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In vitro Antifungal Activity of Somee Higher Plant Extracts against *Alternaria brassicae* (Berk.) Sacc. and *A. brassicicola* (Schw.) Wiltsh

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Abstract

The aqueous extracts of 10 plant species *viz*. *Alangium solviifolium* (root), *Cestrum nocturnum* (leaf), *Ranunculus sceleratus* (leaf), *Ageratum conyzoides* (stem), *Annona squamosa* (leaf), *Zingiber officinale* (rhizome), *Nicotiana plumbaginifolia* (fruit), *Adhatoda vasica* (fruit), *Saraca indica* (bark), *Cannabis sativa* (leaf) were assayed in vitro for antifungal activity against *Aternaria*s pp.-the causal organisms of leaf blight of crucifers. The assessment of fungi toxicity was carried out by poisoned food technique on the basis of percent of inhibition in colony diameter of the test fungi *Alternaria brassicae* and *A. brassicicola*. The extracts of all plant species were found to be effective against test fungi. Among them, the aqueous extracts of root of *Alangium solviifolium* showed total inhibition of mycelial growth against both species of *Alternaria*. The present study was found out a source of biofungicide, so that environmental hazards can be minimized by using these chemicals.

Keywords: *Alangium solviifolium*, Antifungal, Aqueous Extracts, *Alternaria brassicae* and *A. brassicicola*

INTRODUCTION

In Agriculture industry, there is great damage and loss of plants as well as plant products due to fungi. It is not only reduces the quantity but also affect the quality of the plant products. Some diseases such as Ergot of rye caused by *Claviceps purpurea* make the plant products unfit for consumption by making them poisonous. Several species of *Alternaria* attack cultivated crucifer including oil seeds bearing brassicas and vegetables such as cabbage, cauliflower and radish. A large number of synthetic pesticides especially fungicides are used extensively in the effective and efficient

management of crop diseases. Most of these synthetic compounds have been found to exhibit teratogenecity, mutagenicity, carcinogenicity, phytotoxicity and residual effect (Bajajand Ghosh 1975). Ravikumar and Garampalli (2013) evaluated the antifungal activity of aqueous extracts of 39 plants against *Alternaria solani* at 4% concentration. Out of these, 13 plants extracts such as *Crotalaria trichotoma, Citrus aurantifolia, Azadirachta indica, Polyalthia longifolia, Datura metel, Muntingia calabura, Oxalis latifolia* etc. Significantly showed to reduce mycelial growth of test pathogen. Parveen *et al.* (2014) evaluated the inhibitory activity of five plant extracts *viz. Artemisia absinthium, Rumex obtusifolius, Taraxacum officinale, Plantago lanceolata* and *Malva sylvestris* against the mycelial growth of three fungi *Alternaria alternata, Penicillium expansum* and *Mucor piriformis* that causes of rot diseases in the fruit and vegetables resulting in low yield and quality of fruits and vegetables. They found that all concentrations of plant extracts brought about significant inhibition in the mycelial growth of these pathogenic fungi. Devi*et al.* (2017) reported the antifungal activity of leaf extracts of three Plants and Neen oil against three post harvested fungal pathogens viz. *Rhizopus arrhizus, Sclerotium rolfsii, Fusarium solani.* Among them the leaf extracts, *Datura erecta* showed maximum antifungal activity against test pathogens, followed by *Lawsonia inermis*, Neem oil and *Cocculus hirsutu.*

Therefore, the present study was undertaken to evaluate ten higher plant extracts against *Alternaria brassicae* and *Alternaria brassicicola*, the causal organisms of leaf blight of crucifers and to investigate active fraction of the most active plant in order to find out a source of biofungicide so that environmental hazards can be minimized by using these chemicals.

MATERIALS AND METHODS

Collection of Plants: Samples of fresh plants used to prepare extracts such stem, root, leaf, bark, flower; fruit etc. of different plant species belonging to different families were collected from local area during growing season at regular intervals and brought in the laboratory.

Preparation of plant extracts: The different parts of 10 plants viz. *Alangium solviifolium* (root), *Cestrum nocturnum* (leaf), *Ranunculus sceleratus* (leaf), *Ageratum conyzoides* (stem), *Annona squamosa* (leaf), *Zingiber officinale* (Rhizome), *Nicotiana plumbaginifolia* (fruit), *Adhatoda vasica* (fruits), *Saraca indica* (bark), *Cannabis sativa* (leaf) were used for extraction. 40 gram of each plant material was sterilized with 0.1 % mercuric chloride solution followed by proper washing with distilled water and was macerated to pulp in a Warring blender. The macerated plant samples were filtered through cheese cloth and finally with Whatman No. 1 filter paper on next day. Thus, a clear extract was prepared for the test of antifungal activity

Test Pathogens: *Alternaria brassicae* and *A. brassicicola* were isolated from infected cruciferous plants. The infected cruciferous plants collected from the field and brought in the Laboratory of Botany Department, Shibli National PG Collage Azamgarh Uttar Pradesh. The infected plant was identified on the basis of the morphology and symptom of the disease. The sterilized infected pieces were placed on Molten Agar Medium as Czapek's Dox Agar medium (Thom and Raper, 1945) which was selected to isolate the test pathogens and is the most widely used appropriate media for mycelial growth.

Mycelial Disc: For assessment the antifungal activity, a mycelial disc (4mm in diameter) cut from the periphery of a seven days old culture of the test fungi.

Antifungal Assay: The sample of plant extracts were assayed for antifungal activity against isolated fungi *Alternaria brassicae* and *A. brassicicola*. All the tested plant samples were subjected to antifungal assayed by Poisoned Food Technique (Grover and Moore, 1962 and Mishra and Tiwari, 1992). The extracts of each plant sample was mixed thoroughly with Molten Czapek'sDox Agar medium at 40^0C in equal amount and poured into sterilized petriplate at the rate of 10 ml per petripalte (3'' Diameter). For this purpose a mycelial disc (4 mm in diameter), cut from the periphery of a seven days old culture of the test fungi, was aseptically transferred at the centre of the Petreplate using sterilized cork borer. Then the plates were incubated at 24^0C for seven days and observations were recorded. All plates were taken with three replicates and were arranged in completely randomized block design.

The screening was repeated throughout the course of the present investigation to confirm the result. On the seventh day, the colony diameter of treatment discs and the control discs were measured in mm and Percentage of inhibition of mycelial growth was determined by using the following formula (Mohana and Raveesha, 2007).

Percentage mycelial inhibition = $\frac{C-T}{T}$ X 100

Where, C = Average mycelial growth in control plate

T = Average mycelial growth in treatment plate

Table 1: Screening of some angiospermic plant extracts against *Aternariabrassicae* and *A. brassicicola*

Name of The Plants	Family	Part used	Mycelial Inhibition (%)	
			A.brassicae	***A. brassicicola***
Adhatoda vasica Ness.	Acanthaceae	Fruits	67.59	60.78
Ageratum conyzoides Linn.	Asteraceae	Stem	80.33	74.66
Alangium solviifolium (L.f.) Wang.	Alangiaceae	Root	100	100
Annona squamosa Linn.	Annonaceae	Leaf	80.27	68.14
Cannabis sativa Linn.	Cannabaceae	Leaf	61.53	50.96
Cestrum nocturnum Linn.	Solanaceae	Leaf	94.76	91.41
*Nicotiana plumbaginifolia*Viv.	Solanaceae	Fruits	68.40	60.32
Ranunculus sceleratus Linn.	Ranunculaceae	Leaf	93.42	85.16
Saraca indica Linn.	Fabaceae	Bark	65.83	65.44
Zingiber officinale Roscoe	Zingiberaceae	Rhizome	74.67	80.95

RESULTS AND DISCUSSION

In the present investigation, allaqueous plant extracts showed inhibitory effect on the growth of the test fungi (table 1). Among these extracts, the root extract of *Alangium solviifolium* was recorded 100 percent inhibition of mycelial growth against both the test fungi- *A. brassicae* and *A. brassicicola*. Next to *Alangium soviifolium*, the highest percent of mycelia inhibition against *A. brassicae* and *A. Brassicicola* was recorded in *Cestrum nocturnum* Linn. (Leaf) and *Ranunculus scleratus* Linn. (Leaf). It is evident from the above results that there are some antifungal compounds present in plants which act as fungicide. Wuthi-udomlert *et al.* (2002) conducted anexperioment to investigate the inhibitory effect of *Alangium solviifolium* against dermatophytes and *Candida albicans* and reported inhibitory effect of *Alangium solviifolium* against *Candida albicans* without any local toxicity.

Sasode et al. (2012) evaluated the fungitaxicity of some palnts viz. Neem, Eucalyptus, Datura, Pudina, Tulsi, Lantana against *Alternaria brassicae* and *A. brassicicola* and they observed minimum growth in crude extract of Neem followed by Tulsi, Lantana, Datura and Pudina except Eucalyptus. The leaves of *Alangium solviifolium* contain flavonoids, terpenoids, alkaloids and steroids which are known to be bioactive antidiabetic principles and its antioxidant properties (Kalarani *et al*. 2011). The anti-fertility activity of the stem bark of *Alangium solviifolium* in Wister female rats has also been reported by Murugan*et al.*(2000)**.**But none of earlier reports have demonstrated the antifungal potency of *Alangium solviifolium* against phytopathogenic fungi causing blight of crucifers. Thus, the present study is the first report of the antifungal potency of *Alangium solviifolium* against the phytopathogens *A. brassicae* and *A. brassicicola*.Further research is needed for successful separation, purification and characterization of biologically active compounds.

CONCLUSION

From the above results, it may be concluded that the root extract of *Alangium solviifolium* contains fungitoxic compounds which inhibited mycelial growth of test fungi. It is promising that the tested plant could be used to synthesized novel fungicide. Fungal diseases still are an obstacle to the economic production of plants such as cruciferous plants. Pesticides traditionally used at large scale

are synthetic chemicals which have non target action as well as along with some of them have persistence in the environment. The antifungal substances from higher plants have mostly been found to be non-phytotoxic, more systemic, and easily biodegradable and limit pesticidal pollution (Fawcett and Spencer, 1970; Beye, 1978). To overcome these problems for last two decades, intensive efforts have been made by the agricultural researchers to discover chemicals of plant origin having antimicrobial properties (Sofowara, 1993). Thus, the present study was found out a source of biofungicide, so that environmental hazards can be minimized by using these chemicals.

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