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Study of Antimicrobial Activity of *Madhuca longifolia* and its against various Microorganisms

Bhawana Pandey[1] and Sudha Agarwal[2]
[1] *(Department of Biotechnology and Microbiology, Bhilai Mahila Mahavidyalaya, Hospital Sector, Bhilai (C. G.) India)*
[2] *(Department of Zoology, Bhilai Mahila Mahavidyalaya, Hospital Sector, Bhilai (C. G.), India)*

Abstract: *Madhuca longifolia is known from ancient times for its medicinal uses. Its every part is used for the treatment of various infections and diseases. Present study deals with the antimicrobial activity of Madhuca longifolia leaf extracts against some microorganisms such as bacteria and fungi. This collected plants are used as ethno medicinal plants for the folk treatment of skin diseases, diabetes, snake bites, headache.*
Antimicrobial activity tests were performed by Agar well diffusion method against three bacterial strains viz. E. coli, Pseudomonas, S. aureus, and three fungal strains viz. Aspergillus niger, Penicillium spp., Scytalidium spp. M. longifolia showed highest inhibition in case of S. aureus and then E. coli. In case of fungal strains showed negative tests for A. niger and Penicillium spp., but for Scytallidium spp. M. longifolia showed positive result from the concentration of 40% i.e. 0.5cm followed by 60% and 80%

Keywords: *Antimicrobial activity, Folk treatment, Medicinal uses*

I. Introduction

Medicinal plants may be defined as a group of plants that possess some special properties or virtues that qualify them as articles of drugs and therapeutic agents, and are used for medicinal purposes (Chopra and Doiphode, 2002). Drugs derived from natural sources play a significant role in the prevention and treatment of human diseases. (Ayyanar and Ignacimuthu, 2005)

An antimicrobial is an agent that kills microorganisms or inhibits their growth. Antimicrobial medicines can be grouped according to the microorganisms they act primarily against. Antibacterial, commonly known as antibiotics, are used against bacteria and antifungal are used against fungi. They can also be classed according to their function. (Cowan, 1999).

Plant products still remain the principle source of pharmaceutical agents used in traditional medicine. (Mangesh Khond et al., 2009, Bandow et al., 2003), Phytochemicals are the compounds naturally occurring in plants. Some are responsible for colour and other organoleptic properties, such as the deep purple of blueberries and the smell of garlic. Plant produces various compounds which are responsible for protection against pathogens. Some plants may contain compounds of potential medical use. (Yadav, 2012, Ahmad et al., 2007).

Flavonoids were referred to as Vitamin P (probably because of the effect they had on the permeability of vascular capillaries). These are the compounds which appear to play a major role in the successful medical treatments of ancient times. (Ashnagara et al., 2012 Saponins are secondary metabolites of glycosidic nature widely distributed in higher plants but also found in some animal sources, like e.g. marine invertebrates. Despite their fairly large structural diversity these compounds share some unique biological properties like the ability to lyse erythrocytes or to foam (Bruneton 1995; Rao and Gurfinke 2000; Francis et al. 2002).

II. Material and method

2.1Test microorganisms

Three bacterial strains, E. coli, Staphylococcus aureus and Pseudomonas aeruginosa, and three fungal strains viz. Aspergillus niger, Penicillium sp., and Scytalidium sp. were selected for the experiments.

2.2Collection of Plant Sample

Leaves of **Madhuca longifolia** were collected for the experiment purpose.

2.3**Extract Preparation of Plant Samples**

500g of plant leaf sample was washed and allowed for shade drying for 6-7 days. The dried and crushed plant sample was soaked into 1500 ml of methanol solvent for three days to dissolve their components and was filtered. The sample obtained after filtration was allowed for second washing with methanol and were again filtered. For solvent recovery from the extract the collected filtrates were then allowed for Rotary-evaporator (Rotavapour) to obtain the plant extracts in concentrated form. The extracts were then concentrated in water-bath.

III. Observations and Results

3.1 Antimicrobial activity tests of the M. longifolia leaf extract against different bacteria:

1). M. longifolia showed the clear zone of inhibition around the wells which was increased by increasing the extract concentration against E. coli.

Table- 1: Antimicrobial activity of M. longifolia leaf extract against E. coli

S. No.	Extract concentration (%) of M. longifolia	Antimicrobial Activity (against E. coli)		
		Diameter of zone (cm) A	Diameter of well (cm) B	Zone of Inhibition (cm) C (C=A-B)
1	0.5	-	0.8	-
2	1	-	0.8	-
3	1.5	1.1	0.8	0.3
4	2	1.1	0.8	0.3
5	2.5	1.2	0.8	0.4
6	3	1.3	0.8	0.5
7	3.5	1.4	0.8	0.6
8	4	1.4	0.8	0.6
9	4.5	1.6	0.8	0.8
10	5	1.9	0.8	1.1
11	10	2.0	0.8	1.3
12	15	2.5	0.8	1.7
13	20	2.6	0.8	1.8

M. longifolia inhibited growth of E. coli. Its activity had started from 1.5% of concentration i.e. 0.3cm and the best result was observed in 20% of concentration i.e. 1.8cm.

2). M. longifolia showed the clear zone of inhibition around the wells which was increased by increasing the extract concentration against S. aureus

Table- 2: Antimicrobial activity of M. longifolia leaf extract against S. aureus

S. No.	Extract conc. (%) of M. longifolia	Antimicrobial activity against (S. aureus)		
		Diameter of zone	Diameter of well	Zone of Inhibition (cm)
1	0.5	-	0.8	-
2	1	-	0.8	-
3	1.5	-	0.8	-
4	2	-	0.8	-
5	2.5	1.1	0.8	0.3
6	3	1.2	0.8	0.4
7	3.5	1.3	0.8	0.5
8	4	1.4	0.8	0.6
9	4.5	1.4	0.8	0.6
10	5	1.5	0.8	0.7
11	10	2.2	0.8	1.4
12	15	2.5	0.8	1.7
13	20	2.7	0.8	1.9

M. longifolia inhibited growth of S. aureus Its activity had started from 2.5% of concentration i.e. 0.3cm and the best result was observed in 20% of concentration i.e. 1.9cm.

3). M. longifolia showed the clear zone of inhibition around the wells which was increased by increasing the extract concentration against Pseudomonas

Table-3: Antimicrobial activity of M. longifolia leaf extract against Pseudomonas

S. No.	Extract concentration (%) of M. longifolia	Antimicrobial activity (against Pseudomonas)		
		Diameter of zone (cm) A	Diameter of well (cm) B	Zone of Inhibition (cm) (C=A-B)
1	0.5	-	0.8	-
2	1	-	0.8	-
3	1.5	1.1	0.8	0.3
4	2	1.1	0.8	0.3
5	2.5	1.3	0.8	0.5
6	3	1.4	0.8	0.6
7	3.5	1.5	0.8	0.7
8	4	1.5	0.8	0.7
9	4.5	1.6	0.8	0.8
10	5	1.7	0.8	0.8
11	10	1.8	0.8	1.0
12	15	1.9	0.8	1.1
13	20	2.0	0.8	1.2

M. longifolia inhibited growth of Pseudomonas. Its activity had started from 1.5% of concentration i.e. 0.3cm and the best result was observed in 20% of concentration i.e. 1.2cm.

3.2Antimicrobial activity tests of M. longifolia leaf extract against different fungal strains:

Antimicrobial activity of M. longifolia leaf extract against fungal strains viz. Penicillium spp., Aspergillus niger and Scytalidium spp was observed.

Table-4: Effect of M. longifolia leaf extract Against Scytalidium spp.

S.no.	C. myxa Extract Concentration (%)	Antimicrobial activity (against Scytalidium spp.)		
		Diameter of Zone (cm) A	Diameter of well (cm) B	Zone of inhibition (cm) C (C=A-B)
1	5	-	0.8	-
2	10	-	0.8	-
3	20	1.3	0.8	0.5
4	40	1.3	0.8	0.5
5	60	1.6	0.8	0.8
6	80	2.0	0.8	1.2

M. longifolia leaf extract was not showed any activity on A. niger and Penicillium spp., but in case of Scytalidium spp., it had showed some activity. M. longifolia leaf extract started its activity from concentration of 40% i.e. 0.5cm and on increasing its concentration, zone of inhibition also increased. The best result was observed with concentration of 80% i.e. 1.2cm.

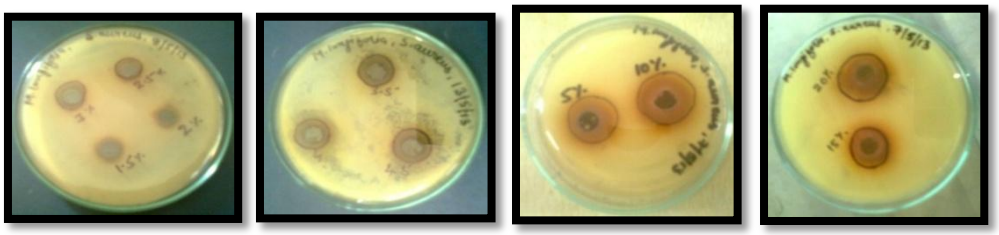
- **Effect of M. longifolia leaf extract with different dilutions on E. coli**

Control-1(MHA) Control-2 (E.coli) Conc. 0.5% & 1%

Conc. 1.5% to 3% 3.5% to 4.5% 5% & 10% 15% & 20%

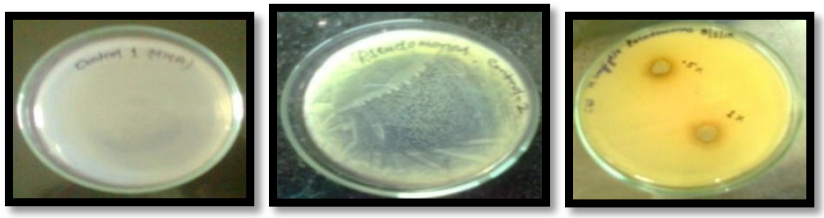
- **Effect of M. longifolia leaf extract with different dilutions on S. aureus.**

Control-1 (MHA) Control-2 (S. aureus) Conc. 0.5% & 1%

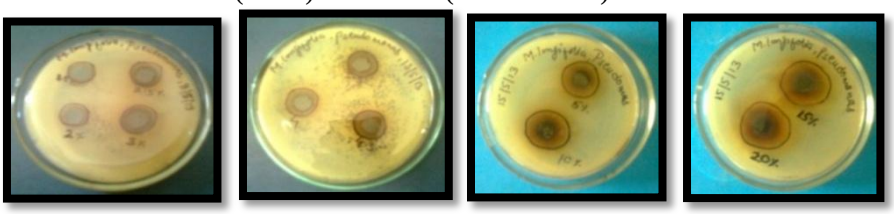


Conc. 1.5% to 3% 3.5% to 4.5% 5% & 10% 15% & 20%

- **Effect of M. longifolia leaf extract with different dilutions on Pseudomonas**

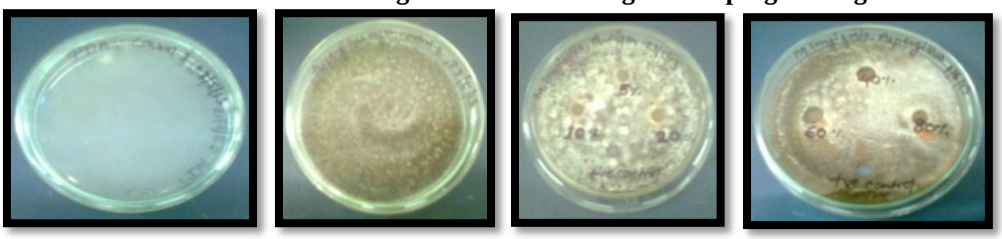


Control -1 (MHA) Control-2 (Pseudomonas) Conc. 0.5% & 1%



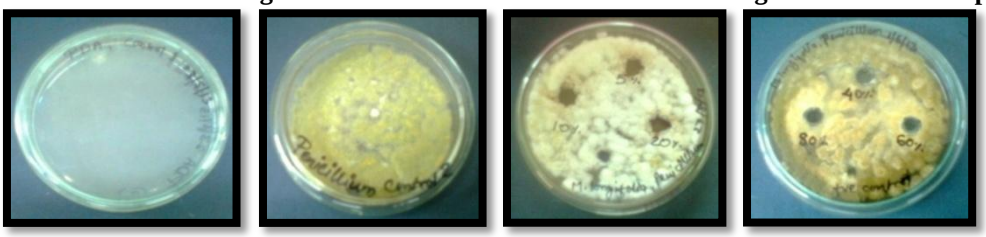
Conc. 1.5% to 3% 3.5% to 4.5% 5% & 10% 15% & 20%

➢ **Effect of M. longifolia leaf extract against Aspergillus niger**



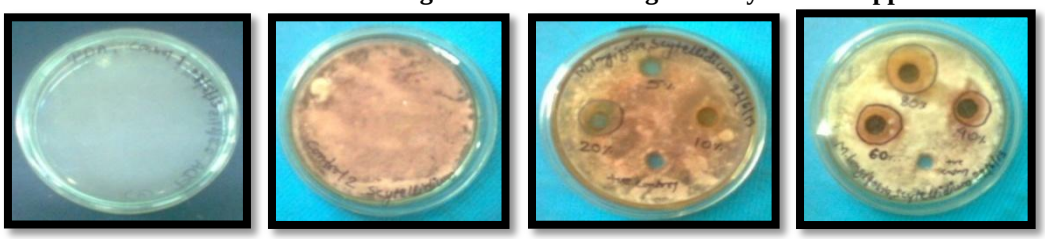
Control (PDA) Control (A. niger) Conc. 5%, 10%, 20% 40%, 60%, 80%

➢ **Effect of M. longifolia leaf extract with different dilutions against Penicillium spp.**



Control (PDA) Control (Penicillium sp.) Conc. 5%, 10%, 20% 40%, 60%, 80%

➢ **Effect of M. longifolia leaf extract against Scytalidium spp.**



Control (PDA) Control (Scytalidium sp.) Conc. 5%, 10%, 20% 40%, 60%, 80%

IV. Discussion

Medicinal plants are very important in our daily life as these are used for the treatment of many diseases. It has been used from ancient time and now a days they are used as food supplement, nutraceuticals, in modern medicines. Madhuca longifolia is having great concern today as its every part is used as medicines and is edible too. It is mostly used in the tribal area.

In the present study, study of antimicrobial activity of Madhuca indica is done. According to study Madhuca indica showed good potency in terms of inhibition zones against all the tested bacterial strains. Gram positive bacteria were found to be more susceptible to the M. indica extracts. Here in this study also the sample is having good potency in terms of inhibition zones against all the three tested bacterial strains. Gram positive bacterial strains were more susceptible for both extracts as compared to Gram negative strains and in case of fungal strains tested, Scytalidium spp. was found to be susceptible for M. Longifolia leaf extract; other fungal strains were resistant for this.

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