



MORPHOLOGICAL AND CULTURAL VARIABILITY OF *Fusarium solani* ISOLATES FROM CHILLI (*Capsicum annuum* L)

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Abstract:

Considerable morphological and cultural variability existed among the isolates of *Fusarium solani* from chilli (*Capsicum annuum* L). The isolates showed slow to rapid growth and variable pigmentation. On the basis of the radial growth on potato dextrose medium in mm, these isolates were categorized into five groups such as Nine isolates very slow (<50 mm), Seven isolates Slow growth (51-60 mm), Eight isolates medium growth (61-70), 17 isolates showed fast growth and fifteen isolates possessing more than 80 mm and above radial growth hence categorized under very fast growing group.

Key words:

Fusarium solani. Chilli, Variability

Introduction:

Although the chilli crop is susceptible to Damping off, dieback, fruit rot, and powdery mildew but wilt seems to be a new dimension for studying the various aspects. The incidence of wilt is gradually increasing particularly in black cotton soil of irrigated tract. Not much work has been done in respect of chilli caused by *Fusarium solani*. Recently it appears to be major pathogen causing losses nearly 5 to 100 per cent. The production and productivity of chilli are constrained due to the incidence of Fusarial wilt, a soil borne disease that causes yield loss to the tune of 50-80 per cent. (Madhavi, *et al*, 2006) the spread of disease is very fast particularly in chilli growing areas of Maharashtra. The disease can be located mainly in vertisols having over irrigation and ill drained soils. The disease can be seen in all high yielding varieties of chilli hence there is need to understand the diversity of *Fusarium* isolates collected from different geographical area of Vidarbha, Maharashtra.





Materials and Method:

Survey was conducted in different areas of Vidarbha region of Maharashtra. On Fusarium wilt of chilli during crop season 2007-2008. The roots of completely and partially wilted plants of chilli (*Capsicum annum* L) suspected to be infected with *Fusarium solani* were collected from the field in which most plant exhibited disease symptoms. Pure cultures of the isolates of pathogen from the diseased plants were established by using single hyphal tip technique and pure culture was obtained. The representative cultures were sent to Indian type culture collection ((ITCC) 1AR1, New Delhi for identification. The cultures were identified using keys (Booth, 1971) and compared with reference cultures identified at IARI, New Delhi as *F. solani*. The remaining cultures were microscopically examined and identified as *F. solani*. On the basis of morphological characters of the fungus, forty eight pure cultures collected from different regions and four cultures received from department of Plant Pathology college of Raichur, Karnataka were maintained on potato dextrose medium slants for further study.

All the 52 isolates of *F. solani* were characterized on the basis of their cultural characteristics on PDA. The type of mycelia colony growth pattern and pigmentation was recorded on 7th days of inoculation of pathogen on PDA medium. Produced in substrate was observed during the incubation period at 27±1°C.

Results and Discussion:

All the 52 isolates of *F. solani* were characterized on the basis of their cultural characteristic on PDA (Table-1). The isolates collected were designated as FS-1 to FS-52. The general variation in cultural characteristics was observed among the isolates of *F. solani*. Mycelial growth of isolates varied in the form of dull white, submerged, cottony white, submerged to raised, profuse fluffy white, fussy cottony developed in petriplates and reddish or brownish colour developed at backside of the petriplates (FS-15) Fussy raised star like appearance in (FS-





14) white submerged on petriplates and reddish colour on the backside of the petriplates in (FS-25) yellowish white but greenish colour at the centre (FS-20) indicates the wide variation among isolates of *F. solani*.

Maximum growth (89.44 mm) was observed in FS-11 followed by FS-9 and FS-13 recording 87.50 and 87.33 mm respectively. All these three isolates were obtained from Amravati district. The lowest growth was observed in FS-1 and FS-6 (41.66 mm each) followed by FS-41 and FS-8 exhibiting 44.33 and 45.66 mm respectively. These isolates were obtained from Akola and FS-41 from Bhandara district. The pigmentation also reflects the variation among isolates of *F. solani*. Three milky white, 8 dull white to white, 4 reddish brown, 7 yellowish, 3 purple, 11 light red and 10 brownish to dark brown pigmentation was noticed in different isolates. Different workers have also reported the differences in cultural characters of pathogens belonging to same genus and species. The findings of the present results were also on the line of work reported by Patil *et al.* (2005), Randhawa *et al.* (2006), Patil *et al.* (2008), Murumkar and Deshpande (2009), Patel *et al.* (2011) and Singh *et al.* (2011).

On the basis of radial mycelial growth on potato dextrose agar medium, 52 isolates of *F. solani* causing chilli wilt were categorized. (Table-2). Five isolates viz. FS-1, FS-6, FS-8, FS-41 and FS-28 had shown very slow growth rate after 7 days of incubation at $27 \pm 1^\circ\text{C}$ (<50 mm), Slow growth (51-60 mm) was noticed in seven isolates, Eight isolates showing a range of 61 to 70 mm radial growth were categorized as medium growth. Seventeen isolates were categorized as fast growth which ranged between 71-80 mm growths. Another very fast rate group encompasses fifteen isolates possessing more than 80 mm and above radial mycelial growth. Fifteen different isolates has categorized in this group.

Earlier workers also grouped the isolates on the basis of growth rates while working with different fungus causing diseases. Similar types of grouping were made in the present investigations as adopted by Paulikar and Raut (2004), Giri (2002), Honnareddy and Dubey (2007), Patil Kulkarni *et al.* (2008) and Murumkar and Deshpande (2009) for *Fusarium oxysporum* *F.sp.ciceri*, *F.udum*,





F. oxysporum F.sp. ciceri, *F. oxysporum F.sp. gladioli* and *F. oxysporum F.sp. earthemi* respectively.

Table-1: Growth of various *Fusarium solani* isolates on Potato dextrose agar medium

Sr. No.	Designated as	Colony characters	Colony diameter (mm)	Pigmentation
			Mean	
1	FS-1	Dull white submersed growth	41.66	Milky white
2	FS-2	Mycellium cottony white suppressed aerial at centre	53.33	Light Red
3	FS-3	Submerged white slow to medium growth	62.11	Purple
4	FS-4	Dull white submerged growth	59.33	Purple
5	FS-5	Profuse fluffy white	76.22	Purple
6	FS-6	Aerial loose purple white growth	41.66	Dull white
7	FS-7	Yellow to white fussy cottony raised growth	68.33	Light Red
8	FS-8	Cottony mycelium, submerged fast growth	45.66	Dull white
9	FS-9	White fussy cottony growth	87.50	Light Yellow
10	FS-10	Dull white submerged growth	72.44	-
11	FS-11	Brick red submerged growth	89.44	Yellowish
12	FS-12	White yellowish raised growth	83.66	Milky white
13	FS-13	Dull white submerged growth	87.33	Brownish
14	FS-14	Fussy raised star like appearance	78.50	Dark Brown
15	FS-15	Cottony fussy raised growth, reddish colour developed at the back side of petriplates	65.00	Light red
16	FS-16	Cottony white medium to fast submersed growth	65.33	Light red
17	FS-17	White straw colour. dusty black at centre and brown around it	84.66	Light red
18	FS-18	Dull white to yellowish suppressed growth	81.33	Yellowish
19	FS-19	White creamy raised growth	71.66	Reddish brown
20	FS-20	Yellowish white but greenish colour at centre submerged growth	74.44	Whitish
21	FS-21	Dull white yellowish raised growth	81.11	-
22	FS-22	Cottony fussy raised growth .reddish brown colour developed at back side of petriplates	78.33	Dark brown
23	FS-23	Cottony white submerged growth	68.33	Reddish brown
24	FS-24	Medium dull white cottony raised growth	71.55	Reddish brown





Sr. No.	Designated as	Colony characters	Colony diameter (mm)	Pigmentation
25	FS-25	white submerged and reddish growth on the back side of the petriplate	51.33	Reddish brown
26	FS-26	Cottony white submerged growth	65.78	Milky white
27	FS-27	Submerged white fussy growth	58.66	Whitish
28	FS-28	Submerged dull white growth	49.33	Dull yellow
29	FS-29	Cottony white raised medium growth	74.55	-
30	FS-30	Fussy white raised growth	72.44	Light red
31	FS-31	Reddish brown colour fussy and fast growth	82.00	Brownish
32	FS-32	Dull whitish yellow submerged but raised at centre	58.89	Yellowish
33	FS-33	Raised cottony white but lightly yellowish at centre	82.00	-
34	FS-34	Fussy dull white cottony raised growth	64.66	-
35	FS-35	Whitist cottony raised growth	83.11	Dull white
36	FS-36	Dull white submerged growth	82.44	Dull white
37	FS-37	White yellowish fussy growth	56.33	Light red
38	FS-38	White fussy cottony growth	71.11	Dark brown
39	FS-39	Raised white fussy growth	78.33	Whitish
40	FS-40	Yellowish white fussy red colour developed at the back of petriplates	81.66	Light yellow
41	FS-41	White yellow submerged growth	44.33	-
42	FS-42	Dull whitish to brown colour medium raised growth	71.11	Yellowish
43	FS-43	Dull white creamy fast growth	55.33	Light red
44	FS-44	Fussy white cottony submerged growth, greenish colour appeared in the middle	71.11	Light red
45	FS-45	Dull white submerged fast growth	68.00	Light red
46	FS-46	Yellow white dull submerged growth	75.55	Dark brown
47	FS-47	Creamy white to yellowish suppressed growth	81.11	Whitish
48	FS-48	Creamy white submerged growth	75.00	Dark brown
49	FS-49	Submerged dull white growth	82.22	Dark brown
50	FS-50	Creamy white submerged fast growth	82.70	Dark brown
51	FS-51	Dull white suppressed growth	75.67	Brownish
52	FS-52	White cottony submerged growth	73.66	Yellowish





Table-2: Categorization of *Fusarium solani* isolates on the basis of growth on PDA in mm

Sr. No.	Growth range (mm)	Isolates	Total Isolates
1	<50	FS-1,FS-6,FS-8,FS-41, FS-28 .	5
2	51-60	FS-25,FS-2,FS-43,FS-37, FS-27, FS-32 , FS-4.	7
3	61-70	FS-3 ,FS-34,FS-15,FS-16,FS-26,FS-45, FS-23, FS-7	8
4	71-80	FS-42,FS-38 ,FS-44,FS-24,FS-19,FS-30, FS-10,FS-52, FS-20 , FS-29.FS-48, FS-46, FS-51 ,FS-5, FS-39,FS-22,FS-14	17
5	>80	FS-47 , FS-21, FS-40,FS-18 ,FS-31, FS-33, FS-49,FS-36,FS-50,FS-35,FS-12,FS-17, FS-9,FS-13,FS-11 .	15

Conclusion:

Fusarium wilt isolates were collected from varied places and hence reflect the changes in morphological and cultural characters. The present findings revealed high level of morphological and cultural diversities among the isolates of *Fusarium solani* collected from various locations of Vidarbha region of Maharashtra.

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