Research Paper

Volume : 3 | Issue : 12 | December 2014 • ISSN No 2277 - 8179

Invitro Evaluation of Fungicides Against *Sclerotium Rolfsii* Sacc Causing Stem Rot of Groundnut

Agricultural Science

KEYWORDS : Groundnut, Stem rot. Fungicides.

K.C.Deepthi Department of plant pathology, S.V.Agricultural College, Tirupati-517502.

ABSTRACT

Stem rot caused my Sclerotium rolfsii sacc is one of the most important disease effecting groundnut crops all over world and in the Andhra Pradesh. A total of 40 antagonists were isolated from soil rhizosphere and root endophytes of the groundnut crop. When these isolates are subjected to in vitro studies and hence GRE-9 and GRB-4 has shown 100% inhibition of the mycelial growth against Sclerotium rolfsii. The efficacy of six fungicides viz., Carbendazim, Hexaconazole, Propiconazole, Thiophenate Methyl and COC and Mancozeb. When these fungicides were tested @ 0.1%, 0.2% and resulted that Mancozeb & propiconazole were found 100% effective in checking the growth of the pathogen while carbendazim was not effective against pathogen.

INTRODUCTION:

Groundnut (*Arachis hypogaea L.*) is a major legume oil seed crop in India, covering nearly half of the area under oilseeds. It is mostly affected with the pathogen *Sclerotium rolfsii* Sacc is a soil-borne pathogen and causes disease in different crops including peanut (Punja, 1988; Krupa and Dummergues,1979). The loss of yield caused by pathogen infection generally is 25%, but sometimes it reaches 80 - 90% in some cases (Grichar and Bosweel, 1987). Biological control is an alternate source by introducing soil borne pathogens which helps in suppressing the disease (Zehnder, *et al.,* 2001). Several Rhizospheric bacteria was proved as bio agents to control soil born pathogens i.e., Bacillus (Nair et al., 2002, kishore. 2005). While in combination with biocontrol agents and fungicides as seed treatment was effective against suppressing the pathogen was reported by Rakholiya, 2010. The present study was undertaken to evaluate the efficacy of the fungicides on the growth of the *Sclerotium rolfsii.*

MATERIALS AND METHODS:

Dual culture method:

In vitro antagonistic activity of microflora isolates against *S.rolfsii* was determined by dual culture technique (Morton and Stroube, 1955). Mycelial discs measuring 6 mm diameter of four day old cultures of both fungal antagonist and the test pathogen were placed at equidistant on sterile Petri plate containing PDA medium. One day old cultures of bacteria were streaked on opposite side of the pathogen on PDA medium. The Petri plates were then incubated at 28 ± 2°C. Three replications were maintained in each treatment. Controls were kept without antagonist. Growth of antagonists, pathogen and zone of inhibition were measured after recording full growth in control plate. Per cent inhibition of mycelial growth of test pathogen was calculated.

Poisoned Food technique:

In vitro efficacy of the systematic and nonsystematic fungicides against test pathogens was evaluated by poisoned food technique (Nene and Thapliyal, 1993).The selected native potential biocontrol agents were tested for their compatibility with the fungicides generally recommended for soil drenching viz., copper oxychloride (0.1% & 0.2%), mancozeb (0.1% & 0.2%), carbendazim (0.1% & 0.2%), thiophanate methyl (0.1% & 0.2%), Hexaconazole (0.1% & 0.2%) and Propiaconazloe (0.1% & 0.2%). Completely Randomized Design (CRD) was used for, poisoned food technique (Gomez and Gomez, 1984).

$I = C-T/C \times 100$

Where,

I = Per cent inhibition,

C = Colony diameter of the test fungus in Control and

T= Colony diameter of the test fungus in Treatment

RESULTS AND DISCUSSION:

A total of 40 antagonists were isolated from groundnut rhizosphere bacteria (GRB 1 to GRB 20) and root endophytes (GRE 1 to GRE 20). From the obtained data (Table-1) it is evident that GRE-9 & GRB-4 completely suppressed the growth of the pathogen. The obtained results were in agreement with gayathri 2010, ganeshan 2012. From the data (Table-2) all the fungicides were significantly effective in inhibiting the mycelial growth of the pathogen as compared to control was observed. Among the fungicides Manocozeb, Thiophenate methyl, Hexaconazole, Propiconazole were effective against suppressing the pathogen at both 0.1% and 0.2% concentrations. The results obtained are in correlation with Johnson 2008, who reported the inhibition of *S.rolfsii* pathogen with Hexaconazole and Propiconazole at 0.1% and 0.2%. Radhaiah 2012 also reported that mancozeb @ 0.2% completely suppressed the pathogen. Under *in vitro* Conditions the present findings resulted Mancozeb was highly effective against inhibiting the *S.rolfsii* Pathogen. Now a day's biological control has come forward to increase the crop yield in combination with fungicides is a possible solution for effective management of stem rot disease.

CONCLUSION:

A study was undertaken to isolate the bacterial antagonists from the soil rhizosphere in the groundnut field. In the present study efficacy against the *S.rolfsii* pathogen was tested and resulted Mancozeb followed by Thiophenate methyl completely inhibited the growth of the mycelium.

ACKNOWLEDGMENT

We express our sincere gratitude to Prof. N.P. Eswara Reddy, Department of plant pathology, S.V. Agricultural College, Tirupati for providing laboratory facilities and kind support during the course of these investigations.

Table 1. In vitro evaluation of the antagonistic activity of Groundnut (GRE) Root endophytes and (GRB) Groundnut Rhizosphere bacteria by *S. rolfsii* in dual culture technique

Isolate	*Linear growth of *S. rolfsii* (cm)	Per cent inhibition of mycelial growth of *S. rolfsii*	Isolate	*Linear growth of *S. rolfsii* (cm)	Per cent inhibition of mycelial growth of *S. rolfsii*
GRE-1	2.1	77.77 (61.86)	GRB-1	4.0	55.56 (48.19)
GRE-2	2.2	75.55 (60.36)	GRB-2	4.7	47.78 (43.72)
GRE-3	2.0	76.66 (61.11)	GRB-3	5.0	44.44 (41.80)
GRE-4	3.7	58.88 (46.53)	GRB-4	0.0	100.00 (90.00)
GRE-5	3.1	66.66 (54.73)	GRB-5	4.5	50.00 (45.00)
GRE-6	2.8	68.89 (56.09)	GRB-6	4.2	53.33 (46.90)
GRE-7	2.43	72.96 (58.83)	GRB-7	4.6	48.89 (44.36)

GRE-8	2	77.78 (61.88)	GRB-8	6.8	24.44 (29.62)
GRE-9	0.0	100 (90.00)	GRB-9	4.4	51.11(45.63)
GRE-10	2.83	68.52 (55.87)	GRB-10	5.5	38.89 (38.58)
GRE-11	5.0	44.00 (41.55)	GRB-11	3.9	55.93 (48.40)
GRE-12	7.3	18.88 (25.75)	GRB-12	3.1	65.19 (53.84)
GRE-13	9.0	00.00 (00.00)	GRB-13	2.5	72.22 (58.19)
GRE-14	3.0	66.66 (54.73)	GRB-14	3.4	62.00 (51.94)
GRE-15	9.0	00.00 (00.00)	GRB-15	3.6	60.00 (50.76)
GRE-16	5.1	43.33 (41.16)	GRB-16	1.3	85.55 (67.65)
GRE-17	5.0	44.44 (41.80)	GRB-17	3.0	66.66 (54.73)
GRE-18	4.5	50.00 (45.00)	GRB-18	2.0	77.41(61.62)
GRE-19	6.0	33.33 (35.26)	GRB-19	3.3	63.33(52.73)
GRE-20	5.4	40.00 (38.58)	GRB-20	1.8	80.00 (63.43)
Control	9	0	Control	9	0
CD (0.05)	-	8.894	CD (0.05)	-	7.2426
S.Em±	-	2.021	S.Em±	-	2.018

*** Mean of three replications**

Figures in parenthesis are angular transformed values

Table:2. Efficacy of fungicides on mycelial growth of *Sclerotium rolfsii*

S. No.	Fungicides	Colony diameter at various concentrations		Mean
		0.1%	0.2%	
1.	Carbendazim	51.11 (45.36)	75.55 (60.36)	63.33 (52.73)
2.	Hexaconazole	100.00 (90.00)	100.00 (90.00)	100 (90.00)
3.	Propiaconazole	100.00 (90.00)	100.00 (90.00)	100 (90.00)
4.	Thiophenate Methyl	100.00 (90.00)	100.00 (90.00)	100 (90.00)
5.	Copper oxychloride	43.70 (41.38)	50.73 (45.42)	47.21 (43.4)
6.	Mancozeb	100.00 (90.00)	100.00 (90.00)	100 (90.00)
	Control	-	-	-
	C.D (0.05)			3.621
	S.Em ±			2.063

* Mean of three replications
Figures in parenthesis are angular transformed values

REFERENCE

Grichar VJ, Bosweel TE (1987). Comparison of lorsban and tilt with terrachlor for control of southern blight on peanut. The Texas Agriculture Experiment Station. PR-4534. | | Gomez K A and Gomez A.A (1984) Statistical procedures for agricultural research (second edition). John Wiley and Sons, New York. | | Gayathri K.T., Thahir Basha S. and Eswara Reddy. N.P. (2010). Integrated management of stem rot (Sclerotium rolfsii) of groundnut with fungicidal compatible seed endophyte. Bionature, 30(2): 57-65. | | Ganesan S. (2012) Fluorescent Pseudomonas as plant growth promoting Rhizobacteria and | biocontrol agents in groundnut crop (Arachis hypogaea L.). Int. J. Applied Bio Research. Vol.No.12:1-61 | | Johnson, M. and Reddy, P.N. and Reddy, D.R. (2008) Comparative efficacy of rhizosphere mycoflora, fungicides, insecticides and herbicides against groundnut stem rot caused by Sclerotium rolfsii. Annals of Plant Protection Sciences, 16 (2). pp. 414-418. | | Krupa SV, Dummergues YR (1979). Ecology of Roots Pathogens. Elsevier Scientific Publishing Company. Amsterdam, p. 281 | | Kishore G. K, Pande S., and Podile A. R. (2005) Biological control of collar rot disease with broad-spectrum antifungal bacteria associated with groundnut. Can. J. Microbiol. 51(2):123-32. | | Morton, D.J. and W.H. Stroube (1955) Antagonistic and stimulating effects of soil microorganism of Sclerotium. Phytopathol., 45, 417-420 | | Nene, Y. L. and Thapliyal, P. N. (1993). Fungicides in plant disease control 3rd edition. Oxford and I B H Publishing Co., Pvt. Ltd., New Delhi pp: 526-531. | | Nair, J.R., Singh, G., Sekar, V. (2002) Isolation and characterization of a novel Bacillus strain from | coffee phyllosphere showing antifungal activity. Journal of Applied Microbiology. 93: 772-780. | | Punja, Z.K. (1988). Sclerotium (Athelia) rolfsii, a pathogen of many plant species. Adv. Plant Pathol. 6: 523-534. | | Rakholiya, KB (2010) Effect of seed treatment of biocontrol agents and chemicals for management of stem and pot rot of groundnut. International journal of plant protection.Vol.3 N.2:276-278 | | Radhaiah A. (2012) Biocontrol potential of indigenous pseudomonas spp.against sclerotium rolfsii causing stem rot of groundnut. International Journal of Food, Agriculture and Veterinary Sciences. Vol. 2 (1) January-April, pp.134 -141.7 | | Zehnder GW, Murphy JF, Sikora EJ and Kloepper JW (2001). Application of rhizobacteria for | induced resistance. European Journal of Plant Pathology 107 39-50. |