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Phyto-chemical analysis, anti-microbial activity and germination studies of *Mimosa pudica* extracts

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ABSTRACT

Mimosa pudica is a perennial creeper. It has been found to have several medical benefits as it serves as an anti-asthmatic, Anti-convulsant, analgesic anti-diabetic and many more .In the present study the various phyto-chemicals present in *Mimosa pudica* were determined using phyto-chemical analysis. The well diffusion method was employed to determine the antibacterial activity of *Mimosa pudica* and the point inoculation method was used to determine the antifungal activity of *Mimosa pudica* This anti-microbial activity was tested at different concentrations of the extract. The findings showed potential anti-microbial property of extracts. Preliminary phyto-chemical analysis of the extracts was performed. A few samples were analyzed for the presence of Flavonoids by the method of UV Spectroscopy. Germination studies were performed using the aqueous extracts of *Mimosa pudica* .The findings showed enhanced germination in the presence of the extracts.

Introduction

Plant material

The plant was collected from B.M.S.College Of Engineering campus, Bangalore and from an area near Baiyapannahalli Metro station during the month of October 2012 and February 2013.The plant was authenticated by Dr. Jayarama Reddy, Professor, Department Of Botany, St. Joseph's Post Graduate Centre,Bangalore. The fresh plant materials (root, stem and leaves) were collected, washed with tap water followed by distilled water and sterilized with 70% Ethanol and dried under the shade[1].

Preparation of extracts

The freshly collected plant material (leaves, root and stem) was dried in shade, then coarsely powdered and the powder was extracted separately with Distilled water ,Ethanol, Methanol, Chloroform and Petroleum ether using the Soxhlet apparatus[2]. The solvent was removed by distillation at atmospheric pressure and under reduced pressure using rotary evaporator. The concentrated extracts were dried in the hot air oven to obtain a powder.

Micro-organisms

The micro-organisms used for the study included the Bacterial organisms- *Bacillus subtilis* and *Klebsiella pneumoniae* and Fungal organisms- *Aspergillus niger* and Trichoderma sp.

Anti bacterial activity

Antibacterial activity was carried out using Well diffusion method[3] .Petri plates were prepared using sterile Nutrient Agar. The diameter of the zone of inhibition was measured and the Minimum Inhibitory Concentration of the extracts was determined.

Results:

The aqeous leaf extract of *Mimosa pudica*(30mg/ml) showed the highest activity of inhibition against *K.pneumoniae* compared to other leaf extracts used at different concentrations. The methanolic stem extract of *Mimosa pudica*(25mg/ml) showed the highest activity of inhibition against *K.pneumoniae* compared to other stem extracts at different concentrations. The aqeous root extract of *Mimosa pudica*(30mg/ml) showed the highest activity of inhibition against *K.pneumoniae* compared to other root extracts used at different concentrations

The aqueous and methanolic leaf extracts(30mg/ml) of *Mimosa pudica* showed maximum inhibition against *Bacillus subtilis* compared to other leaf extracts at different concentrations

The aqueous and petroleum ether stem extracts of *Mimosa pudica* showed maximum inhibition at 30mg/ml against *Bacillus subtilis* compared to other stem extracts at different concentrations. The methanolic root extract(30mg/ml) of *Mimosa pudica* showed maximum inhibition against *Bacillus subtilis* compared to other root extracts at different concentrations

Anti-fungal activity

Antifungal activity was carried out using Point inoculation method The in-vitro tests were carried out to measure the effects of the extracts on radial growth of the seed-borne fungi[4].

Results:

The ethanolic leaf extract of *Mimosa pudica* inhibits the growth of *Trichoderma sp.* compared to the aqueus root and methanolic stem extracts of *Mimosa pudica*

The ethanolic leaf extract of *Mimosa pudica* showed minimum or very less growth of *Aspergillus Niger* compared to the other extracts

Phyto-chemical analysis

Phyto-chemical examinations were carried out for all the *Mimosa pudica* extracts as per the standard methods[5]

Results

Spectroscopic Analysis

Flavonoids possess Anti-microbial activity[6]. Spectroscopic Analysis[7] was performed on Chloroform stem extract, methanolic stem extract and methanolic root extract of *Mimosa pudica* to determine the presence and concentration of flavonoids. The analysis was carried out at Azyme Biosciences, Bangalore with the help of UvitoChemi 2100 spectrometer. The

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presence of flavonoids in the *Mimosa pudica* extracts was compared with the suitable standard Rutin(citrus flavonoid glycoside). Quantitative analysis was performed for the above extracts to determine the concentration of flavonoids for the same.

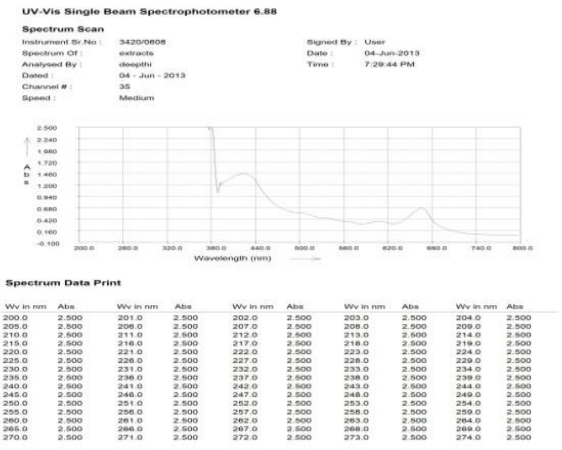

Fig 1. Spectrum for *Mimosa pudica*

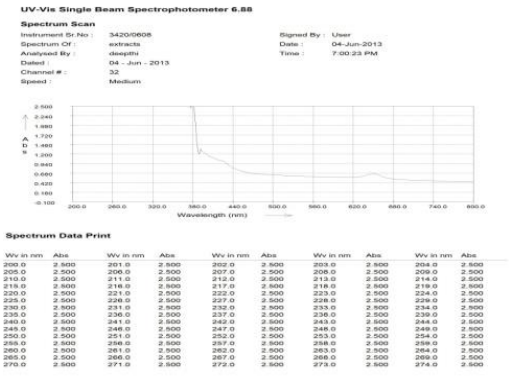

Fig 2. Spectrum for *Mimosa pudica*

Chloroform Stem extract Methanolic Stem extract

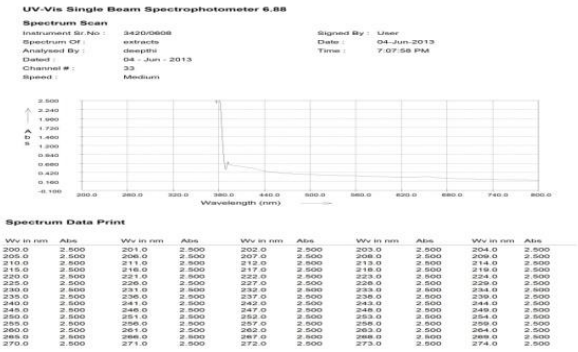

Fig 3. Spectrum for *Mimosa pudica* Methanolic root extract

Germination studies

The groundnut seeds were soaked in the Aqueous leaf, root and stem extracts of *Mimosa pudica*, distilled water(negative control) and Fluconazole (positive control) respectively**.** After soaking the Groundnut seeds were then transferred to a petriplate containing a filter paper respectively and then placed in a humidity chamber[4]. The percentage of germination was determined and it was observed that the Aqueous extracts showed enhanced germination compared to that of positive and negative controls.

Conclusion

To conclude the present study, the plant contains potential anti-microbial components that maybe of use for development of phytomedicine for the therapy of infections. Further, analysis of phytochemicals with broad spectrum of anti-microbial activity was performed by UV Spectrophotometry. It was observed that the Aqueous extracts of *Mimosa pudica* showed enhanced germination compared to that of the controls.

Table 1. Phyto-chemical Screening of Extracts of *Mimosa pudica*.

Phytochemical	Root extract	Leaf extract	Stem extract
Carbhydrates	-	Aqueous	Aqueous, Ethanolic
Alkaloids	Methanolic	Ethanolic,Methanolic	Ethanolic,Methanolic
Saponins	Aqueous	Aqueous,Methanolic	Aqueous,Methanolic
Triterpenes	Methanolic	Chloroform,Methanolic	Chloroform,Methanolic
Phenols	Aqueous,Methanolic	-	-
Tannins	Aqueous,Methanolic, Ethanolic	Aqueous,Methanolic, Ethanolic	Aqueous,Methanolic, Ethanolic
Flavonoids	Chloroform,Ethanolic ,Methanolic	Chloroform,Ethanolic ,Methanolic	Chloroform,Ethanolic ,Methanolic
Proteins	-	Ethanolic, Petroleum ether	Ethanolic, Petroleum ether
Diterpenes	Aqueous,Methanolic	Aqueous,Ethanolic, Methanolic	Aqueous,Ethanolic

Table 2.Concentration of flavonoids

EXTRACT (10mg/ml)	O.D (275-800 Nm)	Concentration of flavonoid in 10mg/ml of extract(mg)	Concentration of flavonoid in 1mg/ml of extract(mg)
Chloroform stem	1.195	2.011	0.2011
Methanolic stem	2.274	3.82	0.382
Methanolic root	0.820	1.38	0.138

Table 3. Percentage of germination

EXTRACT (30 mg/ml)	*NO. OF SEEDS GERMINATED*	*GERMINATION (cm)*	*AVERAGE GERMINATION (cm)*	*PERCENTAGE GERMINATION*
Aqueous stem	*4*	*3.2* *3.5* *2.5* *2.4*	*2.9*	*40*
Aqueous leaf	*7*	*5.0* *3.5* *3.0* *1.5* *3.0* *5.0* *1.5*	*3.2*	*70*
Aqueous root	*6*	*4.0* *3.2* *2.3* *0.5* *1.2* *1.4*	*2.1*	*60*
CONTROLS	*NO. OF SEEDS GERMINATED*	*GERMINATION (cm)*	*AVERAGE GERMINATION (cm)*	*PERCENTAGE GERMINATION*
Positive control Fluconazole	*2*	*2.0* *1.9*	*1.95*	*20*
Negative control Distilled water	*3*	*3.0* *2.3* *1.7*	*2.33*	*30*

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