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Influence of various botanicals as soil amendment in the management of *Fusarium oxysporum* f. spp. *vigni* causing wilt in mungbean [*Vigna radiata* (L.) Wilczek]

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ABSTRACT

The experiment was conducted in pots under glass house condition where leaf powder of nine plants extracts *i.e. Neem* (*Azadirachta indica*), *Karanj* (*Pongamia pinnata*), *Babul* (*Acacia nilotica*), *Nilgiri* (*Eucalyptus tereticornis*), *Jatropha curcas (Jatropha) Ashok* (*Polyalthia longifolia*), *Tulsi* (*Ocimum sanctum*), *Bougainvillea (Bougainvillea* sp.) and *Mehndi* (*Lawsonia alba*) were mixed with soil @ 40 g/ kg soil. Showed antifungal properties of leaves were tested as soil amendment against *Fusarium oxysporum* f. spp. *vigni* the plant grown on *Neem* amended soil minimum plant mortality recorded

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INTRODUCTION

Green gram commonly known as mungbean [*Vigna radiata* (L.) Wilczek] is one of the important short duration pulse crops containing about 25 per cent protein which is almost three times that of cereals. Pulses or grain legumes provide essential amino acids and have four times riboflavin which is ten times that of cereals. In addition of being an important source of human food and animal feed, green gram also plays an important role in sustaining soil fertility by improving soil physical properties and fixing atmospheric nitrogen. It is drought resistant crop and suitable for dry land farming and predominantly used as an inter crop with other crops. Mungbean is cultivated in 2890 thousand ha area with 870 thousand tones production in India of which Madhya Pradesh contributes 89 thousand ha of land for its cultivation with 289 kg / ha yield (Anonymous, 2008). Seed and seedling rot of legumes caused by *Fusarium oxysporum* f. sp. *vigni* has assumed economic importance in many states of India (Khare *et al*., 1977). These diseases result in pre and post-emergence

mortality and root diseases at later stages of crop growth (Chindhelore, 1974). Among various disease causing agents *Fusarium oxysporum* poses a great threat to the cultivation of mung bean by inflicting severe yield losses (Perveen *et al*., 1999; De *et al*., 2000 and Mahapatra and Swain, 2001). Reports are available on the effect of plant products (extract, powders etc.) showing management of soil borne fungal diseases on their application in to the soil. Botanical pesticides have the potential to replace or augment the conventional plant disease management practices, based on the use of synthetic pesticides, provides an eco-friendly means of managing the plant pathogens, through the use of indigenous sources. This method is consistent with the aim of sustainable agriculture and integrated disease management system to minimize/ replace the use of chemicals. The work was conducted under glass house condition against soil borne pathogen of mungbean with the object of influence of various botanicals as soil amendment in the management of *Fusarium oxysporum* f. spp. *vigni* causing wilt in mungbean [*Vigna radiata* (L.) Wilczek].

MATERIAL AND METHODS

Sandy loam was thoroughly washed with three to four changes of water so as to remove the soluble leachetes and air dried. This soil was then mixed with well decomposed FYM (3:1) to prepare soil composite and the same was used throughout the investigation. The soil composite was sterilized with four per cent commercial formaldehyde by sealing the heap corners with polyethylene sheet for 15 days and spread in a thin layer and later exposed to direct sunlight to allow complete evaporation of remnants of formaldehyde. Sterilized soil composite was stored in a clean aluminum tray, covered with polyethylene sheet and was utilized whenever required for the experimental purpose. Fresh plant leaves, collected, were thoroughly washed in running tap water so as to remove undesirable contents. Hot water extract was prepared by drying these at 60°C in hot air oven till complete dryness. Leaves were ground with the help of pestle and mortar in to a fine powder. Ten g powder of each plant leaf was suspended in 100 ml distilled water and heated at 70°C for 30 minutes the decoction was filtered through cotton wool to obtain clear extract (Sarvamangala *et al*., 1993). Required quantity of leaf powder was kept aside for evaluation purpose and rest was used for making extract. The powder and extract were used immediately to carryout experiments. Good, bold and healthy seeds of mungbean (var. TJM - 1) seeds were surface sterilized by mercuric chloride as described earlier and were sown in pots containing 500g sterilized soil composite. The pots were watered with sterilized tap water as and when needed. The experiment was conducted in pots under glass house conditions. The test fungus *Fusarium oxysporum* f. sp. *vigni* was grown on crushed mung seeds and mixed with the soil @ 40g / kg soil as per the method described earlier. At the same time the plant leaves powder were incorporated @ 30 g / kg soil along with fungus. The soil mixture was then filled in sterilized pots. Surface sterilized seeds of mungbean were sown in each pot. Each pot received 25 seeds. On germination thinning was done and 15 seedlings in each pot were maintained. Each treatment was replicated three times and randomized over glass house bench. The pots were irrigated with sterilized tap water as and when required. The glass house temperature ranged between 18 – 30° C during the period of experimentation. The pots were observed for seed germination, seedling mortality and appearance of wilt symptoms.

RESULTS AND DISCUSSION

Leaf powders of plants *viz., Neem, Tulsi, Karanj, Jatropha, Babul, Ashok*, Bougainvillea, *Mehndi* and *Neelgiri* were mixed with soil @ 40/ kg soil along with an un amended control under glass house condition in pots. The observation was recorded at 20, 30 and 40 days after sowing. The data presented in the (Table 1) revealed that all treatments were significantly superior over control in managing the diseases upto 40 days the maximum time period involved in the experimentation. It is evident from the data that the leaf powders of *Neem* and *Tulsi* were effective in managing the wilt of mung plants within 20 days. The plant mortality was minimum (1.00) in *Neem* followed by *Tulsi* (1.66) against control where maximum (5.60) plants were killed within 20 days of plant growth. These treatments were followed by Jatropha (1.80), *Karanj* (2.10) and Bougainvillea (3.88). *Babul* (4.00) and *Ashok* (4.33) were remained at par in their efficacies in managing the disease. Rest of the treatments *viz., Mehndi* and *Nilgiri* were remained at par with control where 4.11, 5.00 and 5.60 plants were killed due of *F. oxysporum* f. sp. *vigni* within 20 days of

Table 1: Influence of leaf powders against *Fusarium oxysporum* f. sp. *vigni* as soil treatment

Sr. No.	Treatments	Number of wilted plants*		
		Days		
		20	30	40
1.	*Azadirachta indica* (*Neem*)	1.00* (1.22)**	2.22 (1.65)	4.33 (2.20)
2.	*Ocimum sancatum* (*Tulsi*)	1.66 (1.47)	3.00 (1.87)	5.11 (2.37)
3.	*Pongamia pinnata* (*Karanj*)	2.10 (1.61)	5.00 (2.35)	7.33 (2.80)
4.	*Jatropha curcas (Jatropha)*	1.80 (1.52)	4.33 (2.20)	6.22 (2.59)
5.	*Acacia nilotica* (*Babul*)	4.00 (2.12)	6.00 (2.55)	8.00 (2.92)
6.	*Polyanthia longiifolia* (*Ashok*)	4.33 (2.20)	7.00 (2.74)	9.00 (3.08)
7.	*Bouganivillea* sp. *(Bougainvillea)*	3.88 (2.09)	6.88 (2.72)	8.66 (3.03)
8.	*Lawsonia inermeris* (*Mehndi*)	4.11 (2.15)	9.00 (3.08)	11.0 (3.39)
9.	*Eucalyptus globules* (*Nilgiri*)	5.00 (2.35)	10.0 (3.24)	13.0 (3.67)
10.	Control	5.60 (2.47)	11.44 (3.46)	14.0 (3.81)
	S.M. ±	0.003155	0.000222	0.023261

*Each value is a mean of three replications.
** Figure in parentheses are square root transformed values

plant growth. Minimum (2.00) plant mortality was noted in pots were *Neem* powder was incorporated with the soil @ 40g/kg followed by *Tulsi* (3.00). Effect of *Jatropha* was observed to significantly superior over control where 4.33 plants were noted to be killed. Maximum plant mortality was observed in control (11.44) within 30 days of plant growth leaf powder of *Nilgiri* did not efficacy of rest of the treatments were also recorded to be superior over control. It is evident from the data presented in the (Table 1) that *Neem* showed minimum (4.33) plant mortality followed by *Tulsi* (5.11) and *Jatropha* (6.22) against maximum (14.22) in control within 40 days of plant growth efficacy of mehdi and *Nilgiri* was proved inferior where 11.00 and 13.00 plants were killed within 40 days. Rest of the treatments were found superior in managing the within the course of investigation.

Plant mortality was recorded in pots where *Neem* leaf powder was incorporated with the within 40 days plant growth. The experiment these results are in confirmation with the finding on *Amarphophallas* and potato, respectively infected by *Rhizoctonia solani* and *Alternaria solani*. Bhattacharya and Pramanik (1998) reported that *Neem* was found toxic when applied as soil drench and reduced the club root severity significantly in crucifiers. Ahamad and Srivastava (2000) also observed reduced incidence of *Rhizoctonia solani* infecting chickpea in *Neem* amended soil. Singh *et al.* (1980) reported that besides sulphar *Neem* contains bitter yellowish substance which contains alkaloid, resins, glycosides fatty acids and P- Amino benzoic acid which inhibit the growth and development of fungus. Better plant stemd was also noted in *Tulsi* and *Jatropha*. The leaf powders of these plants on degredation producted centain toxic substances which adversely affect the growth of *F. oxysporum* f. sp. *vigni*.

Conclusion :

The plant leaves were tested as soil amendment under pot condition where the leaf powers were mixed with the soil pre infested with *Fusarium oxisporum* f.sp. *vigni*. The plants grown on *Neem* amended soil minimum plant mortality was not within 40 days. *Tulsi* (*Ocimum sancatum*) and *Karanj* (*Pongamia pinnata*), stood next in order of efficacy in managing the disease. Minimum numbers of wilted plants noted in pots were *Neem* (*Azadirachta indica)* leaf power was amended @ 40g/ kg soil followed by *Tulsi* (*Ocimum sanctaum*) and *Karanj* (*Pangamia pinnata*).

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