

Response of inoculation technique to seed and seedling infection by *M. phaseolina* in sorghum

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Abstract— Sorghum is a major cereal of the world and is a staple food for millions of the poorest and most food insecure people. The yield and quality of sorghum is affected by a wide array diseases among them charcoal rot of sorghum caused by *Macrophomina phaseolina* (Tassi) Goid. is causing more yield loss in rabi sorghum growing areas compared to kharif. Different inoculation techniques were followed to know effective method for infecting the seeds and seedlings by the pathogen among method C, that is seed soaking in spore suspension method recorded maximum pre and post emergence mortality of seeds are 43 and 27 per cent respectively compared to other methods.

Keywords— Sorghum, Charcoal rot and *Macrophomina phaseolina* Seedling mortality.

I. INTRODUCTION

Sorghum (*Sorghum bicolor* (L.) Moench) a major cereal of the world after wheat, rice, maize and barley, is a staple food for millions of the poorest and most food insecure people in the Semi-Arid Tropics (SAT) of Africa and Asia. Sorghum commonly known as *durra*, jowari or milo, parts of the world grow sorghum both in rainy and post rainy seasons in India. The yield and quality of sorghum is affected by a wide array of biotic (pests and diseases) and abiotic (drought and problematic soils) stresses. Among the biotic factors of many diseases of sorghum, charcoal rot of sorghum caused by *Macrophomina phaseolina* (Tassi) Goid. is causing more yield loss in rabi sorghum growing areas compared to kharif. It is mainly soil inhabiting fungus is an important root and stalk pathogen that incites the disease by producing microsclerotia/pycnidia (Farr *et al.*, 1995; Pun *et al.*, 1998). The pathogen causes disease in over 500 plant species from 75 families with heterogeneous host specificity *i.e.* the ability to infect monocots as well as dicots and can exhibit non-uniform distribution in the soil (Mayek-Perez *et al.*, 2001 and Su *et al.*, 2001).

II. MATERIAL AND METHODS

To check the seed and seedling mortality due to sorghum *M. phaseolina* different techniques used to infect seeds was followed in laboratory condition.

- A) Seed roll technique: Sorghum seeds (20) rolled on 7 days old culture of *M. phaseolina* on the culture Petri plate, and Petri plate rotated in both clockwise and anticlockwise so that seed surface get covered by sclerotia. The pathogen coated seeds were kept for germination on blotter paper and folded were then kept in an incubator at 30 °C for ten days. The blotters were moistened with sterile water every day. At the end of the incubation period, the per cent seed and seedling mortality were recorded.
- B) Sorghum seedling dip technique: Twenty sorghum seeds were kept for germination for four days then the seedling roots were dipped for 2 min in *M. phaseolina* spore suspension of 10⁵ spore per ml and these seedlings kept for germination. At the end of the incubation period, the per cent seed and seedling mortality observation were recorded.
- C) Seed soaking technique: This method was followed as paper towel technique. The fungus was cultured on Potato Dextrose Broth (PDB). Twenty ml of PDB was poured into 100 ml conical flasks and sterilized. The flasks were then inoculated and incubated for ten days. The mycelial mat from the flask was removed and macerated in a waring blender along with distilled water for a minute. The inoculum was later collected in a beaker. In the mean time, 20 sorghum seeds of M-35-1 were immersed completely in the inoculum for 12 hours. These seeds were then placed side by side on a blotter paper (45 cm x 25 cm with one fold) and was folded. The folded blotter papers were then placed in trays, and kept in an incubator at 30° C for ten days. The blotters were moistened with sterile water every day. At the end of the incubation period, the per cent seedlings infection observations were recorded.

III. RESULT AND DISCUSSION

Different inoculation techniques were followed to know effective method for infecting the seeds and seedlings by the pathogen as given in materials and methods and in these methods maximum seed and seedling mortality was observed. In method C, that is seed soaking in spore suspension method recorded maximum pre and post emergence mortality of seeds are 43 and 27 per cent respectively, whereas in seedling dip technique pre and post emergence mortality was recorded 0.00 and 45.35 per cent respectively and in seed rolling method least pre and post emergence mortality was recorded as 15.00 and 20.45 per cent respectively (Table 1). Results revealed that maximum mortality of seedling was observed in seed soaking methods. These methods can be further used to carry out other experiments. The results are in accordance with the findings of Jayalakshmi (2009) who conducted inoculation technique on *Fusarium oxysporum* fsp *ciceri* and *M. phaseolina* infection to chickpea and also Galli *et al.* (2005) studied that to identify the optimal period for infection of maize seeds on agar colonized by *Fusarium graminearum*, when incubated for 4, 8, 16 and 32 h, and to evaluate the effect of the fungus on the germination and vigor of seeds with different infection levels.

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Table.1: Response of inoculation technique to seed and seedling infection by *M. phaseolina*

Treatment	Pre emergence mortality (%)	Post emergence mortality (%)
Seed rolling method (A)	15.00 (22.79)	20.45 (26.89)
Seedling dip method (B)	00.00 (00.00)	45.35 (42.23)
Seed soaking method (C)	43.00 (40.97)	27.00 (31.30)
Control	00.00 (00.00)	00.00 (00.00)
S.Em ±	0.500	0.306
CD @ 1 %	2.065	1.265