

Studies on the host range of *Rhizoctonia solani* Kuhn causing sheath blight disease in rice

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ABSTRACT

Host range of sheath blight disease in rice caused by *Rhizoctonia solani* Kuhn was studied in different non-paddy hosts viz. maize, wheat, jowar, bajra, ragi, sugarcane and weed hosts namely *Digitaria ciliaris*, *Dactyloctenium aegyptium*, *Eclipta alba*, *Euphorbia hirta*, *Scoparia dulcis*, *Echinochloa colonum*, *Ageratum conyzoides*, *Cyperus rotundus*, *Paspalum scrobiculatum*, *Cynodon dactylon* and *Commelina benghalensis*, which served as collateral hosts for the survival of the pathogen. Production of the highest lesion length was recorded in the weed host *Dactyloctenium aegyptium* while the lowest lesion length was observed in *Euphorbia hirta*.

Key words: rice, sheath blight, non-paddy host, weed

Sheath blight of rice caused by *Rhizoctonia solani* Kuhn [teleomorph: *Thanatephorus cucumeris* (Frank) Donk] is a major biotic constraint of rice in almost all the rice growing tracts of India. Yield losses due to this disease are estimated to range from 1.2 to 69.0% (Naidu, 1992) depending on the cultivar, environmental conditions, crop stage. The pathogen has a wide range of hosts and can infect plants belonging to more than 32 families and 188 genera (Gangopadhyay and Chakrabarti, 1982). The weeds in and around the rice fields, water channel and irrigation ponds may serve as source of primary inoculum of the fungus. Natural occurrence of *Rhizoctonia solani* has been reported on sugarcane (Sangamlal *et al*, 1980), green gram, cowpea, gram and ground nut, soybean, maize, jowar, (Anon; 1973); wheat, bajra, (Singh and Saxena, 1980).

Acharya and Sengupta (1998) reported rice sheath blight fungus surviving in many collateral hosts like *Cyperus rotundus*, *C. difformis*, *Cynodon dactylon*, *Echinochloa colonum*, *Setaria glauca* (*S. pumila*), *Panicum repens*, *Commelina obliqua* and *Amaranthus viridis* in the absence of rice plants. Host

range studies indicated that crop plants such as *Cajanus cajan*, *Capsicum annuum*, *Curcuma longa*, *Dolichos biflorus*, *Lycopersicon esculentum*, *Panicum miliaceum*, *Paspalum scrobiculatum*, *Setaria italica*, *Sorghum vulgare*, and *Zea mays* were moderately susceptible to the pathogen. The other plants such as *Brachiaria mutica*, *Cynodon dactylon*, *Cyperus rotundus*, *Echinochloa colona*, *Eleusinecorocana*, and *Phaseolus aureus* were susceptible to *R. solani*. The other plants *Dolichos lab lab* var. *typicus* and *Vigna sinensis* fall under the most susceptible category (Meena and Muthusamy, 1998). The present study was undertaken to study the reaction of *R. solani* on selected non-rice hosts for their suitability as alternate hosts.

Pot culture experiment was conducted to study the reaction of non-paddy hosts like maize, wheat, jowar, bajra, ragi and sugarcane to the virulent isolate of *R. solani*. The seeds of non-paddy hosts like maize, wheat, jowar, bajra and ragi were surface sterilized by the help of 0.1% HgCl₂. 2-3 seeds of each were placed in earthen pots. Two to three seedlings of ragi and two of sugarcane were transplanted in the earthen pots.

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When the plants were 30cm. tall, the plugs of agar agar with five sclerotia were inserted to the leaf sheath near the water line. Three replications were maintained for individual treatment. After seven days of inoculation, the lesions on the leaf-sheath and leaves were observed and the relative lesion height (RLH) was recorded from each host plant at random and the mean disease incidence was recorded following the 0-9 scale as per

Table 1. Reaction of non- paddy hosts to *Rhizoctonia solani* Kuhn

Treatments	Time taken for Appearance of symptoms (days)	Lesion length (mm)	Percentage of infection (RLH)
Maize	3	79.8	47.13
Wheat	7	14.0	9.17
Jowar	6	62.0	29.19
Bajra	4	22.6	10.43
Ragi	5	28.0	31.67
Sugarcane	4	69.4	29.58
CD (P< 0.05)	1.484	1.139	

the standard evaluation system developed by IRRI (IRRI, 1996) (Table 1).

A number of weeds namely, *Digitaria ciliaris*, *Dactyloctenium aegyptium*, *Eclipta alba*, *Euphorbia hirta*, *Scoparia dulcis*, *Echinochloa colonum*, *Ageratum conyzoides*, *Cyperus rotundus*, *Paspalum scrobiculatum*, *Cynodon dactylon* and *Commelina benghalensis* found near the rice plot and bunds were raised in pots in the Net house. The above weeds were subjected to artificial inoculation by the virulent isolate of *R. solani* (Table 2).

The experimental findings revealed the production of highest lesion length (79.8 mm) after 3 days of inoculation in maize plant followed by sugarcane after 4 days of inoculation . The lowest lesion length was observed in wheat 7 days after inoculation. The study indicating the expression of symptoms in different non-paddy hosts at different time intervals established the heterotrophic nature of the pathogen confirming with the earlier findings of different workers Singh and Saxena (1980), Sangamlal *et al.* (1980). The sheath blight symptoms already observed in rice were also found in these hosts and re isolation of the fungus could easily be obtained from sugarcane, maize and ragi

Table 2. Study of sheath blight symptoms in different weed hosts

Weeds	Pathogenic reaction	Latent incubation period (days)	Lesion length (mm)
<i>Digitaria ciliaris</i>	+	4	37.8
<i>Dactyloctenium aegyptium</i>	+	3	49.4
<i>Eclipta alba</i>	-	-	-
<i>Euphorbia hirta</i>	+	5	22.0
<i>Scopariadulcis</i>	-	-	-
<i>Echinochloa colona</i>	+	4	43.6
<i>Ageratum conyzoides</i>	-	-	-
<i>Cyperus rotundus</i>	+	3	26.0
<i>Paspalum scrobiculatum</i>	+	4	33.2
<i>Cynodon dactylon</i>	+	3	24.0
<i>Commelina benghalensis</i>	+	5	26.8
CD (P<0.05)			1.623

+ indicates infection, - indicates no infection

producing mycelium and sclerotia in agar plates, similar with that of rice. Successful isolation of the fungus could not be achieved from wheat, jowar and bajra showing scanty mycelial growth without any sclerotial formation which might be due to the ecological adaptability of the individual isolate to its own host.

Development of lesions were observed in 8 different weed hosts other than the weeds belonging to Asteraceae and Scrophylariaceae families. The present finding supported the earlier reports of Gokulapalan and Nair (1985), Acharya and Sengupta (1998).

It was observed that all the weed hosts except *Eclipta alba*, *Scoparia dulcis* and *Ageratum conyzoides* showed symptom of infection by *R. solani*. The expression of symptoms in these weed hosts were observed to be more or less similar to that of rice.

It is obvious from the present study that *R. solani* can infect almost all the plant species studied.

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