ANNALS OF PLANT SCIENCES
ISSN: 2287-688X
OPEN ACCESS
www.annalsofplantsciences.com

ORIGINAL RESEARCH ARTICLE

Study of leaves of *Alstonia scholaris* linn. (satvin), Family: apocynaceae, as a potential source of natural fungicide

Vinit Vaidya* and Deepak Gupta
Department of Botany, Thakur College of Science & Commerce, Kandivali (East), Mumbai 400101, Maharashtra, India.

Received: October 10, 2015;
Accepted: November 24, 2015.

Abstract: Infections of the plants caused due to fungal pathogens are of worldwide occurrence and discussed for a long period. World has witnessed various epidemics caused due to various fungal diseases, which have not only caused loss of quantity and quality of the plants but also were responsible for death of the people. The fungi can invade the plants at various stages right from seed to a fully grown plant including flowers and fruits making them inappropriate and hazardous for human consumption. Hence, fungal pathogens have to be treated with suitable fungicides to control their growth. The fungicides can be categorized as biological or chemical. In case of biological fungicides; extracts of Neem, Turmeric, Tulasi etc. are considered to be very effective fungicides while mancozeb, carbendezim, sulphur etc. are very effective chemical fungicides available in the market in various forms. There are problems associated with chemical as well as conventional biological fungicides. Hence, in this study, we have tried to work out with leaf extract of *Alstonia scholaris* Linn. as a natural fungicide to find out an alternative to the conventional fungicides and study its effect in various forms of extracts to control growth of *Aspergillus niger, Aspergillus flavus* and *Rhizopus stolonifer*; which are very common fungal pathogens.

Key Words: Fungal Pathogens; Chemical Fungicides; Biological Fungicides

Introduction

Plant pathology is a vital branch of botany dealing with various causes, symptoms, cycles and control measures caused by various organisms. Study of any plant disease is very crucial task because the plant can be invaded by the concerned organism at any stage of development of plant i.e. from time of sowing to the time of harvest and consumption. When they cause heavy losses in terms of quantity and quality, they are also responsible for causing diseases and prove to be fatal to animals and human beings (D. K. Jha, 1993). Once we confirm the fungal pathogens and damaged caused by them, suitable control measures of growth of the pathogens can be used (Singh and Swami, 2004).

There are various methods of control of the fungal pathogens as physical methods, mechanical methods, biological methods and chemical methods. Out of these, chemical methods can be considered to the most effective method since ancient time and even implemented today. In case of traditional biological fungicides, many a times, growth of fungal pathogens cannot be controlled very effectively as required while the chemical fungicides are proved to be harmful not only to the fungal pathogen but to the host plant on which they are used and there is bioaccumulation of these chemicals in the ecosystem; which is hazardous for human health.

As a result, there is an utmost need to invent a new biological fungicide which can be very effective to control growth of the fungal pathogens but at the same time do not cause any kind of bioaccumulation in the plants as in case of the chemical fungicides. Naturally occurring secondary metabolites in any plant material can be tested for such kind of experiment (Olajide, 2000) because alkaloids, tannins, glycosides are the secondary metabolites in the plants which are not utilized by the plants for their day to day metabolic activities and remain unused. Leaves of *Alstonia scholaris* Linn. are known to contain very high amount of alkaloids (Ramchandra *et al.,* 2012) which can be extracted for this purpose. Hence, in the present study, we have tried to extract alkaloids from the leaves of *Alstonia scholaris* Linn. commonly called as Satvin (Family: Apocynaceae); which is easily available as road side, cultivated ornamental tree.

Materials and Methods

Preparation of leaf extract:

The leaf was prepared into aqueous and organic extracts. Aqueous extract was prepared in sterilized distilled water while organic extract was prepared in pure ethyl alcohol. For preparation of both the extracts, 1 gm of leaf material was extracted with 10 ml of respective solvents separately and boiled on water bath to reduce the volume up to 5 ml. The extracts were allowed to cool and then filtered by using Whatman No. 1 filter paper. The collected extracts were used for testing.

Preparation of the Petri plates:

In agar plate method, potato dextrose agar medium was used. For preparation of potato dextrose agar medium, 200 gms of peeled potatoes were boiled in 500 ml of distilled water and the extract was collected.

20 gms of dextrose was added to the extract along with 20 gms agar agar. The final volume of the extract after addition of dextrose and agar agar was brought to 1000 ml with distilled water. The medium was sterilized at 120º C and 15 lbs pressure for further use. 20 ml of sterilized potato dextrose agar medium was poured in Petri plates. The medium was allowed to cool till solidified. A well of 8 mm diameter was prepared in each Petri plate in the solidified

***Corresponding Author:**
Vinit Vaidya,
Department of Botany,
Thakur College of Science & Commerce,
Kandivali (East), Mumbai 400101, Maharashtra, India.

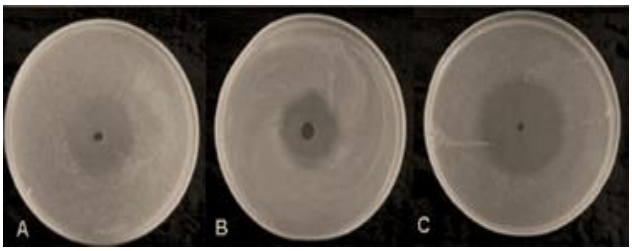
medium by using cork borer. In one Petri plate, 1 ml aqueous leaf extract; in the other Petri plate, 1 ml pure ethyl alcohol while in the third Petri plate, 1 ml organic leaf extract were added along with cultures of respective fungal pathogens i.e. *Aspergillus flavus, Aspergillus niger* and *Rhizopus stolonifer*. The plates were incubated for 4 days at 28° C. The results were recorded in terms of colony growth and zone of inhibition.

Results and Discussion

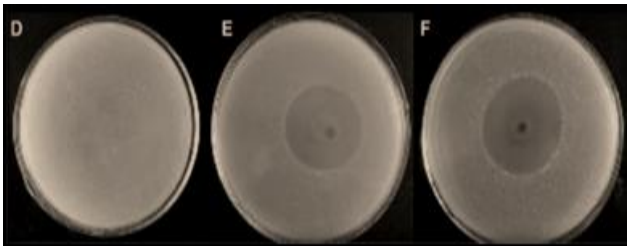
Table 1: Zone of inhibition of various fungal pathogens in leaf extracts

S.No.	Fungal Pathogen	Zone of inhibition (mm)		
		Aqueous Leaf Extract	Pure Alcohol	Leaf extract in pure alcohol
1	*Aspergillus flavus*	1.2 (A)	1.5 (B)	1.8 (C)
2	*Aspergillus niger*	NIL (D)	1.2 (E)	1.7 (F)
3	*Rhizopus stolonifer*	0.6 (G)	1.0 (H)	1.5 (I)

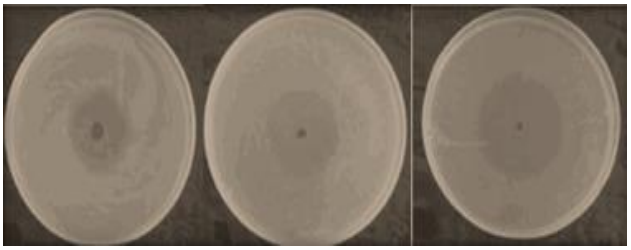
Results in Table 1 clearly indicate that aqueous extract of *Alstonia scholaris* Linn. is effective against all the three fungi in ascending order from *Rhizopus stolonifer* to *Aspergillus niger* and *Aspergillus flavus*. Similarly, pure alcohol and leaf extract of *Alstonia scholaris* Linn. in alcohol also show the same effect in ascending order of *Rhizopus stolonifer* to *Aspergillus niger* and *Aspergillus flavus*. In this case, aqueous extract of *Alstonia scholaris* Linn. showed retardation of growth of fungal pathogens. Pure alcohol was used purposely because alcohol itself is a very strong antifungal agent, which also contributed in control of growth of the fungal pathogens but when it was used along with leaf of *Alstonia scholaris* Linn. there was enhancement in the antifungal activity. All these cases indicate that organic extract of leaves of *Alstonia scholaris* Linn. showed considerate antifungal activity and can be used effectively as a natural biological fungicide in various treatments.



Effect of various Extracts on *Aspergillus flavus*



Effect of various Extracts on *Aspergillus niger*


Effect of various Extracts on *Rhizopus stolonifer*

Acknowledgement

Author is extremely thankful to Dr. (Mrs.) C. T. Chakraborty, Principal, TCSC; Dr. C. P. Shukla, Head and Assistant Professor, Department of Botany, TCSC for continual support throughout the project. My thanks are due to the Management of the College to provide me with the infrastructural facilities. I wish to extend my thanks to Mr. Bholanath Yadav, Laboratory Assistant and Mr. Pravin Singh for their support and cooperation throughout the project.

References

1. Jha, D. K. "A Textbook on Seed Pathology." (1993) *Vikas Pulishing House Pvt. Ltd., New Delhi.*

2. Ramchandra, Y. L., Sudeep, H. V., Rai, P. and Ramdas, K. "Evaluation of Wound Healing Activity of Leaf Extract of Alstonia Scholaris Linn. In Rats. *International Journal of Pharmacy and Pharmaceutical Sciences, vol. I, suppl. 1(*2012)*: 390 – 393.*

3. Singh, S. D. and Swami, S. D. "Pathogenic potential of seed mycoflora of pearl millet (*Pennisetum glaucum* (L) R.Br.)." *J. Mycol. Pl. Pathol. Vol. 34*. (2004).

4. Olajide, O.A., Awe, S.O., Akinde, J.M., Ekhelar, A.I., Olusola, A., Morebise, O. and Kpako, D.T., Studies on the anti-inflammatory, antipyretic and analgesic properties of *Alstonia boonei* stem bark. J. Ethnopharmacol., 71 (2000): 179-186.

Cite this article as:
Vinit Vaidya and Deepak Gupta. Study of leaves of *Alstonia scholaris* linn. (satvin), Family: apocynaceae, as a potential source of natural fungicide. *Annals of Plant Sciences* 4.11 (2015): 1202-1203.

Source of support: UGC, New Delhi, India
Conflict of interest: None Declared