

FACTORS INFLUENCING THE COMPETITIVE SAPROPHYTIC ABILITY OF *MACROPHOMINA PHASEOLINA* IN GROUNDNUT

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ABSTRACT

The influence of moisture levels, inoculum potential and incubation period on the competitive saprophytic ability of *Macrophomina phaseolina* was studied. Experimental results revealed that in both levels of inoculum i.e., 50 & 100 g / kg of soil the saprophytic survival of *Macrophomina phaseolina* on groundnut stem bits was maximum at 40 % moisture levels as against 60 and 80% moisture levels. CSA was increasing with increase in incubation period at 40 per cent while it decreased progressively with increase in incubation period at 60 and 80% moisture levels. However variation in the diseases incidence was observed according to level of inoculum added.

KEY WORDS: *Macrophomina phaseolina*. Moisture Holding Capacity (MHC), Competitive Saprophytic Ability (CSA).

Macrophomina phaseolina causing root rot is polyphagous and survive in the form of sclerotia in soil. Competitive saprophytic ability is determined by the level of moisture in soil and incubation period. High saprophytic survival of the pathogen is at 20-60% moisture holding capacity and progressive decrease with increase in moisture content (Sekhar et al 1987). Dhingra and Sinclair (1975) observed 99% decline in sclerotial population of *Macrophomina phaseolina* at 100% moisture holding capacity due to environmental factors. Ghaffer and Erwin (1969) reported that sclerotia survived at least for ten months in infected cotton roots under dry storage in the laboratory. However, survival was only 15 days in root segments buried in moisture soil. This experiment was carried out to observe the influence of moisture level and incubation period on *Macrophomina phaseolina* colonising the groundnut stem bits.

MATERIALS AND METHODS

Stem segments of groundnut were used to evaluate competitive saprophytic ability of *Macrophomina phaseolina* under artificially inoculated soil following the baiting method (Sekhar et al 1987).

Macrophomina phaseolina was multiplied on sand maize medium and inoculated in soil at the rate of 50 and 100 g / kg of soil. Moisture levels of 40, 60 and 80 per cent was maintained as per Keen

and Raczkowski. (1921). The groundnut stem bits were recovered at 15 days interval from 5 to 65 days. The recovered bits were surface sterilized with 0.1 per cent mercuric chloride and washed with distilled water, placed on potato dextrose agar plates and incubated at 30 + 2°C for 48 hours. The percent of groundnut stem bits colonised by *Macrophomina phaseolina* was recorded.

RESULTS AND DISCUSSION

Saprophytic survival of *Macrophomina phaseolina* was maximum at low moisture levels of 40% recording a mean of 65.9 per cent as against 15.9 per cent and 7.9 per cent survival at 60 and 80 per cent respectively (Table 1). At 65 days of incubation the saprophytic ability was 3.4% at 80 % MHC as compared with 73.4 per cent at 40 per cent MHC. CSA was also increased with increase in incubation period at 40 per cent MHC, while it decreased progressively with increase in incubation period at 60 and 80 per cent MHC in both the inoculum levels.

The inherent factors involved in determining the ability of a fungus to colonize a substrate in soil was first recognised by Garret (1950). In this study the CSA of pathogen on groundnut stem bits were found to be high at 40 per cent MHC and progressively increased in incubation period at both the inoculum levels tested (Table 1 & 2). It was also evident that at 60 – 100 % MHC the mean

Table 1. Competitive Saprophytic Ability of *Macrophomina phaseolina* at 5% inoculum level

S. Sampling No/Interval (Days)	CSA (%) MHC (%)			Mean
	40	60	80	
1 5	56.7 (48.8)	20.0 (26.6)	13.3 (21.4)	29.9 (32.3)
2 20	63.4 (52.8)	20.0 (26.6)	10.0 (18.2)	31.1 (32.5)
3 35	66.5 (54.7)	16.5 (23.9)	6.7 (15.0)	29.9 (31.2)
4 50	69.9 (56.7)	13.3 (21.4)	6.5 (14.3)	29.9 (30.8)
5 65	73.4 (59.1)	9.9 (18.1)	3.4 (11.2)	28.9 (29.5)
Mean	65.9 (54.4)	15.9 (23.3)	7.9 (16.0)	

CD (P=0.05) Treatments = 2.75, Intervals = NS, Interaction = 6.2

(Figures in parenthesis indicate mean angular transformed values).

saprophytic survival of the pathogen decreased and the recovery of *Macrophomina phaseolina* also decreased from 20 days onwards. Similar results were obtained by Sekhar et al (1987). Dhingra and Sinclair (1974) reported a 100 % recovery from stem pieces of soyabean in dry soil as against only 12% at 60 – 100 per cent MHC. Survival of *Macrophomina phaseolina* in cucurbit roots in dry soil upto 10 months was reported by Ghaffar and Akhtar, (1968). The Competitive saprophytic ability of *Macrophomina phaseolina* tends to decrease at high moisture level because the activity of other soil micro flora such as bacteria which may infect the sclerotia and cause loss in viability. Increased moisture levels will block the air movement in the porespace. Thereby the oxygen availability for the fungus will be reduced and additional accumulation of carbon-dioxide will result in aerobiosis, which might induce selectively different microbial distribution. (Dhingra and Sinclair, 1975; Shekhar et al 1987).

Table 2. Competitive Saprophytic Ability of *Macrophomina phaseolina* at 10% inoculum level

S. Sampling No/Interval (Days)	CSA (%) MHC (%)			Mean
	40	60	80	
1 5	69.9 (56.7)	36.5 (37.2)	20.0 (26.3)	42.1 (40.0)
2 20	73.4 (59.1)	33.4 (33.2)	10.7 (24.0)	39.1 (38.8)
3 35	76.5 (61.1)	29.9 (33.1)	10.0 (18.2)	38.8 (37.4)
4 50	84.5 (66.8)	23.5 (28.8)	6.6 (14.5)	38.1 (36.7)
5 65	86.5 (69.0)	16.7 (24.0)	3.4 (11.3)	35.6 (34.8)
Mean	78.2 (62.6)	28.0 (31.2)	10.1 (18.8)	

CD (P=0.05) Treatments = 3.9 Intervals = 5.1, Interaction = 8.9

(Figures in parenthesis indicate mean angular transformed values).

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