J Indian bot Soc Vol 72 (1993) 127-129

RESPONSE OF SOME ACCESSIONS OF CHICKPEA TO MACROPHOMINA PHASEOLINA AND THEIR EFFECT ON PEROXIDASE ACTIVITY

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Response of 65 accessions of chickpea to Macrophomina phaseolina was determined in terms of root-rot index and percentage suppression in shoot dry weight. A positive correlation was found between peroxidase activity and resistance to the accessions.

Key Words: Accessions, chickpea, Macrophomina phaseolina, peroxidase.

Macrophomina phaseolina (Tassi) Goid is an important pest of chickpea causing significant loss in the yield. Cultivation of resistant cultivars may be an effective measure to avoid the pest as it requires neither any special equipment nor any extra capital investment. In the present study 65 accessions of chickpea were screened for their resistance against the pathogen.

1936) for 15 days at 25°C. Mycelium was collected on blotting sheets and excess of water and nutrients were removed by pressing it between two folds of blotting sheets. Hundred gram of mycelium was macerated in 1 litre distilled water and 10 ml of this suspension containing 1g fungus was inoculated around the root by removing top soil layer carefully and after inoculation soil was replaced.

Peroxidase plays an important role in the resistance mechanism in plants. It is a key enzyme required for lignin synthesis and phytoalexin production. It catalyzes several reactions including those involved in the metabolism of phenols and indoles. Response of accessions was determined in terms of root-rot index, percentage suppression in shoot dry weight. Peroxidase activity of control and inoculated plants was also determined for their correlation.

MATERIALS AND METHODS

Seeds of chickpea accessions were sown in 15 cm clay pots containing 1kg steam sterilized soil. After germination the seedlings were thinned to one per pot, and after a week, seedlings were inoculated with 1g mycelium of *Macrophomina phaseolina*. Plants were watered regularly and each set was replicated six times (3 for peroxidase and 3 for shoot dry weight and rootrot index). The experiment was terminated 90 days after inoculation and data on shoot dry weight and rootrot index were recorded.

Peroxidase activity of control and infected plants (5 days after inoculation) was determined by the method of Chance & Maehly (1955). A calibrated standard curve was prepared by graded concentration of pure purpurogallin. Specific activity of peroxidase was calculated by purpurogallin formed per mg protein per minute.

Resistance susceptibility ratings were determined on the basis of scale of Husain(1986) with slight modification (using root rot index in place of nematode reproduction). Root-rot index was determined on the scale 0-5 where 0 = no disease while 5 means severe root rot. Scale on the basis of suppression in shoot dry weight was also determined on 0-5 scale as 0 =no suppression in shoot dry weight (immune); 1 =suppression in shoot dry weight up to 5% (Resistant); 2 = suppression in shoot dry weight 5.1-10.0% (Moderately resistant); 3 = suppression in shoot dry weight 10.1-15.0% (Tolerant); 4 = suppression in shoot dry weight 15.1-25.0% (Susceptible); $5 = \sup$ -

M. phaseolina was isolated from chickpea roots and maintained on potato dextrose agar (PDA). inoculum of fungus was prepared by culturing the isolate in Richard's liquid medium (Riker & Riker

pression in shoot dry weight more than 25% susceptible).



RESULTS AND DISCUSSION

Data presented in Table-1 clearly show that none

Received September 1992

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Cultivar	Shoot dry wt. (g)	% suppression in shoot dry weight	Root- rot index	Reaction	Peroxidase activity	
					activity per	% increase
					mg protein	over control
		C			per minute	
	1.00				0.125	2 0
Gora Hissar	1.92	34.4	5	нз	0.133	2.9
L-144	2.83	16.0	4 A	5	0.137	23.2
Annegiri	1.75	15.4 26.0	5	н	0.180	13.9
Avrodni C 225	1.71	20.9	5	HS	0.248	10.1
C-255 BGM_417	1 08	26.8	5	HS	0.258	8.5
K-850	2.62	36.3	5	HS	0.216	2.8
IG-315	1.87	15.5	4	S	0.132	28.0
GNG-146	2.24	27.7	5	HS	0.200	14.5
Gaurav	1.62	35.2	5	HS	0.228	2.6
ICC-7002	1.82	25.3	5	HS	0.137	14.3
BG-244	1.83	22.9	4	S	0.126	22.2
H81-73	2.89	41.5	5	HS	0.185	7.0
BGM-408	3.27	19.6	4	S	0.180	25.0
P-256	6.08	40.8	5	HS	0.140	20.0
IC-4918	8.40	15.2	4	S T	0.103	22.1
IC-4919	8.85	13.7	3		0.200	10.6
IC -4920	6.73	28.4	5	нз	0.179	18.7
IC-4921	10.51	15.7	4	5	0.232	18 9
IC-4922	10.50	10.9	4	D	0.191	51.2
IC-4923	12.27	4.1	5	LIC L	0.204	14.2
IC-4924	0.90	25.2	3 A	п5 S	0.192	16.2
IC-4925	6 72	20.8	4	нs	0.214	10.3
IC-4920	6.87	16.0	4	S	0.228	25.0
IC-4927	9.84	12.9	3	Ť	0.174	31.6
IC-4929	8.46	16.7	4	S	0.206	26.2
IC-4930	8.96	34.4	5	HS	0.207	3.4
IC-4931	12.18	32.5	5	HS	0.204	2.0
IC-4932	12.54	22.2	4	S	0.206	16.6
IC-4933	9.55	17.8	4	S	0.179	25.1
IC-4934	8.60	16.4	4	S	0.195	24.1
IC-4935	8.73	21.4	4	S	0.165	
IC-4937	14.04	17.1	4	S	0.230	23.3
IC-4938	8.60	13.7	3	l	0.245	30.3 15 Q
IC-4939	1.68	18.5	4	5	0.207	18.4
IC-4940	2.74	18.3	4	5	0.103	17.0
IC-4941	2.94	17.0	4	з Т	0.134	32.3
IC-4942	2.08	15.5	5 A	1	0.184	17.4
IC-4943	2.93	25.0	4	ы	0.177	10.7
IC-4944	5.20	25.0	5	HS	0 191	12.6
IC-4945	2.08	16.8	4	S	0.190	23.2
IC-4940 IC-4947	2.98 4 18	16.0	4	š	0.175	19.1
IC-4948	1.86	19.4	4	S	0.178	18.0
IC-4949	1.87	28.3	5	HS	0.207	13.9
IC-4950	1.76	13.6	3	Т	0.202	34.8
IC-4951	2.03	9.3	2	MR	0.135	41.6
IC-4952	1.76	27.3	5	HS	0.181	9.4
IC-4953	2.13	15.5	4	S	0.180	20.6
IC-4954	2.18	25.7	5	HS	0.236	11.4
IC-4955	2.40	28.3	5	HS	0.175	
IC-4956	2.95	29.2	5	HS	0.209	0.0 9.0
IC-4957	2.98	38.6	5	HS	0.140	0.7
IC-4958	1.94	10.5	4	3	0.172	16.9
IC-4959	1.39	15.8	4	3	0.190	10.0
IC-4960	1.83	13.3	4	3 C	0.109	16 4
IC-4961	1.80	17.2	4 A	3 C	0.171	22.4
IC-4902	1.74	23.0		цс	0.165	12.7
IC-4903	1.80	10.7	5 Д	۲۱۵ ۲	0.155	20.0
IC-4904	1.07	17.2	4	S	0.189	22.2
IC-4903 IC-4066	1.77	26.1	5	нѕ	0.208	8.7
IC-4067	2 21	29.4	5	HS	0.158	14.2
IC-4968	2.11	18.0	4	S	0.157	21.1

Table 1: Response of 65 accessions of chickpea to Macrophomina phaseolina and their effect on peroxidase activity.

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Response of some accessions of chickpea

of the 65 accessions were immune to *Macrophomina phaseolina* on the basis of suppression in shoot dry weight and root-rot index. Only one accession (IC - 4923) was found resistant and accession IC-4951 was moderately resistant. Five accessions (IC-4919, IC-4928, IC-4938, IC-4942 and IC -4950) were rated as tolerant. Others were susceptible or highly susceptible.

Resistant accession (IC-4923) showed 51.2% increase in peroxidase activity in inoculated plant over control while in moderately resistant accession (IC-4951) this increase was only 41.6%. In tolerant accessions the increase in peroxidase activity ranged between 31.6-36. 3% while in susceptible accession it was from 15.9-28.0%. However, in highly susceptible accessions increase in peroxidase activity was $2.0_{7}14.5\%$ (Table-1).

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Increase in peroxidase activity resulted in the increase in resistant response of the chickpea accessions. Role of peroxidase in resistant response of the plant has also been observed by others (Fehrman& Diamond 1967; Daly *et al.*, 1971; Noel & McClure 1978). Higher peroxidase activity resulted in an increase in the phenolic contents of the plant which plays an important role in the resistance of the cultivar (Mahmood & Saxena 1986). A positive correlation was found between peroxidase activity and resistance response of the accession.

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