ANTIMICROBIAL ACTIVITY OF EXTRACTS OF *SESBANIA GRANDIFLORA* LEAF

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ABSTRACT

Sesbania grandiflora (Fabaceae) is commonly known as sesbania and agathi, used as an important dietary nutritive source and often planted for its edible flowers and pods in Southeast Asian countries. In the present study, petroleum ether, chloroform, alcoholic and aqueous extract of leaves of *S. grandiflora* were screened for antibacterial and antifungal activity against various microbial stains by disc-diffusion method. The extracts produced mild antibacterial activity against the bacterial strains (*Bacillus cereus*, *Micrococcus luteus*, *Staphylococcus epidermidis*, *Clostridium sporogens*, *Streptococcus faecalis*, *Streptococcus pyogens*, *Staphylococcus aureus*, *Bacillus subtilis*, *Agrobacterium tumifaciens*, *Klebsiella pneumoniae*, *Salmonella typhi*, *Pseudomonas aeruginosa*, *Serratia marcesens*, *Entobacteria aerogens*, *Proteus vulgaris* and *Escherichia coli*), and only petroleum ether and alcoholic extracts exhibited mild antifungal property against the tested fungal strains (*Cryptococcus neoformans*, *Gibberella fugikoroi*, *Rhizophus oligosporus*, *Neurospora classa*, *Myrothecium verrucasia*, *Aspergillus niger* and *Candida albicans*) compared to standard drugs.

INTRODUCTION

Sesbania grandiflora, a short lived, fast growing tree belongs to the family, Fabaceae is commonly known as sesbania and agathi. It is used as an important dietary nutritive source and often planted for its edible flowers and pods in Southeast Asian countries [1]. The leaves are traditionally used in case of nasal cattarah, night blindness, epilepsy, headache, epileptic fits of children, itching, leprosy, gout; and as antipyretic, diuretic, laxative etc [2-4]. The aim of the present study is to investigate the antimicrobial activity of different successive extracts of leaves of the plant.

MATERIALS AND METHODS

Collection and Preparation of Plant Material

The leaves of *Sesbania grandiflora* were collected from Pune, Maharashtra and authenticated through NBRI, Lucknow and voucher specimen was preserved for further references. The leaves were air dried under shade, coarsely powdered and kept in air tight container until further use.

Preparation of Extracts

About 80 gm of coarsely powdered leaf was extracted successively with petroleum ether, chloroform and alcohol using soxhlet apparatus, and finally water extract was prepared by decoction. The extracts were dried in rotary vacuum evaporator and preserved in closed container in refrigerator until further use.

Preliminary Phytochemical Screening

Preliminary phytochemical screening of different extracts for the presence of different groups of compounds was carried out by using standard procedures described by Harbone and Khandelwal [5, 6].

Antibacterial Activity

The antibacterial activity was evaluated by disc-diffusion method [7, 8]. The bacterial strains used were, Gram Positive: *Bacillus cereus* (NCIM-2797), *Micrococcus luteus* (NCIM-2704), *Staphylococcus epidermidis* (NCIM-2493), *Clostridium sporogens* (NCIM-2559), *Streptococcus faecalis* (NCIM-2404), *Streptococcus pyogens* (NCIM-2608), *Staphylococcus aureus* (NCIM-2079), *Bacillus subtilis* (NCIM-2439), and Gram Negative: *Agrobacterium tumifaciens* (NCIM-2942), *Klebsiella pneumoniae* (NCIM-2957), *Salmonella typhi* (NCIM-2501), *Pseudomonas aeruginosa* (NCIM-2863), *Serratia marcesens* (NCIM-2078), *Entobacteria aerogens* (NCIM-2693), *Proteus vulgaris* (NCIM-2813) and *Escherichia coli* (NCIM-2831). Nutrient agar media was taken in a pre-sterilized Petri-dish

and the microorganisms were grown. The extracts were dissolved separately in dimethyl sulfoxide (DMSO) and used in the concentration of 100µg/disc in triplicate, placed in petri dishes and incubated at 37^0C for 24 hrs. The diameters of zone of inhibition (mm) were recorded and compared with standard drug Ciprofloxacin.

Antifungal Activity

Antifungal activity against *Cryptococcus neoformans (NCIM-3378), Gibberella fugikoroi (NCIM-665), Rhizophus oligosporus (NCIM-1215), Neurospora classa (NCIM-908), Myrothecium verrucasia (NCIM-1130), Aspergillus niger (NCIM-618), Candida albicans (NCIM-3552)* was studied using disc diffusion assay. The different extracts were used in the concentration of 100 µg/disc, in triplicate and the antifungal activity was tested by disc diffusion technique using sabouraud dextrose agar (SDA) medium against the fungal strains. Fluconazole (10 µg/disc) was used as standard drug. The zone of inhibition of different extracts was determined as mentioned above [9-11].

RESULT AND DISCUSSION

Preparation of Extracts

The physical characteristics and yield of different extracts are furnished in table 1.

Table 1: Yield and physical characteristics of different extracts of *S. grandiflora* leaf

Extracts	Consistency	Colour			% yield (w/w)
		Naked eye	254 nm	365 nm	
Petroleum ether	Powder	Brownish yellow	Greenish yellow	Dark brown	4.1
Chloroform	Semisolid	Algae green	Dark green	Redish brown	5.1
Alcohol	Semisolid	Brownish black	Dark green	Black	14.4
Water	Powder	Chocolate brown	Light green	Redish brown	11.5

Preliminary Phytochemical Screening

Various groups of phytoconstituents present in different extracts of *S. grandiflora* are alkaloids, glycosides, carbohydrates, amino acids, proteins, tannins and steroids (table2)

Table 2: Preliminary phytochemical screening of different extracts of *S. grandiflora* leaf

Group of Phytoconstituents	Chlorofom Extract (CE)	Alcoholic Extract (AE)	Petrolem ether Extract (PE)	Water Extract (WE)
Alkaloids	+	+	-	+
Glycosides	-	+	-	+
Carbohydrate	-	-	-	+
Amino acid	-	+	-	+
Proteins	-	+	-	+
Tannins	-	+	-	+
Steroids	-	-	+	-
Flavonoids	-	-	-	-

+ indicates present and – indicates absent

Antibacterial Activity

Petroleum ether, chloroform, alcoholic and aqueous extracts of the plant exhibited antimicrobial activity against 13, 14, 15 and 13 number of the tested microbial strains (total 16) respectively. All the extracts showed activity against *S. epidermidis*, *S. faecalis*, *S. auerus*, *A. tumifaciens*, *K. pneumonia*, *P. aeruginosa*, *S. marcesens*, *E. aerogens* and *P. vulgaris* (table 3).

Antifungal Activity

Petroleum ether and alcoholic extracts showed minimal antifungal activity while, chloroform and aqueous extract did not show any activity. Petroleum ether extract was active against *N. classa* and *C. albicans*, while alcoholic extract was active against *G. fugikoroi* and *M. verrucasia* (table 4). The antibacterial and antifungal activities of the extracts of *S. grandiflora* were found to be very less as compared to the standard drugs.

Table 3: Zone of inhibition of different extracts of *S. grandiflora* leaf against bacterial strains

Test organism	Zone of inhibition (in mm)				Ciprofloxacin (30 µg/disc)
	Different extracts (100 µg/disc)				
	PE	CE	AE	WE	
B. cereus	10	-	11	10	35
M. leuteus	11	11	12	-	29
S. epidermidis	11	11	12	11	33
C. sporogens	-	10	-	14	>40
S. faecalis	09	09	10	12	>40
S. pyogenes	-	10	08	11	37
S. auerus	11	12	14	11	28
B. subtillus	11	13	12	-	34
A. tumifaciens	11	11	10	10	24
K. pneumonia	11	14	13	14	32
S. typhi	11	-	11	-	35
P. aeruginosa	10	10	10	08	31
S. marcesens	11	11	12	13	33
E. aerogens	11	10	12	11	40
P. vulgaris	14	10	12	12	35
E. coli	-	10	12	11	>40

PE- Petroleum ether extract, CE- Chloroform extract, AE- Alcoholic extract, WE- Water extract

Table 4: Zone of inhibition of different extracts of *S. grandiflora* leaf against fungal strains

Test organism	Zone of inhibition (in mm)				Fluconazole (10 µg/disc)
	Different extracts (100 µg/disc)				
	PE	CE	AE	WE	
C. neoformans	-	-	-	-	28
G. fugikoroi	-	-	12	-	34
R. oligosporus	-	-	-	-	32
N. classa	10	-	-	-	23
M. verrucasia	-	-	09	-	28

A. niger	-	-	-	-	32
C. albicans	09	-	-	-	40

PE- Petroleum ether extract, CE- Chloroform extract, AE- Alcoholic extract, WE- Water extract

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