



## RESEARCH PAPER

## OPEN ACCESS

## Occurrence and prevalence of air borne fungi due to rain falling on date palm (*Phoenix dactylifera* L) harvesting crop in area of Gambat Khairpur District, Sindh, Pakistan

Mirza Hussain<sup>1</sup>, Shafique Ahmed Rind<sup>2</sup>, Atta Hussain Rind<sup>\*3</sup>

<sup>1</sup>Department of Botany Govt. Girls Degree Science College Gambat, Sindh, Pakistan

<sup>2</sup>Institute of Microbiology, Shah Abdul University, Khairpur, Sindh, Pakistan

<sup>3</sup>Institute of Chemistry, Shah Abdul University, Khairpur, Sindh, Pakistan

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### Abstract

During harvesting, date palm crop is damaged due to rain falling at study area, unfortunately rainfalls at harvesting dates crop in mid of July to September months and provide max; chance for occurrence and prevalence air borne fungi. In present study, air borne fungi at harvesting dates of different varieties (Karbalianan, Kupro and Gajar) were isolated and characterized, these fungi viz *A. fumigatus*, *A. flavus* and *A. niger* was isolated, the fungus *A. fumigatus* was isolated from kupro, *A. flavus* observed from Gajar and *A. niger* was tvaluated from Karbalianan.

\* **Corresponding Author:** Atta Hussain Rind ✉ [attahussain243@gmail.com](mailto:attahussain243@gmail.com)

## Introduction

Occurrence and prevalence of air borne fungi are dependent upon rain falling for their development on date fruit and atmospheric humidity also has a considerable influence on the date palm fruit at harvesting crop in the area of gambat khairpur district, Sindh Pakistan researched. These factors provide a maximum chance for best growth of fungal pathogens in study area thus area was chosen for research, Aims and objectives is to find out impact of rain fall on the development of fungal diseases on date palm (*Phoenix dactylifera* L) during harvesting crop and to collect samples of infected dates from experimental area and carried out to laboratories for isolation and identification of fungal pathogens, To observe the effects of fungi and to focus role of environment in disease development .

Rain fall has a crucial impact on date production and quality in Sindh. Rain during the sparing (date pollination period) washes away the pollen, during summer (date ripening period) does not allow the dates to mature properly and during harvesting period deteriorates the quality and quantity of date palm. Date palm (*Phoenix dactylifera* L) is one of the oldest trees in the world and is mentioned in the holy Quran and Bible, Date palm belongs to family Areaceae, or Palmaceae. Date palm is widely grown throughout the world especially in Asia, Africa, America and Australia (Al Harrasi, 2014; Alani *et al.*, 1971 and Chughtai *et al.*, 1986; NJ. Ismaili, 1998) Date palm is robust feathered and dioecious plant. The fruit drops with fleshy pericarp is borne in bunches and the yield may be as high as 30-100kg per tree these fruit bunches are bear at 5-7 years of age (Barren Oudejans, 1984) It contains huge amount of fruit in per plant and its fruit is rich in all essential nutrients which make the man healthy (Ishtiqe *et al.*, 1988). It is unavoidable fact that all animals and man depends upon plants .food is primary necessity for man and that is derived from plants. There are several date palm diseases such as nematodes, fungi, bacteria, viruses these microorganisms cause serious plant diseases and destroy the economy of the region (Singh *et al.*, 1983). Amongst several microorganisms fungi are known as most severest pathogens. Diseases

caused by fungi on dates fruit are of considered of great importance and interest, because date fruit is rich in essential nutrients and provides good medium for several fungal species for their luxuriant growth, occurrence and prevalence (Ismaili *et al.*, 1994). Date fruit is to be spoilt during rainy season when climatic conditions are highly humid. Most of the fungi attack and caused diseases on dates fruit at harvesting crop.

During rainy season, Dates are susceptible to fungal infections during khalal to rutab stage.

Fruit is subjected to fungal attack either the wound at any point on the surface or through the region of calyx, where cuticle is absent (Djerebi, 1983; Dowson 1982 and Chughtai, 1986) These infections constitute the problem where ever the date palm are grown . Due to the fungal infections there is max; loss of date crop in field, because of this significance the study of fungi are of great importance and interest (MK. Khush, 1988 and MS. Memon1991).

Previously work has been done that fungus due to high humidity and rain seen at Basria in Iraq, Saudia Arabia, Bahrain, Iran and other countries (Maitlo *et al.*, 2013; Dowson, 1982) In Pakistan, work has not been done in this direction. So, Concentrative research work is needed on the subject particularly Khairpur District, Sindh.

## Material and method

The medium Czepak's Dox Agar used for isolation and identification of fungal Pathogens

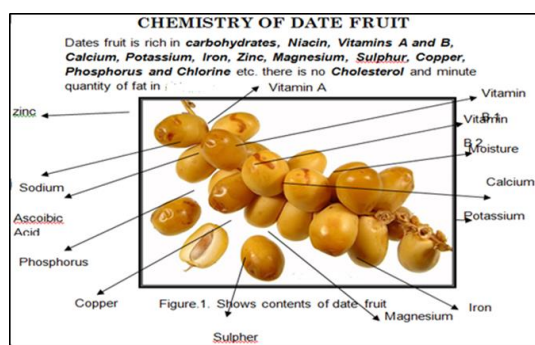
### Composition

Formula (Per Liter)

1. Sodium Nitrate	2.0g.
2. Potassium Chloride	0.5g.
3. Magnesium Glycerophosphate	0.5g.
4. Ferrous Sulphate	0.1g.
5. Potassium Sulphate	0.35g.
6. Sucrose	30.0g.
7. Agar No.3 (Oxoid 1.13)	12.0g.
8. H <sub>2</sub> O:	1000mL

Note: 1. Oxoid Company.

2. Add 10mL lactic acid 10% per liter after sterilization. All the constituents of medium mixed together & heated in order to dissolve the contents in a 1000mL flask .sterilized the medium by autoclaving at 15 Lbs and 121°C for 15-20 minutes in autoclave then poured the medium in sterilized Petri dishes & allowed to solidify. All the glass wares including flasks, petri dishes and pipettes washed with the vim washing powder & dried at room temperature and then sterilized all the glass wares at 120°C for 6-8 hours in oven.



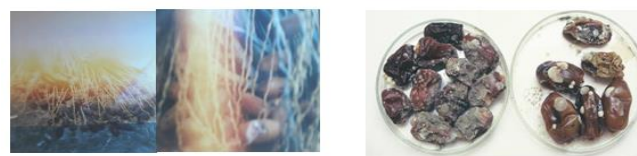
**Fig. 1.** Chemistry of date fruits

During rain falling, Samples of infected date fruits (Fig. 2) of different varieties i.e. Karbalianan, Kupro and Gajar were collected from experimental area of harvesting dates fruit crop with the help of sterilized forceps into polythene bags. Samples were brought to the laboratory for isolation and identification of fungal pathogens (Irshadsoomro, 1990) Czpepk's Dox Agar medium was used for isolation of fungal pathogens. The medium in Petri plates was inoculated with the infect parts of date fruits. The inoculated petriplates were incubated at 29°C for 3 to 7 days. Now (CFUs) Plate 1) Shows Colony forming units appeared in petri plates they were, separated and counted. The individual colonies were picked and placed on fresh medium in the petri plates for purification of the fungi (Plate No: 1, 11 & 111). The fungi were identified on the basis of different keys (Gilman 1975; Cook 1963; Thom and Rapper, 1945)

### Result

The date palm orchards at area of Gambat Khairpur district were visited. Atmospheric humidity was measured with hygrometer at minimum 21% in the

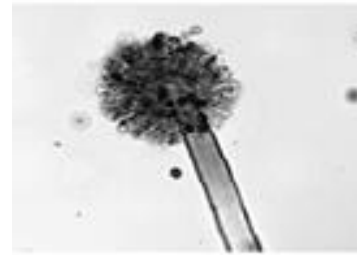
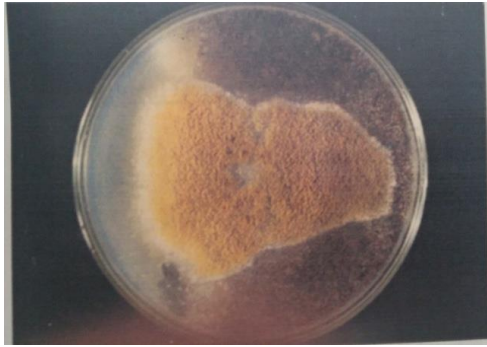
hot whether i.e march to April and 56% to 96% maximum humidity noted during rainy season. It was investigated that periods of high atmospheric humidity add to actual rain by creating conditions favorable for microorganisms. Fungi were observed more damageable to date crop. [NJ. Ismaili, 1999] Karbalianan, Kupro and Gajar varieties were researched dates fruit at ripening stage generally infected by fungal species i.e *A. fumigatus*, [Fig. 3], *A. flavus* [Fig. 4] and *A. niger* [Fig. 5].



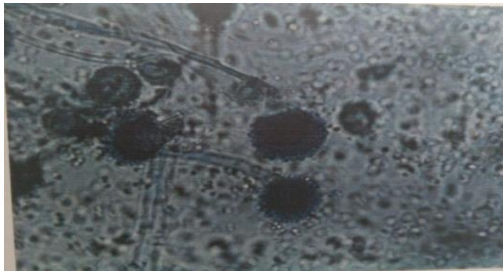
**Figure.2.** Infected dates with different fungi.



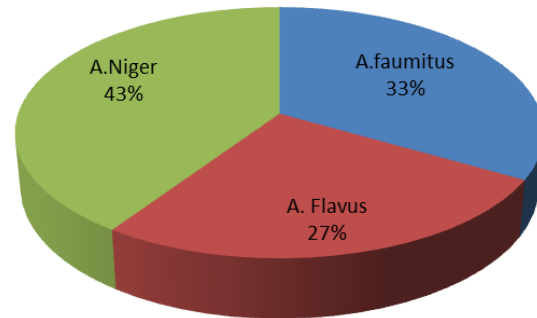
**Fig. 3.** Colony of *A. flavus* on Czpepk'sDox Medium B Hyphae with conidiophores



**Fig. 5.** Colony of *A. niger* on Czpek'sDox Medium. B Conidiophore with conidia.



**Fig. 4.** A colony of *A. fumigatus* on Czpek'sDox medium B Hyphae with conidiophores



**Fig. 6.** Shows overall frequency of air borne fungi.



Our results are in agreement to those of [AL-Yasir & AR Saad 2010] recorded different levels of the incidence of decline of date palam in orchards of karbela in Iraq ,Saudi Arbia, Iran , and India (Maitlo W.A,G.S Markhnd 2013) During investigation dates fruit pathogens at area of Gambat khairpur date palm crop season 2018. *A. fumigatus* 3.3%, *A. flavus* 2.7% *A. niger* 4.3% were recooded.

**Table 1.** Shows the isolated Fungi. Three petriplates for three selected varieties were made in which CFUs colony forming units appeared then counted and finally mean wisely result was made.

Isolated Species	Selected Varieties	Samples of Infected Date Fruit	No: of petriplates			Total	Mean
			P/1	P/2	P/3		
<i>A. fumigatus</i>	Kupro variety	Blemeshes of dates fruit	03	04	03	10	3.3
<i>A. flavus</i>	Gajar variety	Stal and Spoilages dates fruit	00	04	04	08	2.7
<i>A. niger</i>	Karbalianan variety	Discolouration of dates fruit	04	03	06	13	4.3

It has investigated that mycoflora in ripening stage fruit rot is *A. niger* which infected the fruit directly rutab to tamer stage. The fumigatus app is also important which infected the fruit of ripening stage through wound. From spoilage dates, *Aspergillus flavus* was identified. The obtained results from experiments of different species at area of Gambat Khairpur district are *A. fumigatus* 3.3% *A. flavus* 2.7% and *A. niger* 4.3%. The highest was *A. niger* 4.3 and the lowest *A. flavus* 2.7 and the overall frequency

of these three fungi is given in Fig. 6. It is quite clear that these air borne fungi have some role in infecting the date fruit. Our observations and results are clearly indicate that airborne fungi, depends on rainfall and humidity for causing infections [Mahar *et al.*, 1994]

**Discussion**

A survey of date palm orchard at Gambat area has been done. The purpose of the survey at harvesting crop of dates fruit was to have the disease assessment

that will provided the information about effect of high atmospheric humidity and symptoms at early and late stage of selected varieties of date palm indicates that diseases can produce black spots, fruit rot, whitish and blackish mould through would [A.Q Mahar, 1998] Secondary the isolation of pathogen from the collected samples during rutab to tamar stage rot spots has been observed at this stage.

It has been investigated that heavy rain falls, high humidity 56% to 96% dates were susceptible and damage in such unfavorable conditions and produce effect such as lose skin, blemishes, discolouration and stal spoilages the important dates fruits and cause fungal pathogens *A. fumigatus*, *A. flavus* and *A. niger*. It is thus very important to introduce impact of rain fall and humidity which is main source for the occurrence and prevalence of fungal diseases of dates fruits in the area of Khairpur (MH, 2012 & M. Hussain, 2020).

### Conclusion

A great deal of fungus attack on date palm fruit has been reported obviously associated with moisture level of environment during rainy season. Fungal diseases on date palm are of great importance and interest because dates fruit contains essential nutrients and serves as good medium to several fungus species for their luxuriant growth and are easy to be spoilt during rainy season. Date palm tree under favourable conditions attacked by fungal pathogens viz. *A. fumigatus*, *A. flavus* and *A. niger* and caused serious diseases to date palm fruits at area of Gambat Khairpur district and maximum harm to date palm fruit due to air born fungi concluded.

### Hypothesis

1. Date palm is universally fruit.
2. Date palm is better fruit than other fruits.
3. Date palm is necessary for human nutrition.
4. Date palm is source of human income.
5. Fungal pathogens of date palm fruit are of great importance and interest.

### Conflict of interest

We have no conflict of interest.

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