Pak.J.Bot., 25(2): 235-236, 1993.

EFFECT OF WATER STRESS ON CHARCOAL ROT DISEASE OF MASHBEAN (*VIGNA MUNGO* (L.) HEPPER) CAUSED BY *MACROPHOMINA PHASEOLINA*

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Mashbean (*Vigna mungo* L.) Hepper) an important pulse crop of Pakistan is planted over 85,000 hectares giving an yield of 30- 40 thousand metric tonnes (Anon., 1990). Of the fungal, bacterial and viral diseases which produce an annual loss of 12-14% the charcoal rot caused by *Macrophomina phaseolina* (Tassi) Goid., produces 100% damage to the crop in severe cases (Bashir & Malik, 1988). The fungus infects the seedling, root, stem or pods producing small black sclerotia which are liberated in soil upon tissue decomposition or during tillage operation (Cook *et al.*, 1973).

Water stress has been reported as an important predisposing factor in increasing the severity of root rot on sorghum (Hsi, 1961; Edmunds, 1964) and cotton (Ghaffar & Erwin, 1969). Similarly infection on black gram (mashbean), guar, okra and cotton was generally low at high soil moisture whereas more infection was observed in soil at low moisture level of 25% MHC (Sheikh & Ghaffar, 1979). An experiment was, therefore, carried out to study the effect of water stress on charcoal rot disease of mashbean caused by *M. phaseolina*.

Five mashbean seeds were sown in plastic pots containing 1 kg autoclaved sandy clay loam soil, pH 7.8, artificially infested with sclerotia of *M. phaseolina* @ 20 scl./g soil. Soil without sclerotia was used as control. The soil was adjusted and maintained at 50% MHC (Keen & Rackzkowski, 1921). There were 4 replicates of each treatment and the pots were kept in randomized block design under greenhouse conditions. After 4 weeks of growth, a set of plants was subjected to water stress by allowing the water content of soil to drop to approximately 10% MHC (on the basis of daily weight). In a comparable set the plants were watered daily to keep the soil moisture at 50% MHC. After 5 days the plants were uprooted, the roots washed in running tap water and 1 cm root pieces surface disinfected with 1% $Ca(OCl)_2$ transferred onto PDA plates containing penicillin @ 100,000 units/l and streptomycin @ 0.2g/l. The Petri plates were incubated at $28\pm2^{\circ}C$ for 5 days to confirm root infection by *M. phaseolina*.

Mashbean plants showed wilting within 5 days with 100% infection in infested soil under water stress condition as compared to 45% infection in regularly watered series. Similarly, plant showed no wilting at 10% MHC in non infested soil and in regularly watered treatment. Similar observations have been made where root rot of cotton (Ghaffar & Erwin, 1969) and sorghum (Edmunds, 1964) caused by *M. phaseolina* was severe under water stress conditions. Sheikh & Ghaffar (1979) also found that *M. phaseolina* infection on black gram, guar, okra and cotton roots was greater at 25% MHC than at high soil moisture level. Zaki & Ghaffar (1988) reported that soil flooding with or without paddy cultivation holds promise in the inactivation of sclerotia in *M. phaseolina* infested soil. The results of the present study indicate that the pathogenic activity of *M. phaseolina* can be controlled by keeping the soil moisture at higher level.

References

Anonymous, 1990. *Agricultural Statistics of Pakistan.* Govt. of Pakistan Ministry Food, Agriculture and Cooperatives. Food & Agriculture Division (Economic Wing). Islamabad. pp. 51-52.

Bashir, M. and B.A. Malik. 1988. Diseases of major pulse crops in Pakistan-a review. *Tropical Pest Management*, 34: 309-314.

Cook, G.E., M.G. Boosalis, L.D. Dunkle and G.N. Odvondy. 1973. Survival of *Macrophomina phaseolina* in corn and sorghum stalk residue, *Plant Dis. Repr.*, 57: 873-875.

Edmunds, L.K. 1964. Combined relation of plant maturity. temperature and soil moisture to charcoal stalk rot development in grain sorghum. *Phytopath.*, 54: 514-517.

Ghaffar, A. and D.C. Erwin. 1969. Effect of soil water stress on root rot of cotton caused by *Macrophomina phaseolina. Phytopathol.*, 59: 795-797.

Hsi, C.H. 1961. An effective technique for screening sorghum for resistance to charcoal rot. *Phytopath.*, 51: 340-341.

Keen, B.A. and H.Rackzkowski. 1921. The relation between clay content and certain physical properties of soil. *J. Agri. Sci.*, 11: 441-449.

Sheikh, A.H. and A. Ghaffar. 1979. Relation of sclerotial inoculum density and soil moisture to infection of field crops by *Macrophomina phaseolina* under paddy cultivation. *Pak. J. Bot.*, 20: 245-250.

(Received for Publication 31 March 1993)