

Short Communication

ISOLATION AND CHARACTERIZATION OF *Sclerotium rolfsii* SACC. CAUSING COLLAR ROT OF PIGEONPEA IN TRIPURA**Durga Prasad Awasthi^{1*}, Partha Das², Biman De³, Sujoy Hazari⁴ and Navendu Nair⁵**¹Department of Plant Pathology, College of Agriculture, Tripura-799 210, INDIA^{2,3,4}AICRP on Pigeonpea, College of Agriculture, Tripura-799210, INDIA⁵Department of Entomology, College of Agriculture, Tripura-799210, INDIA

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ABSTRACT

In Tripura, Pigeonpea (*Cajanus cajan* (L.) Millsp.) is grown in an area of 6,500 ha having productivity of 1.8 t/ha. Among major diseases of pigeonpea in Tripura such as *Phytophthora* Stem Blight (PSB) and *Fusarium* Wilt; a new disease namely collar rot caused by the fungi *Sclerotium rolfsii* Sacc. is becoming a crucial threat. The disease starts appearing after one to four weeks of sowing of the crop in a sporadic manner. Leaves of the plants shows water soaked light brown or yellow appearance followed by drooping and drying of leaves. Under favourable climatic condition collar region of the infected plant shows white mycelia growth of the fungus and sometime initials of sclerotia were also observed under *in vivo* condition. During present study average disease incidence of 8.5% was observed in the year 2015-16 & 2016-17. The fungus was isolated and grown in Potato Dextrose Agar (PDA) medium & Koch's postulates was confirmed. Cultural and morphological characteristics like dry mycelial weight, mycelial diameter, time of appearance of initials of sclerotia, pattern and numbers of sclerotia produced were also recorded. Small reddish brown sclerotia were found to be distributed throughout the petri plates, average numbers of sclerotia produced was found to be 573.

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INTRODUCTION

Pigeonpea [*Cajanus cajan* (L.) Millspaugh] is a short-lived perennial shrub that is traditionally cultivated as an annual crop. It is an important legume crop having vast natural genetic variability in local germplasm and the presence of numerous wild relatives. India is probably the primary center of origin of pigeonpea. In Tripura, pigeonpea is grown in an area of 6,500 ha having productivity of 1.8 t/ha. Diseases and insect pests are major concern for growing this crops thus the present case of study was undertaken under agro-climatic condition of Tripura to screen major as well as minor diseases which are becoming concern for cultivation of pigeonpea.

MATERIALS AND METHODS

Pigeonpea plants grown at All India Co-ordinated Research Plots of College of Agriculture, Tripura, Lembucherra, West Tripura as well as at different farmers field were evaluated for Collar Rot of Pigeonpea in the year 2015-16 and 2016-17. Samples from collar rot affected plant of pigeonpea were collected and brought into the laboratory. Pathogen was isolated aseptically in Potato Dextrose Agar (PDA) slants. Before isolation small bits from the diseased plant parts were cut and washed in running tap water followed by washing in distilled water. The washed samples

were then dipped in 0.1% HgCl₂ (Mercuric Chloride) solution for 30 to 45 seconds for surface sterilization and then washed 3 times in sterile distilled water. The PDA slants were then incubated at 28 ± 1°C in B.O.D. incubator for 14 days. Further sub culturing was carried out by taking 6 mm discs or single sclerotia of fungus. The isolated fungus was inoculated into healthy plants grown in pots for confirmation of Koch postulates. Sclerotia were further inoculated in PDA petri plates to study cultural and morphological characteristics of the fungus like rate of mycelial radial growth (mm or cm /day), growth pattern, day's of appearance of sclerotial initials, day's of maturity of sclerotia, size of sclerotia, pattern of sclerotia development, distribution on petri plates, colour, growth pattern of mycelium.

RESULTS AND DISCUSSION

Among various diseases of pigeonpea based on symptomatological study *Phytophthora* Stem Blight (PSB) and *Fusarium* wilt were recorded. It was also observed that a disease namely collar rot caused by the fungi *Sclerotium rolfsii* Sacc. is becoming a crucial threat for pigeonpea cultivation, during early stage of cultivation of crop. *S.*

rolfsii Sacc. (teleomorph *Athelia rolfsii* (Curzi) Tu & Kimbrough) is a devastating soil-borne plant pathogenic fungus with a wide host range Aycock (1966). The fungus was placed in the form genus *Sclerotium* Saccardo (1913), as it forms differentiated sclerotia and sterile mycelia. Although there are several other sclerotium producing fungi, the fungi characterized by small tan to dark-brown or black spherical sclerotia with internally differentiated rind, cortex, and medulla were placed in the form genus *Sclerotium*. However, the teleomorphic state was discovered later, confirming that the fungus was a basidiomycete. *S. rolfsii* usually causes collar rot, but spotted leaf rot with a single tiny sclerotium in the center has also been reported Singh and Pavgi (1965).

S. rolfsii Sacc. is a destructive fungal plant pathogens causing diseases in many mono and dicotyledonous plants encompassing more than 500 host species (Punja and Jenkins, 1984).

Symptom of collar rot and pathogenicity test

The disease starts appearing during one to four weeks of sowing the crop in a sporadic manner. Leaves of the plants

shows water soaked light brown or yellow appearance followed by drooping and drying of leaves (Fig. 1). Under favourable climatic condition collar region of the infected plant shows white mycelia growth of the fungus and sometime initials of sclerotia were also observed under *in vivo* condition (Fig. 2). Anahosur (2001) observed dark brown lesion on the stem just below the soil surface followed by drooping and wilting of leaves and gradually wilting of the whole plant. During present case of study average disease incidence of 8.5% was observed in the year 2015-16 & 2016-17. Results of pathogenicity test further confirm development of above mentioned symptom after 4 to 5 days of inoculation of inoculum followed by successful re-isolation of the pathogen. In control pots no disease symptoms were developed. Datar and Bindu (1974) proved the pathogenicity of *S. rolfsii* on sunflower. Typical symptoms are produced within a week of the inoculation. Kulkarni et al. (1994) reported maximum mortality of groundnut seedlings in 15 days old plants.



Fig. 1. Drooping & Drying of Leaves



Fig. 2. Collar Rot infected Part

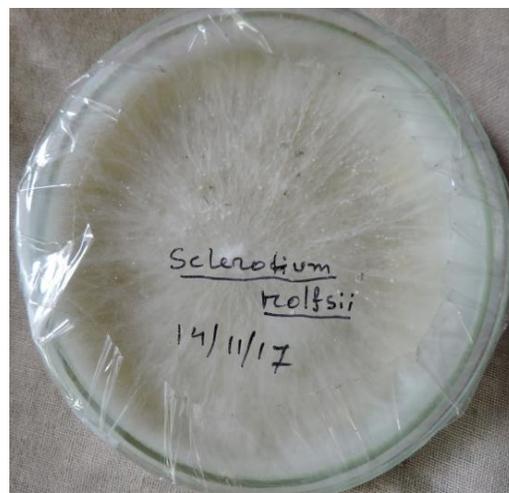


Fig.3. Cultural growth of *S. rolfsii* Sacc. on PDA plates

Cultural and morphological character of the pathogen

Light cottony growths of mycelium were observed which on an average completely covers PDA petri plate of 9.0 cm within 5 days or 120 hours.

Days of appearance of sclerotial initials vary from 6 to 7 days, which starts maturing from 8 days onwards (Fig. 3).

Small reddish brown sclerotia were found to be distributed throughout the petri plates, average numbers of sclerotia produced was found to be 573. Mean dry mycelial weight in Potato Dextrose broth was 820.23 mg. Hyphae thickness varies from 2.55 to 17.5 micron.

Table 1. Mean mycelia diameter growth of *S. rolfsii* Sacc. on PDA medium

Pathogen	Mean mycelia diameter growth on PDA medium in hours				
	24 hrs	48 hrs	72 hrs	96 hrs	120 hrs
<i>S. rolfsii</i> Sacc	1.4 cm	3.5 cm	5.6 cm	7.5 cm	9 cm

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