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COMPARATIVE STUDIES ON THE MORPHOLOGY AND PATHOGENICITY OF FOUR ISOLATES OF *RHIZOCTONIA SOLANI*

P. LAKSHMANAN[1] AND M. CHANDRASEKARAN NAIR[2]

Rhizoctonia solani Kuhn isolated from rice compared well in its Morphology with other isolates of *R. Solani* from cowpea, Jack and Cotton. The pathological reactions of these four isolates varied and the one from rice was able to infect all the plants tested including *Manihot esculenta* and *Allium cepa* which are new records. On rice seedlings isolates from rice and cowpea produced almost similar symptoms. Isolate from Jack produced only a very mild symptom and isolate from cotton was not pathogenic to rice. The soil inoculation studies with four isolates showed that the isolates from rice, cowpea and Jack were Pathogenic to all plants tested. Isolate from cotton was not Pathogenic to *Oryzae sativa*, *Sorghum vulgare* and *Vigna sinensis*. Isolates from rice and cowpea produced more or less same Pathogenic reactions on various hosts tested.

MATERIALS AND METHODS :

Isolates of *Rhizoctonia solani* used for the present studies were obtained from naturally infected rice (isolate A), Cowpea (isolate B), Jack (isolate C) and Cotton (isolate D) plants. The cultures were purified by hyphal tip method.

a. MORPHOLOGICAL CHARACTERS :

A detailed comparative studies on the morphological characters of three more isolates of *R. Solani* with that of rice isolate (isolate A) was carried out by adopting standard laboratory techniques. The morphological characters of these four isolates were studied by growing them in 9 cm per dishes on PDA and incubated under laboratory conditions. After 15 days hyphal thickness, number of sclerotia formed and size of macro and micro sclerotia were recorded.

b. HOST RANGE AND PATHOGENICITY :

The above four isolates were used to study their host range and Pathogenic reactions on the plants of economic importance. The plants used for this studies were 1) *Oryza sativa* Linn. 2) *Sorghum vulgare* pers. 3) *Pennisetum typhorides* Staff and Hubb.

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1. Assistant Professor, Tamil Nadu Agricultural University Research Centre, Vellore-632 001.
2. Professor and Head, Plant Pathology, Kerala Agricultural University, Vellayani-695 522.

4) *Zea mays* Linn. 5) *Zingiber officinale* Roscoe. 6) *Canavalia gladiata* DC. 7) *Trichosanthes anguinea* Linn. 8) *Abelmoschus esculentus* Linn. 9) *Vigna sinensis* savi. 10) *Arachis hypogaea* Linn. 11) *Allium cepa* Linn. 12) *Manihot esculenta* crantz. 13) *Phaseolus aureus* Roxb and 14) *Gossypium hirsutum* Linr. The plants were raised in 32x38 cm size earthen pots and were artificially inoculated separately in aerial parts as well as at the collor region. The aerial inoculations were done by placing sclerotia or mycelial bits from the culture. Soil inoculation was done by mixing the pathogen cultured in sand maize media near the collor portion of the plants at the rate of 5 gm/plant.

RESULTS AND DISCUSSION

The morphological characters of the four isolates were presented in Table 2 The Hyphae of isolate A (rice) and isolate D (Cotton) are slightly thicker than those of isolates B (Cowpea) and C (Jack) micro sclerotia are produced only by isolates B and D. Except isolate D all other isolates produced macro sclerotia. Isolate D produced numerous sclerotia whereas isolates B, C and A produced 345, 210 and 165 sclerotia respectively.

R. Solani is known as versatile fungus and so an attempt has been made in the present studies to compare the pathogenic reactions of rice isolate (A) with other isolates of *R. Solani* from Cowpea (B), Jack (C) and Cotton (D) and the results are presented in Table 2. The results showed that of all the four isolates, isolate from rice (A) is most virulent pathogen. All fourteen Plants inoculated with rice isolate gave positive response. This isolate compared well with the Cowpea isolate (B) in its Pathological reactions. The symptoms produc d by these isolates on rice were identical and more over they produced more or less same type of symptoms on plants which were infected. A local isolate of *R. Solani* from Jack (C) causing aerial blight differed considerably from those of rice and Cowpea isolates. It produced only a very mild symptom on rice whereas the isolate from Cotton (D) produced no symtom on rice. Cotton isolate from an entirely different environment differed drastically from all the other three local isolates tested in its Pathogenic reections on the various host plants tested. Since cotton isolate was collected from Coimbatore and new to Kerala conditions, it could not adopt itself to the prevailing local conditions.

It is seen from these studies that the isolates of *R. Solani* from rice and cowpea are related in their pathological potentials. The genitic relationship between rice isolate and cowpea isolate has already been established by Lakshmanan *et al.*, (1979). More over the morphological characters of cowpea isolate resemble to those of *R. Micro sclerotia* (Matz)

Table 1 Morphological characters of four *R. Solani* isolates.

Charcters	Isolate A		Isolate B		Isolate C		Isolate D	
	Range	Average	Range	Average	Range	Average	Range	Average
Hyphal measurement	7.14 um -10.71 um	8.93 um	5.36 um -8.90	7.13 um	5.36 um -7.14 um	6.25 um	7.14 um -10.71 um	8.93 um
Microsclerotia	Absent		600 um -675 um	637.5 um	Absent		150 um -300 um	225 um
Length								
Breadth			450 um -600 um	525 um			150 um -225 um	163 um
Macrosclerotia	1.50 mm -2.00 mm	1.8 mm	1.05 mm -1.13 mm	1.09 mm	1.05 mm -1.50 mm	1.30 mm	Absent	
Length								
Breadth	1.00 mm -2.00 mm	1.50 mm	1.05 mm -1.20 mm	1.13 mm	975 um -1.30 mm	1.14 mm		
Number of sclerotia	165		345		210		Numerous	

Table 2. Host range and Pathogenicity of Four isolates of *R. Solani*

HOST	Isolate A	Isolate B	Isolate C	Isolate D
I. *Aerial inoculation*				
a. *Oryza Sativa*	Typical sheath blight symptom produced within five days of inoculation.	Typical sheath blight symptom produced within seven days of inoculation.	Only a mild symptom produced with in seven days of inoculation	No symptom
b. *Sorghum vulgare*	Typical sheath blight symptom produced within two days of inoculation.	Typical sheath blight symptom produced within five days of inoculation.	Typical sheath blight symptom produced within five days of inoculation.	Typical sheath blight symptom produced within seven days of inoculation.
c. *Pennisetum typhoides*	Characteristic sheath blight symptom produced within two days of inoculation.	No symptom	No symptom	Characteristic sheath blight symptom produced within five days of inoculation.

HOST	Isolate A	Isolate B	Isolate C	Isolate D
d. *Zea mays*	Characteristic sheath blight symptom produced within two days of inoculation.	No symptom	No symptom	Characteristic sheath blight symptom produced within seven days of inoculation.
e. *Allium cepa*	Inoculated portion dried up.	Inoculated portion dried up.	Inoculated portion dried up.	Inoculated portion dried up.
f. *Zingiber officinale*	Shredding of tissue within five days of inoculation.	Shredding of tissue within five days of inoculation.	Shredding of tissue within five days of inoculation.	No symptom
g *Canavalia gladiata*	Spindle shaped spot within five days of incculation.	No symptom	Ellipsoidal spot within five days of inoculation.	Spindle shaped spot within five days of inoculation.
h. *Trichosanthes anguina*	Water soaked lesions within five days of inoculation.	water soaked lesions within five days of inoculation.	Water soaked lesions within five days of inoculation.	No symptom
i. *Abelmoschus esculentus*	Sunken spot within seven days of inoculation.	Sunken spot within seven days of inoculation.	Sunken spot within seven days of inoculation.	No symptom
j. *Viana Sinensis*	Circular spot witnin three days of inoculation.	Web blight symptom within three days of inoculation.	Leaf blight symptom produced within four days of inoculation.	Leaf blight symptom produced within seven days of inculation.
k. *Arachis hypogaea*	No symptom	No symptom	No symptom	No symptom
l. *Manihot esculenta*	Typical leaf blight symptom within five days of inoculation.	No symptom	No symptom	No symptom

HOST	Isolate A	Isolate B	Isolate C	Isolate D
II. *Soil inoculation*				
a. *Oryza sativa*	Typical sheath blight symptom at the base of the plant within seven days of inoculation.	Typical sheath blight symptom at the base of tne plant within seven days of inoculatipn	Typical sheath blight symptom at the base of the plant within seven days of inoculation.	No symptom
b. *Vigna Sinensis*	Typical collor rot symptom within five days of inoculation.	Typical collor rot symptom within five days of inoculation.	Typical collor rot symptom within five days of inoculation.	No symptom
c. *Gossypium hirsutum*	Collor rot and root rot symptom produced within seven days of inoculation.	Collor rot and root rot symptom produced within seven days of inoculation.	Collor rot and root rot symptom produced within seven days of inoculation.	Collor rot and root rot symptom produced within seven days of inoculation
d. *Zingiber officinale*	Rotting of rhizome within ten days of inoculation.	Rotting of rhizome within ten days of inoculation.	Rotting of rhizome within ten days of inoculation.	Rotting of rhizome within ten days of inoculation.
e. *Allium cepa*	Rotting of bulbs with in seven days of inoculation.	Rotting of bulbs within seven days of inoculation.	Rotting of bulbs within seven day of inoculation.	Rotting of bulbs within seven days of inoculation.
f. *Phaseolus aureus*	Collor rot symtpom within five days of inoculation.	Collor rot symtpom within five days of inoculation.	Wilting of plants within three days of inoculation.	Collor rot symptom within five days of inoculation.
g. *Arachis hypogaea*	Black lesion at collor region.	Black lesion at collor region.	Black lesion at collor region.	Light coloured lesion.
h. *Pennisetum typhoides*	Collor rot symptom within five days of inoculation.	Collor rot symptom within five days of inoculation.	Collor rot symptom within five days of inoculation.	Collor rot symptom within five days of inoculation.

HOST	Isolate A	Isolate B	Isolate C	Isolate D
i. *Sorghum Vulgare*	Collor rot symptom within five days of inoculation.	Collor rot symptom within five days of inoculation.	Collor rot symptom within five days of inoculation.	No symptom
j. *Canavalia gladiata*	Collor rot symptom within seven days of inoculation.	Collor rot symptom within seven days of inoculation.	Collor rot symptom within seven days of inoculation.	Collor rot symptom within seven days of inoculation.

weber first described by Matz (1917) as causing leaf blight of Fig. *R. Micro sclerotia* is also known to be associated with the stubbles of rice in different parts of India (Mundkur, 1935). Lakshmanan *et al*, (1979) pointed out that the potential danger of Paddy straw as the carrier of the organism serving as a primary source of inoculum for both sheath blight of rice and collor rot and web blight of cowpea. It is evident from these studies that cultivation of cowpea as a fallow crop in rice fields may aggravate the problem of Sheath blight of rice and may develop into potential danger for these important food crops.

Of various plants tested *Manihot esculenta* and *Allium cepa* gave positive results when inoculated with rice isolate and they are new records. In Kerala cassava is extensively cultivated and it functioning as a colleteral host of the pathogen may develop as a Potential danger.

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