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# Cultural and morphological variations among the isolates of *Sclerotinia sclerotiorum* (Lib.) de Bary causing Sclerotinia stem rot

■ DEVESH PATHAK*, R.U. KHAN AND VAIBHAV PRATAP SINGH

Department of Plant Protection, Faculty of Agricultural Sciences, Aligarh Muslim University, ALIGARH (U.P.) INDIA

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***Corresponding author:**
devpathak58@gmail.com

ABSTRACT

Sclerotinia stem rot caused by *Sclerotinia sclerotiorum* (Lib.) de Bary is one of the most serious and damaging disease of many important crops and weeds worldwide. It causes considerable yield losses in quality and quantity of crop produce. In present study, Eleven isolates of *Sclerotinia sclerotiorum* were collected from different host plants and studied for their cultural and morphological variations. The observations of study revealed that all isolates varied in their cultural characters *viz.*, colony growth (mm), colony appearance (colour and type of growth) and morphological characters *viz.*, initiation, size and number of sclerotia. Among different isolates, carrot isolate (75.86 mm) was found significantly fast growing followed by brinjal isolate (70.96 mm), while potato isolate (57.13 mm) grown slowly in potato dextrose agar medium at 72 hours after inoculation. Maximum number of sclerotia (34.66) was produced in tomato isolate, whereas, minimum (4.33) in parthenium isolate. Largest size of sclerotia (9x4.66 mm) was observed in tomato isolate however, smallest size of sclerotia (2.0x2.0 mm) were produced in lentil and parthenium isolates.

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## INTRODUCTION

*Sclerotinia sclerotiorum* (Lib.) de Bary causing Sclerotinia rot, is most common necrotrophic and devastating soil borne pathogen distributed throughout the world (Purdy, 1979). The pathogen has a wide host range and reported to cause over 600 plant species from diverse phylogenetic background including cultivated and wild host plants (Boland and Hall, 1994 and Farr and Rossman, 2011). Its occurrence is more common and severe in temperate and sub-tropical regions with considerable yield losses upto 100 per cent under favourable conditions that exceed over several hundred million dollars worldwide in important crops annually (Purdy, 1979). The study for variability within the population of pathogen in relation to cultural, morphological and pathogenic character is important,

because it reveal the changes occurs in the population (Manjunatha *et al*., 2014). Management of pathogen is very difficult and uneconomical due to its non- host specificity and long-term survival in soil through sclerotia. However, host resistance is only economical and sustainable method for its management (Zhao *et al*., 2004 and Li *et al*., 2006) and for develop resistant varieties, information of pathogen variability is most essential (Kohn *et al*., 1991 and Upadhyay *et al*., 2015). Hence, the present studies have been conducted to ascertain the cultural and morphological variations among different isolates of *Sclerotinia sclerotiorum* obtained from different crops and weeds.

## MATERIAL AND METHODS

**Isolation of pathogen from disease plants :**

Infected plant parts showing characteristic symptoms of Sclerotinia rot (*S. sclerotiorum*) were collected from 11 different hosts *viz.,* Indian mustard (*Brassica juncea*), fababean (*Vicia faba*), chickpea (*Cicer arietinum*), brinjal (*Solanum melongena*), tomato (*Lycopersicum esculentum*), lentil (*Lens culinaris*), pea (*Pisum sativum*), carrot (*Daucus carota*), potato (*Solanum tuberosum*), congress grass (*Parthenium hysterophorus*) and cannabis (*Cannabis sativa*). The diseased plant parts were collected and cut into small pieces, thoroughly washed 2 to 3 times in sterilized distilled water and then surface sterilized by dipping in 0.1 per cent sodium hypochloride solution for 1 min., followed by washing with sterilized water 3-4 times which were then aseptically transferred into Petri plates containing PDA. These plates were incubated at 22±2ºC for seven days. The pathogen was purified by hyphal tip method and maintained on PDA slants for further studies.

**Cultural and morphological variations :**

A 5 mm diameter mycelia disc from 3 days old actively growing culture of eleven isolates of *S. sclerotiorum* collected from different hosts were inoculated separately on Petri plates containing PDA. The experiment replicated thrice and plates were incubated at 22±2$^0$C for 4-7 days. The cultural characters *viz.*, radial growth, colony colour and type of growth of the pathogen were examined at 24 hrs interval for 4 days. The morphological characters *viz.*, sclerotia formation, number and size of sclerotia, were examined at 4-7 days after inoculation.

## RESULTS AND DISCUSSION

All the isolates of *S. sclerotiorum* were differed in their cultural and morphological characters. The cultural characters *viz*., radial growth (mm), pattern and colour of colony and morphological characters *viz*., formation of sclerotia (day after inoculation), number and size of sclerotia were recorded on PDA (Plate 1). The results shown in Table 1 revealed that carrot (75.86 mm) and brinjal (70.96 mm) isolates were recorded significantly maximum radial growth followed by pea isolate (70.93 mm) at 72 hrs after inoculation. However, minimum was

**Table 1: Cultural variations among *Sclerotinia sclerotiorum* isolates**

| Isolates | *Radial growth (hrs after inoculation) | | | Colour of colony | Type of growth |
|---|---|---|---|---|---|
| | 48 | 72 | 96 | | |
| Mustard | 29.66 | 65.16 | 90.00 | Creamy white | Fluffy regular |
| Chickpea | 25.43 | 64.03 | 90.00 | Yellowish white | Sparse irregular |
| Lentil | 28.06 | 62.50 | 84.86 | Yellowish white | Sparse irregular |
| Faba bean | 23.70 | 66.60 | 90.00 | Dully white | Sparse irregular |
| Pea | 32.30 | 70.93 | 90.00 | Creamy white | Fluffy regular |
| Tomato | 29.33 | 69.40 | 90.00 | Creamy white | Fluffy regular |
| Potato | 23.06 | 57.13 | 85.33 | Yellowish white | Sparse irregular |
| Brinjal | 31.36 | 70.96 | 90.00 | Creamy white | Fluffy regular |
| Carrot | 38.56 | 75.86 | 90.00 | Creamy white | Fluffy regular |
| Cannabis | 30.93 | 64.26 | 90.00 | Creamy white | Fluffy irregular |
| Parthenium | 29.26 | 64.03 | 90.00 | Yellowish white | Sparse irregular |
| C.D. (P=0.05) | 2.47 | 2.47 | 0.88 | - | - |

* Mean of three replication

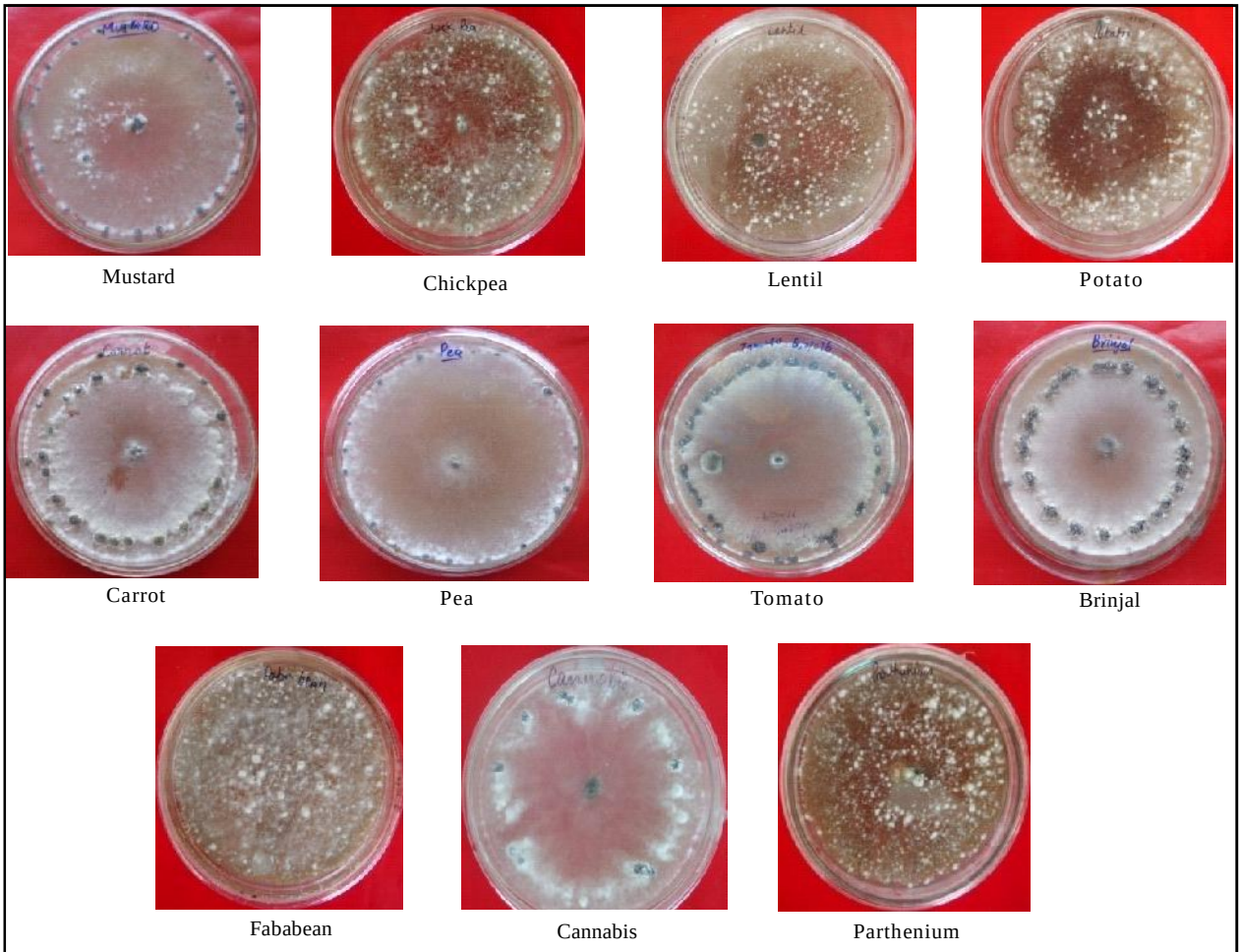


**Plate 1 : Cultural and morphological variability among *S. sclerotiorum* isolates**

**Table 2 : Morphological variations among *Sclerotinia sclerotiorum* isolates**

| Isolates | Initiation of sclerotia formation (DAI) | *Number of sclerotia | **Size of sclerotia | |
|---|---|---|---|---|
| | | | Width | Length |
| Mustard | 5 | 26.00 | 3.66 | 2.66 |
| Chickpea | 6 | 11.66 | 2.33 | 2.33 |
| Lentil | 6 | 5.33 | 2.00 | 2.00 |
| Faba bean | 6 | 11.00 | 2.33 | 2.66 |
| Pea | 4 | 17.33 | 2.66 | 3.00 |
| Tomato | 5 | 34.66 | 4.66 | 9.00 |
| Potato | 7 | 9.66 | 2.00 | 2.33 |
| Brinjal | 5 | 32.33 | 5.66 | 5.00 |
| Carrot | 5 | 30.33 | 4.66 | 5.66 |
| Cannabis | 5 | 8.33 | 4.00 | 7.66 |
| Parthenium | 6 | 4.33 | 2.00 | 2.00 |
| C.D. (P=0.05) | - | 2.24 | 1.07 | 1.85 |

* Mean of three replication;** Mean of five *Sclerotia*

found in potato isolate (57.13 mm). Sparse-irregular growth pattern was observed in chickpea, lentil, fababean, potato and parthenium isolates with yellowish white mycelial growth; fluffy-irregular in cannabis; fluffy-regular in mustard, pea, tomato, brinjal and carrot with creamy white mycelial growth (Plate 1).

Sclerotia were first initiated in pea isolate after 4 days of inoculation while in tomato, brinjal, carrot, cannabis and Indian mustard, sclerotia initiated after 5 days of inoculation. But in potato isolate, it was formed after 7 days of inoculation. Sclerotia were formed either at the centre or at the periphery of the Petri plate in scattered or circular manner (Plate 1). Maximum number of sclerotia were formed in tomato isolate (34.66) followed by brinjal (32.33), carrot (30.33) and mustard (26.00) isolates. However, minimum (4.33) was formed in parthenium isolate (Table 2).

Shape of the sclerotia of all the isolates were more or less spherical to semi spherical. Largest size of sclerotia was observed in tomato isolate (9x4.66 mm) followed by cannabis (7.66x4.00 mm) and brinjal (5.66x5 mm) isolates. However, smallest size was found in lentil and parthenium isolates (2.0x2.0 mm) (Table 2 and Plate 1). Variability among different isolates of *Sclerotinia sclerotiorum* was also supported by earlier workers (Ghasolia and Shivpuri, 2007; Akram *et al*., 2008 and Upadhyay *et al*., 2015) who studied variability on the basis of radial growth, number, size and pattern of sclerotia of different isolates of *Sclerotinia sclerotiorum.*

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