



Host range and Host Age on Susceptibility and Survival of *Colletotrichum Dematium* Causing Blight of Chickpea (*Cicer arietenum* L.)

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ABSTRACT

Among the leguminous hosts tested, greengram, blackgram, redgram, clusterbean and cowpea expressed susceptible reaction where as soybean, horsegram and beans expressed highly susceptible reaction to *colletotrichum dematium*. Investigations on plant age on susceptibility revealed that all the growth stages are susceptible to pathogen infection and maximum Percent Disease Index (71.28%) was observed on twenty one day old plants. The survival studies revealed that the fungus survived up to 150 days in sterilized soil and upto 125 days in unsterilized soil.

Key words : *Colletotrichum dematium*, Host age, Host range, Percent Disease Index, Survival

Chickpea is one of the widely grown pulse crop in India. Number of pathogens attack chickpea and the blight disease caused by *Colletotrichum dematium* causes considerable yield losses to the chickpea growing farmers near the river tracts. In the present investigation, the host range, host age on susceptibility and survival studies was conducted to formulate better management practices.

MATERIAL AND MTHODS

To know the host range of *C. dematium* eight leguminous hosts viz., greengram, cowpea, soybean, redgram, horsegram, black gram, beans and cluster beans were selected and fifteen seedlings of each crop were raised in the earthen pots under glass house conditions. Seedlings were spray inoculated with conidial suspension of 2.8×10^6 conidia/ml. The inoculated seedlings were covered with polythene bags for forty eight hours to maintain high humidity and then the bags were removed from inoculated seedlings and maintained in glass house.

Symptom expression and Percent Disease Index was calculated by using 0-4 scales given by Mayee and Datar (1986) and Murthy (1997) (Table 1).

The percent disease index (PDI) was calculated by using the formula given by Wheeler (1969).

To know the susceptible stage of chickpea plant to pathogen infection, healthy chickpea seedlings were raised by staggered plantings at

weekly intervals. The seedlings at 7,14,21,28 and 35 days were inoculated by spraying conidial suspension (2.8×10^6 / ml). The inoculated seedlings were covered with polythene bags and kept at room temperature for forty eight hours and then shifted to glass house conditions for symptom expression. The observations on appearance and severity of the disease on seedlings were recorded eight days after inoculation.

To study the survival of *C. dematium* the infected stem pieces were collected, cut into small pieces (3-4cm) and buried in earthen pots containing sterilized and unsterilized soil. Samples were also kept under stored conditions (polythene bags) and also exposed the infected samples to the open conditions. Samples were retrieved at twenty five days interval from earthen pots, surface sterilized with 0.1% sodium hypochlorite and inoculated on potato dextrose agar plates.

The observations on mycelial growth were recorded eight days after incubation. The sampling procedure was continued till the test fungus was recovered from the diseased samples.

RESULTS AND DISCUSSION

The results on host range studies (Table 2) showed that all the legumes under study were found to be susceptible to *C. dematium* infection. Soybean, horsegram and beans expressed highly susceptible reactions. Greengram seedlings produced necrotic spots and the infected leaves

Table 1. Symptoms expression and percent disease index.

Grade	Reaction	Symptoms	P DI (%)
0	Immune (I)	No disease	Nil
1	Resistant (R)	Black lesions at the basal portion of the stem	1-10
2.	Moderately resistant (MR)	Black lesions appearing in all branches	11-25
3	Susceptible (S)	Drying of leaves on lower branches or canopy	26-50
4	Highly susceptible (HS)	Black lesions on all branches of the plant and 75 percent drying of the plant from base to top or complete drying of the plant.	> 50

Table 2. Host range of *C. dematium* causing blight of chickpea (*Cicer arietenum* L.).

Leguminous Host	Botanical Name	Symptom Appearance (Days)	Percent Disease Index (%)*	Reaction
Greengram	<i>Vigna radiata</i>	7	43.45 (41.23)**	Susceptible
Cowpea	<i>Vigna unguiculata</i>	8	24.28 (29.65)	Susceptible
Soybean	<i>Glycine max</i>	7	65.25 (53.87)	Highly Susceptible
Redgram	<i>Cajanus cajan</i>	7	40.37 (44.13)	Susceptible
Horsegram	<i>Macrotyloma uniflorus</i>	6	74.50 (59.67)	Highly Susceptible
Black gram	<i>Vigna mungo</i>	6	37.97 (38.40)	Susceptible
Beans	<i>Dolichos lablab</i>	7	80.90 (62.43)	Highly Susceptible
Cluster beans	<i>Cymopsis tetragonolobe</i>	8	49.17 (51.20)	Susceptible
S.Em ±			0.476	
C.D at 1%			1.523	

* Mean of three replications

** Arc sine transformed values

Table 3. The age of chickpea plants on susceptibility of *C. dematium* infection.

S.No	Age of plants at inoculation (Days)	Percent Disease Index (%)*	Reaction
1	7	44.42 (41.79)**	Susceptible
2	14	59.53 (50.49)	Highly Susceptible
3	21	71.28 (57.59)	Highly Susceptible
4	28	36.47 (37.15)	Susceptible
5	35	24.61 (30.92)	Susceptible
S.Em \pm		0.755	
C.D at 1%		2.439	

* Mean of three replications

** Arc sine transformed values

Table 4. Survival of *C. dematium* causing blight of chickpea under various conditions.

Days after initiation	Radial growth of mycelium (mm*)			
	Sterilized soil	Unsterilized soil	Polythene cover	Open conditions
25	90.00	90.00	78.66	Nil
50	90.00	81.33	53.67	Nil
75	76.00	65.33	17.00	Nil
100	64.33	14.66	0.00	Nil
125	43.33	0.00	0.00	Nil
150	21.00	0.00	0.00	Nil
175	0.00	5.66	0.00	Nil
200	0.00	0.00	0.00	Nil
S.Em \pm	0.759	0.537	0.219	
C.D at 1%	2.461	1.743	1.043	

* Mean of three replications

appeared brittle. On cowpea the pathogen produced brown coloured discoloration at collar region and later spread to entire stem with small brown coloured sclerotia. On beans the symptoms were formation of dark brown lesions of 2-4 mm size which later enlarged and lead to complete drying of the stem. On redgram, the symptoms are production of dark brown spots on leaves with tan coloured centers.

On horsegram the fungus produced dark brown spots on the basal portion of seedlings and leads to post emergence damping off. On blackgram the fungus produced "shot hole" symptoms on affected foliage, it was further confirmed by reisolating the pathogen from all the affected plant parts.

The results on host age on susceptibility (Table 3) revealed that chickpea plants at all the stages of growth were susceptible to pathogen infection. However seedlings of 21 days were highly susceptible followed by 14 days (59.50%), 7 days (44.40%) and 28 days (36.47%).

The results of survival studies (Table 4) ved in sterilized soil up to 150 days. The fungus could not be recovered in subsequent isolations. In unsterilized soil the fungus could be recovered up to 125 days and not in subsequent isolations. The fungus survived up to 75 days where the diseased samples stored in polythene cover under laboratory conditions. The fungus could not survive upto 25 days in diseased samples kept in open conditions. It was found that the survival capacity of the fungus decreased over a period of time.

Lenne *et al* (1984) reported that *Colletotrichum spp.* has wide host range and it infects twenty four species of sixteen genera in leguminaceae family.

Pring *et al* (1995) reported that *C. capsici* infects several leguminous hosts especially *Cicer arietenum*, *Vigna radiata*, *Vigna unguiculata*, *Cajanus cajan*, *Arachis hypogea* and *Phaseolus lunatus*.

Rajan Sharma and Kaushal (1999) reported that *C. truncatum* possess large host range and infects the leguminous hosts like adjukibean, mungbean, lentil, broadbean, arhar, soybean, cowpea, frenchbean and horsegram. Yoshida and

Ashrita (1999) reported that length of survival of *C. dematium* depends on incubation temperature and can survive up to 120 days at 25°C. Nene *et al* (1991) reported that blight of chickpea caused by *C. dematium* can kill the plants at any stage depending upon amount of inoculum and favourable weather conditions.

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