



## ANTIMICROBIAL PROPERTIES OF FEW PLANTS USED IN TRADITIONAL SYSTEM OF MEDICINE

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### ABSTRACT

Medicinal plants contribute a sizeable portion in human health care system both at commercial and production levels. The plants *Azadirachta indica* (neem), *Mangifera indica* (mango), Eucalyptus, *Curcuma longa* (turmeric), *Cinnamomum verum*, Musa, *Capsicum annum* (red chilly) were studied as these plants are popularly used in many folk medicines for last many centuries. Plant parts taken in the study were leaves, peels, rhizomes and fruit. The extracts were found to be very active against the test organisms viz: *Escherichia coli* (MTCC 729), *Micrococcus luteus* (MTCC 0439). Tannins, flavonoids, alkaloids, saponins, phenols, starch, general glycosides and bitter principles were found in the extract. Methanolic extract of turmeric shown maximum antimicrobial activity i.e 25 mm against *Escherichia coli* and 35 mm against *Micrococcus luteus*. The lowest antimicrobial activity found in case of banana ethanolic extract was 9 mm for *Escherichia coli* and 5 mm for *Micrococcus luteus*. The data obtained led a basis for its wide use as a therapeutic both in traditional and folk medicine.

**Key Words:** Medicinal plants, Flavonoids, Tannins, Saponins and MTCC

### INTRODUCTION

Therapies of plant origin are well known in human medication for years and live stock<sup>1</sup>. Whether rational or merely due to superstition this practice has become deeply entrenched in many cultures and farming system as the knowledge has passed on to the present from the ancient past. Plants have limitless ability to synthesize aromatic substances mainly secondary metabolites of which more than 12000 have been isolated and estimated to less than 10% of the total. In India the use of different parts of several medicinal plants to cure specific ailments has been in practice from ancient times. The indigenous system of medicine namely Ayurvedic, Siddha and Unani have been in existence for several centuries. These systems of medicine cater to the needs of nearly 70% of our population residing in the villages.

The plants are the repositories of phytochemicals in the form of secondary metabolites which are the primary source of various drugs. The present trend in modern medication is heading for a shift from synthetic to herbal drugs as only 2% of the total plants present in nature are screened till date. Extracts of plants from around 157 families have been reported to be active against microorganisms. In recent years multiple drug resistance has come up as a real problem for the health care professionals and it's due to indiscriminate use of existing antimicrobial drugs in the treatment of infectious diseases<sup>2</sup>. In addition to these, antibiotics are associated with various adverse effects; therefore to address the problem researchers need to screen and exploit the traditional system of medication using the current tools and techniques for the possible out come in the form of novel compounds and activities from the folk medicines and plants. There are reports available on the relationship of biodiversity with drug discoveries<sup>3</sup>.

### MATERIAL AND METHODS

Plants used were *Azadirachta indica*, *Mangifera indica*, Eucalyptus, *Curcuma longa*, Musa, *Capsicum annum*. Fresh leaves, peels, rhizomes and fruits were collected and shade dried at room temperature for 10 days until a constant weight is obtained dried, grounded and used for further investigation.

#### Extraction

Plant metabolites were extracted using soxhlet apparatus. 50g of the dried powder was packed with a thimble and different solvents are used for extraction. Ethanol and methanol are used for extraction of neem and mango leaves. Acetone, methanol and distilled water for extraction of turmeric rhizome, banana peel and for red chilly. The collected extracts were concentrated under reduced pressure by evaporation. Cinnamom bark was grounded to obtain fine powder. 1g of powder was dissolved in 50% ethanol and kept for 48 hrs at room temperature with frequent shaking.

#### Column Chromatography

Neem extracts were purified in silica gel column using eluant petroleum ether and ethyl acetate in 9:1 ratio. Mango extract was purified by ethyl acetate and hexane in 1:1 ratio and solvent system used for the extraction and purification of turmeric extract was n-hexane, ethyl acetate in 7:1, 15:2 and 13:4 ratios. Banana extract was purified using the solvent methanol. Red chili extract was purified using ethyl acetate, hexane in 1:1 ratio.

#### Antibacterial Assay

Antibacterial activity of the purified and crude extracts was performed by modified disc diffusion method<sup>4</sup>. 20 ml of TSA agar was poured in the sterile petridish and allowed for solidification. 20µl of the test strains *Escherichia coli* (MTCC 729) and *Micrococcus luteus* (MTCC 0439) were spread over the medium. 5 mm diameter wells were punched using sterile borer. 100µl of the plant extracts were added to the wells and incubated at

37°C for 24 hours. Zone of inhibition was measured using mm scale.

**RESULTS AND DISCUSSION**

The results obtained from disc diffusion method showed that neem and eucalyptus ethanolic extracts have shown maximum antibacterial activity and among the methanolic extracts turmeric has shown highest antimicrobial activity and red chilly has shown lowest activity against the test organisms (Table 1 and 2). Several studies have been

conducted in the past and since three decades the research has been on the antimicrobial properties of herbs, spices and their derivatives such as essential oils, extracts and decoctions which gave many significant and substantial findings that supported the present investigation<sup>5-8</sup>. Some researchers reported that there is a relationship between the chemical structures of the most abundant compounds in the tested extracts or essential oils and their antimicrobial activity<sup>9-10</sup>. Aromatic phenolic compounds found to have antimicrobial properties<sup>8</sup>.

**Table 1: Zones of inhibition (mm) of various extracts against the test organisms**

Test organism	NE	EE	BE	TM	MM	RM
<i>Escherichia coli</i>	22	22	9	25	12	15
<i>Micrococcus luteus</i>	11	11	5	35	9	7

NE-Neem ethanolic extract; EE- Eucalyptus ethanolic extract; BE- Bannana ethanolic extract; TM- Turmeric Methanolic extract; MM- Mango methanolic extract; RM- Red chilly methanolic extract.

**Table 2: Comparative study of antimicrobial activity of purified extracts**

Sl No	Solvent mixture combination of purified extract	Elutes (ratio)	Zone of inhibition in (mm)	
			<i>Escherichia coli</i>	<i>Micrococcus luteus</i>
1	PE:EA(N)	9:01	8	5
2	PE:EA(N)	8:02	8	8
3	PE:EA(N)	7:03	8	9
4	PE:EA(N)	6:04	8	5
5	PE:EA(N)	5:05	7	10
6	(E)	1:9	15	25
7	(E)	3:07	15	20
8	(E)	5:05	20	13
9	EA:He(M)	1:01	12	09
10	(B)	10:00	12	14
11	(B)	9:01	17	07
12	(B)	8:02	24	12
13	(B)	7:03	20	22
14	He:EA(T)	17:01	18	28
15	He:EA(T)	15:02	10	11
16	He:EA(T)	13:04	17	24
17	EA:He(R)	9.8:2	4	5
18	EA:He(R)	9.7:3	10	20
19	EA:He(R)	9.4:6	12	3
20	EA:He(R)	9.2:8	8	8

PE: EA (N) Neem purified extract in the eluant Petroleum ether and ethyl acetate. (E) Eucalyptus purified extract  
EA: He(M) Mango purified extract by the solvent system Ethyl acetate and n-Hexane, (B) purified extracts of Banana  
He:EA(T) Turmeric purified fraction by Hexane and Ethyl acetate., EA:He (R) Red chilly purified fraction by Ethyl acetate and n-Hexane

**CONCLUSION**

Although the exact active components of the extract that showed this effect were not identified, but active antimicrobial plant compounds such as flavonoids, alkaloids and tannins were observed in the extract. The result of phytochemical analysis indicates the presence of saponins, cyanogenic glycosides, flavonoids and tannins. Alkaloids and anthraquinones were not present in the extracts, cyanogenic glycosides reported to possess antimicrobial activity are very effective in uterine infections<sup>11</sup>. The observed antimicrobial activity against the test organisms might be due to the presence of tannins and cyanogenic glycosides in the extract as these have previously been reported to possess antimicrobial activities<sup>12</sup>. Present findings turn as the rationale for use of these plants in the treatment of various conditions in traditional medical practice.

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