Research Paper :

Exploration of fungicides and bio-organics against *Macrophomina phaseolina* (Tassi.) Goid. causing leaf spot in green gram

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International Journal of Plant Protection, **Vol. 4 No. 1 (April, 2011) : 17-19**

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SUMMARY

The leaf blight of green gram incited by *Macrophomina phaseolina* (Tassi.) Goid. was observed at Agronomy farm, College of Agriculture, Dapoli. Among the different fungicides tested against the fungus, carbendazim (0.1%), propiconazole (0.05%) and mancozeb (0.25%) were very effective in inhibiting the growth of the pathogen. Goneem containing cow urine + neem extract was most effective at 0.3 per cent concentration among the bio- organics tested.

Magar, S.V., Kadam, J.J., Rite, S.C., Thaware, D.S. and Potphode, P.D. (2011). Exploration of fungicides and bio-organics against *Macrophomina phaseolina* (Tassi.) Goid. causing leaf spot in green gram. *Internat. J. Pl. Protec.*, **4**(1): 17-19.

Key words : Green gram, *Macrophomina phaseolina*, Bio-organics

Received : ***August, 2010***
Accepted : ***October, 2010***

Green gram [*Vigna radiata* (L.) Wilczek] is nutritionally the most important legume among pulse crops grown in India. It is supposed to be easily digestible and hence is preferred by patients. When green gram is allowed to sprout, ascorbic acid (vitamin C) is synthesized. The amount of riboflavin and thiamine are also increased. It is also used as a green manuring crop. It contributes 14 per cent of total area and 7 per cent in total pulses production. In Konkan region of Maharashtra it is grown as a sole crop during late *Kharif, Rabi* and summer seasons. Among the various diseases of green gram, the leaf blight caused by *Macrophomina phaseolina* was noticed at the farm of Agronomy, College of Agriculture, Dapoli during the *Kharif* season in the year 2008. The disease incidence was observed to be more than 45 per cent. So far, no studies have been undertaken on leaf blight affecting green gram in Konkan region of Maharashtra. Therefore, it was decided to conduct the present investigation.

MATERIALS AND METHODS

Seven fungicides belonging to different groups were tested against the test fungus by using 'Poisoned Food Technique' (Nene and Thapliyal, 1993) in the present assey. Potato dextrose agar medium (PDA) was used as the basal medium and was distributed in 250 ml sterilized conical flasks each containing 100 ml. The quantity of fungicide per treatment was calculated for 100 ml medium separately. The requisite quantity of the test fungicides was added to each flask at 45^0C. The fungicides were thoroughly mixed before solidification and poured into sterilized Petri plates. The mycelial disc of 5 mm diameter of 7 days old culture was cut with the help of sterile cork borer. Each disc was transferred aseptically to the centre of each Petri plate, already poured with poisoned medium. The PDA plates without fungicide were also inoculated and maintained as control. The plates were incubated at room temperature (27 $\pm$ 1^0C) for 10 days. Three replications per treatment were maintained. The observations on colony growth and sclerotial formation were recorded until Petri plate in control treatment was fully covered with mycelial growth.

The per cent inhibition of growth was calculated by the following formula (Horsfall, 1956).

$$X = \frac{Y - Z}{Y} \times 100$$

where,

X = Per cent inhibition

Y = Growth of fungus in control (cm)

Z = Growth of fungus in treatment (cm)

For evaluation of bio-organics against the test fungus seven different bio-organics were tested using 'Poisoned food technique' while the rest of the procedure was same as described earlier in screening of fungicides in *in vitro*.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been presented under following heads:

Efficacy of different fungicides against the pathogen (Poisoned food technique) *in vitro*:

The perusal of the data in Table 1 indicated that the growth of *Macrophomina phaseolina* was completely inhibited by carbendazim (0.1%), propiconazole (0.1%) and mancozeb (0.25%). Triadimefon, difenconazole and benomyl were found to be moderately effective exhibiting 75.93, 79.63 and 81.46 per cent inhibition over control, respectively at 0.1 per cent concentration. The results obtained are in agreement with the findings of Lambhate *et al.* (2002) who also recorded complete inhibition of growth of *Macrophomina phaseolina* by carbendazim at 0.1, 0.2 and 0.3 per cent concentrations. It was observed during the present study that copper oxychloride was the least effective fungicide for the control of *Macrophomina phaseolina* in *in vitro* condition. Similarly, Lambhate *et al.* (2002) also observed that blitox-50 (COC) showed poor performance by inhibiting 15.2, 25.5 and 33.3 per cent growth of *Macrophomina phaseolina* at 0.1, 0.2 and 0.3 per cent concentrations, respectively.

The present findings regarding carbendazim are in close conformity with the observations recorded by Jha and Sharma (2006). The present report regarding mancozeb is also similar to that of Bainade *et al.* (2007) who recorded complete inhibition of *Macrophomina phaseolina* by 0.25 per cent mancozeb in *in vitro* condition.

Table 1 : Effect of different fungicides on growth and sclerotial formation of *Macrophomina phaseolina* (Tassi.) Goid

Sr. No.	Fungicide	Conc.	Mean colony dia.(cm)*	Per cent inhibition	Sclerotial formation
1.	Carbendazim	0.1	0.00	100.00	-
2.	Copper oxychloride	0.15	6.40	28.89	+++
3.	Difenconazole	0.1	1.83	79.63	+
4.	Propiconazole	0.1	0.00	100.00	-
5.	Triadimefon	0.1	2.17	75.93	+
6.	Mancozeb	0.25	0.00	100.00	-
7.	Benomyl	0.1	1.67	81.46	-
8.	Control	-	9.00	-	++++
		S.E ± 0.07	C. D. (P=0.05) = 0.31		

* Mean of three replications.

Sclerotial formation: – No sclerotia, + Poor, ++ Moderate, +++ Good, ++++ Excellent

Table 2 : Efficacy of different bio-organics against the pathogen (Poisoned food technique) *in vitro*

Sr. No.	Bio-organics	Concentration (%)	Mean colony diameter (cm)*	Per cent inhibition	Sclerotial formation
1.	Reviver	0.3	6.83	24.07	++
2.	Purna	0.3	7.10	21.11	++
3.	Varada	0.3	7.53	16.30	++
4.	Amogh	0.3	4.57	49.26	++
5.	Bio-force	0.3	7.37	18.15	++
6.	GoNeem	0.3	3.20	64.44	-
7.	Biozyme	0.3	7.63	15.19	++
8.	Control	--	9		++++
		S. E. ± 0.11	C. D. (P=0.01)= 0.45		

* Mean of three replications.

Sclerotial formation: - No sclerotia, + Poor, ++ Moderate, +++ Good, ++++ Excellent

No sclerotial formation was observed in carbendazim, propiconazole, mancozeb and benomyl. Poor sclerotial formation was observed in triadimefon while good sclerotial formation was observed in copper oxychloride (Table 1).

Among seven bio-organics tested at 0.3 per cent concentration, GoNeem (containing cow urine + Neem extract) inhibited the growth of *Macrophomina phaseolina* to the extent of 64.44 per cent, followed by Amogh (49.26%), Reviver (24.07%) and Purna (21.11%). The present findings seem to be almost similar to those of Raju and Kurucheve (1998) who reported that the buffalo urine completely inhibited the sclerotial germination of *Macrophomina phaseolina.* Bhave (2005) also observed that Purna at 0.3 per cent concentration showed 22 per cent inhibition of mycelial growth of *Rhizoctonia solani*. Santhosh Priya (2006) also demonstrated that GoNeem was most effective against *Macrophomina phaseolina* and caused 62.66 per cent mycelial inhibition followed by Amogh (48.42 per cent inhibition).

No sclerotial formation was observed in GoNeem. Moderate sclerotial formation was observed on rest of the bio-organics *i.e.* Amongh, Purna, Reviver, Bio-force, Varada and Biozyme.

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