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Short communication

Effect of various plant extracts on dry root rot of chillies caused by *Sclerotium rolfsii*

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ABSTRACT

Eight different plant extracts were evaluated *in vitro* against *Sclerotium rolfsii* causing dry root rot in chillies. Among these, leaf extract of neem (*Azadirachta indica*) caused maximum inhibition of mycelial growth (80.74%), followed by periwinkle *Vinca rosea* (78.8%) and bottlebrush (*Callistemon,* 74.8%) respectively. Sclerotial production was inhibited to an extent of 11% and the inhibition caused was maximum with neem extract, followed by *Polyalthia longifolia* and *V. rosea* extracts. Though sclerotial germination was inhibited by 30% to 95% in various treatments, the most effective treatment was that of neem leaf extract (95%), followed by ginger extract (92%).

Key words: *Sclerotium rolfsii*, plant extracts, mycelial growth, sclerotial production

Dry root rot of chillies, caused by *Sclerotium rolfsii*, is a major disease in chilli-growing areas of Andhra Pradesh, and causes severe losses. The pathogen survives as sclerotia in soil for a long duration which served as a source of primary inoculum (Shoeraj Singh *et al*, 2007). Due to prolonged, saprophytic survivability of the pathogen, chemical management is not very effective and is, therefore, uneconomical. Plant derivatives endowed with pesticidal properties are being evolved worldwide as alternatives or supplements to existing chemical pesticides for several reasons, *viz.*, spiralling costs, environmental hazards and development of resistance by pathogens and insects (Mishra, 2005). Plant extracts are known to possess antimicrobial properties and several research workers have studied antifungal activity of various plant extracts (Seshakiran *et al*, 2006; Sheoraj Singh *et al*, 2007; Deepak Kumar *et al*, 2008). These reports prompted the present investigation on *in vitro* screening of plant extracts, viz., neem (*Azadirachta indica*), bottlebrush (*Callistemon lanceolatus* De), periwinkle (*Vinca rosea*), ashoka (*Polyalthia longifolia*), curry leaf (*Murraya koenigii*), prosopis (*Prosopis julifera*), onion bulb (*Allium cepa*) and ginger stem (*Zingiber officinalis*) to assess their inhibitory effect on pathogen mycelial growth, sclerotial production and sclerotial germination.

Plant extracts: Leaves of neem, *Callistemon*, *Vinca*, ashoka, curry plant and *Prosopis* plants and onion bulb and ginger stem were washed with sterilized distilled water and air-dried. A hundred grams of freshly-chopped leaves, bulb and stem were taken and boiled at 80°C for 10 min. in water. The material was homogenized for five min., filtered through muslin cloth and the filtrate was centrifuged at 5000rpm for 15 min. The clear supernatant was collected and used as 100% standard extract. For evaluation of antifungal activity of these extracts, 10% concentration was made by adding 10ml of standard, basic stock of plant extract to 90ml Potato Dextrose Agar (PDA) in Petri plates, replicated thrice for each treatment. PDA without the plant extract served as the Check. Each plate was inoculated with a sclerotium taken from 15-day old culture of *S. rolfsii*. Inoculated plates were incubated at 25±1°C and data on (i) mycelial growth and (ii) sclerotial formation were recorded. Sclerotial germination was recorded by collecting sclerotia from 15-day old cultures of the pathogen grown on PDA medium. The sclerotia were at first surface-sterilized with sodium hypochlorite solution (0.35% available chlorine) and then washed in sterile distilled water and placed in sterilized Petri plates under dry conditions. Three sclerotia were suspended in aqueous extracts obtained from the above plant material in the cavities of cavity slides placed over a V- shaped glass rod in a humidity chamber made in sterile Petri plates. The plates were incubated at 28±1°C for 72 hours. A check was also maintained with sterilized distilled water in place of aqueous extract. Each treatment was replicated thrice, germination of sclerotia was recorded and per cent inhibition calculated.

Table 1. Effect of various plant extracts on mycelial growth, sclerotial formation and germination of *Sclerotium rolfsii*

S.l No.	Plant extract used	Mycelial growth (cm)	Per cent inhibition of growth	Inhibition (%) of sclerotium formation	Sclerotial germination (%) after 72 h	Inhibition (% over Control)
1	Neem (*Azadirachta indica*)	1.73	80.61	11.00	5	95
2	Callistemon (*Callistemon lanceolatus*)	2.26	74.80	5.83	60	40
3	Periwinkle (*Vinca rosea*)	1.90	78.80	6.67	12	88
4	Ashoka (*Polyalthia longifolia*)	2.96	67.03	9.83	30	70
5	Curry leaf (*Murraya koenigii*)	5.90	34.40	3.16	70	30
6	Prosopis (*Prosopis julifera*)	4.26	52.59	4.50	50	50
7	Onion (*Allium cepa*)	5.83	35.18	3.20	55	45
8	Ginger (*Zingiber officinale*)	4.46	48.22	3.63	8	92
9	Check	8.96	0	99.00	100	0
	SEM ±	0.117		0.404		2.041
	CD (*P= 0.05*)	0.350		1.211		6.119

Effect of plant extracts: All plant extracts were by and large inhibitory to pathogen mycelial growth and sclerotial formation. Mycelial growth inhibition ranged from 35.18 to 80.74% (Table1). Significantly, highest inhibition was recorded in the extract obtained from neem leaves (80.1%). Next in order were extracts obtained from *Periwinkle* (78.8%), *Callistemon* (74.8%), Ashoka (67.03%), *Prosopis* spp (52.59%) and Ginger (48.22%). Curry leaf extract was least inhibitory, as was the extract of onion bulbs.

The plant extracts did not affect sclerotial formation, although these delayed sclerotial formation by 20 days. Maximum reduction (Table1) in sclerotial formation (11%) was recorded in plates amended with neem leaf extract, followed by Ashoka (9.83%) and *Vinca* (6.67%).

Aqueous extract of neem leaves inhibited sclerotial germination in *S. rolfsii* by 95%. This was followed by ginger (92%) and *Vinca* (88%), whereas foliar extracts of ashoka and prosopis recorded 70% and 50% inhibition, respectively. Inhibition of sclerotial germination was low with extracts of onion bulb (*Allium cepa,* 45%) and bottlebrush (*Callistemon lanceolatus* De, 40%) whereas, it was least with extract of curry leaf (30%).

These results are in agreement with findings of Shoeraj Singh *et al* (2007) who reported that foliar extract of neem followed by that of ashoka, caused maximum inhibition of mycelial growth, sclerotial production and viability of *S. rolfsii* causing collar rot of lentil. Seshakiran *et al* (2006) found mycelial growth and sclerotial formation to be inhibited by extracts of prosopis, neem and onion bulb, as also recorded in the present investigation. Sonali and Gupta (2004) reported that acqueous extracts of mustard cake and neem cake, neem oil reduced *in vitro* germination of sclerotia of *S. rolfsii* causing seedling blight of apple. Fungitoxic properties of *Prosopsis julifera* against various species of *Fusarium*, *Dreschlera* and *Alternaria* were reported by Raghavendra *et al* (2002) and Ganesan (1993), whereas Datar *et al* (1999) reported fungicidal properties of leaf extracts of ashoka (*Polyalthia longifolia)* against *Macrophomina phaseolina*. Sharma and Gupta (1995) observed decrease in root rot incidence in apple using neem cake as an organic amendment. Similar report came form Karthikeyan and Karunanidhi (1996) with work on several soil-borne pathogens. Singh and Dwivedi (1989) found that *Azadirachta indica*, *Emblica officinalis*, turmeric and ginger extracts reduced hyphal dry-weight and sclerotial production *in vitro* in *S. rolfsii.* Leaf, flower, stem and root extracts of *Vinca rosea* were found to be inhibitory to *S. rolfsii, Fusarium oxysporum* and *Aspergillus niger* (Narain and Satapathy, 1977).

Findings in the present study are in conformity with those in the above-stated reports and these can be further exploited for formulating integrated disease management (IDM) schedule for dry root rot of chillies.

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