Pak. J. Bot., 7 (1): 85—87, 1975.

COLONIZATION OF *MACROPHOMINA PHASEOLINA* ON COTTON ROOTS IN RELATION TO SCLEROTIAL POPULATION IN SOIL

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Macrophomina phaseolina (Tassi) Goid., the cause of root rot and stem rot of a variety of crop plants, produces large numbers of sclerotia on the host tissue which are subsequently dispersed in the soil during decaying process (Young, 1949; Ghaffar et al. 1964; Smith, 1969). The sclerotial propagules are reported to survive for upto 10 months under dry storage (Ghaffar & Akhtar, 1968), although the proportion of sclerotia surviving is not known. During a survey of cotton fields, the population of sclerotia have been found to be more upto 2" layers of the soil with decline in numbers at 6-9" depths (Sheikh & Ghaffar, 1975). Since roots of plants are subject to colonization by sclerotial propagules, a study was carried out to elucidate whether colonization of cotton roots was in some way related to sclerotial density in soil.

Roots of cotton plants were carefully dug out from the soil. Samples of plants exhibiting symptoms of wilting were collected from cotton fields of Tandojam, Setharja and Lyallpur where root rot was in prominent patches. For comparison healthy plants were obtained from disease free patches. Roots were thoroughly washed in running tap water to remove adhering soil particles and 2 cm pieces of the entire root length were rinsed in 25% CaOCl before transfer on PDA containing Penicillin and Streptomycin each @ 60 mg/l. The dishes were incubated at 28°C and frequency of colonization by *M. phaseolina* in the upper, middle and lower portions of the roots corresponding approximately to 8,16 and 24 cm from the soil level was calculated as follows:

$$\text{Frequency of colonization} = \frac{\text{Total No. of } M.\ phaseolina \text{ isolates}}{\text{Total No. of root pieces observed}} \times 100$$

A significantly greater degree of colonization ($p<0.001$) was found in roots of diseased plants in comparison to the healthy ones (Table 1). No consistent pattern of the relative colonization of various portions of roots of healthy plants was observed. A differential colonization of root portions was, however, detected in the diseased

TABLE 1. Frequency of colonization of *Macrophomina phaseolina* on cotton roots.

Portion of root	LOCALITIES					
	Tandojam		Setharja		Lyallpur	
	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased
Upper	11.3 ± 6.43	85 ± 7.63	0	30 ± 30.0	0	33.3 ± 10 18
Middle	0	75 ± 12.12	0	21.6 ± 20.1	4.4 ± 3.73	25.8 ± 12.93
Lower	0	39.4 ± 22.46	0	0	22.2 ± 22.22	0

ANALYSIS OF VARIANCE

Source of variation	SS	df	MS	
Localities (L)	91.174	2	45.587	*
Healthy/Diseased (H)	130.543	1	130.543	***
Root portions (P)	32.482	2	16.241	*
1st order interaction:				
L x H	74.199	2	37.099	*
L x P	6.405	4	1.601	n.s.
P x H	37.045	2	18.522	*
2nd order interaction:				
L x P x H	21.428	4	5.357	n.s.
Residual	192.609	36	5.350	
Total:	585.885	53	—	

$LSD_{0.05}$ = 3.815; $LSD_{0.01}$ = 5.083; $LSD_{0.001}$ = 6.675

plants which showed a substantially greater extent of colonization of *M. phaseolina* in the upper portions with relatively lesser degree of colonization in the middle and lower portions of the roots.

Soil samples obtained, after removal of the roots from the field, were analyzed for sclerotial density of *M. phaseolina* (Shaikh & Ghaffar, 1975). Population of sclerotia of *M. phaseolina* (Table 2) did not differ significantly in the healthy or

TABLE 2. Population of sclerotial propagules of *Macrophomina phaseolina* at different levels in soil.

Depth of Soil	LOCALITIES					
	Tandojam		Sitharja		Lyallpur	
	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased
Surface	16.6±4.41	14.0±1.0	9.0±6.0	7.0±3.5	17.3±4.18	17.6±4.53
Subsurface	6.6±0.70	14.3±3.26	7.5±5.0	6.3±4.10	2.6±0.86	2.6±0.91

diseased portions of the cotton fields although the surface soil showed significantly more sclerotial propagules than the subsurface soil. This would suggest that the level of colonization on different root portions could be related to the sclerotial population at different depths. However, the correlation coefficient of 0.16 for the frequency colonization of the upper portions of roots and soil surface sclerotial population and 0.24 for the frequency colonization of lowerroot portions and the subsurfae sclerotial population were found to be insignificant.

Acknowledgement

We are grateful to Mr. Shahid Shaukat for statistical analysis and to Mr. Abdul Hakeem Sheikh for the data on sclerotial population presented in this paper.

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