



RESEARCH ARTICLE

ANTIFUNGAL ACTIVITY OF MEDICINAL PLANT EXTRACTS AGAINST LEAF SPOT DISEASE IN RICE

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ABSTRACT

Paddy is one of the most important food plants in the world. The plants practice of growing rice in heat lands, popularly known as rice has led a number of diseases affecting the crop. The aim of the present investigation suggests that the antifungal activity of 10 plant extracts used in traditional medicine against the phytopathogenic fungus *Bipolaris oryzae* by agar well diffusion method. *Bipolaris oryzae* is a soil borne pathogenic fungi which cause leaf spot disease in Rice. The plants are reservoir of biological active compounds to combat various pathogens. Various medicinal plants were used for antifungal activities against *Bipolaris oryzae*. The plants *Acalypha indica*, *Achyranthes aspera*, *Andrographis paniculata*, *Azadirachta indica*, *Catharanthus roseus*, *Justicia adhatoda*, *Plectranthus amboinicus*, *Phyllanthus niruri*, *Senna auriculata* and *Vitex negundo* with different solvents such as aqueous, ethanol and methanol was used for extracts of plant phytochemicals by Soxhlet apparatus. However methanol with medicinal plants extracts was excellent performance when compared to other solvents. The results were discussed in detail.

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INTRODUCTION

The fungi are major disease causing agent on plants and can lose up to 90% agricultural practice. Plants which contain thousands of metabolites. Medicinal plants is very useful to the society are being used against various pathogens Khalil *et al.* (2007). Generally, phytopathogenic fungi are controlled by synthetic fungicides but it is harmful to the society so avoid such a applications. The paddy field was 15% loss from the yield due to the brown leaf spot disease. The increasing demand of production and regulations of the use of agrochemicals and the emergence of pathogens resistant to the products employed. The plant kingdom has provided a variety of compounds know therapeutic properties were present. In recent years antimicrobial properties of plant extracts have been reported with increasing frequency from different parts of the world (Cowan 1999). The World health organization estimated that 80% of the population in developing countries still relies on traditional medicines. Higher plants are a treasure house of phytochemical which serve as voluble drugs that helped compact several fetal disease over world (Umamekeshwari *et al.*, 2008). The plan of this work was to evaluate with *invitro* studies of potential antifungal activity of medicinal plant extracts against *Bipolaris oryzae*. Sandeep Pandey (2015) studied that the efficacy of leaf extracts in controlling leaf blast and brown spot in Rice (*Oryza sativa*) and aqueous extract of leaves *Azadirachta indica*, *Emblia*

officinalis, *Pongania glabra* and *Acacia nilotica* were tested *invitro* analysis with some clinical isolates.

MATERIALS AND METHODS

Plant collection

The Medicinal plants were collected from paddy field in and around terrestrial area of Thanjavur (Dt), Tamilnadu. The medicinal plants such as *Acalypha indica*, *Achyranthes aspera*, *Andrographis paniculata*, *Azadirachta indica*, *Catharanthus roseus*, *Justicia adhatoda*, *Plectranthus amboinicus*, *Phyllanthus niruri*, *Senna auriculata* and *Vitex negundo* were brought into the laboratory for further analysis. The collected samples were carefully stored in sterile polythene bags and used for the further study.

Sterilization of plant materials

The disease free and fresh plants were selected for this investigation. About 5 grams of fresh and healthy leaves were taken washed with water and then 0.1% mercuric chloride for each solvent including aqueous. Then, surface sterilized with few seconds and the plant materials were washed thoroughly with distilled water in three times and prepared plant extract.

Preparation of plant extracts

Two gram of sterilized plant leaves were kept in the 10 ml organic solvents such as aqueous, ethanol and methanol. Then these were grind with the help of pestle and mortar. The

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ground plant material was subjected to centrifugation, for 10,000rpm at 15min and then was filtered through whatman No.1 filter paper. The supernatant was collected and stored for antifungal screening process.

Test pathogen

The plant leaf spot pathogen *Bipolaris oryzae* is a soil-borne pathogenic fungus in the paddy leaves. The fungus was isolated from paddy field soil, Thanjavur (Dt), Tamilnadu.

Preparation of medium

The potato tubers were peeled and weighed for about 250 gm. The tubers were chopped into small pieces with the help of sterile knife. The chopped potatoes were transferred into a conical flask containing about 100 ml of distilled water. The content was boiled for 20 min. The supernatant was decanted and filtered by muslin cloth and the filtrate was collected. Dextrose 15 gm and agar 18 gm were added into the extract to dissolve the ingredients. The medium was made up to 1 liter by addition of distilled water. The pH of the medium was adjusted to 6.7. Finally, the medium was sterilized by autoclave at 121 °C in 15lbs for 20 minutes.

Antifungal Activity assay (Agar - well diffusion method)

The fungal culture was evenly spreaded on the PDA medium by using sterile cotton swabs. Then a well 6 mm was made in the medium by using sterile cork borer. 200µl of the each plant extracts were transferred into separate wells. Then these plates were incubated at 27°C for 72 hours. After incubation period the results were measured the zone of inhibition around the each well.

RESULTS AND DISCUSSION

The current investigation suggests that the antifungal activity of crude extracts and their respective dilutions from medicinal plants were prepared against *Bipolaris oryzae*. The demonstrated antifungal properties using different types of solvent extracts were used. Our research findings were similar there was methanol solvent extracts exhibited greater antimicrobial activity and suitable to verify the properties of medicinal plants and they were supported by many investigators (Krishna *et al.*, 1997; Singh and Singh, 2000 and Manimegalai, 2011). Satish *et al.* (2009) reported the antifungal activity of different solvent extracts of 12 plants against *Fusarium proliferatum* with different polarity solvents were selected extracts for the investigations, and this bioactive principle responsible for antifungal activity of medicinal plants soluble in petroleum ether, benzene and chloroform solvents were used. Harish *et al.* (2008) observed that under glasshouse conditions, post infectional spraying of rice plants with neem cake extract and *N.oldeander* leaf extract were significantly effective results for reducing the incidence of brown spot if rice. In the current investigation that the methanolic extract of *Senna auriculata* (20.5±1.80mm) was maximum zone of inhibition and followed by *Justicia adhatoda* with methanol extract was 20.1±2.25mm and ethanol was 15.1±1.25mm against *Bipolaris oryzae* fungi respectively. Some of the plant extract with methanol solvent of antifungal activity was moderate zone of inhibition was 13.1±1.75, 15.1±1.75, 19.8±2.33, 10.1±1.25, 20.1±1.75, 13±2.02 and 20.5±1.80mm

with *Azadirachta indica*, *Achyranthes aspera*, *Andrographis paniculata*, *Catharanthus roseus*, *Vitex negundo*, *Phyllanthus niruri*, *Plectranthus amboinicus* and *Senna auriculata* plant respectively whereas in the case of ethanolic plant extract was 15.1±1.25, 15.1±1.25, 5.5±1.80, 9.8±1.75, 15.1±1.25 and 5.1±1.75 mm with *Azadirachta indica*, *Justicia adhatoda*, *Catharanthus roseus*, *Vitex negundo*, *Senna auriculata* and *Acalypha indica* were measured respectively and remaining plant extracts such as *Achyranthes aspera*, *Andrographis paniculata*, *Phyllanthus niruri* and *Plectranthus amboinicus* was no activity against *Bipolaris oryzae*.

Table 1. Antifungal activity of medicinal plants against *Bipolarize oryzae*

S.No	Name of the plants	Zone of inhibition (mm)		
		Aqueous	Ethanol	Methanol
1	<i>Acalypha indica</i>	12.1±0.42	5.1±1.75	20.1±1.25
2	<i>Achyranthes aspera</i>	-	-	15.1±1.25
3	<i>Andrographis paniculata</i>	13.4±1.43	-	15.1±1.75
4	<i>Azadirachda indica</i>	10.2±1.00	15.1±1.25	13.1±1.75
5	<i>Catharanthus roseus</i>	-	5.5±1.80	19.8±2.33
6	<i>Justicia adhatoda</i>	-	15.1±1.25	20.1±2.25
7	<i>Phyllanthus niruri</i>	14.3±0.40	-	20.1±1.75
8	<i>Plectranthus amboinicus</i>	-	-	13.±2.02
9	<i>Senna auriculata</i>	-	15.1±1.25	20.5±1.80
10	<i>Vitex negundo</i>	13.8±1.20	9.8±1.75	10.1±1.25

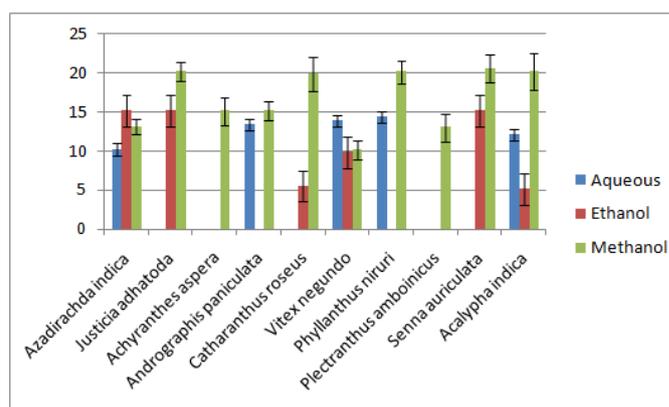


Fig. 1. Antifungal activity of medicinal plants against *Bipolarize oryzae*

The aqueous plant extracts such as *Azadirachta indica*, *Andrographis paniculata*, *Vitex negundo*, *Phyllanthus niruri* and *Acalypha indica* was 10.2±1.00, 13.4±1.43, 13.8±1.20, 14.3±0.40 and 12.1±0.42 mm zone of inhibition of *Bipolaris oryzae* respectively. Some specific plants of *Justicia adhatoda*, *Achyranthes aspera*, *Catharanthus roseus*, *Plectranthus amboinicus* and *Senna auriculata* was no antifungal activity against *Bipolaris oryzae* respectively (Table 1 and Fig. 1). However the dissolving solvent was main tools for extraction of phytochemical compounds from the plants. So, Maximum antifungal activity of methanolic plant extracts against *Bipolaris oryzae* was high when compared to other solvents of ethanol and aqueous extracts. Similarly some of the articles was investigated by Paola Diaz Dellavalle (2011). The antifungal activity of ten traditional medicinal plants extract against the phytopathogenic fungi *Alternaria* sp. The plants were selected on the basis of these reported ethanobotanical uses with some solvents screened *Invitro* antifungal activity against *Alternaria* sp. the suggestive of antimicrobial activity almost related antifungal properties using different kinds of extracts (Guo *et al.*, 1997; Wilson *et al.*, 1997; Zhu *et al.*, 2005) were assessed with some solvents extracted with medicinal plants.

Conclusion

The present investigation concluded that the antifungal activity of medicinal plants showed better results to remedy the pathogenic fungi *Bipolaris oryzae*.

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