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**Madhavi Adhav**  
Department of Botany P.M.B.  
Gujarati Science College, Indore  
(M.P.)

## Phytochemical screening and antimicrobial activity of *Mallotus philippensis* Muell. Arg.

**Madhavi Adhav**

### Abstract

*Mallotus philippensis* Muell. Arg (Euphorbiaceae) is one of the medicinally important plant used in indigenous system of medicine for cultivation prospects. It is commonly known as "Kamela". Antimicrobial studies of *Mallotus philippensis* (red hairy substance from fruits) extracts show strong antibacterial activity against selected gram negative and gram positive bacteria viz. *Escherichia* (MTCC 739) *Pseudomonas aeruginosa* ATCC 25668. *Shigella dysenteriae* (Locally isolated) *Klebsiella pneumoniae*, *Staphylococcus aureus* (ATCC9144), *Streptococcus* sp. (ATCC 6633) and *Bacillus subtilis* (ATCC 6633). The extract is known to contain flavonoids, glycosides, tannins, proteins and amino acids. The fruits contain various active ingredients and different types of flavonoids. The result of the present study showed a good deal of correlation with antimicrobial study and also corrected usage of the plant in medicinal systems.

**Keywords:** *Mallotus philippensis*, Euphorbiaceae, antimicrobial

### 1. Introduction

Plant produce a diverse range of bioactive molecules making them a rich source of different types of medicines. Higher plants as sources of medicinal compounds have continued to play a dominant role in the maintenance of human health care since ancient times [1]. *Mallotus philippensis* Muell. Arg small much branched evergreen tree widely distributed throughout tropical India. The plant is found useful in anthelmintic, cathartic, antioxidant, astringent, blood purifier, styptic [2, 3]. It is also effective in weeping eczema, bile trouble, boils, eruptions of skin, pimples, pimples and frackles [1, 2, 3, 4, 5]. The fruits contain rottlerin, cinnamoyl chromene and flavanone chromene 2' 2' 6' trihydroxy - 2' 2' dimethyl pyrano 6" 5" 4", 5 - chalcone, 5-7 dihydroxy-6 methyl-8-prenyl flavone [1]. The present work yielded useful information which can be exploited for the successful treatment of many diseases.

### 2. Materials and Methods

For present investigation the plant materials of *Mallotus philippensis* Muell. Arg (red hairy substances from fruits) were collected from Indore and its surrounding regions. The collected plant materials were identified with the help of Regional Floras and Flora of British India [6, 7, 8].

To obtain ethanolic extract 100 gms. Of shade dried plant material was extracted with 500 ml. of ethanol (95%) in "Soxhlet Extraction Apparatus". Finally, the prepared plant material is macerated with water for 24 hrs. To obtain an aqueous extract. The extract was concentrated by distilling off the solvent [9, 10].

The extract thus obtained was then subjected to preliminary phytochemical screening for identification of various plant constituents by methods suggested by Finar [11] (1962); Farnsworth [12] (1966) and Horborne [13] *et al.* (1979). Each extract samples were tested for antimicrobial activity against selected human pathogenic bacteria by Cup Borrer Method.

The component of ethanolic extract was separated by column chromatography using a silica gel column where Hexane is used as solvent. The purity of each component was checked by Thin Layer Chromatography. Each fraction are then again subjected for testing antimicrobial activity by "Disc Diffusion Method" (Bauer [14] *et al.* 1996 and Agrawal [15] (1974)

### 3. Results and Discussions

The preliminary phytochemical screening of ethanolic fruit extract reveals the presence of flavonoids, glycosides phenolic compounds, tannins, proteins and amino acids. The alkaloids saponins, fixed oils and fats are found absent.

**Correspondence:**  
**Madhavi Adhav**  
Department of Botany P.M.B.  
Gujarati Science College, Indore  
(M.P.)

The results of antimicrobial testing of ethanolic and aqueous extract show antibacterial activity against selected gram positive and gram negative bacteria. The extract showed strong antibacterial activity against *Pseudomonas aeruginosa*, *E. coli* and *Staphylococcus aureus* while extract does not show any response against *Shigella dysenteriae*, *Streptococcus sp.* and *Bacillus subtilis*. Similar results were obtained with aqueous extract. Ethanolic extract exhibit strong antibacterial activity as compared to aqueous extract. Fractionation of extract by column chromatography suggest single fraction H<sub>1</sub>, which shows similar results of antimicrobial activity against tested gram positive and gram negative bacteria.

#### 4. Conclusion

The presence of flavonoids, glycosides, phenolic compound and tannins are mainly contributed to the antimicrobial activity of the plant [16, 17]. This proves its correlation with the antimicrobial activity and the present study confirms correct use of the plant in medicinal system.

#### 5. Acknowledgement

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**Table 1:** Preliminary phytochemical screening of ethanolic extract of *Mallotus philippensis* Muell. Arg

	Plant constituents test/Reagent	Results
<b>1.</b>	<b>Alkaloids</b>	
	(i) Mayer's Reagent	-
	(ii) Dragendorff Reagent	-
<b>2.</b>	<b>Carbohydrates</b>	
	(i) Molish test	+
	(ii) Fehling solution test	+
	(iii) Benedict test	+
<b>3.</b>	<b>Types of Carbohydrates</b>	
	(i) Glucose	+
	(ii) Fructose	+
	(iii) Galactose	-
	(iv) Lactose	-
	(v) Starch	-
<b>4.</b>	<b>Glycosides</b>	
	(i) Keller Killiani test	+
	(ii) Legal's test	+
	(iii) Borntrager's test	+
<b>5.</b>	<b>Phytosterols</b>	
	Liebermann's test	-
<b>6.</b>	<b>Fixed oils and Fats</b>	
	Spot test	-
<b>7.</b>	<b>Saponins</b>	
	Foam test	-
<b>8.</b>	<b>Phenolic compounds</b>	
	(i) Ferric chloride test	+
	(ii) Liebermann's test	+
<b>9.</b>	<b>Tannins</b>	+
<b>10.</b>	<b>Proteins</b>	
	(i) Xanthoproteic test	+
	(ii) Biuret test	+
<b>11.</b>	<b>Amino Acids</b>	+
<b>12.</b>	<b>Flavonoids</b>	+
<b>13.</b>	<b>Gums and Mucilages</b>	
	Molish test	-

**Table 2:** Antimicrobial testing of extracts of *Mallotus philippensis* Muell Arg. (red hairy substances from fruits) against gram positive bacteria

S. No.	Extract used	Quantity of extract used	<i>S. aureus</i>	<i>Streptococcus Sp.</i>	<i>Bacillus subtilis</i>
1	Ethanolic	0.05 ml	21 mm	No Zone	No Zone
		0.08 ml	23 mm	No Zone	No Zone
		0.11 ml	26 mm	No Zone	No Zone
		0.14 ml	28 mm	No Zone	No Zone
		0.17 ml	31 mm	No Zone	No Zone
	<b>r</b>		<b>0.96</b>		
		<b>Zone Colour</b>	<b>Brown</b>		
2	Water	0.05 ml	10 mm	No Zone	No Zone
		0.08 ml	13 mm	No Zone	No Zone
		0.11 ml	15 mm	No Zone	No Zone
		0.14 ml	17 mm	No Zone	No Zone
		0.17 ml	20 mm	No Zone	No Zone
	<b>r</b>		<b>1.00</b>		
		<b>Zone Colour</b>	<b>Brown</b>		

Note: \* r = correlation coefficient

**Table 3:** Antimicrobial testing of extracts of *Mallotus philippensis* Muell Arg. (red hairy substances from fruits) against gram negative bacteria

S. No.	Extract used	Quantity of extract used	<i>E. coli</i>	<i>Shigella dysenteriae</i>	<i>Salmonella typhi</i>	<i>Pseudomonas aeruginosa</i>	<i>K. pneumoniae</i>
1	Ethanolic	0.05 ml	16 mm	No Zone	No Zone	25 mm	No Zone
		0.08 ml	18 mm	No Zone	No Zone	30 mm	No Zone
		0.11 ml	25 mm	No Zone	No Zone	33 mm	No Zone
		0.14 ml	27 mm	No Zone	No Zone	36 mm	No Zone
		0.17 ml	30 mm	No Zone	No Zone	38 mm	No Zone
	<b>r</b>		<b>0.98</b>			<b>0.99</b>	
		<b>Zone Colour</b>	<b>Brown</b>				
2	Water	0.05 ml	08 mm	No Zone	No Zone	08 mm	No Zone
		0.08 ml	11 mm	No Zone	No Zone	10 mm	No Zone
		0.11 ml	14 mm	No Zone	No Zone	12 mm	No Zone
		0.14 ml	16 mm	No Zone	No Zone	15 mm	No Zone
		0.17 ml	18 mm	No Zone	No Zone	17 mm	No Zone
	<b>r</b>		<b>0.97</b>			<b>0.96</b>	
		<b>Zone Colour</b>	<b>Brown</b>				

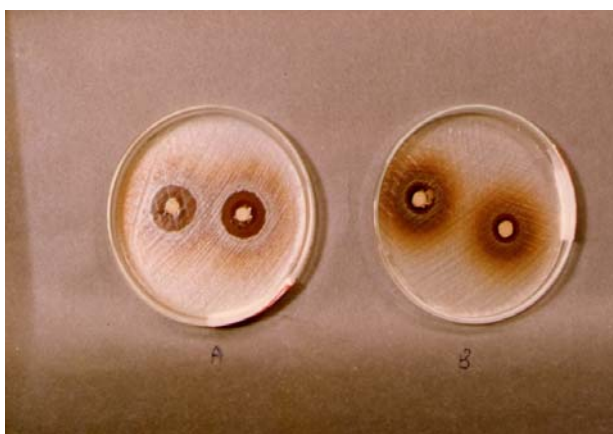
Note: \* r = correlation coefficient

**Table 3(a):** Antimicrobial testing of hexane fraction against gram positive bacteria

S. No.	Fraction	<i>S. aureus</i>	<i>B. subtilis</i>	<i>K. pneumoniae</i>
1	H1	16 mm	No Zone	No Zone

**Table 3(b):** Antimicrobial testing of hexane fraction against gram negative bacteria

S. No.	Fraction	<i>E. coli</i>	<i>S. dysenteriae</i>	<i>S. typhi</i>	<i>P. aeruginosa</i>	<i>K. pneumoniae</i>
1	H1	14 mm	No Zone	No Zone	18 mm	No Zone

**Fig 1:** Results of antimicrobial testing against *E. coli* *Pseudomonas aeruginosa*

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