorch, rooting of aerial offshoots and Leaf spots are considered of date palm serious diseases (Baraka et al 2011). Several soil borne fungi attach date palm causing root rot and wilt diseases (Abdalla et al., 2000). The dominant fungi associated with date palm are: *Thielaviopsis paradoxa* (Black scorch), *Botryodiplodia theobromae* (Basal rot), *Maugniella scattae* (Inflorescence rot), *Heminthosporium* spp. and *Alternaria* spp (leaf spots) (Abdalla et al., 2001; Al-sharidy and Molan, 2008). Key references are used to identify the fungi to the genus level (according to the taxonomic systems of Ellis (1971), Barnett and Hunter (1972),

022. | *Int. J. Bacteriol. Virol. Immunol.*

Nelson et al. (1983) and Paulin-Mahady et al. (2002). The objective of the study was to determine the cause of root rot, wilting and the causal agents

## 2. METHODOLOGY

### 2.1. Study area

This study was conducted in NIFOR substation at Dutse, Jigawa State. It consists of date palm plantations from different genepools of National Coordinated Research Projects. The disease survey was conducted in Genepool I, Genepool II, Genepool III, Genepool IV, Genepool V, By-Pass I, II, III and Sucker Seed Garden.

The disease survey and severity were conducted on date palms based on year planted, spacing, field size, number of palms planted and number of dead palms.

#### **Sampling of root rot and wilting of date palm:**

We evaluated the state of spread on the basis of incidence and severity of the disease. The pure cultures were isolated, reisolated and identified according to Barnett and Hunter, 1972. Percentage of the incidence was calculated on the basis of ratio of the number of diseased palms to the total number of palms planted. Intensity of symptoms on the palms was determined using the disease index scale from 0 to 5 also to determine the progression of the intensity of disease were as follows:

0 - No disease, healthy palm

1 - Premature nut fall, blackening of inflorescence, leaves still green

2 - Yellowing of leaves, less than half of the canopy leaves still green

3 - Most of the leaves yellow with few green leaves

4 - Total yellowing / bronze colour of all the leaves

5 - Wilting / decapitation

#### 2.2. **Data Analysis**

For each location the percentage occurrence was calculated as the percentage of infected palms in the total palms population sampled. (Eziashi et al., 2013).  
 $CM (\%) = (T(\%) - C(\%) / 100 - C(\%) \times 100$  (Abbott, 1925).

## 3. RESULTS

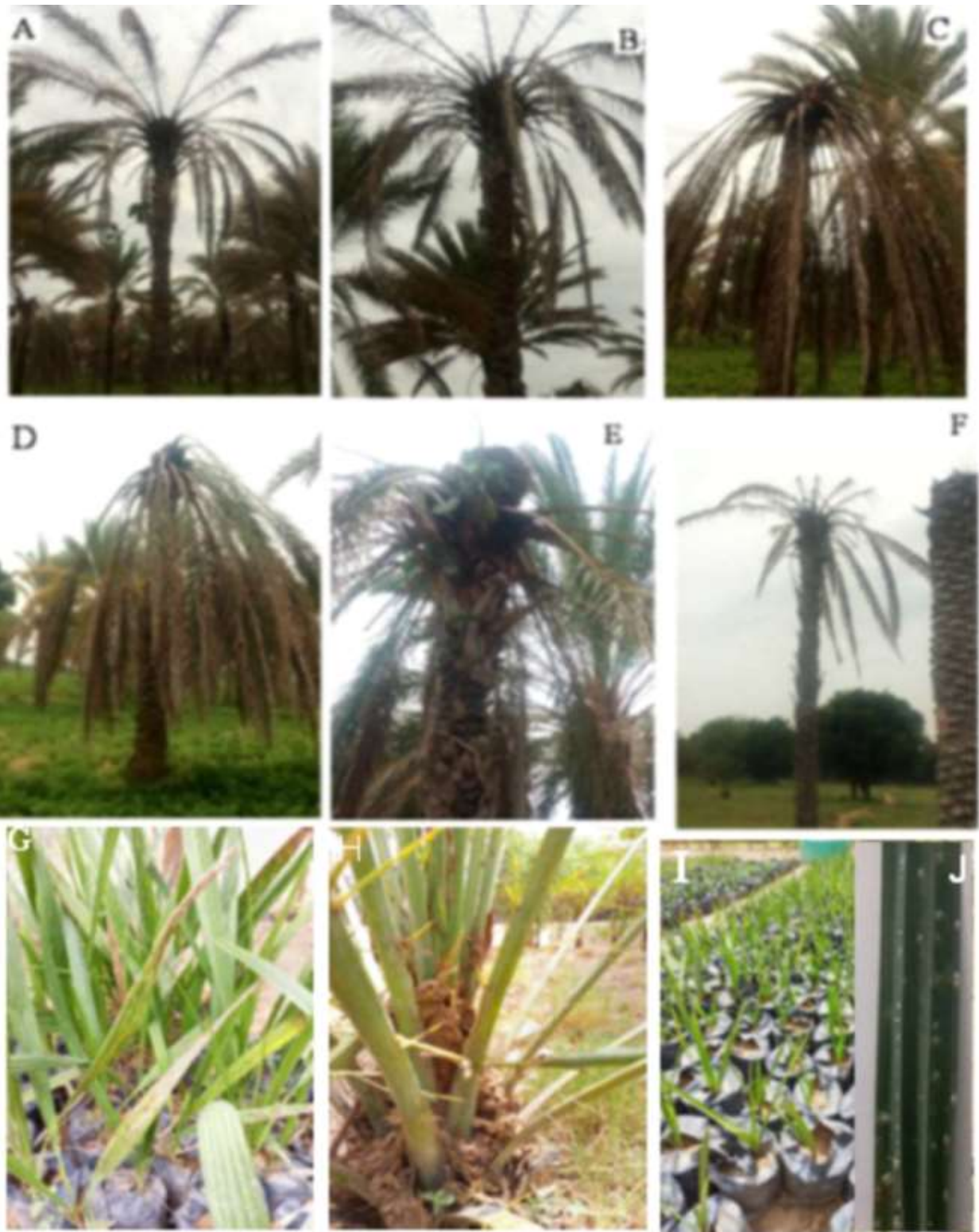
The symptoms on date palm trees were recorded from the surveyed palms. The disease symptoms were yellowish and greyish of the fronts, wilting of the palms, collapse of the canopies and in some cases decapitation. Also observed were inflorescence rot, blackening and rotting of aerial

offshoots, Pestalotia leaf spots and date palms at chronic and acute stages (plates 1A-J).

The survey revealed that diseased palm fronts were found overcrowded and overlapped on healthy palms which resulted to infections and adjoining on other healthy palms. (plates 1a-e). Similarly, Pestalotia leaf spots were predominantly isolated from young seedlings

The plates 2a-d, show photos of isolated pure cultures of *Fusarium oxysporium* f. sp. *albedinis* species from the diseased date palms. The dilution methods revealed that *F. oxysporium* f. sp. *albedinis* species were predominantly isolated from the bole, roots, fronts and soil. Plates 1 (A, B, C). Shows yellow coloration of the leaves, (D, E) wilting, inflorescence rot, blackening and rotting of aerial offshoots, (D) collapse of the canopies, (F) decapitation, (G, J) Pestalotia leaf spots, (H) declined of offshoots, (I) overcrowded and overlapped seedlings and A,B,C overcrowded and overlapped adult date palms at chronic and acute stages.

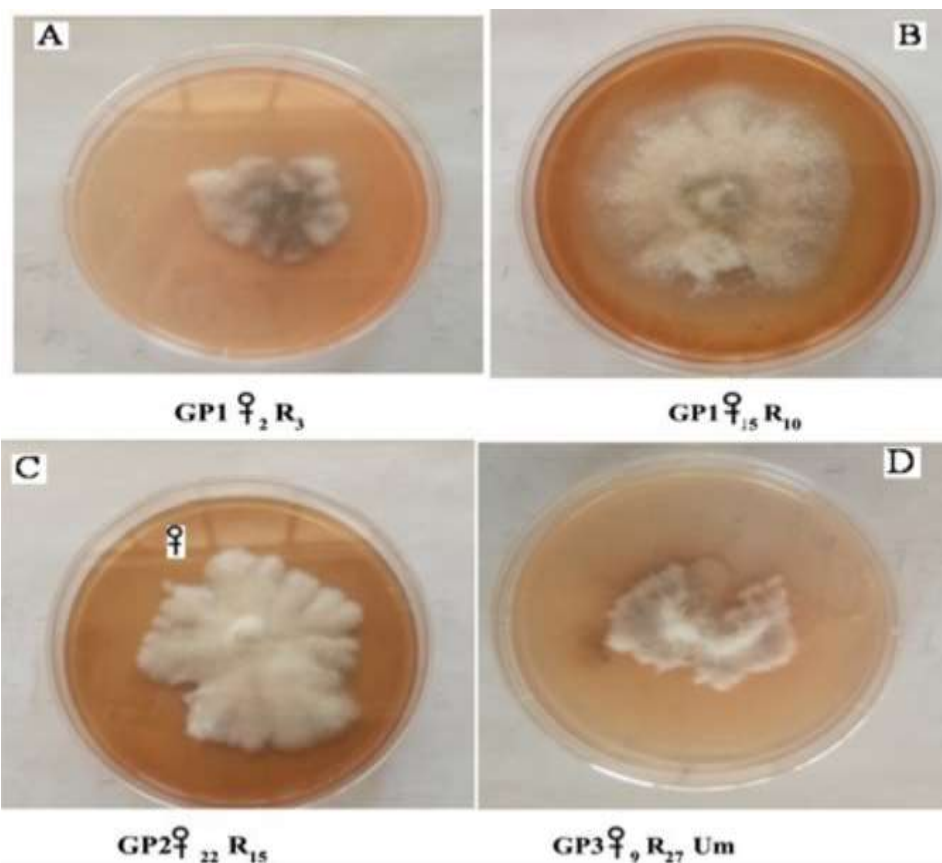
Genepool III NCRP 2B-08, planted in 1984 had the highest number of dead palms with 695 while the least were NCRP 2B-09 with 6 dead, planted in 1997 and By Pass III planted in 2003 also with 5 dead (table 1). The diseased date palms were more susceptible with the isolation of *F. oxysporium* f. sp. *albedinis* species from Genepool I, Genepool II and Genepool III, predominantly male date palms (plates 2 a-d), when compared with the female palms. More time is needed to observe the field Sucker Seed Garden planted in the year 2005 with the spacing of 8 x 8m to know if they will develop similar symptoms of root rots and wilting of the date palm observed in genepool I-V and by-pass I-111(table 1)



**Plates 1:** (A, B, C). Shows yellow coloration of the leaves, (D, E) wilting, inflorescence rot, blackening and rotting of aerial offshoots, (D) collapse of the canopy, (F) decapitation, (G, J) *Pestalotia* leaf spots, (H) declined of shoots, (I) overcrowded and overlapped seedlings and A,B,C overcrowded and overlapped adult date palms at chronic and acute stage.

**Table 1:** Root Rot and Wilting of Date Palm

Genepool	Year Planted	Spacing Triangular (m)	Field Size (ha)	No of Palms Planted	No of Dead Palms
Genepool I NCRP 2B-08	1981	3.5 x 3.5	2	1,500	118
Genepool II NCRP 2B-08	1982	8 x 8	9.4	1,170	102
NCRP 2B-09	1997	6 x 6	0.7	187	6
Genepool III NCRP 2B-08	1984	8 x 8	12.5	1,950	695
Genepool IV	1987	8 x 8	12.5	1,155	151
Genepool V	1990	7 x 7	6 ha	1,225	685
By-Pass Plantation I	2001	7 x 7	1.35	320	8
By-Pass Plantation II	2002	7 x 7	2-26	595	6
By-Pass Plantation III	2003	7 x 7	6.0	1,368	14
Sucker Seed Garden	2005	8 x 8	0.71	90	Nil



**Plate 2:** Shows: *Fusarium oxysporium* f. sp. *albedenis* species isolated from genepool I, genepool II and genepool III, predominantly from male date palms

#### 4. DISCUSSION

Absence of field maintenance of diseased date palms at chronic and acute stages caused reservoir for breeding of *F. oxysporium* f. sp. *elaeidis* that were predominantly isolated including primary and secondary pathogens. A similar study reported that several soil borne fungi attack date palm causing root rot, wilt diseases (Abdalla *et al.*, 2000). Many scientists believe that unsuitable climatic conditions such as high temperature, hot winds and low humidity influence the disease incidence (Shirazi *et al.*, 2008). Many fungal species have been isolated from affected date palm with no direct or had primary role in occurrence of bunch disorder (Karampour and Pejman, 2007).

#### 5. CONCLUSION

The study revealed that spacing played important role in transmitting infections from diseased palms to healthy palms. Proper spacing of 9 x 9 meter should be recommended to avoid overlapping of fronts on each other. Date palms at acute or chronic stages should be fell, burnt and replanted.

#### REFERENCES

Abdalla MY, Al-Rokibah A, Moretti A, Mule A, et al. Pathogenicity of toxigenic *Fusarium proliferatum* from date palm in Saudi Arabia. *Plant Dis J* 2000; 84: 321-324.

Abdalla MY, Ibrahim GH, Al-Mihanna AA, Al-Rokibah AA et al. Brown leaf spot of date palm in Saudi Arabia and the influence of leaf Epicuticular wax on disease severity. *J. Adv Agric Res.*, 2001; 6: 585-593.

Abdullah SK, Asensio L, Monfort E, Gomez-Vidal S, Salinas J, Lorca LVL, Jansson, HB, et al. Incidence of the two date palm pathogens, *Thielaviopsis paradoxa* and *T. punctulata* in soil from date palm plantations in Elx, South-East Spain. *J. Plant Protection Res.* 2009; 49: 276-279

Abbott WS. A method of computing the effectiveness of an insecticide. *J. Econ. Entomol.*, 1925; 18:265-267.

Anonymous, Agriculture statistical yearbook. Agriculture and Water Ministry of Saudi Arabia. Riyadh. 2009

Arafat KH, Mahammad KH, ElSharabasy S. Biological control of date palm root rot s disease using Egyptian isolates of streptomycetes. Books google.com. 2015

Baraka MA, Fatima M, Radwan, Arafat KH. Survey and identification of major fungi causing root rot on date palm and their relative importance in Egypt. *J. boil. Chem. Environ. Sci.* 2011; 6(2), 319-337

Barnett HL, Hunter BB. Illustrated Genera of Imperfect Fungi. 1st Edn., Burgess Publishing Co., Minnesota, 1972

Elarosi H. Studies on plants disease affecting date palm trees at the Eastern Province of Saudi Arabia. *King Abdul Aziz City. Sci. Technol.*, J 1989; 26: 79-109

Ellis MB, Dematiaceous Hyphomycetes. 1st Edn., Commonwealth Mycological Institute, Kew, Surrey, UK., ISBN-13: 978-0851986180, 1971; Pp: 608

Eziashi EI, Omamor IB, Aisueni NO, Aisagbonhi1 CI, Airede CE, Ikuenobe CE, Ataga CD, Oruade-Dimaro EA, Odewale JO, Osagie IJ. (2013). Potential Weed Species as Alternate Hosts of Insect Vectors of the Lethal Yellowing Disease (LYD) of Coconut Palms (*Cocos nucifera* L.) in Nigeria. *British Journal of Applied Science & Technology* 2013; 3(1): 123-130

Karampour F, Pejman H. Study on possible influence of pathogenic fungi on date bunch fading disorder in Iran. *Acta Hortic.*, J. 2007; 736: 431-439.

Nelson PE, Toussoun TA, Marasas WFA. *Fusarium* species: An Illustrated Manual for Identification. Pennsylvania State University Press, USA., ISBN: 0271003499, 1983; Pp: 193

Paulin-Mahady AE, Harrington TC, McNew D. Phylogenetic and taxonomic evaluation of *Chalara*, *Chalaropsis* and *Thielaviopsis* anamorphs associated with Ceratocystis. *Mycologia*, J. 2002; 94: 62-72

Shirazi MP, Izadi M, Khademi R. Study the climatical factors effects on bunch fading disorder of date palm in southern Iran and the methods of its control. *Am.-Eurasian J. Agric. Environ. Sci.*, 2008; 4: 570-574.