

FIRST REPORT OF *ALTERNARIA HELIANTHI* IN SUNFLOWER FROM PAKISTAN

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INTRODUCTION

Sunflower (*Helianthus annuus* L.) is one of the important oilseed crops which has the maximum potential for bridging the edible oil gap in Pakistan. The major diseases which affect the yield of sunflower in this country are, root and stem rot (*Macrophomina phaseoli*), stem rot (*Sclerotinia sclerotiorum*), head rot (*Rhizopus* sp.) and leaf spot (*Septoria helianthi*). The crop was severely affected by leaf and stem spots caused by *Alternaria helianthi* at the National Agricultural Research Centre (NARC), Islamabad, during the autumn of 1982, resulting in extensive defoliation and lodging of the plants. Although a brief description of the symptoms has been published (Lipps and Herr, 1981) this is the first report on the occurrence of *Alternaria helianthi* from Pakistan.

The pathogen was first described as *Helminthosporium helianthi* Hansf. by Hansford (1943) as the cause of blackish brown zonate spots on leaves of sunflower in Uganda. Later on Wallace and Wallace (1950) reported a severe outbreak of *H. helianthi* on sunflower in Tanganyika. Stem breaking of sunflower due to *H. helianthi* was reported from northern Rhodesia (Anonymous, 1962). Pavgi and Upadhyay (1964), unaware of Hansford's report, described *H. helianthi* Pavgi as a new species causing leaf spot on sunflower in northern India. Tubaki and Nishihara (1969) detected the pathogen in Japan and renamed it *Alternaria helianthi*, because of presence of longitudinal septa in the conidia and porogenous conidial development, and this name is currently accepted.

Shane et al. (1981) reported that *A. helianthi* cause a severe seedling blight of sunflower in Minnesota, and is capable of inciting disease over a wide range of temperatures (Ačimović, 1974) and thus constitutes a potential threat to sunflower producing regions

worldwide (Zimmer and Hoes, 1978; Sackston, 1981).

The objectives of this study were to identify the causal organism and to establish its pathogenicity.

MATERIALS AND METHODS

ISOLATION OF THE PATHOGEN

A disease survey of sunflower field was made during autumn 1982 at the National Agricultural Research Centre (NARC), Islamabad. Diseased specimens of sunflower showing lesions on the leaf and stem were collected for identification of the pathogen in the laboratory. 3–4 mm sections of tissue from symptomatic host were surface sterilized with one percent solution of sodium hypochlorite for 3 minutes, then rinsed in sterile water and plated on potato-dextrose agar (PDA) amended with 100 µg/ml streptomycin sulphate and then incubated at 23°C. Thus the fungus was isolated in pure culture and was subsequently maintained on PDA at 25°C.

PATHOGENICITY TEST

For inoculations, 10–15 days old culture on PDA plates were flooded with 20 ml sterile water and fungal colonies were rubbed with a sterile wire loop to obtain conidial suspension. Three to four weeks old sunflower plants of susceptible cultivar Peredovik grown in sterile small plastic pots were inoculated by spraying conidial suspension (10,000 conidia per milliliter) on plant foliage with an atomizer. Inoculated plants were kept under humidity, at 25–27°C for 48 hours. After inoculations and providing high humidity, plants were kept in sunlight in the laboratory at 22–27°C for disease development.

RESULTS AND DISCUSSION

The symptoms of the disease in the field were apparent on leaves and stem. On the leaves, leaf spots were roughly circular, 5–

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15 mm in diameter, brown border and frequently surrounded by chlorotic halos and sometime zonate. Under high humidity and warm temperature during July—September, in infected plants, leaf spots enlargement and coalescence resulted in wilting and drying of the leaves. In heavy infected plants complete defoliation was observed. On the stem blackened lesions as flecks or streaks, elliptical were present and some time breakage was also noticed.

CONIDIAL CHARACTERISTICS

The conidia were solitary, non-beaked, born on simple unbranched conidiophores, cylindrical to elongate elliptic, yellowish brown in colour, septate with 3—10 transverse of occasionally longitudinal septa, constricted at septa, rounded at both ends and $40-120 \times 15-20$ um (average 100.6×25.5). The shape and size of conidia were similar to those of *Alternaria helianthi* as described by Tubaki and Nishihara (1969) and thus the pathogen was identified as *Alternaria helianthi* and confirmed by Dr. S. H. Qureshi.

PATHOGENICITY TEST

The pathogen virulence was tested on 3—4 weeks old sunflower artificial inoculated plants with conidial suspension. After 10—15 days post inoculation, typical symptoms of the leaf spots developed on the inoculated plants were identical to those observed in nature but checks remained healthy. Mortality up to 10 percent was also observed in some inoculated plants. The pathogen was successfully reisolated from the infected leaves of the inoculated plants.

So far *Alternaria helianthi* on sunflower has been reported from various African countries, Argentina, India, Japan, Yugoslavia and Brazil (Zimmer and Hoes, 1978), from Romania and Bulgaria (Hulea et al., 1973; Bocharova, 1977), from Mississippi, Minnesota and North Dakota (Shane et al., 1981), from Wisconsin and Florida (Sackston, 1981). The pathogen is seedborne and is presumed to be introduced into Pakistan through imported seed from abroad. However, this is the first report of *Alternaria helianthi* (Hansf.) Tub. & Nish. as a new pathogen on sunflower from Pakistan.

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PREMIER RAPPORT RELATIF À ALTERNARIA HELIANTHI SUR LE TOURNESOL AU PAKISTAN

Résumé

L'alternariose du tournesol causée par *Alternaria helianthi* a été identifiée en 1982 au Centre national de recherches agronomiques d'Islamabad, la maladie étant signalée pour la première fois au Pakistan dans le présent rapport. On a étudié les symptômes de la maladie, les caractéristiques des conidies et la virulence du pathogène par l'inoculation artificielle des plantes de tournesol avec des suspensions de conidies. Le pathogène a été réisolé avec succès à partir des feuilles infectées des plantes inoculées.

Le pathogène est transmis par les semences et on suppose qu'il a été introduit au Pakistan avec les semences importées.

EL PRIMER INFORME SOBRE ALTERNARIA HELIANTHI DEL GIRASOL EN PAKISTÁN

Resúmen

El manchamiento de las hojas y del tallo del girasol provocado por el hongo *Alternaria helianthi* fue identificado el en año 1982 en el Centro nacional de investigaciones agrícolas de Islamabad, esta enfermedad siendo señalado por primera vez en Pakistán en este artículo. Se han estudiado los síntomas de la enfermedad, las características de los conidios y la virulencia del patógeno inoculando artificialmente las plantas de girasol con suspensión de conidios. El patógeno volvió a ser separado con éxito de las hojas infectadas de las plantas inoculadas.

El patógeno se transmite a través de las semillas y se presupone que haya sido introducido en Pakistán junto con las semillas importadas del extranjero.