

## DATE PALM FUNGAL DISEASES IN THREE LIBYAN OASES

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### ABSTRACT

Survey of date palm fungal diseases in three Libyan oases (Jalo, Aujla and Ejkara) revealed the presence of several leaf spot and leaf blight diseases besides to the inflorescence rot (Khamej). The diseases symptoms on different date palm cultivars were described, and the fungi were isolated in pure cultures and identified. *Diplodia*, *Alternaria*, *Phoma*, *Ulocladium* and *Stemphylium* were involved in the leaf spot and leaf blight diseases. The causal pathogen of the inflorescence rot was identified as *Mauginiella scaettae*.

### INTRODUCTION

Date palm (*Phoenix dactylifera* L.) infected with several fungi resulting in decline in the growth and production of date palm (Djerbi, 1983 and Akaidy, 1994). Several fungal diseases of date palm trees have been reported from many date producing countries including: (1) Bayoud disease caused by *Fusarium oxysporum* var. *albedinis* which is the most serious date palm disease in Morocco and Algeria. (2) In florescence rot (Khamedj) caused by *Mauginiella scaettae* is a serious disease of date palm in Iraq, Libya, Morocco, Tunisia and Saudia Arabia. (3) Leaf spots caused by *Helminthosporium spp.* and *Alternaria spp.* were reported in Al –Qassim region, Saudia Arabia. (Al-Rokibah 1991).

First report on date palm fungal disease from Libya was reported by Cavara in 1925 about *Mauginiella Scaettae* causing Khamedj disease on inflorescences as stated by Al –Baker, (1972). Karnz (1962) recorded two diseases in Northern East of Libya caused by *Maugniella Scaettae* and *Graphiola phoenicis* and mentioned that the Oases were free from either diseases. Edongli et al. (1985) reported several fungal diseases including spots and blights caused by *Alternaria sp.*, *Diplodia* and heart rot caused by *Thielaviopsis paradoxa* in the South of Libya. In of the importance of Jalo, Aujla and Ejkara areas for date palm production in Libya no previous researches was published on date palm fungal diseases in this area. This

work was proposed to survey the fungal diseases on date palm trees in Jalo, Aujla and Ejkara localities where several important Libyan date palm cultivars are cultivated.

## MATERIAL AND METHODS

Study area lays between 28° and 30° N°, about 400 km from Benghazi and about 220 km South of Ejadbia it includes three Oases: Jalo, Aujla and Ejkara. Forty random farms were inspected to survey the fungal diseases as follows: 20 farms in Jalo, 10 farms in Aujla and 10 in Ejkara from November 1999 to July 2000. Symptoms were noticed and described and samples of infected parts were collected, kept in plastic bags, and examined carefully in the laboratory. Small pieces from infected tissues were surface sterilized by dipping in 1.5% sodium hypochlorite for 5 min. Then rinsed in sterilized distilled water and placed on to potato dextrose agar (P.D.A) plates and incubated at 25C° for one week. Colonies were described and fungi were examined under the microscope. Specific keys and references (Barnett and Hunter, 1972; Djerbi, 1983; Ellis, 1977, Abdulkader and Mohammed,1997) were used to identify the fungi to the genus level, and measurements of their reproductive structures and spores were determined.

## RESULTS

The survey showed the presence of the following diseases:

### **Khamedj disease:**

Symptoms of the disease appeared as a rot inside the spathe before opening or in the beginning of opening in “Mesleo” cultivar in Labah area in Oasis of early of spring 2000 as a soft brown rot covered with white powdery fungal growth on the spikelets and flowers. The brown rot was also found on the interior surface of the spathe opposite to the infected spikelets. Another infection was also found in Labah area on opened spadix the of “Saidy” cultivar on April, 2000. Early infection before opening of spathe was found more seriously than the late infection after spathe opening.

Colonies of the fungus on P.D.A was of white, light cottony growth round or irregular in shape. Down view of the colony was light olive green with darker edges. The mycelium was hyaline, branched, septate and produced 1 or 2 celled hyaline conidia in long chains. The conidia were 12-60 X 8-12 µm. The fungus was identified as: *Mauginiella scaettae*.

## **Diseases of Leaves:**

These diseases confined to spots and blights on leaves which found to be common in inspected areas on many date palm cultivars:-

### **I. Diseases caused by one fungus:**

#### **Alternaria blight:**

Symptoms started as small black spots about 2mm in diameter on the mid rib, later the spots enlarged to form a blighted area reaching to 10 cm long, 4 cm in diameter and 1.5 cm deep. The internal tissue was light brown in color. At advanced stages the center of blight become white in color with black edges. Sometimes, the symptoms were found on the upper and lower surfaces of midribs and nearer spines. If the pinnae base was infected the infection moved up causing the death of the pinnae and falling them down.

The isolated fungus has round with black center and cottony grayish edges. The down view of colony was black with dark live green edges. Conidiophores were golden brown, smooth, up to 50  $\mu\text{m}$  long and 3-6  $\mu\text{m}$  wide. Conidia formed in long chains with short beak and with transverse, several longitudinal or oblique septa. Over all length 20 -63 $\mu\text{m}$  thick. The fungus was identified as *Alternaria* sp.

#### **Diplodia blight:**

Symptoms started as pale elongated spots on the mid rib. At leaf base converted to long blights along the mid rib of pale yellow color and dark brown edges. At advanced stage the blight becomed dark brown in color and might extend to infect the pinnae.

Colonies, round or irregular, velvety, olive green to black, powdery and dry. Down view from plate bottom of the colony was black in color. Pycnidia black, single, globose, ostiolate, the fungus had two types of conidia 1 – celled hyaline and the mature had 2-celled with dark color measuring: 22-42 X 2-10  $\mu\text{m}$ . The fungus was identified as: *Diplodia* sp.

#### **Phoma leaf blight:**

In the beginning of the symptoms appeased as a black spots with white center measuring about 8 mm in diameter. They enlarged and became white in color with black edges spreading on wide area of mid rib reaching 8

cm long and 4 cm in diameter. The infection was not read first on upper and lower surfaces of mid rib and then extended to the adjacent pinnae and spines.

Fungal colonies was round with black velvety center and dark blue to black with irregular edges. The down view of the colony was black, pycnidia dark, ostiolate, lenticular to globose 160-384 (245 ) X 104 –240  $\mu\text{m}$ . Conidia are small, 1-celled, hyaline, ovoid to elongate 11-18 (13.5)  $\mu\text{m}$  diameter. The fungus was identified as *Phoma* sp.

## **II. Diseases caused by more than one fungus:**

### **Blight of pinnae and mid rib:**

Symptoms started on pinnae as light brown blights with dark brown edges then extended to the mid rib on both surface causing death of pinnae followed by their drooping down.

Growth of two fungi was obtained from the isolation from infected tissues. The first one formed round colonies with gray cottony center surrounded with dark gray to black area with light olive green edges. Down view of the colony was dark with grayish concentric circles and pale olive green edges. Mycelium was septate brown, conidiophores short dark brown, septate. Conidia dark usually without constriction at major septum, ovoid to elongate with 2-3 dark, usually without constriction at major septum, ovoid to elongate with 2-3 transverse septa and 1-2 longitudinal septa. The conidia 28-48 (36.9)X20-36 (26.6)  $\mu\text{m}$ . The fungus was identified as: *Ulocladium* sp.

The second fungus formed round cottony colonies of light olive green to grayish color and light green edges surrounded with white mycelial growth. Down view of the colony was black. Mycelium was septate, conidiophores long, dark mostly simple with darker terminal swelling, bearing a single, terminal conidia. Conidia dark, with cross and longitudinal septa, 36-100 (59) X28 –76 (39.6)  $\mu$ . The fungus was identified as: *Stemphylium* sp.

### **Burning of mid rib.:**

One year old leaves but not new leaves were affected. The infection appeared as brown spots on both sides of the mid rib enlarged and coalesce

to cover the mid rib. Infection transferred to pinnae resulting in their burning on both sides of the mid rib.

Three fungi were isolated and two of them were described and identified before (*Diplodia* and *Ulocladium*). The third has dark colonies with black center, and light grayish cottony edges. Down view of the colony was from plate bottom black. Conidia have 3-5 transverse septae, 2-3 longitudinal septae and 1-2 oblique septae and measured 40-50  $\mu\text{m}$  long, 20-28  $\mu\text{m}$  thick with short beak 6-8  $\mu\text{m}$  long and 7-9 thick. The fungus was identified as *Alternaria* sp.

## DISCUSSION

This study showed for the first time the existence of Khamedj disease in the desert region of Libya. Although the first report of *Mauginiella* on date palm in the world was from the coastal belt of Libya by Cavara in the early of 20<sup>th</sup> century (Al – Baker 1972). But its existence in the dry climate of oases area was not expected. This disease showed limited spread in the study area because of the dry conditions and high temperature for most of the year but it may become of more spread if it rained late in winter as in the last two years. This opinion agreed with the observations of Djerbi (1983) on the distribution of *Mauginiella scaettae* in other Arab countries. The present study showed the presence of leaf spots and blight diseases on midrib, pinnae, and spines of many date palm cultivars and many of the farms in the surveyed area. Such diseases are common on similar climate conditions in other districts in Libya Such as Obari, Murzuk, Sabha, and Shattee as reported by Edongli et al. (1985) and other parts of the Arab world like Saudi Arabia according to (Abdulkader and Mohammed, 1997). Although so far no serious damage was caused by the leaf spot and blight disease but high incidence of such diseases is expected especially in the absence of any control measures which may represent a real problem for date palm cultivation in the studied area in future.

Several leaf blight diseases were found caused by more than one fungus, similar findings were reported by Edongli et al. (1985 and 1993) from Libya and by Abdulkader and Mohammed, (1997) from Saudi Arabia. Further studies are needed to determine the role of each fungus in disease development. As in other reports on the date palm diseases in Libya Kranz (1962), El –Baker (1972) and Edongli et al. (1985and1993) this study found no existence of Bayoud disease which threaten date palm cultivation in two of the countries on the borders of Libya (Dejerbi, 1983). Libya is still free

from this disease because the farmers are not using to import date palm off shoot outside their areas.

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