

Phylloplane Mycoflora of Date Palm (*Phoenix Dactylifera*) From Shuqaiq Region of Jizan Province, Saudi Arabia

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Abstract

Date Palm (*Phoenix dactylifera*) is considered as the "tree of life" as it has contributed in so many ways to all aspects of life for thousands of years. Dates are implicated to possess medicinal properties in addition to its nutritional value. This is the first study to isolate and identify the phylloplane mycoflora associated with date palm from Shuqaiq region of Jizan province. Potato Dextrose media was used for the growth of mycoflora which was inoculated by 0.5cm direct pieces of the diseased parts leaves of the date palm. A qualitative and quantitative assessment of mycoflora was carried out by the fungal cultures on the petri plates and the slides were identified by microscopic and macroscopic characteristics. The mycoflora isolated belongs to the four classes of fungi *Zygomycotina*, *Oomycotina*, *Basidiomycotina* and *Ascomycotina*. Forty three isolates represented by fourteen genera *Absidia*, *Aspergillus*, *Botrytis*, *Curvularia*, *Epicoccum*, *Penicillium*, *Periconia*, *Phoma*, *Phytophthora*, *Rhizoctonia*, *Rhizopus*, *Saprolegnia*, *Syncephalastrum* and *Ceratocystis* were isolated during this study. The diverse group of genera isolated are phytopathogenic and are the causal organisms for a number of important date palm diseases. This leads to poor health and fruit quality and hence the diseases need to be controlled and the palm protected.

Keywords: Date Palm, Jizan, Mycoflora, Phylloplane, Shuqaiq, Saudi Arabia.

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INTRODUCTION

The date palm tree is the second most common and useful palm tree in the world, (the coconut palm is generally acknowledged as the first). The list of remedies of date palm is never ending. For example, the fruits are good for everything from a sore throat to bronchial asthma and of course, as an aphrodisiac. The date palm trunk gum is used to treat diarrhea, the roots for toothache, and the seeds for skin complaints and malarial symptoms. The date tree fruit itself is also simply a great source of vitamins (A and C) and calcium, iron, sulphur, potassium, magnesium and fibre, as well having high sugar contents. They are a pretty good source of nutrition for the frail [1]. The bark of the palm tree could also be a source of firewood and the leaves are also used in building huts, baskets and mats.

Dates are implicated to possess medicinal properties in addition to its nutritional value [2]. Several studies have reported date fruit with a wide range of bioactivities, such as antioxidant activity due to the presence of phenolics, carotenoids and anthocyanins in it [3-5], antimutagenic [5], anti-inflammatory [3], antihyperlipidemic [6], antibacterial [7] and antifungal [8] activities. Over 450 date palm

varieties or cultivars are grown in the Kingdom of Saudi Arabia and yield more than 1 million metric tons of date fruits accounting for about 14% of the total world production [9, 10].

Ceratocystis paradoxa (Dade) C. Moreau (anamorph: *Thielaviopsis paradoxa* (de Seynes) Hohn.), and *C. radicola* (Bliss) Moreau (anamorph: *T. punctulata* (Hennebert) Paulin, Harrington et McNew, are two pathogens commonly found either alone or in combination associated with several disease symptoms on palm trees. These fungi can infect any part of the palm tree, and symptoms are often expressed as black scorched leaves, trunk rot, and neck bending or inflorescence blight [1].

B. cinerea was previously recorded in northern Italy on canary island date palm (2) and was recently detected in southern Italy on majesty palm (3). To our knowledge, this is the first report of leaf spot and rachis blight caused by *B. cinerea* on pygmy date palm [11].

Belaat disease: The causal pathogen is *Phytophthora* sp. The disease is of minor importance

and sporadic. It is known from North African countries [12, 13]. Symptoms appear at the crown of the palm [1].

Most *Periconia* species are saprophytes in a variety of plant substrates. It is possible that the host for this new species is found in the vegetation surrounding the evaporation ponds, which is composed of mangrove forests and xerophytic vegetation [14].

They consisted of five relatives of *Alternaria bokurai* (Fc3s: three isolates; Fc4s: two isolates) and three *Curvularia* sp. (Fc1s: three isolates) (Fig-1). Palm roots were noted to harbor a number of different genera, with a prevalence of *Fusarium* [15].

Belâat disease was reported by several authors and from several North African countries (Algeria, Morocco, Tunisia, etc) [16, 17, 12, 13]. The entire cluster of young fronds will whiten and die as a result of the attack, followed by the infection and death of the terminal bud (Figures 10 and 11). Accompanied by secondary organisms, the infection will progress downward in the trunk as a conical wet heart rot form, releasing an odour of acetic and butyric fermentation. Belâat disease is caused by *Phytophthora* sp. similar to *P. palmivora* [18].

Sample collection from the Sampling site

The samples were collected in sterile polythene packs using sterile instruments like scissor,

needles, knife etc. Symptomatic leaves of the date palm were collected are from Shuqaiq region of Jizan. The major diseases noticed were leaf spots, black scorch, leaf basal rot and fruit spots, wilt and rust.

MATERIALS AND METHODS

Potato Dextrose media was used for the growth of mycoflora which was inoculated by 0.5cm direct pieces of symptomatic leaves of the date palm from the region under study. A qualitative and quantitative assessment of mycoflora was carried out by the fungal cultures on the petri plates and the slides were identified by microscopic and macroscopic characteristics. Photomicrographs of the represented genera were also taken during the study (Figs 1-10).

RESULTS AND DISCUSSION

The mycoflora isolated belongs to the four classes of fungi *Zygomycotina*, *Oomycotina*, *Basidiomycotina* and *Ascomycotina*. Forty three isolates represented by fourteen genera *Absidia*, *Aspergillus*, *Botrytis*, *Curvularia*, *Epicoccum*, *Penicillium*, *Periconia*, *Phoma*, *Phytophthora*, *Rhizoctonia*, *Rhizopus*, *Saprolegnia*, *Syncephalastrum* and *Ceratocystis* were isolated during this study (Table-1) (Figs 1-10). *Ceratocystis* is the predominant genera with eight isolates followed by *Phoma* with six isolates (Fig-11).

Table-1: Different Fungal Genera Isolated from the different parts of the Date Palm.

Sr. No	<i>Zygomycotina</i>			<i>Oomycotina</i>		<i>Basidiomycotina</i>	<i>Ascomycotina</i>							
	<i>Absidia</i>	<i>Rhizopus</i>	<i>Syncephalastrum</i>	<i>Phytophthora</i>	<i>Saprolegnia</i>	<i>Rhizoctonia</i>	<i>Aspergillus</i>	<i>Botrytis</i>	<i>Curvularia</i>	<i>Ceratocystis</i>	<i>Epicoccum</i>	<i>Penicillium</i>	<i>Periconia</i>	<i>Phoma</i>
1	-	-	+	-	-	-	-	+	-	+	-	-	-	+
2	+	+	-	+	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	+	-	+	+	-	-	+
4	-	-	-	-	-	+	+	-	-	+	+	-	-	-
5	+	+	-	-	-	-	-	-	-	+	-	-	+	+
6	-	-	+	+	-	-	-	-	-	+	-	-	+	-
7	-	-	-	-	-	-	+	-	+	+	-	-	-	+
8	-	+	-	-	-	-	-	+	-	+	+	-	-	+
9	-	-	-	-	-	-	+	-	-	+	+	-	-	+
10	-	+	-	-	+	-	+	-	-	-	-	+	+	-
	2	4	2	2	1	1	4	3	1	8	5	1	3	6

Fourteen different fungal genera were isolated from the phylloplane of date palm which are the causal organisms of many diseases; leaf spots, necrosis, wilting, yellowing, black scorch, leaf basal rot etc. The major diseases noticed were leaf spots, off-shoot

decline, black scorch, and leaf basal rot and fruit spots. Seven different fungal species were isolated from date palm exhibited different symptoms [19].

Photographs of the Mycoflora from Date Palm

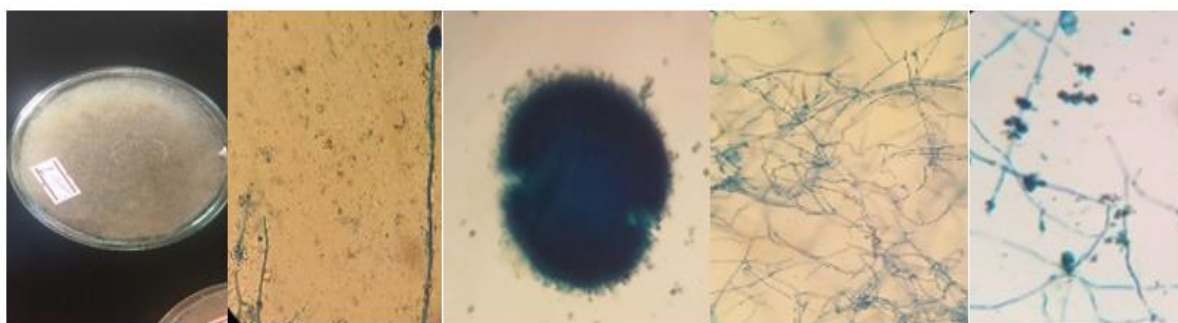


Fig-1: Phylloplane 1, i) Phoma, ii) Syncephalstrum, iii) Ceratocystis, iv) Botrytis



Fig-2: Phylloplane 2, i) Absidia, ii) Rhizopus, iii) Phytophthora



Fig-3: Phylloplane 3, i) Phoma, ii) Botrytis, iii) Epicoccum, iv) Ceratocystis

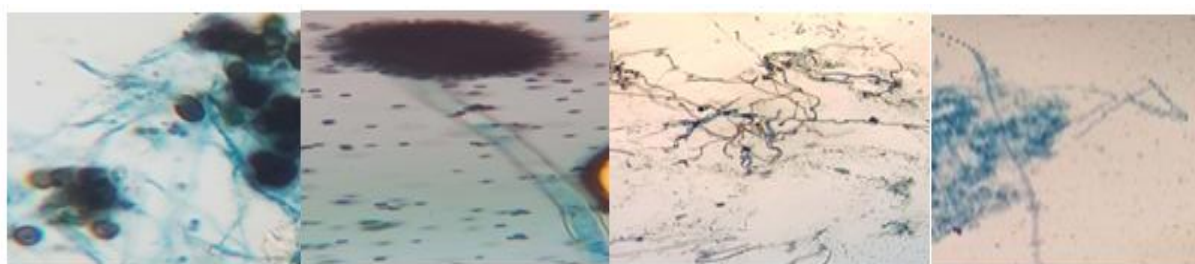


Fig-4: Phylloplane 4, i) Epicoccum, ii) Aspergillus, iii) Rhizoctonia, iv) Ceratocystis

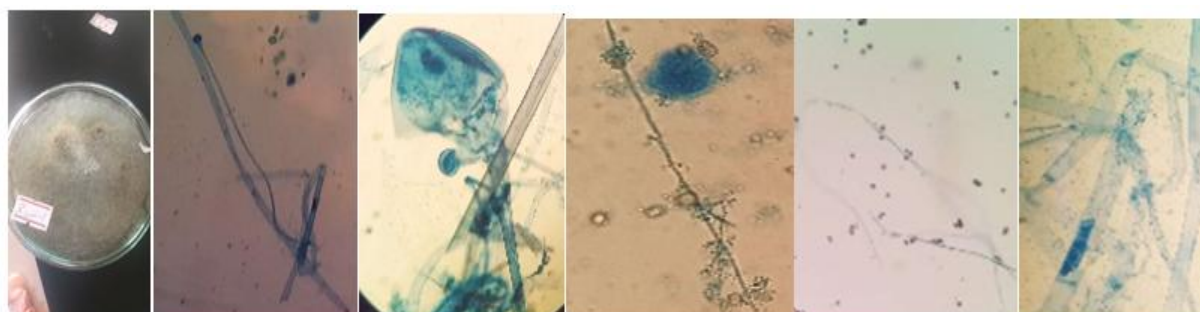


Fig-5: Phylloplane 5, i) Absidia, ii) Rhizopus, iii) Phoma, iv) Periconia, v) Ceratocystis

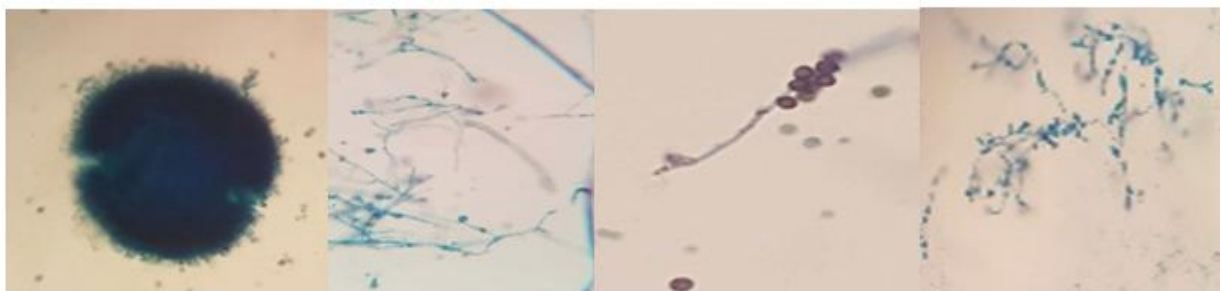


Fig-6: Phylloplane 6, i) Syncephalastrum, ii) Ceratocystis, iii) Periconia, iv) Phytophthora

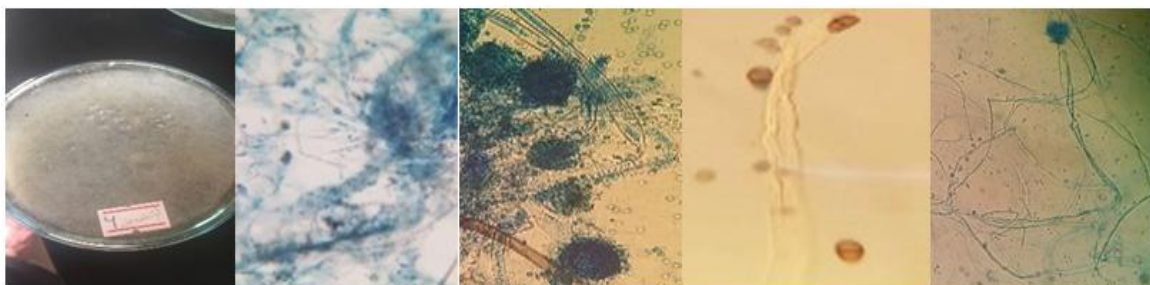


Fig-7: Phylloplane 7, i) Ceratocystis ii) Aspergillus, iii) Curvularia, iv) Phoma

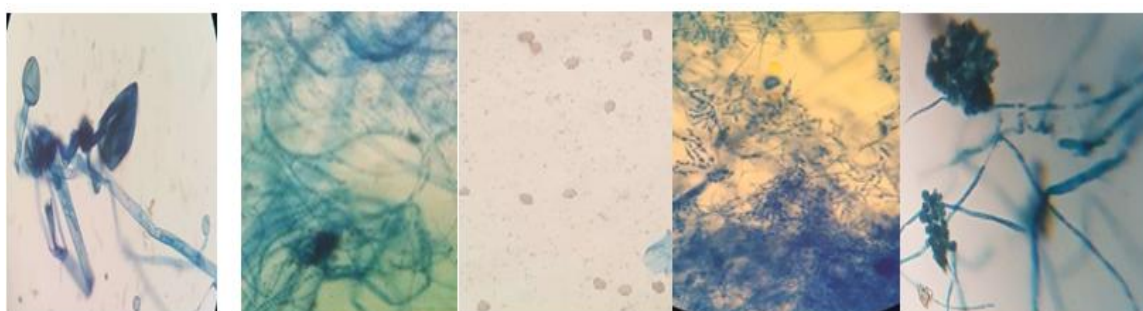


Fig-8: Phylloplane 8, i) Rhizopus, ii) Phoma, iii) Ceratocystis, iv) Epicoccum, v) Botrytis



Fig-9: Phylloplane 9, i) Epicoccum, ii) Phoma, iii) Ceratocystis, iv) & v) Aspergillus sp



Fig-10: Phylloplane 10, i) Saprolegnia, ii) Aspergillus sp, iii) Periconia, iv) Penicillium, v) Rhizopus

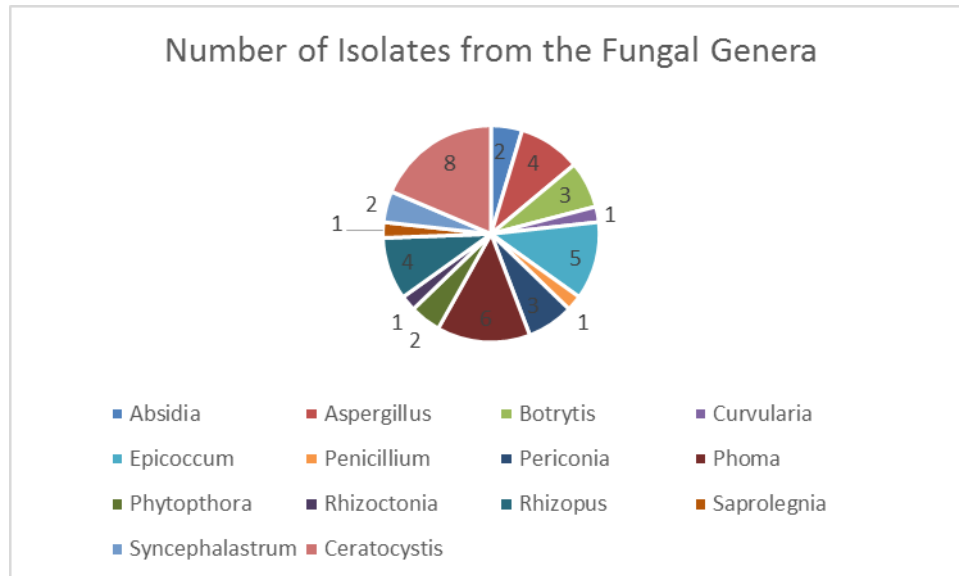


Fig-11: Pie Diagram Showing the Number of Isolates from each Fungal Genera

CONCLUSION

The phytopathogenic fungi cause various diseases like leaf spots, wilt, black scorch, smuts etc. on the date palm and hence must be controlled in order to protect the plants thereby helping in better health, good yield and resistance to the crops grown in the region of study. This study can help in controlling the diseases, damage and economic losses to the crop.

Conflict of Interest

The author declares that there is no conflict of interest.

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