IN VITRO STUDY ON RHIZOCTONIA SOLANI CAUSING DAMPING OFF AND ROOT ROT DISEASES IN DIFFERENT CROP SEEDLINGS

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DOI: https://doi.org/10.31995/Book.AB334.A25.Chapter8

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ABSTRACT

A total of eighteen crop types were tested for their reaction against *Rhizoctonia solani* under artificially inoculated conditions. Pathogenicity test revealed that various crop seedlings showed different percentages of damping off and root rot diseases. Results indicated highest incidence of damping off disease in fenugreek and lowest in chilly seedlings. The incidence of root disease was maximum in lentil and minimum in green gram, while fenugreek showed nil as it got almost completely damaged by damping off disease.

Keywords: Pathogenecity, damping off, root rot, *Rhizoctonia solani*

Introduction

Species of the form genus *Rhizoctonia* are diverse and ubiquitous in the soil, often associated with plant roots and many are economically important plant pathogens that occur globally and cause disease on a wide range of hosts (Garcia *et al*., 2006, Sneh *et al*., 1996). *Rhizoctonia solani* Kuhn is the imperfect stage of *Thanatephorus cucumeris*, predominantly a plant pathogenic soil inhabiting fungus (Carling and Kuninaga, 1990). The fungus occurs worldwide and very plurivorous and it is a common pathogen of 250 plant species including commercially grown crops (Mordue, 1974, Bolkan, 1980). This fungus causes damping-off of seedling, root rot as well as stem canker of growing plant and

$$Disese\ incedence(\%) = \frac{No.of\ infected\ plants}{Total\ No.of\ plants} \times 100$$

black scurf of potato tubers (Weinhold and Bowman, 1977). The pathogen is multifaceted in nature and attacks almost all parts of crop plants. The fungus is troublesome for vegetable, cereal and pulse crops but it is particularly destructive to beans, pepper and rubber plant causing considerable losses. The survival of various *Rhizoctonia* strains may be due to the presence of others crops or weed acting as secondary hosts. Present experiment was thus designed to find out the pathogenic reaction of virulent isolate of *R. solani* to different crop seedlings.

Materials and methods

Pathogenecity of *R. solani* to roots of different crop seedlings was tested by growing the plants in autoclaved soil amended with the test inocula of *R. solani*. For inoculation of the sterilized soil, 10g of *Rhizoctonia* inocula was mixed with 1kg of soil and the mixture was kept moist for three days. The inoculated soil was filled in poly bags (10 cm × 16 cm) before planting. Soil in poly bags mixed with only autoclaved soil was served as control. Three poly bags were used for each treatment and five seeds were planted in each poly bag. Different Crop seeds with 90-100% germination rate were selected for sowing. A month after planting, seedlings in each poly bag were uprooted, washed under tap water and percentage disease assessments as percentage of damping off and root rot were recorded at 30 days after planting (Carling and Leiner, 1990) and calculations were made using following formula.

Statistical analysis

Data were subjected to proper statistical analysis of variance by transforming the values into square root transformation by using √X+0.50 formula and means of treatments were compared by calucating critical difference (C.D) at 0.05.

Results and discussion

Results on the diseases reaction of different crop seedling against *R. solani* exhibited that fungus had pathogenic effect against the tested

commercial varieties of different crop seedlings where the incidence of various percentages of damping-off and root rot diseases was recorded (table.1 & fig. 1) Results showed that incidence of damping off disease was in range of 3.00 to 90.00 % whereas the incidence of root rot disease was in the range of 1.50 to 66.67 %. Results indicated that incidence of damping off disease was highest of 90% in fenugreek, intermediate of (13.00-82.00%)in sorghum, paddy, wheat, maize, cauliflower, tomato, brinjal, barley, lentil, chilly, black gram, pegion pea, white beans and chick pea etc. and lowest of (3.00-5.00%) in pearl millet and green gram seedlings respectively. The incidence of root rot disease in different crop seedlings was in range of 1.50 to 66.66% with highest incidence of 66.67% in brinjal, followed by (24.00-54.67%) in barley, cabbage, chilly, tomato, white beans, black gram, lentil, pegion pea, white bean, and chick pea etc. and least of (1.50-4.40%) in pearl millet, green gram, sorghum and paddy respectively (table. 1 & fig. 1). It is thus clear that among the different crop seedlings fenugreek seedlings were considered to be most sensitive as they recorded maximum disease incidence, and pearl millet and green gram seedlings were least susceptible and rest of the crop seedlings were intermediately in the reaction as they were moderately sensitive to *Rhizoctonia* damping off and seedling rot infections. These results to some extent are in confirmation with those recorded by Hadwan and Khara (1992) where they reported that incidence of damping off disease in pot experiment in different crop seedlings ranged between 19 to 90 %. In addition surveys conducted by Jiskani *et al*. (2007) and Hawang *et al*. (2014) revealed that *R. solani* was isolated as the predominant damping off fungus with highest frequency of 60.00% in different field crops.

Average percentage of disease incidence

Host name	Damping off	Root rot
Paddy	15.00 (3.93)	3.60 (2.02)
Sorghum	13.00 (3.67)	2.60 (1.76)
Pearl millet	3.00 (1.87)	1.50 (1.41)
Wheat	45.00 (6.74)	17.60 (4.25)
Barley	82.00 (9.08)	4.40 (2.21)
Maize	60.00 (7.78)	24.00 (4.95)
Brinjal	16.67 (4.14)	66.66 (8.20)
Fenugreek	90.00 (9.51)	0.00 (0.71)
Cabbage	22.66 (4.81)	54.67 (7.49)
Tomato	34.00 (5.87)	33.33 (5.82)
Chilly	2.00 (7.78)	38.60 (6.25)
Cauliflower	40.00 (6.36)	16.66 (4.14)
Lentil	48.00 (6.96)	32.66 (5.76)
Black gram	33.40 (5.82)	25.00 (5.05)
Pigeon pea	28.00 (5.34)	15.30 (3.97)
White beans	61.00 (7.84)	35.60 (6.01)
Green gram	5.00 (2.34)	1.50 (1.41)
Chick pea	34.00 (5.87)	25.30 (5.08)
Control	0.00 (0.71)	0.00 (0.71)
SE±	0.09	0.04
C.D. (0.05)	0.26	0.12

Table 1. Pathogenic effect of different crop seedlings against virulent strain of *R. solani*

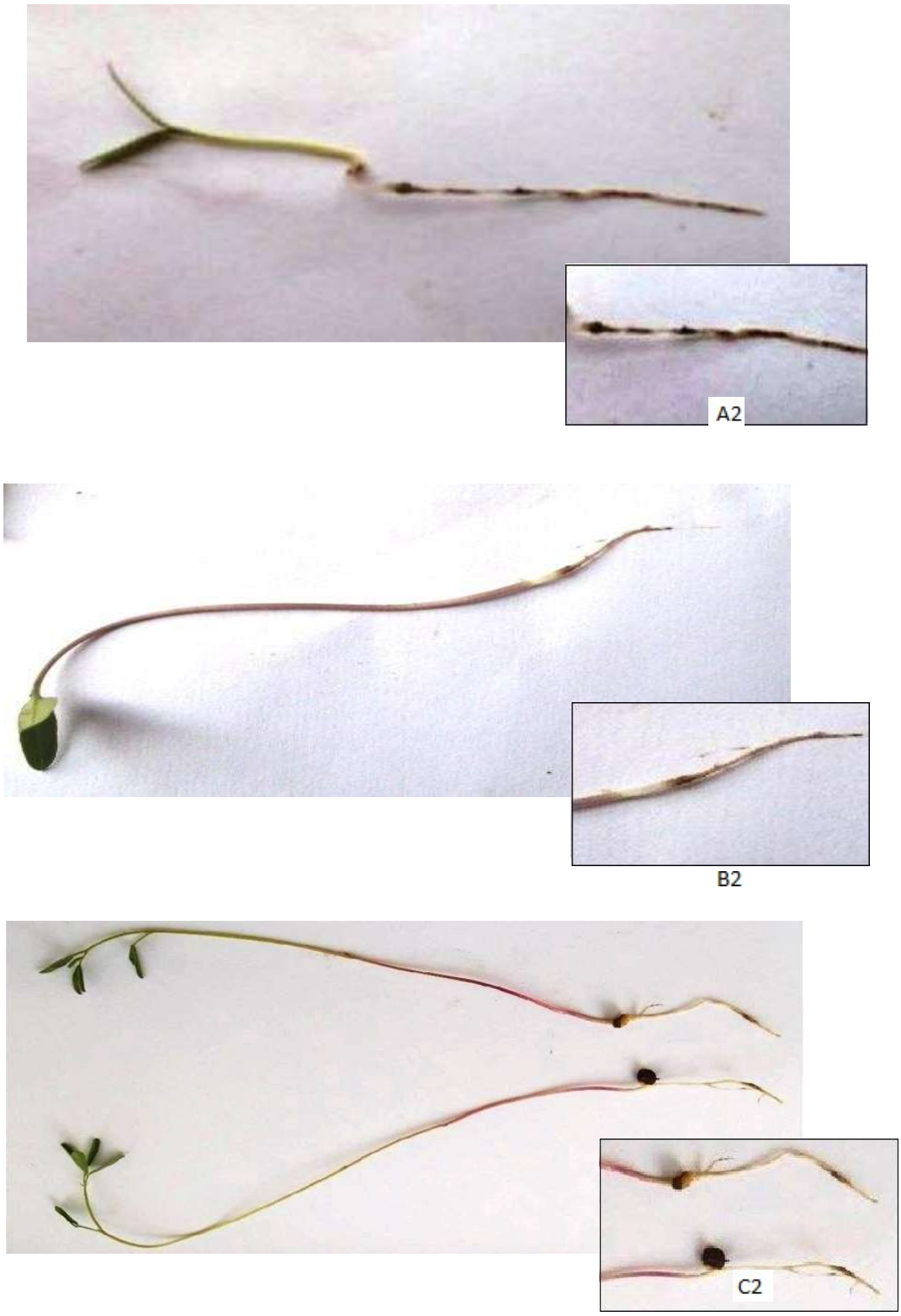

Fig. 1. *Rhizoctonia* disease symptoms on roots of different seedlings. A1 & A2. Disease symptoms on brinjal roots B1 & B2. Disease symptoms on tomato roots C1 & C2. Disease symptoms on lentil roots.

Acknowledgements

The authors thankfully acknowledge Coordinator, Department of Plant Protection, CCS University, Meerut, India, to facilitate for successful completion of research work

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