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Differential Reaction of Pigeonpea Genotypes against Isolates of *Phytophthora drechsleri* f.sp. *cajani* Causing Blight of Pigeonpea

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Abstract

An experiment was conducted to assess the differential reaction of six genotypes of pigeonpea against 12 isolates of *Phytophthora drechsleri* f. sp. *cajani* collected from 12 locations from different districts of eastern Uttat Pradesh. On the basis of plant incidence and disease reaction genotypes, Bahar and ICP 7119 categorized as moderately susceptible to susceptible against most of the isolates. However, rest of the genotypes KPBR 80-2-1, KPL-30, MAL-10, and MAL-13 showed different types of disease reaction i.e. resistance, moderately resistance, moderately susceptible to susceptible to susceptible. It was also observed that isolate NAg_1 was more virulent than other isolates i.e. SD_1, K_1, T_2, DP_1, NS_1, BG_1 $Daphi_1$, UM_1 D_1, KB_1 and CA_1.

Key words : *Phytophthora drechsleri* f.sp. *cajani*, Isolates, Pigeonpea genotypes.

Pigeonpea (*Cajanus cajan* (L.) Millsp.) is one of the most important grain legume crop grown in almost all the states of India. Several resistant varieties evolved against phytophthora blight but do not perform uniformly against all the races. Therefore knowledge about the variability in the pathogen's population is essential for a reliable breeding program. Variations in disease reaction of pigeonpea genotypes against the isolates of *P. drechsleri* f.sp. *cajani* were observed from various parts of the country and the variability in the pathogen population has also been reported by Nene et al. (1991) and Chauhan et al. (2001). The existence of variability in pathogen suggests that monitoring of pathogenic variability in population of pathogen is important for understanding the biological basis of differential reaction.

Methods

Twelve samples of the phytophthora blight infected plants were collected from different districts of Uttar Pradesh viz. Azamgarh, Bhadohi, Ghazipur, Jaunpur and Varanasi. After isolation, purification, characterization and confirmation in laboratory the isolates were termed as SD_1, K_1, T_2, DP_1, NS_1, BG_1, NAg_1, $Daphi_1$, UM_1 D_1, KB_1 and CA_1 (Table 1). The differential reaction of 12 isolates viz., SD_1, K_1, T_2, DP_1, NS_1, BG_1, NAg_1 $Daphi_1$, UM_1 D_1, KB_1 and CA_1 of pathogen were tested on six genotypes of pigeonpea viz. KPBR 80-2-1, Bahar, MAL 10, MAL 13, KPR 30 and ICP 7119 grown in crop season. Fifty selfed seeds of each genotype were sown in 5-meter row with three replications at spacing of 60 × 10 cm in July by adopting standard agronomic practices. The isolates of pathogen were grown on potato dextrose agar medium (PDA) for multiplication of inoculum. Knife cut method (Nene et al. 1981) was adopted to inoculate 2-month-old plants of a set of six genotypes of pigeonpea. These cuts were banded with cellophane

Table 1. Isolates collected from various locations in different district of Uttar Pradesh.

	Isolate code	Place	District
1.	SD_1	Sidhona	Ghazipur
2.	K_1	Kaptanganj	Azamgarh
3.	T_2	Tarwa	Azamgarh
4.	DP_1	Dullahpur	Ghazipur
5.	NS_1	Naisere	Ghazipur
6.	BG_1	Babatpur	Varanasi
7.	NAg_1	BHU	Varanasi
8.	$Daphi_1$	Daphi	Varanasi
9.	UM_1	Umaraha	Varanasi
10.	D_1	Devgoan	Azamgarh
11.	KB_1	Kachawa	Bhadohi
12.	CA_1	Chetaipur	Varanasi

Table 2. Percent plant incidence and disease reaction of pigeonpea genotypes inoculated with different isolates of *P. dreshsleri* f.sp. *cajani.* *Data in parentheses are angular transformed values and word italics are disease reaction.

Isolate	Genotype						
	KPBR 80-2-1	ICP 7119	Bahar	KPL 30	MAL 10	MAL 13	Mean
SD_1	30.0 *MS* (33)*	43.3 *S* (41.2)	50.0 *S* (45.0)	23.3 *MS* (28.8)	0.0 *R* (0.0)	0.0 *R* (0.0)	24.4
K_1	40.0 *MS* (39.1)	60.0 *S* (50.8)	66.7 *S* (55.5)	33.3 *MS* (34.9)	26.7 *MS* (30.3)	70.0 *S* (56.3)	49.4
T_2	20.0 *MR* (26.6)	50.0 *S* (45.0)	80.0 *S* (63.4)	0.0 *R* (0.0)	10.0 *R* (18.4)	0.0 *R* (0.0)	26.3
DP_1	33.3 *MS* (34.9)	30.0 *MS* (33.2)	50.0 *S* (45.0)	20.0 *MR* (26.7)	36.7 *MS* (37.4)	10.0 *R* (18.4)	30.0
NS_1	0.0 *R* (0.0)	10.0 *R* (8.4)	70.0 *S* (57.3)	10.0 *R* (18.4)	26.7 *MS* (30.3)	23.3 *MS* (28.8)	23.3
BG_1	60.0 *S* (50.8)	43.3 *S* (41.0)	36.7 *MS* (41.7)	26.7 *MS* (31.0)	33.3 *MS* (35.3)	13.3 *MR* (21.1)	35.6
NAg_1	70.0 *S* (56.3)	66.6 *S* (53.1)	90.0 *S* (71.6)	66.6 *S* (52.8)	70.0 *S* (56.3)	45.3 *S* (34.9)	67.3
$Daphi_1$	6.7 *R* (12.3)	40.0 *MS* (39.2)	83.3 *S* (66.0)	23.3 *MS* (23.4)	30.0 *MS* (33.2)	0.0 *R* (0.0)	30.6
UM_1	0.0 *R* (0.0)	50.0 *S* (45.0)	23.3 *MS* (23.9)	0.0 *R* (0.0)	0.0 *R* (0.0)	13.3 *MR* (21.9)	14.4
D_1	26.7 *MS* (31.0)	36.7 *MS* (37.1)	50.0 *S* (45.0)	20.0 *MR* (26.6)	32.3 *MS* (34.2)	36.7 *MS* (37.1)	33.7
KB_1	26.7 *MS* (31.0)	23.3 *MS* (28.8)	30.0 *MS* (33.2)	10.0 *R* (18.4)	46.7 *S* (43.1)	10.0 *R* (18.4)	22.8
CA_1	16.7 *MR* (23.9)	30.0 *MS* (33.2)	53.3 *S* (46.9)	26.7 *MS* (28.3)	46.7 *S* (43.1)	10.0 *R* (18.4)	30.6
Mean	27.5	40.3	57.0	21.4	29.9	30.6	
		SE ±		LSD (P = 0.05)			
	Isolate	1.5		4.3			
	Genotype	1.1		3.0			
	Isolate × Genotype	3.7		10.5			

tape to retain the inoculum and further development of the pathogen. The disease incidence was recorded at the interval of 15 days over three months after inoculation. Plant incidence percentage of different genotypes was calculated to categorize the resistant (R), moderately resistant (MR), moderately susceptible (MS) and susceptible (S) against the test isolates using 1—4 scale (Amin et al. 1993) as given below. Plant showing 0–10% incidence was grouped as R, MR = 10.1—20%, MS = 20.1—40.0%, and S = 40.1—100.0% and data were analyzed statistically by using two factor randomized block design.

Results and Discussion

Differential reaction of six pigeonpea genotypes to 12 isolates of *P. drechsleri* sp. *cajani* indicated presence in wide range of pathogenic variability (Table 2). Isolates $N.Ag_1$ and K_1 were highly virulent against most of the genotypes showed 67.3 and 49.4% plant incidence, respectively. None of the genotype was found to be resistant to all the isolates. All 12 isolates exhibited highly pathogenic to genotypes Bahar and ICP 7119 which exhibited 57.0 and 40.3% virulence except isolates NS_1 that showed less (10.0%) pathogenic against genotype ICP 7119. These two genotypes ICP 7119 and Bahar categorized as mederately susceptible to susceptible. Veriable reaction of pigeonpea genotypes to 12 isolates of *P. drechsleri* sp. *cajani* collected from different locations of various districts in Uttar Pradesh corroborated with the findings of Nene et al. (1991). and Chauhan et al. (2001). They reported that isolates BHU, Hisar, Kanpur and New Delhi differed from Hyderabad in their aggressiveness. Similar trend was observed in the present study. Based on reaction of six geno-

types used in this study isolate NAg_1, was highly virulent that showed 67.3% plant mortality and UM_1 was least virulent showing only 14.4% mortality of plants. However, remaining isolates were moderately virulent.

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