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GROWTH RATE OF DIFFERENT ISOLATES OF *FUSARIUM SOLANI*, THE CAUSE OF ROOT ROT OF OKRA *(ABELMOSCHUS ESCULENTUS* L).

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ABSTRACT

Fusarium solani is a phytopathogenic fungus and is an important causal agent of several crop diseases, such as root and fruit rot of Cucurbita spp., root and stem rot of pea, root rot of okra. The objective of current research was to determine the growth rate of different isolates of Fusarium solani, the cause of root rot of okra, in Peshawar. Five isolates of Fusarium solani collected from five different places and were investigated for growth rate of the colonies. Highest colony growth rate (86.3 mm) was recorded for isolate collected from Achini payan and lowest (60 mm) for isolate collected from Palosi. Under In vitro.

Keywords: Abelmoschus esculentus L, Fusarium solani, Colony growth rate

INTRODUCTION

Okra (*Abelmoschus esculentus L*.) is an important vegetable valued for its edible green pods. The geographical origin of okra is disputed, with supporters of South Asian, Ethiopian and West African origins. The plant is cultivated in tropical, subtropical and warm temperate regions around the world (Anonymoys 2006). Okra is a popular health food due to its high fiber, vitamin-C and foliate content (Gopalan *et al*., 2007).

The disease root rot in okra is caused by *Fusarium solani* (Rahim *et al*., 1992). Morphological characteristics are still the most important criteria to identify different *Fusarium* species (Leslie *et al*., 2001). In laboratory, isolated can be separated on specific culture medium for cultivation, preservation, microscopical examination and subsequent biochemical and physiological characterization. A wide range of media are used for isolation of different groups of fungi that influence the vegetative growth, colony morphology, pigmentation and sporulation. However, it largely depend on the composition of specific culture medium, pH, temperature, light, water availability and surrounding atmospheric gas mixture (Kuhn and Ghannoum, 2003; Kumara andRawal, 2008).

It is well known that most *Fusarium* species are pathogenic to plants. At least one *Fusarium*-associated disease is found on many plants (Leslie *et al.,* 2006). The fungi have caused plant diseases such as crown rots, head blights, scabs, vascular wilts, root rots and cankers. *Fusarium* species are also widely distributed in all major geographic regions of the world (Burgess, 1981; Nelson *et al*., 1994). They are commonly found in soils, and persist as chlamydospores or as hyphae in plant residues and organic matter (Burgess, 1981). However, many *Fusarium* species are abundant in fertile cultivated and rangeland soils, rather than in forest soils (Burgess *et al.,* 1988; Jeschke *et al.,* 1990).

Keeping in view, the importance of root rot of okra and the losses it causes, this research study was designed to find out the variability in growth rate of different isolates of *Fusarium solani* in district Peshawar.

MATERIALS AND METHODS

Isolation of Pathogen and Identification

Five Isolates of okra root rot pathogen were collected from five different sites within Peshawar district which include Achinipayan, Budhni, Chamkani, Jogian and Palosi district. These were transported to the laboratory of Department of Plant Pathology, The University of Agriculture, Peshawar-Pakistan and preserved. Pathogen was isolated from all samples on potato dextrose agar (PDA) medium, under aseptic condition. PDA was prepared using standard procedure (25% peeled potatoes, 2% agar and 2% dextrose). Medium was sterilized at $121^{O}C$ for 15 minutes. Streptomycin was added for the inhibition for bacterial growth and then poured it into sterilized petriplates.

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For isolation, infected seedlings roots of okra were cut into small pieces then surface sterilized by dipping in 0.1% solution of Mercuric Chloride ($HgCl_2$) for 30 seconds. Then, three dips in sterilized distilled water, the specimen were plated on Petriplates having PDA and kept at 25°C in incubator for the growth of pathogen. The isolated fungus was identified by using the key of Barnet and Hunter (1972).

In vitro study

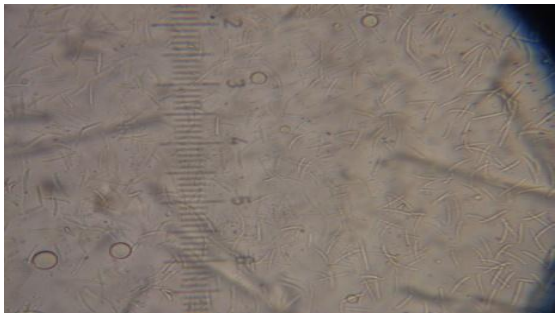
Experiment was conducted using sterilized Petriplates. The design used was completely candomized. Each isolate was replicated six times. Inoculums plug of equal diameter was maintained for all the isolates. Then, all the Petriplates were kept in the incubator at 25°C for the fungal growth. Data were recorded on colony diameter after every two days of interval. All the recorded data were pooled for statistical analysis using analysis of variance (ANOVA) and means were separated by using least significant difference (LSD) test (Dana, 2001).

RESULTS AND DISCUSSION

Identification of pathogen

The pathogen was identified as *Fusarium solani* by using the key of Barnet and Hunter (1972).

Culture of *Fusarium solani*



Macroconidia of *Fusarium solani*

In Vitro Study

Data presented in Table. 1 indicated that there were significant differences among the different isolates of *Fusarium solani* after two days of incubation. The colony diameter of *Fusarium solani* isolated from Palosi was 43.4 mm. This was the highest radical growth than the other isolates. This was followed by Achinipayan isolate, whose colony diameter was 36.6 mm. Isolate of *Fusarium solani* isolated from Jogian had the lowest colony diameter 17.8 mm. Data recorded after 4 days of incubation indicated that, there was significant differences among the different isolates of *Fusarium solani* in the colony diameter of *Fusarium solani.* The colony diameter of Achinipayan was 56.8 mm, the highest one. This was followed by Palosi isolate, whose colony diameter was 48.6 mm. Isolate of *Fusarium solani* isolated from Jogian had the lowest colony diameter 29.9 mm. Similarly, data recorded after six days of incubation had significant differences among the different isolates of *Fusarium solani. Fusarium solani* isolated from Achinipayan had the highest 76.9 mm radical growth than the other isolates. This was folloswed by Palosi isolate 53.7 mm. Isolate of *Fusarium solani* isolated from Jogian had the lowest colony diameter 41.4 mm.

Data recorded after eight days of incubation also had significant differences among the different isolates of *Fusarium solani* in colony diameter. *Fusarium solani* isolated from Achinipayan was 80.8 mm. This was the highest radical growth than the other isolates. This was followed by Jogian isolate, whose colony diameter was 60.6 mm. Isolate of *Fusarium solani,* isolated from Chamkani had the lowest colony diameter 55.4 mm. Colony diameter recorded after ten days of incubation also had significant differences among the different isolates of *Fusarium solani.* The colony diameter of *Fusarium solani* isolated from Achinipayan was 84.0 mm, the highest than the other isolates. This was followed by Jogian isolate, whose colony diameter was 66.6 mm. Isolate of *Fusarium solani* isolated from Palosi had the lowest colony diameter 60.5 mm. Similarly, data taken after twelve days of incubation had significant differences among the different isolates of *Fusarium solani.* The colony diameter of *Fusarium solani* isolated

from Achinipayan was 86.3 mm, the highest than the other isolates. This was followed by Budhni isolate (66.6 mm). Isolate of *Fusarium solani* isolated from Palosi had the lowest 63.8 mm colony diameter.

APPENDICES

Isolate	Days						Mean	St. Dev
	2	4	6	8	10	12		
Palosi	43.4	48.6	53.7	56.1	60.5	60.0	**53.51**	**54.06**
Jogian	17.8	29.9	41.4	60.6	66.6	70.4	**47.78**	**51.62**
Budhni	34.3	43.3	52.1	58.9	66.0	71.3	**54.31**	**55.78**
Achinipayan	36.6	56.8	76.9	80.8	84.0	86.3	**70.23**	**72.47**
Chamkani	29.9	38.9	49.8	55.4	61.5	63.8	**49.88**	**51.33**

Appendix 1. Colony growth (mm) of *Fusarium solani* after 2 days of incubation at 25°C (replicated data).

Isolates	R_1	R_2	R_3	R_4	R_5	R_6
Palosi	45.0	37.5	43.0	44.0	44.0	47.0
Jogian	22.0	20.0	13.0	13.5	25.5	12.5
Budhni	36.5	7.5	49.5	37.0	32.5	42.5
Achinipayan	16.0	40.0	42.0	48.0	32.5	41.0
Chamkani	29.5	23.5	28.0	29.5	34.5	22.5

Appendix 2. Colony growth (mm) of *Fusarium solani* after 4 days of incubation at 25°C (replicated data).

Isolates	R_1	R_2	R_3	R_4	R_5	R_6
Palosi	47.0	47.0	56.0	46.0	46.0	49.5
Jogian	44.5	41.0	16.0	15.5	45.0	17.5
Budhni	41.0	11.0	55.5	49.5	55.0	47.5
Achinipayan	50.0	55.0	60.0	60.5	57.5	57.5
chamkani	33.5	36.0	38.0	44.0	41.6	40.5

Appendix 3. Colony growth (mm) of *Fusarium solani* after 6 days of incubation at 25°C (replicated data).

Isolates	R_1	R_2	R_3	R_4	R_5	R_6
Palosi	49.0	56.5	69.0	48.0	47.5	52.0
Jogian	67.0	62.0	16.3	16.0	64.6	22.5
Budhni	46.0	14.5	61.5	62.0	77.0	51.5
Achinipayan	84.0	70.0	78.0	73.0	82.5	74.0
Chamkani	37.5	48.5	48.0	58.5	47.0	58.5

Appendix 4. Colony growth (mm) of *Fusarium solani* after 8 days of incubation at 25°C (replicated data).

Isolates	R_1	R_2	R_3	R_4	R_5	R_6
Palosi	50.0	59.0	79.0	49.0	48.5	51.0
Jogian	86.0	77.0	33.3	47.5	80.0	40.0
Budhni	51.0	24.5	70.0	69.0	77.0	62.0
Achinipayan	84.0	75.0	80.0	79.0	90.0	76.5
chamkani	38.5	58.0	49.0	66.0	53.3	67.5

Appendix 5. Colony growth (mm) of *Fusarium solani* after 10 days of incubation at 25°C (replicated data).

Isolates	R_1	R_2	R_3	R_4	R_5	R_6
Palosi	50.5	79.5	81.0	50.0	49.5	52.5
Jogian	88.5	84.5	41.0	48.0	82.5	55.0
Budhni	69.0	30.0	74.5	77.0	82.0	63.5
Achinipayan	87.5	76.0	82.5	87.5	91.5	79.0
Chamkani	39.0	68.0	52.0	67.0	64.5	78.5

Appendix 6. Colony growth (mm) of *Fusarium solani* after 12 days of incubation at 25 °C (replicated data).

Isolates	R_1	R_2	R_3	R_4	R_5	R_6
Palosi	52.0	81.5	83.5	50.5	51.0	53.5
Jogian	89.0	88.5	48.5	50.0	85.5	61.0
Budhni	76.5	35.0	80.5	84.0	83.5	68.5
Achinipayan	89.0	80.0	84.0	91.0	93.0	80.5
Chamkani	40.0	70.5	53.5	68.5	69.5	80.5

Table.1. Mycelial growth rate (mm) of different isolates of *Fusarium solani* incubated *at 25 °C.*

Isolates	1st data (2nd day)	2nd data (4th day)	3rd data (6th day)	4th data (8th day)	5th data (10th day)	6th data (12th day)
Palosi	43.4 A*	48.6 AB*	53.7 B*	56.1 B*	60.5 B*	60.0 B*
Jogian	17.8 C	29.9 C	41.4 B	60.6 B	66.6 AB	70.4 AB
Budhni	34.3 AB	43.3 B	52.1 B	58.9 B	66.0 AB	71.3 AB
Achinipayan	36.6 AB	56.8 A	76.9 A	80.8 A	84.0 A	86.3 A
Chamkani	29.9 BC	38.9 BC	49.8 B	55.4 B	61.5 B	63.8 B
LSD Value	10.5	12.4	18.9	18.3	18.8	18.6
CV (%)	27.7	24.04	29.01	24.6	23.4	22.1

*Value followed by different letter(s) are significantly different from one another at 5% level of significance.

CONCLUSION AND RECOMMENDATION

There were significant differences between the radial growths of different isolates of *Fusarium solani*, the cause of root rot of okra incubated at 25°C. The colony diameter of isolates, isolated from Achinipayan was the highest 86.3 mm and lowest 60 mm of Palosi.

On the basis of these results and as for as the problem is concerned, I would like to recommend further detailed research work and hence the confirmation of these results

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