OCCURRENCE OF SUNFLOWER COLLAR ROT DISEASE CAUSED BY *SCLEROTIUM ROLFSII* IN PAKISTAN

M. SIDDIQUE MIRZA * **and**
L. K. KHOKHAR **
(Pakistan)

INTRODUCTION

Sclerotium rolfsii Sacc., causal organism of collar rot of sunflower *(Helianthus annuus* L.) is a soil-borne facultative parasite of over 200 plants and widely distributed throughout the tropics and warmer portions of the temperate zones of the world (A y c o c k, 1966). The most characteristic effect of this organism is the rotting of affected tissue due to propectinase and depolymerase enzymes (H u s a i n, 1957). K o l t e and T e w a r i (1977) have reported 10—11% yield losses in India.

During July to September, 1984, collar rot disease was observed for the first time on sunflower cultivar Record at National Agricultural Research Centre (NARC), Islamabad with upto 5.0 percent incidence, which resulted in wilting of diseased plants. The symptoms in the field developed as light brown lesions on the stem which extended above the soil surface, 2—10 cm with large number of small, round brown sclerotia (0.5—2 mm) about the size of mustard seed appeared on the infected portion of the stem (Fig. 1). In some plants white mycelial growth was also observed at the base of the stem and on the surrounding soil surface. The sclerotia developed on the mycelial growth were first white and later turned light brown. A brief description of the symptoms has also been reported by D a t a r and B i n d u (1981).

This paper reports the occurrence of sunflower collar rot disease *(S. rolfsii)* and determination of its pathogenicity.

MATERIALS AND METHODS

ISOLATION

Diseased sunflower plants were collected from NARC, Experimental fields, Islamabad for isolation and identification of the pathogen during autumn (July—September) 1984. From infected tissue, 3—5 mm section were surface sterilized with 1 percent sodium hypochlorite solution for 2 minutes, then rinsed 3 times in sterilized distilled water (SDW) and plated on potato-dextrose agar (PDA) amended with 100 µg/ml streptomycine sulphate and then incubated at 25±1°C for 15 days. Thus the fungus was isolated in pure form and subsequently maintained on PDA at 25±1°C.

PATHOGENICITY TEST

The causal fungus was isolated from infected stem tissue and maintained in pure culture. Small clay pots filled with field soil were autoclaved for two hours. Three weeks old sclerotia of the pathogen grown on PDA in Petri dishes at 25±1°C were mixed into the

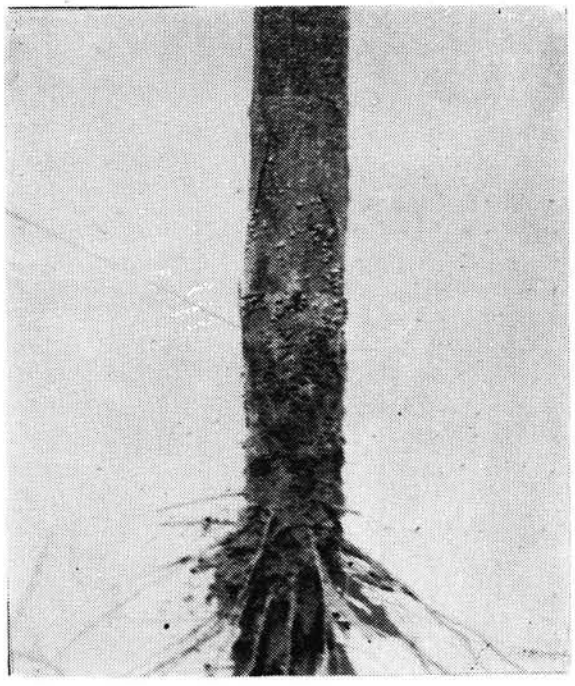

Fig. 1 — Sclerotia on infected stem

* Oilseed Pathologist, National Agricultural Research Centre P.O.NIH, Islamabad.
** Plant Pathologist, CDRI, National Agricultural Research Centre, Islamabad.

soil in the ratio of 50 : 1 (w : w) as described by Chakravarty and Bhowmik (1983). Seeds of sunflower susceptible cultivar Record were surface sterilized in 1 percent sodium hypochlorite solution and rinsed 3 times with SDW. The seeds were planted in pots containing infested soil and uninfested control. The pots were placed in sunlight at 25°C. All the pots were watered daily to maintain high level of moisture and examined daily after emergence of seedlings for development of disease symptoms. The seedlings which developed definite wilt symptoms including control were pulled and examined.

RESULTS AND DISCUSSION

ISOLATION

A pure culture of white fan shaped profusely branched, septate mycelia with clamps developed within 4—5 days. Large number of small round brown sclerotia, about the size of mustard seed (0.5—2 mm) were formed after 10—15 days. Developing sclerotia in culture were first white in colour which later turned brown (Fig. 2). On the basis of morphological and cultural characteristics, the causal organism was identified as *Sclerotium rolfsii* Sacc.

PATHOGENICITY

The pathogenicity of the organism was tested by planting the seeds of sunflower susceptible cultivar Record in the pots containing infested soil and uninfested control. Within 5—7 days after sunflower seedlings emerged in pots containing infested soil with sclerotia of *S. rolfsii*, the mycelial growth was observed on soil surface and arround some of the seedlings. In severely infected seedlings, symptoms such as soft watery rot, and brown lesions which advanced up to 2 cm above the soil surface appeared on the stem. On the lesions white mycelial growth with white and brown sclerotia depending upon the stage of maturity, developed similar to those observed in the field and seedlings died within 10—15 days. Roots of the infected seedlings were found to be rotted but the seedlings in the uninfested control pots remained healthy. The fungus was reisolated from all the infected seedlings while no organism was isolated from the seedlings in uninfested control pots.

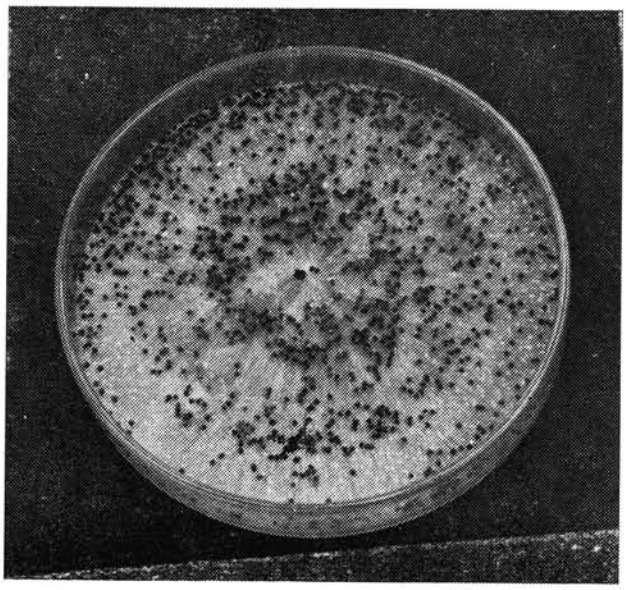

Fig. 2 — Mycelial growth with white and brown sclerotia on PDA in Petri-dish

So far *Sclerotium rolfsii* on sunflower has been reported from Australia (Middleton, 1971), Israel and Egypt (Sackston, 1978), Trinidad (Briton-Jone and Baker, 1934) and Uruguay (Pastorino, 1965). In India occurence of *S. rolfsii* was recorded without mentioning the species by Butler and Bisby (1960) but later was identified as *S. rolfsii* (Kolte and Mukhopadhyay, 1973). However, this is the first record of occurrence of *S. rolfsii* on sunflower from Pakistan.

REFERENCES

Aycock R., 1966, *Stem rot and other diseases caused by Sclerotium rolfsii*, North Carolina Agri. Expt. Stn. Tech. Bull. 174, 1—202 pp.

Briton-Jone H. R. and Baker R. E., 1934, *Notes on some other fungus diseases in Trinidad*, Trop. Agric., 11 : 67.

Chakravarty S. and Bhowmik T. P., 1983, *Symptoms and techniques of inducing collar rot of sunflower caused by Sclerotium rolfsii* Sacc., J. Agric. Sci. 53 (7) : 570—573.

Datar V. V. and Bindu K. J. 1981, *Physiologic studies on Sclerotium rolfsii Sacc., causing collar rot of sunflower (Helianthus annuus)*, Indian J. Microbiology 21 (1) : 17—20.

Husain H., 1957, *Production of cellulolytic enzyme* by *Sclerotium rolfsii*, Abstr. Phytopathology 47 : 17—18.

Kolte S. J. and Mukhopadhyay A. N., 1973, *Occurrence of some new sunflower diseases in India*, PANS. 19 (3) : 392—396.

Kolte S. J. and Tewari A. N., 1977, *Note on effect of planting dates on the occurrence and severity of sunflower disease*, Pantanagar J. Res. 2 (2) : 236.

Middelton K. J., 1971, *Sunflower diseases in South Queensland*, Qd. Agric. J. 97 : 597.

Pastorino A., 1965, *Polyphagous Fungus : Sclerotium rolfsii*, Abstr., Biol. Abstr. 46 (19) : 86591.

Sackston W. E., 1978, *Sunflower diseases mapping in Europe and adjacent mediterranean countries*, Proc. 8th Int. Sunflower Conf. Minneapolis, Mn. 7—29 pp.

APPARITION DE LA POURRITURE DU COLLET DE LA TIGE DU TOURNESOL PRODUITE PAR *SCLEROTIUM ROLFSII* AU PAKISTAN

Résumé

La pourriture du collet de la tige du tournesol a été observée pour la première fois au Centre National de Recherches Agricoles d'Islamabad, en automne 1984. Sur la tige, à la surface du sol, ont apparu des lésions brunes claires, de 3 à 10 cm. Sur la surface des tiges attaquées et sur le sol environnant, des sclérotes bruns ont été formés, ayant la dimension des graines de moutarde (0,5 à 2 mm). La fréquence de cette maladie allant jusqu'à 5% a été signalée chez le cultivar de tournesol Record.

Ce champignon a été identifié comme *Sclerotium rolfsii* Sacc. La pathogénicité de ce champignon a été déterminée sur des plantules de tournesol élevées dans un sol infecté artificiellement, en observant les symptômes identiques de la maladie.

LA APARICIÓN DE LA PODREDUMBRE DE LA BASE DEL TALLO DE GIRASOL PRODUCIDA POR *SCLEROTIUM ROLFSII* EN PAKISTÁN

Resúmen

La podredumbre de la base del tallo de girasol se observó por primera vez en el Centro Nacional de Investigaciones Agrícolas de Islamabad en el otoño del año 1984. En el tallo, a la superficie del suelo, aparecieron lesiones de color castaño claro, de 3—10 cm. En la superficie del tallo atacado y en suelo contiguo se formaron esclerocios de color castaño, del tamaño de una semilla de mostaza (0,5—2 mm). La presencia de la enfermedad en proporción de hasta 5 por ciento fue señalada en variedad de girasol Record.

El hongo fue identificado como *Sclerotium rolfsii* Sacc. La potogenia del hongo fue determinada en las plantas de girasol cultivadas en el suelo infectado artificialmente, observándose los síntomas idénticos de la enfermedad.