Ethnobotanical Leaflets 12: 995-1002. 2008.

Antimicrobial Activity of Selected Medicinal Plants, *Craetva magna* (Linn.), *Pongamia glabra* (Linn.) and *Areca catechu* (Linn.)

I. Joseph and A.J.A. Ranjit Singh*

Department of Advanced Zoology & Biotechnology
Sri Paramakalyani College, Alwarkurichi,
Tamil Nadu, India, Pin - 627 412
*E- mail: ranjitspkc@yahoo.com
Mobile No: 09443451076

Issued 08 November 2008

ABSTRACT

Antimicrobial potential in the extracts of three plants. viz. *Craetva magna* (Linn.), *Pongamia glabra* (Linn.), *Areca catechu* (Linn.) that are commonly used by theKani Tribes of Tirunelveli district, was traced in the present study. The extract of the plant *Craetva magna* (Linn.), inhibited the growth of pathogenic microbes. Soxhlet extract using chloroform as solvent showed a maximum inhibition of zone formation for the species *Salmonella paratyphi* (14 mm), and *Vibrio cholerae* (13 mm) at a concentration of 50 µg/ml. The crude extract of the plant *Pongamia glabra* (Linn.), showed maximum inhibition for the species *Salmonella paratyphi* (8 mm), and *Vibrio fischeri* (8mm) at the concentration of 50 µg/ml. In the Soxhlet-chloroform extract, of *Areca catechu* the maximum inhibition zone was observed for *Vibrio cholerae* (14 mm), and Salmonella *paratyphi* (13 mm). In the present study it was observed that the extracts of the bark of the *Craetva magna* (Linn.), *Pongamia glabra* (Linn.), *Areca catechu* (Linn.), had a broad spectrum antifungal activity.

Key words: Kani Tribes, *Craetva magna*, *Pongamia glabra*, *Areca catechu*, broad spectrum, antifungal activity.

INTRODUCTION

India is a land of rich biodiversity. The total number of lower and higher plants in India is about 45,000 species (Jain, 1992). The plants are potential source of medicines since ancient times. According to World Health Organization, 80% of the populations in the world depend on traditional medical practitioners for their medicinal needs. Many formulations of plants and their products such as medicines are said in the form of hymns in the Vedas (Kausik and Dhiman, 1997). Yet a scientific study of plant to determine their anti-microbial material is comparatively new. Numerous surveys on antimicrobial medicinal plants had been made in United States and in many countries throughout the world. Such study had demonstrated the wide occurrences of active compounds in higher plants (Hughes, Pates and Madsen, 1995). As the plants represent an extraordinary reservoir for exploration of new drugs in the battle of disease, the present study has been planned to find out the antimicrobial potential in the extracts of three plants, viz. *Craetva magna* (Linn.), *Pongamia glabra* (Linn.), *Areca catechu* (Linn.), that are commonly used by the Kani Tribes of Tirunelveli district.

Materials and Methods

Three plants were chosen. They are, *Craetva magna* (Linn.), *Pongamia glabra* (Linn.) and Areca *catechu* (Linn.).

a. *Craetva magna* (Linn.)

Family: Capparidaceaae

Genus: Craetva

Species: magnta

Habitat: Tree

Flowers: Large, Polygamous, Sepals 4, adnate to the labeled disk petals 4, long clawed, open in bud stamens very numerous inserted at the base of the gynophore ovary on a slender gynophore 1-2 celled stigma sessile ovules many on 2 partial placentas.

Fruit: Berry 1-2 in thick globose of ovate.

Seeds: Seeds imbedded in the pulp.

b. *Pongamia glabra* (Linn.)

Family: Leguminosae

Sub family: Papilinoceaae

Genera: *Pongamia*

Species: *glabra*

Habitat: Tree

Flower: usually in recemes of spike terminal bisexual, the thalam is generally hollowed out to form a small cup.

Fruit: A leagume, seeds exalbuminous wood for cart wheels pods flat oil from seed medicinal.

c. *Areca catechu* (Linn.)

Family: Palmae

Genera: *Areca*

Species: *catechu*

Habitat: Tree

Flower: Stem tall slender annulate spodices from the axils of fallen leaves below the crow branched of flowers minute numerous on the upper parts. Petals obliquely, Lancedate, balvate of flowers much longer few at the base of the branches. Perianth accerescent segment orbicular imbricate the inner with ocute valuate tips ovary – 1 called ovule single basal erect.

Fruit avoid of oblong seed truncate at the base albumen ruminate embryo basilar.

The seeds are well known for masticatery need and are used in medicine.

Collection and Extraction

The plant material was collected from a traditional medicine shop. It was transferred immediately to the laboratory. The plant materials were shade dried for one week. After drying the plant materials were used for

experiments.

The shade dried plant material was powdered with the help of mixer grinder. The fine particles were separated and stored in clean container. It was used for further analysis.

The prepared plant material was extracted by two methods.

1. Crude method
2. Soxhlet method

Crude method

Pre- weighed plant material was taken in a sterilized mortar and pestle. It was crushed well with chloroform solvents. Then different concentration were prepared and used against pathogenic bacterial cultures, viz. *Escherichia coli, Pseudomonas aeroginosa, Salmonella paratyphi, Vibrio cholerae, Vibrio fischeri.*

Soxhlet method

Soxhlet apparatus was fixed in suitable protective place. The water flow was regularly checked. The solvent chloroform was taken in Soxhlet flask and warmed up at suitable temperature. The plant powder was weighed and filled in the Soxhlet extraction tube. The process was continued until the extract was prepared in different concentration.

Antimicrobial assay

For determination of antimicrobial activity of three plant extracts, different bacterial and fungal strains were used by agar ditch method. The pathogenic cultures were swabbed separately in each air dried pre-incubated Nutrient Agar (NA) and Sabouraud Dextrose Agar (SDA) plates with help of sterile cotton swabs. Ditches were prepared in agar plates with the help of surface sterilized borer. After boring the plant extract were added separately to the ditches (50µl).

The commercial available Gentamycin Ranbaxy laboratory Limited New Delhi was used for comparison study. The antibiotic Gentamycin and fungicidal agent Myconazole was prepared the concentrations (50 µg/ml) and was impregnated into ditches in agar medium. The plates were incubated at 37^0 C. Controls were maintained. After 24 h diameter of clear zone produced around the ditches were measured to the nearest mm with the help of the micro scales.

Results and Discussion

1.*Craetva magna* (Linn.)

The extract of the plant *Craetva magna* (Linn.), inhibited the growth of pathogenic microbes. The chloroform extracts of the plant showed a broad spectrum of antibacterial potential. For crude extract the maximum zone formation was observed for *Pseudomonas aeroginosa* (10 mm) and *salmonella paratyphi* (9 mm) on the concentration of 50 µg/ml. (Table 1). In Soxhlet extract using the chloroform as solvent showed a maximum inhibition of zone formation for the species *Salmonella paratyphi* (14 mm), and *Vibrio cholerae* (13 mm)at a concentration of 50 µg/ml. (Table 2).

Table 1. Antimicrobial activity of the chloroform extracts of the bark of the tree *Craetva magna* (Linn.) (Ditch diffusion analysis - crude method).

Antimicrobial agent	Inhibition zones in diameter (mm)				
Extract concentration	*Escherichia coli*	*Pseudomonas aeroginosa*	*Salmonella paratyphi*	*Vibrio cholerae*	*Vibrio fischeri*
Plant extract (50 µg/ml)	07	10	09	07	09
Gentamycin (50 µg/ml)	20	38	55	40	40
Fungal Strain	*Aspergillus fumigatus*	*Aspergillus flavous*	*Candida albicans*	*Epidermatophyto floccosum*	*Fusarium sp.,*
Plant extract (50 µg/ml)	12	12	10	08	09
Myconazole (50 µg/ml)	20	20	21	22	27

Table 2. Antimicrobial activity of the chloroform extracts of the bark of the tree Craetva *magna* (Linn.) (Ditch diffusion analysis - Soxhlet method).

Antimicrobial agent	Inhibition zones in diameter (mm)				
Extract concentration	*Escherichia coli*	*Pseudomonas aeroginosa*	*Salmonella paratyphi*	*Vibrio cholerae*	*Vibrio fischeri*
Plant extract (50 µg/ml)	10	12	14	13	10
Gentamycin (50 µg/ml)	20	38	40	55	40
Fungal Strain	*Aspergillus fumigatus*	*Aspergillus flavous*	*Candida albicans*	*Epidermatophyto floccosum*	*Fusarium sp.,*
Plant extract (50 µg/ml)	18	17	15	14	16
Myconazole (50 µg/ml)	20	20	21	22	27

2. *Pongamia glabra* (Linn.)

The crude extract of the plant *Pongamia glabra* (Linn.), showed maximum inhibition for the species *Salmonella paratyphi* (8 mm), and *Vibrio fischeri* (8mm) at the concentration of 50 µg/ml. (Table 3).For the Soxhlet extract using chloroform as solvent maximum inhibition zone was noted for *Vibrio cholerae* (15 mm), and

Salmonella paratyphi (13 mm) (Table 4).

Table 3. Antimicrobial activity of the chloroform extracts of the bark of the tree *Pongamia glabra* (Linn.) (Ditch diffusion analysis - crude method).

Antimicrobial agent	Inhibition zones in diameter (mm)				
Extract concentration	*Escherichia coli*	*Pseudomonas aeroginosa*	*Salmonella paratyphi*	*Vibrio cholerae*	*Vibrio fischeri*
Plant extract (50 µg/ml)	06	07	08	07	08
Gentamycin (50 µg/ml)	20	38	55	40	40
Fungal Strain	*Aspergillus fumigatus*	*Aspergillus flavous*	*Candida albicans*	*Epidermatophyto floccosum*	*Fusarium sp.,*
Plant extract (50 µg/ml)	12	15	16	13	14
Myconazole (50 µg/ml)	20	20	21	22	27

3. *Areca catech* (Linn.)

In crude extract the maximum inhibition was for the species *Vibrio fischeri* (11mm) and *Salmonella paratyphi* (10 mm) at a concentration of 50 µg/ml. (Table 5) In Soxhlet-chloroform extract, the maximum inhibition zone was observed for *Vibrio cholerae* (14 mm), and Salmonella *paratyphi* (13 mm) at the concentration of 50 µg/ml. (Table 6). The inhibition zone formation was compared with the standard antibiotic Gentamycin. The zone of inhibition at 50 µg/ml concentration of the plant extract was maximum.

Antifungal activity

In the present study it was observed that the extracts of the bark of the *Craetva magna* (Linn.), *Pongamia glabra* (Linn.), *Areca catechu* (Linn.), had a broad spectrum antifungal activity.

Table 4. Antimicrobial activity of the chloroform extracts of the bark of the tree *Pongamia glabra* (Linn.) (Ditch diffusion analysis - Soxhlet method).

Antimicrobial agent	Inhibition zones in diameter (mm)				
Extract concentration	*Escherichia coli*	*Pseudomonasaeroginosa*	*Salmonella paratyphi*	*Vibrio cholerae*	*Vibrio fischeri*
Plant extract (50 µg/ml)	10	12	13	15	12

Gentamycin (50 µg/ml)	20	38	55	40	40
Fungal Strain	*Aspergillus fumigatus*	*Aspergillus flavous*	*Candida albicans*	*Epidermatophyto floccosum*	*Fusarium sp.,*
Plant extract (50 µg/ml)	20	19	22	25	23
Myconazole (50 µg/ml)	20	20	21	22	27

1.*Craetva magna* (Linn.)

The antifungal activity of water and chloroform extracts were tested. For the crude extract of barks of this tree, the maximum inhibition zone was observed for the fungal *Aspergillus fumigatus* (12mm) and *Aspergillus flavous* (12mm) at the concentration of 50 µg/ml. (Table 1). In Soxhlet-chloroform extract the maximum zone of inhibition was noticed for the species *Aspergillus fumigatus* (18mm) and *Aspergillus flavous* (17mm) at the concentration of 50 µg/ml. (Table 2).

Table 5. Antimicrobial activity of the chloroform extracts of the seed of the tree *Areca catech* (Linn.) **(**Ditch diffusion analysis - crude method).

Antimicrobial agent	Inhibition zones in diameter (mm)				
Extract concentration	*Escherichia coli*	*Pseudomonas aeroginosa*	*Salmonella paratyphi*	*Vibrio cholerae*	*Vibrio fischeri*
Plant extract (50 µg/ml)	06	05	10	08	11
Gentamycin (50 µg/ml)	20	38	55	40	40
Fungal Strain	*Aspergillus fumigatus*	*Aspergillus flavous*	*Candida albicans*	*Epidermatophyto floccosum*	*Fusarium sp.,*
Plant extract (50 µg/ml)	15	15	18	13	14
Myconazole (50 µg/ml)	20	20	21	22	27

2.*Pongamia glabra* (Linn.)

For the crude extract of the root barks of this tree the maximum inhibition was seen for the species *Candida albicans* (16mm), and *Aspergillus flavous* (15mm) at the concentration of 50 µg/ml. (Table 3). For the Soxhlet-chloroform extracts of the bark of the plant *Pongamia glabra* the maximum zone of inhibition was observed *Epidermatophyton floccosum* (25mm) and *Fusarium sp*., (23mm) at the concentration of 50 µg/ml. (Table 4).

Table 6 Antimicrobial activity of the chloroform extracts of the seed of the tree *Areca catech* (Linn.) (Ditch diffusion analysis - Soxhlet method)

Antimicrobial agent	Inhibition zones in diameter (mm)				
Extract concentration	*Escherichia coli*	*Pseudomonas aeroginosa*	*Salmonella paratyphi*	*Vibrio cholerae*	*Vibrio fischeri*
Plant extract (50 µg/ml)	10	12	13	14	12
Gentamycin (50 µg/ml)	20	38	55	40	40
Fungal Strain	*Aspergillus fumigatus*	*Aspergillus flavous*	*Candida albicans*	*Epidermatophyto floccosum*	*Fusarium sp.,*
Plant extract (50 µg/ml)	20	28	23	13	15
Myconazole (50 µg/ml)	20	20	21	22	27

3.*Areca catechu* (Linn.)

The antifungal activity of the seed of the plant *Areca catechu* was tested.

In crude water extract the maximum zone of inhibition was observed for the species *Candida albicans* (18mm) at the concentration of 50 µg/ml. (Table 5).

In the Soxhlet chloroform extract, the maximum inhibition zone was noticed for the species Aspergillus *flavous* (28mm), and *Candida albicans* (23mm) in *Areca catechu* at the concentration of 50 µg/ml. (Table 6).

REFERENCES

1. Jain, KK, 1992. Studies on Natural products Ph.D., Thesis. Dr. Hari Singh Gour University sager.

2. Kausik, P., AK.Dhiman, 1997. Some Vedic medicines plants, Advan. Plant sci. 9(II) Spp., 1-12.

3. Hughes, JE., 1952. Survey of antibodies in the wild green plants of southern California. Antibiotics and chemotherapy 2: 487 – 491.

4. Pates AL., GC Madsen, 1955. Occurrence of antimicrobial substances in chloropyhllose plants growing in Florida II. Botany Gaz. 116: 250-261.

5. Elizabeth KM., 2001. Antimicrobial activity of *Allium satirum* on some pathogenic bacteria. Indian Journal Microbiology 4:321-323.

6. Frier M 1971. Inhibition destruction of microbial cell. William B.Huge(ed.,) Academic press, London pp 107-120.