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Integrated disease management of root rot disease of cowpea (*Vigna unguiculata* (L) Walp.)

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Introduction

Cowpea (*Vigna unguiculata* (L) Walp.) is a warm season annual leguminous fodder crop. It is rich in protein and forms an excellent mixture with maize, sorghum, pearl millet and teosinte for increasing the milk production. The productivity of green fodder cowpea is approximately 25-45 t/ha in India. Pests and diseases hampers crop establishment, impair forage quality and reduces green fodder and seed yield. Besides causing direct yield losses they also suppress nodulation and consequently negating the maximum nitrogen fixation. The losses in green fodder and seed yields were estimated to be about 28.8 and 39.7 per cent, respectively (Ram and Gupta, 1988). Sometimes the pests and diseases are responsible for crop failure.

Control of plant diseases is essential for providing an adequate and quality supply of fodder. Attempts were made to prevent fodder crops from diseases even then, losses are occurring. Reducing such losses has long been a high priority objective for forage production. In order to develop an integrated disease management approach, it is essential to appraise the newer molecules of fungicides against causal organism along with bio-control agents for its efficacy. Therefore, a study was conducted to evaluate the fungicides and bioagents against cowpea root rot pathogen (*Rhizoctonia solani*).

Materials and Methods

In order to develop integrated disease management of root rot of cowpea, a field experiment was conducted in *Kharif* 2011-2013 to evaluate three bioagents (*Trichoderma harzianum*, *T. viride* and *Aspergillus niger*), four fungicides (pencycuron, tebuconazole, carbendazim and thiram) in various combinations along with two checks (one recommended protection measure and one untreated control) against the root rot causing organism (*R. solani*).

Results and Discussion

The fungi, like *Rhizoctonia solani*, *Macrophomina* and *Fusarium* sp. are the most widespread and destructive plant pathogens causing root rot/dry root rot in cowpea. These pathogens are restricted to infect the crop either alone or as a complex there by resulting in rots before and after emergence of seedling and wilting of plants (Sumner, 1985; Bhatnagar and Bansal, 2003; Nigam, 2009). This disease causes substantial losses to cowpea crop. Therefore, it is need to develop an effective management practice.

Table 1. Effect of various treatments on root rot of cowpea

Treatments	Root rot severity				% +/- over Control
	2011	2012	2013	Average	
S. T. <i>T. harzianum</i> 5g/Kg seed	18.72	19.66	24.05	20.81	13.1
S. T. <i>T. viride</i> 5g/Kg seed	21.10	21.95	25.31	22.79	4.9
S. T. <i>A. niger</i> 5g/Kg seed	22.79	23.05	25.31	23.72	1.0
S.T. Pencycuron 0.7 ml/Kg seed	16.36	19.66	21.95	19.32	19.3
S. T. Tebuconazole 0.7 ml/Kg seed	22.72	21.95	22.79	22.49	6.1
S.T. Pencycuron @ 0.7 ml/Kg seed + spray 0.7% tebuconazole	16.35	18.74	20.50	18.53	22.6
S.T. <i>T. harzianum</i> 5g/Kg seed + spray 0.7% tebuconazole	18.08	19.04	21.34	19.49	18.7
S. T. <i>T. viride</i> 5g/Kg seed + spray 0.7% tebuconazole	21.02	22.47	25.59	23.03	3.9
S.T. <i>A. niger</i> 5g/Kg seed + spray 0.7% tebuconazole	21.64	21.94	24.82	22.80	4.8
Treated Control (S. T. @ 2 g/KgThiram + Spray 0.2% carbendazim)	17.39	19.36	21.11	19.29	19.5
Untreated Control	22.72	23.83	25.31	23.95	0.0
CD 5%				1.47	

Results of the present study (Table1) revealed that seed treatment (ST) of pencycuron @ 0.7 ml/Kg seed with two sprays of tebuconazole (0.7%) was the most effective for the management of root rot (*R. solani*) of cowpea. This treatment showed 22.6 per cent reduction in root rot severity over the untreated check followed by existing recommended practice *i.e.* seed treatment of Thiram @ 2 g/Kg seed followed by two sprays of carbedazim (0.2%) which reduces the root rot severity by 19.5 per cent. Seed treatment with pencycuron @ 0.7 ml/Kg seed alone (19.3 % reduction) was another promising treatment.

Conclusion

From the study it can be concluded that the seed treatment of Pencycuron @ 0.7 ml/Kg as along with two sprays of tebuconazole (0.7%) at thirty days interval was the most effective in managing the root rot disease caused by *R. solani* in cowpea.

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