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Short Communication

Pathogenic diversity of *Sclerotium rolfsii* isolates, a potential biocontrol agent against *Parthenium hysterophorus* L.

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***Parthenium hysterophorus* L. is a wide-spread weed creating problems for agriculture and public health. Microbes and their by products is now proved to be a worthy alternative to toxic chemicals used for weed management. We determined the relative pathogenicity of ten *Sclerotium rolfsii* isolates recovered from diseased parts of *Parthenium* collected during a survey of various habitats in Central India. There was a considerable diversity amongst various isolates. The isolate designated Par # 02 from Jabalpur showed the maximum disease incidence (80%) whereas isolate Par#10 also from Jabalpur showed the lowest infection rate against targeted hosts (30%). The wide range of pathogenicity among *S. rolfsii* support the view that strain breeding for biological control of *P. hysterophorus* L. is warranted**.

Key words: *Parthenium hysterophorus*, variability, pathogenicity, *Sclerotium rolfsii.*

INTRODUCTION

Parthenium (*Parthenium hysterophorus* L.) is a cosmopolitan weed. In India it is responsible for seve-ral severe health problems viz. dermatitis, asthma, bronchitis etc in humans and animals (Pandey et al., 1996). The weed is also imposing serious effect to economically important crops and forest plants. Ever since the weed became a menace in various parts of world including India, efforts are being made to ma-nage the weed employing different methods. How-ever, so far no single method has been proven satis-factory as each method suffers from one or more limi-tations (Templeton 1990, Hasija et al., 1994). Exploi-tation of microorganisms especially plant pathogenic fungi are now emerging as an effective and eco-friendly alternative to conventional methods of weed control (Pandey et al., 2003; 2004). *Sclerotium rolfsii* Sacc (teleomorph: *Athelia rolfsii*) Curzi Tu Kimbrough is a potential mycoherbicidal agent, incite severe collar rot disease in *Parthenium* (Mishra et al., 1996 a, b; Pandey et al., 1998; Shukla and Pandey 2006).

Although, the pathogen is responsible for severe damage to the weed but wide host range of the species creates doubt about its suitability as mycoherbicides. However, there are several reports where various isolates of *S .rolfsii* have showed significant variations not only in their morpho-logy but also in their pathological behavior (Harlton et al., 1995; Nalim et al., 1995; Okabe et al., 1998, 2000; Sharma et al., 2002; Shukla and Pandey, 2007). Therefore, present investigation was carried out to study the pathogenic varia-bility and justify the separate identity of the *S. rolfsii* isolates associated with *Parthenium*.

MATERIALS AND METHODS

Test isolates and their maintenance

Ten isolates of *S. rolfsii* incites collar rot disease were recovered from Parthenium from diverse geographic locations. These were maintained on Potato Dextrose Agar (Potato-200 g; Dextrose-20 g; Agar-18 g; D/W 1000 ml) in Petri dishes or in test tube slants at room temperature (Agrawal and Hasija, 1986).

Preparation of inoculum

A granular formulation of the inoculum was used for the study. Plastic bags containing 25 g of wheat (pre boiled) sterilized at 121^{O}C and 15 lb pressure for 15 min was seeded with 5 mm^{2} disc of all the 10 *S. rolfsii* isolates obtained from 7 d old cultures grown in PDA Plates. Inoculated bags were kept in incubator (Remi) at 28 ± 2^{O}C for 15 - 20 days (till

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Table 1. Origin and Virulence of *S. rolfsii* isolates after 10 days of inoculation.

S/No.	Isolates	Place of isolation	%Disease incidence
1	Par#01	Jabalpur	45
2	Par#02	Jabalpur	80
3	Par#03	Seoni	56.6
4	Par#04	Singrauli	47
5	Par#05	Sidhi	52
6	Par#06	Kareli	62
7	Par#07	Mandla	55
8	Par#08	Jabalpur	73
9	Par#09	Narsingpur	47
10	Par#10	Jabalpur	30
11.	Control		No effect
	SEM		± 2.1
	C.D		±5.1

Amount of Inoculum: 10sclerotia/pot; No of Pots used: 3pots/treatment. Age of plant: 2 weeks old; R.H = 85-90%. Values given in the table are tested by F test and are significant a 5% level of significance

sclerotia formation) (Moctezuma et al., 2006).

Evaluation of aggressiveness of *S.rolfsii* isolates

Parthenium seeds were sown at 5 seeds/pot in eathern pots (10 cm) containing sterilized soil sand and peat (1:1:1.). Two week after germination (4 leaf stage) these were inoculated with 10 dried sclerotia of each *S. rolfsii* isolate. A non inoculated pot served as control. Sclerotia were placed beneath the surface of the soil, contacting the stem of the plant. All the plants were maintained in the green house and % disease incidence was recorded after 2^{nd} day to 10^{th} of inoculation by the following formula and the data were analyzed by analysis of variance (Moctezuma et al., 2006).

RESULT AND DISCUSSION

Four distinct pathogenicity reactions were observed for all the 10 isolates tested against Parthenium (Table 1). Pathogenicity reactions ranged from 30 to 80%. Disease reactions varied with the isolates which ranged from yellowing of entire plant and formation of sclerotia to wilting and finally death of plant (highly aggressive). As depicted in Table 1 isolate Par# 02 exhibited maximum disease incidence followed by Par#08 isolate. Rest of the isolates also showed more than 50% disease incidence except Par#10 where only 30% disease incidence was recorded. Significant variation in pathogenicity and virulence of various patho-gens at different levels viz., generic, species levels or even at intraspecific level have also recorded by many workers (Agnihotri and Ansari, 2000). Variation in virulence has been correlated with synthesis of oxalic acid and of enzymes (Punja et al., 1985; Agnihotri and Ansari, 2000).

Therefore, significant variation existed between all the isolates tested in the present investigation. Par#02 isolate exhibited maximum disease incidence, has immense potento be develop as mycoherbicide agent against P. hysterophorus.

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