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Studies on collar rot disease of Marigold and its management

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Marigold is one of the most important commercial flowers of India in terms of cultivation and utilization. Though having repellent property, marigold is also affected by number of fungal diseases. Collar rot disease was caused by *Sclerotium rolfsii* as per the study undertaken here and pathogencity of fungus was studied. For controlling this disease, different fungicides were tested *in vitro* namely Topsin-M, Bavistin, Blitox-50, Contaf, Benlate, Captan, Thiram, Manzate. Captan, Thiram and Manzate showed 100% inhibition at 0.3% concentration. Blitox-50 showed 66.7% inhibition at 0.3% concentration. Blitox-50 showed 66.7% inhibition at 0.5% concentration. Five different plant extracts were also tested against this fungus. Out of which *Rauwalfia serpentina* was found to cause maximum inhibition of 56.5% Similarly biological antagonist *Streptoverticillium* ($SVNR_7$) gave 34.7% inhibition. Where *Trichoderma* sp. showed 22.8% inhibition only. Other biological antagonist undertaken was *Gliocladium virens*.

Key words : Marigold, *Sclerotium rolfsii*, plant extract, biological antagonist, agrochemical

INTRODUCTION

Marigold is most widely used flowers in India. It is especially used for beautification, commercial purposes, medicinal values and ornamental. Both leaves and flowers are important as all the parts contain oil and used as repellent against flies. Having accepted as ornamentals for its aesthetic value, marigold has been found to be highly effective in keeping the population of nematode under control. This flower is attacked by some pathogens which results in yield loss and crop failure to a considerable extent. In India, the crop is known to be infected by a number of fungal pathogens causing leaf spot, leaf blight, flower bud rot and collar rot (Sohi, 1983). Loss of flower yield amounts to an extent of 50-60% (Cotty *et al.*, 1985).

Collar rot in marigold caused by *Sclerotium rolfsii* has been observed in Orissa condition which resulted reduction in yield. Keeping this view, an attempt has been made to screen nineteen different formulations against *Sclerotium rolfsii* causing collar rot of marigold in Orissa. Formulations include eight fungicides, six plant extracts and five bioagents.

MATERIALS AND METHODS

Collar rot affected samples of susceptible marigold variety was collected and the causal organism *Sclerotium rolfsii* was isolated. Cultures were purified by single spore inoculation technique tested for pathogencity and maintained in potato dextrose agar (PDA) slants. Poison food media were prepared using selected concentration of different fungicide i.e. Topsin-M (0.15%), Bavistin (0.15%), Blitox-50 (0.5%), Contaf (0.1%), Benlate (0.2%), Captan (0.3%), Thiram (0.3%), Manzate (0.3%) (Table 1). Five plant extracts (Table 2) were prepared by crushing 200 g fresh leaves, bulbs as the case may be, using sterilized water. Solutions were filtered and centrifuged at 5,000 rpm for five minutes. Clear supernatant solutions obtained were used to prepare poison food PDA media. Equal sized core disc (5.0 mm) of seven days old culture of four biocontrol agents (Table 3) were used to study the growth of test fungus (placed in the center) by dual culture method. Efficacy of the formulations was measured as percentage of growth inhibition using the vincient formula C-T/C × 100, where 'C' is equal to colony diameter of the fungal colony in control and 'T' is

colony diameter of the fungal colony in treatment. Inoculated plates were incubated at 28 ± 2ºC. Observations of colony diameter were taken at an interval of 24 hrs till there was a full growth in control plates.

RESULTS AND DISCUSSION

The percentage growth inhibition of eight fungicides were analysed *in vitro* against *Sclerotium rolfsii* and presented in Table 1. Among the eight fungicide tested, Contaf, Benlate, Captan, Thiram and Manzate showed hundred percentage of growth

Table 1 : Effect of different fungicides on growth of *S. rolfsii*

Fungicide	Cencentration (%)	Mean diameter of fungal growth (in cm)	Percentage of inhibition over control
Topsin-M	0.15	78.67	12.6
Bavistin	0.15	33.1	78.9
Blitox-50	0.5	30.2	66.7
Contaf	0.1	0	100.0
Benlate	0.2	0	100.00
Captan	0.3	0	100.00
Thiram	0.3	0	100.00
Manzate	0.3	0	100.00
Control		94.3	0
SEM±		0.38	0.015

inhibition followed by Bavistin (78.9%) and Blitox-50 (66.7%). Topsin-M was found to be less effective (12.6%). Five different plant extracts at three different ratio 1 : 20, 1 : 10 and 1 : 5 were tested for their efficacy against *Sclerotium rolfsii* (Table 2). From the data in the Table 2, it was evident that *Rauwolfia serpentina* acted best against *Sclerotium*

Table 2 : Effect of botanicals against *S. rolfsii*

Plant extract	Percentage inhibition (%)		
	Effective concentration (v/v)		
	1 : 20	1 : 10	1 : 5
Turmeric	13.6	22.8	31.1
Garlic	23.4	27.6	38.7
Neem	25.5	29.7	39.6
Tulsi	17.2	20.2	37.3
Patala garuda	38.3	50.4	56.5
SEM±	0.27	0.19	0.25
CD (0.05)	0.83	0.61	0.72

rolfsii at all three concentrations followed by neem and turmeric. In total four plant extracts were used to check the growth of *Sclerotium rolfsii*.

Among the antagonistie fungi tested against *Sclerotium rolfsii* (Table 3). *Streptoverticillium* ($SVNR_7$) was found to be the best followed by *Gliocladium virens* (GV_2). Although *Trichoderma* sp. is more commonly available antagonistie fungi. It is not as effective as compared to above two antagonist.

The results indicated that among various chemical tested, Contaf was most effective to control *Sclerotium rolfsii*. Although other fungicides were also effective at little higher concentrations. *Rauwolfia serpentina* and neem (*Azadirachita indica*) were found to have better inhibitory effect on *Sclerotium rolfsii* than others among the plant extracts.

Table 3 : Growth inhibition of *S. rofsii* by Antagonists in dual culture

Antagonists	Mean diameters of test fungus (in mm)	Percentage inhibition
Trichoderma harzianum	67.9	22.8
Trichoderma viride	63.7	28.1
Gliocladium virens (GV_1)	68.6	23.2
Gliocladium virens (GV_2)	59.5	34.3
Streptoverticillium ($SVNR_7$)	58.7	34.7
SEM±	2.07	
CD (0.05)	6.31	

Sclerotium rolfsii was treated with some biocontrol agents to develop a method of control over the pathogenic fungi in an ecofriendly way. *Streptoverticillium* was found to be the most effective in inhibiting the growth of *Sclerotium rolfsii* followed by *G. virens* (GV_2). *Trichoderma viride* resulted least inhyibition in the growth of the test fungus. In recent years as reported, commercial formulations of *Trichoderma viride* are becoming popular among farmers for the management of soil borne plant diseases for their eco-friendly nature and lasting effect but in this investigation *Streptoverticillium* has been proved better than *Trichoderma viride* and in future its commercial formulation may be encouraged considering its good effect.

In future, field trials needs to be taken for testing efficacy of *Streptoverticillium* against *S. rolfsii* in view of the present report.

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