Research Paper :

Effect of seed treatment of biocontrol agents and chemicals for management of stem and pod rot of groundnut

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SUMMARY

Three fungicides *viz.,* mancozeb, tebuconazole and vitavax power, two bioagents *viz., Trichoderma harzianum* and *Pseudomonas fluorescens* and one insecticide (chlorpyriphos) were tested as seed treatments against stem and pod rot of groundnut (*Sclerotium rolfsii*). Results were found that seed treatment with *Trichoderma harzianum* (10.0 g/kg) provided maximum protection to the crop by minimum stem rot incidence (37.43%) and maximum pod yield (1464 kg/ha) of groundnut.

Key words : *Trichoderma harzianum, Pseudomonas fluorescens, Sclerotium rolfsii*, Seed treatment

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The combination of biocontrol agents with fungicides as seed treatment could be very effective against stem and pod rot as it makes the plant vulnerable throughout its life starting from rooting of seeds to the death of mature plants. The present work was undertaken to test the efficacy of bioagents and chemicals as seed treatment for management of stem and pod rot of groundnut in the field condition.

Excessive use of chemical fertilizers and plant protection chemicals for maximizing crop yield and changes in traditional cultivation practices results in deterioration of chemical, physical and biological health of the cultivated soil. This situation eliminates the ecologically beneficial microbes from soil, which are detrimental to crop health to establish in soil. Biocontrol strategy is highly compatible with the sustainable agricultural practices that are required for conserving natural resources and beneficial microbes. This requires an understanding of the interactions between the biocontrol agent and complex microbial community in which the agent must function (Pan and Jash, 2004). Field use of biological control agents in modern agriculture is hampered by lack of suitable carrier and application methods (Jash, 2006). Seed coating method has been relatively successful when applied to small volumes of soil (Harman *et al.,* 1980.)

MATERIALS AND METHODS

Field experiments were conducted to study the efficacy of selective: bioagents, fungicides and insecticide as seed treatment for the management of stem and pod rot of groundnut caused by *Sclerotium rolfssi.* The field experiment was conducted in randomized block design with four replications during *Kharif* 2006 and 2007 at Department of Plant Pathology, College of Agriculture, Junagadh Agricultural University, Junagadh. The details of treatments, two bioagents *viz., Trichoderma harzianum* (10^6 cfu/g) 10.0gm/kg seeds and *Pseudomonas fluorescens* ($7x10^9$ cfu/g) 5.0gm/kg seeds, three fungicides *viz.*, mancozeb 4.0gm/kg seeds, Tebuconazole (Raxil 2 SD) 1.25 gm/kg seeds and vitavax power (vitavax 37.50 %+ thiram 37.50%) 3.0gm/kg seeds and. chlorpyriphos (25ml/kg seeds) were used as seed treatments. An untreated control was also maintained. The seed treatment was given before sowing.

In the field experiment groundnut cv. GG-20 was sown at 60 x 10 cm distance in 5.0 x 3.0m plots. At the time of sowing *Selerotium rolfsii* culture was added in each plot @450g/ plot. All agronomic practices were followed as per recommendations.

At the time of harvesting, the numbers of healthy and infected plants were counted in each treatment and per cent disease incidence and per cent disease control were calculated

Table 1.Effect of seed treatments on incidence of stem and pod rot and yield of groundnut

Sr. No.	Seed treatments	Pooled per cent disease Incidence for 2007 and 2008#	Per cent disease control	Pooled yield (kg/ha) for 2007 and 2008#	Per cent yield increased over control
1.	Mancozeb 4.0g/kg	44.23 (48.66)	31.15	1245	21.82
2.	Tebuconazole 1.25 g/kg	42.10 (44.95)	36.40	1390	36.01
3.	Vitavax power 3.0 g/kg	41.05 (43.13)	38.97	1408	37.77
4.	*Trichoderma harzianum* 10.0 g/kg	37.43 (36.94)	47.73	1464	43.25
5.	*Pseudomonas fluorescens* 5.0 g/kg	52.38 (62.74)	11.22	1073	4.99
6.	Chlorpyriphos 25ml / kg	47.30 (54.01)	23.58	1233	20.65
7.	Control	57.21 (70.67)	-	1022	-
	S.E.±	2.01	-	50.69	-
	C.D. (P=0.05)	5.86	-	147.97	-
	C. V.	10.69	-	9.84	-

* Data given in parenthesis are retransformed value
\# Mean of three replications

using the following formula :

$$\text{Per cent disease incidence} = \frac{\text{No. of plants infected}}{\text{Total no. of plants observed}} \times 100$$

$$\text{Per cent disease control} = \frac{\text{Per cent plants died in control} - \text{Per cent plants died in treatment}}{\text{Per cent plants died in control}}$$

RESULTS AND DISCUSSION

The results presented in Table 1 revealed that all the seed treatments were superior to control in reducing the disease incidence. Minimum disease incidence (36.94%) was recorded in the application of seed treatment with *Trichoderma harzianum* @10.0g/kg seed followed by vitavax power 3.0g/kg (43.13%) and tebuconazole 1.25g/kg (44.95%). Maximum disease incidence was recorded in control (70.67%). Seed application with *Trichoderma harzianum* 10.0 g/kg, vitavax power 3.0 g/kg and Tebuconazole 1.25 g/kg exhibited 47.73, 38.97 and 36.40 per disease control, respectively as compared to the incidence in check. All the seed treatments were also found significantly superior over control to improve the pod yield. Maximum pod yield of 1464 kg/ha was recorded from seed treatment with *Trichoderma harzianum* 10.0g/kg followed by vitavax power 3.0g/kg (1408 kg/ha) and tebuconazole @1.25g/kg (1390 kg/ha). They were statistically at par. Minimum disease incidence (36.94%) and highest pod yield (1464 kg/ha) was recorded in the seed treatment of *Trichoderma harzianum* 10.0gm/kg seeds followed by vitavax power (vitavax + thiram) 3.0 gm/kg seeds with 43.13% disease incidence and 1408 kg/ha pod yield. The seed treatment results match with previous findings of Mukhopadhyay *et al*. (1992). They demonstrated that seed treatment with *G. virens* and then with 0.10% carboxin was effective in controlling *S. rolfsii* of groundnut.

In another findings, seed treatment with thiram + carbendazim and *Trichoderma harzianum* at 4g/kg resulted in the greatest reduction in seed rot and reduced seedling mortality from 22.39 to 3.43 and 3.60 %, respectively (Patil *et al.,* 2003). Present findings also coincide with the observations of Prabhu and Patil (2004) and Ansari (2005) where they observed that collar rot of soybean caused by *S. rolfsii* was controlled with seed treatment of *T. harzianum.*

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