

المملكة العربية السعودية  
الرياض

## OCCURENCE OF SOME PLANT FUNGAL DISEASES IN AL-KHARJ AREA, SAUDI ARABIA

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### Abstract

**Bokhary, H.A., S. Parvez, and S.A. Gahtani. 1984. Occurrence of some plant fungal diseases in Al-Kharj Area, Saudi Arabia. Arab J. Pl. Prot. 2: 100 - 102**

The main purpose of this study was to survey plant fungal diseases in a very important and yet rather neglected area of Al-Kharj. Four different genera of fungi were identified on three different host plants. *Alternaria alternata* and *A. tenuissima* on *Solanum melongena* L. (egg plant) leaves, *Helminthosporium tritici* and *Septoria tritici* on *Triticum vulgare* (*T. aestivum*) leaves, *A. alternata* on *Medicago sativum* L. and *Uromyces striatus* causing leaf rust disease of alfalfa. Out of these fungi, *Septoria tritici* causing leaf spots on wheat, *Alternaria alternata* & *A. tenuissima* causing leaf spots on *Solanum melongena* are reported here as a new record for Al-Kharj area while *Helminthosporium tritici* is a new record for Saudi Arabia.

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### Introduction

This study was done on plant fungal diseases of Al-Kharj city, an important area providing demands of vegetables, cereals and animal fodder for Riyadh and other cities of Saudi Arabia, located at a distance of 75 km from the city of Riyadh. According to Ministry of Agriculture and Water report (1968), the agricultural production of Al-Kharj area was 21000 tons of alfalfa, 275 tons of cereals, and 4855 tons of vegetables.

In spite of these facts, most of the previous studies on plant fungal diseases were done only in the suburbs of Riyadh, and some work covered the area of Al-Kharj (2, 3, 4, 11). Furthermore, Abu-Zinada and Ghannam (5) and Abul Hayja *et al.* (1) made some confined investigation on powdery mildews in the Central Region of Saudi Arabia, including Al-Kharj area.

Therefore, the aim of the present investigation was to survey the plant fungal diseases in Al-Kharj area as a first step towards the recognition of the phytopathological problems in this important cultivated area.

### Materials and Methods

This work was started in November 1980 and continued until the end of April, 1981. Weekly visits were made to different fields in Al-Kharj area. Plants showing different symptoms of fungal infection were collected in polythene bags and kept in a refrigerator (temperature 5°C) until used and examined microscopically. Disease symptoms were also studied and reported.

Pieces of infected material were washed with sterile water 4 to 6 times before they were disinfected by fla-

ming after dipping in 96% ethyl alcohol. Pieces were then plated on either Potato Dextrose Agar (PDA) or Czapek Dox Agar (CzDA) and incubated at room temperature (20° - 30°C). The isolated fungal cultures were freed from bacterial contamination by subculturing in media to which terramycin and rose bengal were added. The cultures were further purified by hyphal tip or single spore technique as described by Hildebrand (9).

In case of samples which failed to grow on the above mentioned nutrient media, serial transverse sections in infected organs were made. The fixing solution FAA was used (formalin-acetone-alcohol). After fixation, sections were dehydrated with a series of alcohol concentrations and cleared in xylol. Sections were then stained with light green and safranin to identify the fungus inside the host tissue.

Pathogenicity tests of these fungi were carried out by spraying the suspension of spores and/or mycelium on both surfaces of leaves. The suspension of mycelium and/or spores were taken from 6-days old colonies grown on PDA.

The perfect state of *Helminthosporium tritici-repentis* Died. was obtained by spraying the conidial suspension on autoclaved wheat seeds.

The fungi were identified by using the taxonomic keys and descriptions of Ellis (8) for *Alternaria spp.*; Laundon and Waterston (10) for *Uromyces striatus*; Sutton and Waterston (15) for *Septoria tritici*; Punithalingam and Waterston (13) for *Ustilago nuda*; and Wiese (16) for *Pyrenophora trichostoma*.

## Results and Discussion

The following species of fungi have been isolated from plants of economic importance of Al-Kharj area and described under their host.

A – Host - *Solanum melongena* L.

a. Causal organism: *Alternaria alternata* (Fr.) Keissler.

Symptoms: Yellow to brown spots spread more on upper than on lower surfaces of leaves.

The Fungus: *Alternaria alternata* isolated on CzDA medium shows olivaceous black or grey colored colonies; conidiophores  $50 \times 3-6$  u with several conidial scars; conidia  $30-63 \times 9-18$  u, formed in long, sometimes branches, chains with conical beak 2-5 u thick, Conidia possess several longitudinal and up to 8 transverse septa.

b. Causal organism: *Alternaria tenuissima* (Kunz ex Pres.) Wiltshire.

Symptoms: Yellow to brown leaf spots on leaves of *Solanum melongena* L. were seen in greater number on the upper surface of diseased leaves as compared to the lower surface.

The Fungus: Fungus isolated on CzDA medium shows grey or greenish black colonies with a ring of yellow color and white cottony mycelium at the centre; conidiophores  $80-120 \times 4-6$  u, with one to several scars, branched but rarely unbranched, pale brown in color; conidia in short chains, solitary,  $22-80 \times 10-18$  u with a beak of 2-4 u thick, sometimes roughened but normally smooth; beak is nearly half the length of conidium.

B – Host - *Triticum aestivum* L. (Graminae).

Syn. - *Triticum vulgare* L.

a. Causal organism:

Imperfect Stage: *Helminthosporium tritici-repentis* Died.

Syn. - *H. tritici-vulgaris* Nis.

Perfect Stage: *Pyrenophora trichostoma* (Fr.) Fckl.

Syn. - *P. tritici-repentis* (Died.) Drchs.

Symptoms: Causes yellow leaf spot disease on wheat. Appears initially on both sides of the leaves as tan-brown flecks, which expand up to 12 mm long. Lesions become large, expand with age and finally coalesce together. Older lesions were darker brown than younger ones.

The Fungus: Fungus was isolated on CzDA.

Conidiophore  $100-275 \times 7-8$  u, erect, simple, olive black with swollen base; conidia measuring  $40-200 \times 12-20$  u, septate, mostly 4-7 septa, subhyaline and cylindrical, basal cell conical; pseudothecia 250-300 u, black; ascospores  $45-70 \times 18-28$  u, oval, globose, brown; more than 8 ascospores were found per ascus.

b. Causal organism: *Septoria tritici* Rob.

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Symptoms: Causes leaf spot disease of wheat, forming light green to yellow spots. Occurs mainly on leaves. Spots changed to brown with age because of the development of pycnidia, variable in size, linear to elliptical, reaching up to 1 cm size. Defoliation and shrivelling occurs in case of severe infections.

The Fungus: Pycnidia 80-160 u in diam., at first brown but later becomes black, globose or elliptical, arranged longitudinally between the veins. Walls composed of thickwalled cells; ostiole 15-17 u in diameter; conidia 2-3 septate, curved, hyaline, filiform;  $50-70 \times 2$  u; conidiophore  $10-20 \times 4-5$  u, hyaline.

c. Causal organism: *Ustilago nuda* (Jensen) Rostrup.

Symptoms: causing loose smut of wheat, spikelets are completely destroyed; causes infection on full ear except rachis and awns.

The Fungus: Spores 7-9 u in diam., minutely roughened, spherical or subspherical, pale yellow brown but powdery olive brown when in mass; mostly roughened on lighter side as compared to darker side.

C – Host - *Medicago sativa* L. (Leguminosae)

Pathogens causing leaf spot disease on *Medicago sativa* L. were; two unidentified species of *Helminthosporium*, *Alternaria alternata* and *Uromyces striatus*.

– Causal organism: *Uromyces striatus*, Schroeter.

Symptoms: Reddish-brown uredia and dark-brown to black telia developed on leaves and stems late in the season.

The Fungus: Urediospores  $16-25 \times 16-22$  u, oval, mainly ellipsoidal, slightly roughened; wall 2 u thick; urediospores have equatorial pores, 3-4 in number; Sections through infected leaves showed urediospores of *U. striatus*.

The present study adds more information on the fungal flora in Al-Kharj which is an important agricultural area. The period during which the study was conducted (November 1980 to April 1981) was appropriate since the prevailing conditions of moisture and

coolness were suitable for fungal infections of plants (10, 13, 15).

Earlier reports recorded powdery mildews in the Central Region, (including Al-Kharj area) but without the presence of fruiting bodies (5, 6, 14). Whereas in the present study, we did not report neither powdery mildews nor their fruiting bodies to be present in

Al-Kharj area during the period of this investigation.

Absence of fruiting bodies may be attributed to the fact that many species of *Erysiphe* are unable to form them in warm climates (7). Although the period of study covered winter, yet this is not comparable to winter conditions in temperate climates (Europe) which are favorable for fruiting bodies formation.

## الملخص

بخارى، هـ، س. بارفيز، و.س. جحطاني. ١٩٨٤. حدوث بعض امراض النباتات الفطرية في منطقة الخرج في المملكة العربية السعودية. مجلة وقاية النبات العربية ٢: ١٠٠ - ١٠٢

وستوريا ترييساي على نبات القمح. الترنايا الترنايا ويورماسيس ستراياتس على نبات البرسيم. وتعتبر الفطريات الترنايا الترنايا، الترنايا تينوسيسما وستوريا ترييساي تسجل لأول مرة في منطقة الخرج بينما الفطر هيلمنثوسبوريم ترييساي يسجل لأول مرة في المملكة العربية السعودية.

الهدف الرئيسي من هذه الدراسة المبدئية كانت لمسح أمراض النباتات الفطرية في منطقة الخرج التي لها أهميتها في انتاج المحاصيل للمنطقة الوسطى بالمملكة. عرفت أربعة أجناس فطرية على ثلاث نباتات مختلفة وهي كالتالي: الترنايا الترنايا والترنايا تينوسيسما على نبات الباذنجان هيلمنثوسبوريم ترييساي

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