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RESEARCH ARTICLE

ANTIFUNGAL ACTIVITY OF PLANT EXTRACTS AGAINST *SCLEROTIUM ROLFSII* (COLLAR ROT PATHOGEN) IN TUBEROSE

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ABSTRACT

Tube rose is an important flower plant of our country earning a lot of revenue and trade. Of different diseases affecting tube rose cultivation, collar rot induced by *Sclerotium rolfsii* Sacc. is an important soil borne disease causing devastating losses. In the present study, the sensitivity of the collar rot pathogen was investigated. Out of nine aqueous plant extracts, evaluated in vitro root extract of moringa (*Moringa oleifera* L.) and seed extract soapnut (*Sopindus trifoliate* L.) were found highly inhibitory to S. rolfsii completely at 20 percent concentrations and fairly high inhibition of fungal growth was noted in lower dose. Considerably high inhibition of mycellial growth was noted in leaf extract of neem (*Ajadiracta indica*) and patal gaurad (*Rowlphia serpentine*).

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INTRODUCTION

Tuberose is an important commercial cut as well as loose flower crop due to pleasant fragrance, longer vase-life of spikes, higher returns and wide adaptability to varied climate and soil. This fungal disease is caused by *Sclerotium rolfsii*, mostly affecting the roots. The initial symptom of this disease is flaccidity and drooping of leaves. The leaves become yellow and dry up. The fungus mainly affects the roots and the infection gradually spreads upward through the tuber and collar portion of the stem. Both tubers and roots show rotting symptoms. Thick cottony growth of the fungus is visible on the rotten portion. Apart from conventional fungicides and microbial agents, plant extracts have been found to be effective against a wide range of pathogens (Amadioha, 2003: Bowers and Locke, 2004; Sahayaraj *et al.,* 2009). Furthermore, plant products based bio fungicides are systemic, specific in action, non phytotoxic and does not pose environmental pollution (Singh, 1994). The extracts of many plants possess active constituents which have either direct antimicrobial activity (Amadioha, 2003) or induce host defense response thereby resulting in reduction of disease development (Schneider and Ullrich, 1994). The aim of the present study was to compare the effect of some selected medicinal plant extract and fungicides on *Sclerotium rolfsii* mycelial growth in-vitro and identify the concentration of plant extract that have fungicidal properties against tube rose collar-rot pathogen.

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MATERIALS AND METHODS

The plant samples were collected from farmer's field. Each sample was labelled properly and taken into laboratory for examination of incidence of collar rot caused by *Sclerotium rolfsii.*

Isolation of Pathogens

With the moist blotter method recommended by ISIA (1953,1961), the diseased plant sample collected were washed and diseased collar parts were cut into pieces which were then washed and diseased collar parts were cut into pieces which were then disinfected with 1:1000 (0.1%) mercuric chloride solution.

Table 1. Effect of different plant extract on radial mycelial inhibition (%) of *S.rolfsii* the incitant of Collar –rot in tuberose

S.No.	Plant extract	Concentration (%)		
		10	20	50
1	Basang leaf (Adhhatoda vasika)	19.6 (26.31)	22.43 (28.18)	40.0 (39.23)
2	Moringa root (Moringa oleifera)	96.6 (83.85)	100.0 (90.00)	100.0 (90.00)
3	Neem leaf (Azadirachta indica)	25.7 (30.39)	47.0 (43.27)	87.7 (69.50)
4	Manjuati root (Lawsonia inermis)	33.7 (35.46)	62.0 (51.95)	78.0 (62.04)
5	Neem seed (Azadirachta indica)	28.7 (32.7)	40.0 (3.23)	51.7 (45.96)
6	Soap nut (Sopindus trifoliate)	82.7 (65.43)	100 (90.00)	100 (90.00)
7	Patal garuda leaf (Rawolfia serpentine)	26.3 (30.87)	40.7 (39.62)	84.7 (60.96)
8	Karanja leaf (pongamia glabra)	36.7 (34.85)	51.7 (45.96)	67.3 (55.13)
9	Lantana leaf (Lantana camera)	38.7 (38.45)	46.7 (43.09)	59.0 (50.22)
10	Control	-	-	-
	SE (m)+	2.21	1.14	1.06
	C.D.(0.05)	6.57	3.39	3.15

Figures in parentheses are angular transformed values

These were transferred to PDA slants after several washing in sterile water and incubated at 280C+-1^{o}C. The culture was maintained by sub-culturing to time PDA slants. The pure culture was obtained by transferring a young immature white Sclerotium from culture tube to a fresh PDA slant and incubated for 9-10 days. From this culture a young white Sclerotium was again transferred to sterilised PDA slant. Thus a pure culture was obtained and maintained by sub culturing.

Evaluation of plant extract

Plant extract of Basang leaf (*Adhhatoda vasika*), Neem seed (*Azadirachta indica*), Soap nut (*Sopindus trifoliate*), Patal garuda leaf (*Rawolfia serpentine*), Karanja leaf (*Pongamia glabra*), Moringa root (*Moringa oleifera*), Lantana leaf (*Lantana camera*) were prepared by taking 100g of fresh leaves/root/seeds from each plant was collected, washed in sterile grinded in a mixi and filtered through double layer muslin cloth and again by Watman no. 1 filter paper. The cold aquous extract were diluted to desired concentration by adding in PDA. Before adding in PDA media the aqous extract was boiled at 45^{o} C for about 15 minute.

Inhibition of mycelial growth of *Sclerotium rolfsii*

All the plant extracts mentioned above were used at 10 per cent concentration. The standard plant extract solution (100 %) and the medium were prepared as already described. Ten ml of the plant extracts was added through membrane filter to 90 ml of the sterilized warm PDA medium each separately and poured in to the sterilized petridishes / plates under aseptic conditions. A five mm disc of 7 day old culture of the pathogen was cut by means of a sterilized cork borer and placed in to the medium at the center of the petriplate .Three replications were maintained. The plates were incubated at room temperature (28 + 2^{o}C). The medium without incorporating the plant extract served as control. The fungicide, Dithane M -45 (0.2 per cent) was used as standard check. The mycelial growth of the pathogen was measured when the control treatment with pathogen reached full growth. Three plates per replication were maintained for each treatment. The percent inhibition of mycelial growth was calculated.

RESULTS AND DISCUSSION

Critical examination of data (Table 1) clearly revealed that there was significant difference among plant extracts in inhibiting radial mycelia growth. Root extract of *Moringa olelifera* inhibited mycelia growth even at 10 per cent concentration. It was found significantly better than any other plant extract in respect of mycelia inhibition of *S.rolfsii*. Among nine aqueous plant extract studied, the root extract of moringa (*Moringa oleifera* L.) and seed extract soapnut (*Sopindus trifoliate* L.) were found highly inhibitory to *S. Rolfsii*. Considerably high inhibition of mycellial growth was noted in leaf extract of neem (*Ajadiracta indica*) and patal gaurad (*rowlphia serpentine*). Earlier several phyto extract were reported to cause complete mycelia inhibition of *S. Rolfsii* isolated from different crops (Nene and Kumar, 1996; Konde *et al.,* 2008, Magdalene and Oyibo, 2008). Singh *et al.* (1980) demonstrated complete inhibition of mycelia growth using leaf, trunk extract of neem. Mesta *et al*. (2009) found that among the plant extracts, neem leaf extract (38.49%) was effective than all other plant extracts with respect to inhibition of *A. helianthi* spore germination on sunflower when compared to fungicides. Taskeen-Un- Nisa *et al*. (2011) revealed that Carbendazim, hexaconzol, bitertanol, myclobutanil, mancozeb, captan and zineb and extracts of *Allium sativum, Allium cepa* and *Mentha arvensis* were evaluated for their effect on the inhibition of mycelial growth and spore germination of *Fusarium oxysporum*. Raja Gopal Reddy *et al.* (2009) found that phytoextracts and plant oils were treated *in vitro* for their antifungal efficacy against the growth of *Cercospora moricola*, the incitant of leaf spot of Mulberry (*Morus alba* L.).The beneficial medicinal effects of plant materials typically result from the combinations of secondary products present in the

plant (Santa and Lakshmi, 2007; Mathur *et al.*, 2006). Antifungal activity of soap nut extract against *fusarium moniliforme* was claimed by Gohil and Bala, 1995). Phytoextract of *M. Olefera* and *S. Trifoliate* showing complete inhibition of *S. Rolfsiii* for the time reported here. Kumarasamyraja *et al.* (2012) reported that the chloroform extract of *Acalypha indica* whole plant was effective against *Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli* and showed a promising anti bacterial activity at 300.g/ml concentration due to the presence of alkaloids. In recent years, many plant extracts are being used for the control of plant diseases. However, this product is not very much effective like fungicides. Before advocating to the farmers there efficacy should be evaluated in the field condition along with commercial fungicides to access the real potency as botanical pesticides. If search will continue no doubt some plant products may be available in near future which should be replaced highly toxic fungicides to control collar-rot diseases with minimum risk of environmental pollution and health hazard.

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