HELIA, **16**, Nr. 18, p.p. 85-88 (1993)

Helianthus Tubrosus: A NEW HOST OF *Sclerotium rolfsii* IN PAKISTAN

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SUMMARY

A root rot disease of wild sunflower species (*Helianthus tuberosus L.*) was observed during May, 1992 at National Agricultural Research Centre (NARC), Islamabad. Infected roots showed light brown discoloration, covered with white, fan shaped mycelium with small, round, tan to brown coloured sclerotia of mustard seed size (0.5-2 mm) on the roots and in adjacent soil. Disease incidence ranging from 30-40 % was recorded. On the basis of disease symptoms and cultural characteristics, the causal agent was identified as *Sclerotium rolfsii* Sacc. Thus, *Helianthus tuberosus* appears as a new host of this pathogen in Pakistan.

Key Word: Root rot disease, *Helianthus tuberosus, Sclerotium rolfsii*, Pakistan

INTRODUCTION

A root rot disease of wild sunflower species (*Helianthus tuberosus* L.), also known as *Jerusalem artichoke*, caused by Sclerotium rolfsii Sacc., was observed during May, 1992 at National Agricultural Research Centre (NARC), Islamabad. The disease incidence ranging from 30-40% was recorded. The naturally infected plants first exhibited wilting

Figure 1. Wilting symptoms caused by S. rolfsii on H.tuberosus

Figure 2. Sclerotia of S. rolfsii on PDA

symptoms (Figure 1). Later on entire plants withered and died. The roots were rotted and with light brown discoloration. Numerous small, brown, rounded sclerotia, 0.5-2 mm in diameter, about the size of mustard seed, developed on the lesions and in the surrounding soil. The sclerotia were first white and later on turned tan or light brown to brown. A brief description of the symptoms of *S. rolfsii* on *Helianthus annuus* L. has been described by Datar and Bindu (1981) and Mirza and Khokhar (1985).

S. rolfsii is a soil-borne facultative parasite of over 200 plant species and widely distributed throughout the tropics and warmer portions of the temperate zones of the world (Aycock, 1966). The most characteristic effect of this organism is the rotting of affected tissues due to propectinase and depolymerase enzymes (Hussain, 1957).

The objective of this study is to report the occurrence of *S. rolfsii* on wild sunflower species (*Helianthus tuberosus*) and to establish its pathogenicity.

MATERIALS AND METHODS

Isolation

Infected root parts of *H. tuberosus* were collected from experiment fields at NARC, Islamabad during May, 1992 for isolation and identification of the causal agent. From infected root tissue, 3-5 mm sections were surface sterilized with 1 percent sodium hypochlorite solution for 2 minutes, rinsed 3 times in sterilized water (SW). Then, they were plated on potato-dextrose agar (PDA) amended with 100 ug/ml streptomycin sulphate and incubated at 25°C for 10-15 days. Thus, the causal agent was isolated in pure culture and subsequently maintained at 25°C on PDA.

Pathogenicity

Small clay pots filled with field soil were placed in paper bags and autoclaved for two hours. Fifteen to 20 days old sclerotia of the causal agent grown on PDA in Petri dishes at 25°C were mixed into the soil in the ratio 50:1 (w:w) as described by Chakravarty and Bhowmik (1983). Seeds of *H. tuberosus* were surface sterilized in 1 percent sodium hypochlorite solution, rinsed 3 times with SW and then planted in pots containing infected soil and in uninfected control. The pots were placed in sunlight at 25°C. All pots were watered daily to maintain high level of moisture and examined daily, after the emergence of seedlings, for the development of disease symptoms. The seedlings which developed definite wilt symptoms including control were pulled out and examined for disease symptoms.

RESULTS AND DISCUSSION

Isolation

A pure culture of white, fan shaped, profusely branched, septate mycelium with clamps developed within 4-5 days. Numerous small, round brown sclerotia of mustard seed size (0.5-2.0 mm) were formed after 10-15 days. The sclerotia developing in the culture were first white in colour which later turned tan or light brown to brown (Figure 2). On the basis of the morphological and cultural characteristics, the causal agent was identified as *Sclerotium rolfsii* Sacc., according to West (1961).

Pathogenicity

Within 5-7 days after seedlings emerged in pots containing soil infected with sclerotia of *S. rolfsii*, the mycelial growth was observed on soil surface and around some seedlings. In severely infected seedlings, first soft watery rot symptoms and later brown lesions which advanced up to 1-2 cm above the soil surface developed on the stalk and on the surrounding soil surface. On the lesions, white mycelial growth with white and tan to brown sclerotia developed. These were similar to those observed in the field. The infected seedlings died within 10-15 days. Roots of the infected seedlings were found to be rotted but the seedlings in the uninfected control pots remained free from disease symptoms. The causal agent was reisolated consistently from all the infected seedlings while no fungus was isolated from the seedlings in the uninfected control pots.

CONCLUSION

S. rolfsii has already been reported on cultivated sunflower species (*Helianthus annuus L.*) from Argentina (Luciano and Davreux, 1968), Australia (Middleton, 1971; Achimovic, 1984 & 1988), Iran (Rahmani, 1970), Israel and Egypt (Sackston, 1978), Spain (Achimovic, 1984), Trinidad (Briton-Jone and Baker, 1934), Uruguay (Pastorino, 1965), India (Kolte and Mukhopadhyay, 1973) and Pakistan (Mirza and Khokhar, 1985), but the information on this pathogen on wild sunflower species (*H. tuberosus*) appears lacking. This seems to be the first report of *S. rolfsii* as a new pathogen on *Helianthus tuberosus* from Pakistan as it is not included in "Fungi of Pakistan", compiled by Mirza and Qureshi (1978).

REFERENCES

Acimovic, M. 1984. Sunflower diseases in Europe, United States and Australia, 1981-1983. Helia No.7, 45-54.

Acimovic, M. 1988. Sunflower diseases mapping in Europe and some countries outside Europe in the period 1984-1986. Helia No. 11:41-48.

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.

Hussain, H. 1957. Prodution 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.

Luciano, A. and Davreux, M. 1968. Sunflower production in Argentina. Abstr. Rev. App. Mycol. 47, 1220.

Middelton, K.J. 1971. Sunflower diseases in South Quensland, Qd. Agric. J. 97, 597.

Mirza, M.S. and Khokhar, L.K. 1985. Occurrence of sunflower collar rot disease caused by Sclerotium rolfsii in Pakistan. Helia No.8:41-43.

Mirza, M.S. and Qureshi, M.S.A. 1978. Fungi of Pakistan. Dept. of Plant Pathology, Uni. Agri. Faisalabad. pp.1-311.

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

Rahmani, Y. 1970. Diseases of oilseed crops in Iran. 5th Oilseed Res. Seminar, Tabriz, Iran, Dec. 1970, 53.

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

West, E. 1961. *Sclerotium rolfsii*, history, taxonomy, host range and distribution. Phytopathology 51:108-109.

Helianthus tuberosus: **UN NUEVO HUESPED DE** *Sclerotium rolfsii* **EN PAQUISTAN**

RESUMEN

La enfermedad podredumbre de raiz fue observada en la especie silvestre de girasol (*Helianthus tuberosus* L.) durante el mes de Mayo en el Centro de Investigación Agraria (NARC), es Islamabad. Las raices infectadas mostraron una ligera descoloración marrón, cubierta con micelio blando de forma abanico con pequeños esclerocios, redondos de color canela a marrón, de tamaño de una semilla de mostaza (0.5-2mm) sobre las raices y suelo adyacente. La incidencia de la enfermedad varió de 30 a 40 %. En base a sintomas de la enfermedad y caracteristicas culturales, el agente causal fue identificado con *Sclerotium rolfsii* Sacc. Por tanto *Helianthus tuberosus* aparece como un nuevo huésped de este patógeno en Paquistan.

Helianthus tuberosus: **UNE NOUVELLE PLANTE-HÔTE POUR** *Sclerotium rolfsii* **AU PAKISTAN**

RÉSUMÉ

Une pourriture de la racine a été observée sur l'espèce sauvage de tournesol *Helianthus tuberosus* au cours du mois de Mai 1992 au Centre National de Recherche Agronomique (NARC) d'Islamabab. Les racines infeectes se caractérisaient par des décolorations brunes, couvertes d'un mycelium blanc en éventail. Des sclérotes de la taille d'une graine de colza (0,5 – 2 mm), arrondis, de couleur ocre à brun étaient visibles sur les racines et le sol environnant. Une incidence de 30 à 40% a été observée. A partir des symptômes et des caractéristiques observées en culture, l'agent pathogène a été identifié comme étant Sclerotium rolfsii Sacc. Aussi Helianthus tuberosus apparaît comme une nouvelle plante-hôte de ce pathogène au Pakistan.