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# Phytochemical Constituents and Antimicrobial Effects of *Musa Paradisiaca* Leaves https://doi.org/10.56343/STET.116.012.004.007

# V. Saratha<sup>1</sup> and S. Kayalvizhi<sup>2</sup>

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PG and Research Department of Biochemistry, Sengamala Thayaar Educational Trust Women's College, Sundarakkottai, Mannargudi - 614 016, Tamil Nadu, India.

## Abstract

Phytochemical composition and antimicrobial activities of *Musa Paradisiaca* leaf were assessed by *in vitro* screening. Phytochemical analysis of different solvent (aqueous, ethanolic and methanolic) extracts of *Musa Paradisiaca* leaf revealed the presence saponins, flavonoids, polyphenol, triterpenoids, and glycosides in all the three extracts while alkaloids, tannin and phlobatannins were absent in aqueous extract. Antimicrobial activity of plant extract was investigated against bacterial species *Staphylococcus aureus*, *E-coli* and fungal species *Candida albicans* using agar by disc diffusion method. The study revealed that the ethanolic extract of *Musa Paradisiaca* leaf is effective against bacterial and fungal species.

Key words: Antibacterial activity, Antimicrobial activity, Musa paradisiaca, Phytoconstituents, Phytomedicine.Received : March 2018Revised and Accepted : January 2019

## INTRODUCTION

Medicinal plants are abundant sources of antimicrobial molecules. A wide range of medicinal plants extracts are used to treat several infections as they have potential antimicrobial activity. Some of these bioactive molecules are screened and traded in market as raw material for many herbal industries (Renisheya et al., 2011). Experts turned their concentration back towards obtaining advantages from medicinal plants after observing more side effects of synthetic drugs compared to their benefits (Bushra et al., 2012). It is estimated that about 35,000 to 70,000 plants species are used as medicinal plants out of 422127 reported worldwide plant species (Bibi et al., 2011). In India 80% of the population belonging to the rural areas depend on traditional medicines (Munir et al., 2013).

*Musa Paradisiaca* is a monoecious herb and it grows 10-40 feet in height and has enormous broad green leaves which grow through hollow stem that bears flower and fruit. It occurs in all tropical areas native to India and Burma. It is also distributed in New Guinea, America, Australia and tropical Africa. Cultivation is limited to Florida, The Canary Islands, Egypt, Southern Japan and South Brazil. It is large tree-like herb with

\*Corresponding Author : email: *sarathabiochem@gmail.com*  thick rhizome, pseudo stem fleshy, succulent formed by the imbricate leaf sheaths, Large, oblong, petioles long channeled, bright glossy green (Asuquo and Udobi 2016). This paper reports the phytochemical constituents and antimicrobial properties of *M*. *Paradisiaca*.

### MATERIALS AND METHODS

### **Collection of plant materials**

The leaves of *Musa Paradisiaca* were collected in December 2017 from Maankottai Natham, Thiruvarur district, Tamil Nadu, India. The *Musa Paradisiaca* leaves were washed several times with distilled water to remove the traces of impurities from the leaves. Leaves were spread out in a plain paper and shade dried at room temperature for about 10 days and powdered using grinder mixture. The powdered materials were used for further studies.

### Preparation of plant extract:

Two grams of the powder of *Musa Paradisiaca* dry leaves were transferred into different conical flasks (250ml) containing 50ml of different solution *viz* methanol, ethanol and water and shaked well for 30 minutes by free hand. After 24 hrs, the extracts were filtered using whatman filter paper No.1 and filtrate was used for further analysis.

### Phytochemical screening

Chemical tests were carried out on the extracts using standard procedures to identify the constituents as described by Trease and Evans (1989).

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## Microorganisms

The microbial strains employed in the biological assays were Gram – positive bacteria: *Staphylococcus aureus* (MTCC 3160), Gram – negative bacteria: *Escherichia coli*, (MTCC 732) and the fungus *Candida albicans* (MTCC 183) obtained from Microbial Type Culture Collection (MTCC) at the Institute of Microbial Technology (IMTECH), Chandigarh, India.

## Antimicrobial assay

Antibiogram was done by disc diffusion method (Karadi et al., 2011) using the above plant extracts. Petri plates were prepared by pouring 30 ml of NA / PDA medium for bacteria/fungi. The test organism was inoculated on solidified agar plate with the help of micropipette, spread and allowed to dry for 10 minutes. The surfaces of media were inoculated with bacteria/ fungi from a broth culture. A sterile cotton swab was dipped into a standardized bacterial/ fungi test suspension and used to evenly inoculate the entire surface of the Nutrient agar/PDA plate. Inoculums containing bacteria specie were spread on Nutrient agar plates and fungus strains were spread on potato dextrose agar. Using sterile forceps, the sterile filter papers (6 mm diameter) containing the crude extracts (50ìl) were laid down on the surface of inoculated agar plate. The plates were incubated at 37°C for 24 h for the bacteria and at room temperature (30±1) for 24-48 hr. for fungal strains. Each sample was tested in triplicate.

## **RESULTS AND DISCUSSION**

The phytochemical analyses of the *Musa paradisiaca* leaves revealed the presence of medicinally active phytochemical constituents, *viz* saponins, flavonoids, terpenoids, triterpenoids, steroids, carbohydrate, protein and glycoside in all the three extracts (Table 1).Tannins and phlobatannins and alkaloids were absent in all the three extracts. Flavonoids and polyphenol are absent in ethanol extract. Anthroquinone was found in the methanol extract only.

# Antimicrobial activity

Antimicrobial activity of ethanolic extract of *Musa* paradisiaca was evaluated against Gram – positive bacteria: *Staphylococcus aureus*, Gram – negative bacteria: *Escherichia coli* and fungus *Candida albicans* using the standard agar disc diffusion method. The solidified Nutrient agar plates were swapped with the test organism and the samples were impregnated. After 24 hrs incubation, the inhibition zone was measured. The antimicrobial activity of plant extract was detected by the inhibition of zone around the disc. The *in vitro* antimicrobial activity of the *Musa paradisiaca leaves* extract against these bacteria and fungi were

P - ISSN 0973 - 9157 E - ISSN 2393 - 9249 qualitatively assessed by the presence of inhibition zones represented in the Plate 1. The inhibitory activities in culture media of the *Musa paradisiacal* are reported in Table 2 and compared with standard antibiotic *viz.* chloromphenical and Fluconazole, for bacteria and fungus, respectively.

**Table 1.** Qualitative Phytochemical analysis of

 Musa paradisiaca leaves extract

S.No.	Phytochemicals	Aqueous Extract	Ethanol extract	Methanol Extract
1	Tannin		15	-
2	Phlobatannins	13	13	13
3	Saponnin	4	+	+
4	Flavonoids	+	1 <u>3</u>	+
5	Steroids	4	÷	++
б	Terpenoids	+	+	++
7	Triterpenoids	+	÷	÷
8	Alkaloids	13	12	13
9	Carbohydrate	+	+	+
10	Protein	+	+	+
11	Anthroquinone	8	ंड	++
12	Polyphenol	+	13	++
13	Glycoside	+	+	+

**Table 2.** Antibacterial activity of ethanolic extract of

 Musa paradisiaca leaves

Species	Different concentration of plant extract			Standard* (30µl/ml)	
	50µl/ml	100µl/ml	150µl/ml	1	
	Bacteria				
Staphyloc	3.2	5.2	6.8	8.5	
Escherichi	2.3	4.5	5.7	9.5	
1	Fungi				
Candida	2.1	4.6	9.2	10.2	

The results showed that the antimicrobial activity was directly proportional to the concentration of *Musa paradisiaca* extract. The *Musa paradisiaca* extracts showed higher antimicrobial activity against bacteria when compared to fungi, at low dose i.e,  $50\mu$ l/ml. At high doses (150 $\mu$ l) of *Musa paradisiaca* extract higher antifungal activity. The results are comparable to that of standard drugs *i.e.*, Chloromphenical for bacteria and Fluconazole for fungi. Results of the present study corresponds with the results of Subrata Kumar *et al.*, (2011) who observed antimicrobial activiteies of *M.paradisiaca* against pathogenic bacteria.

## CONCLUSION

It can be concluded from the present study that *Musa paradisiaca* leaves are a rich source of phytochemicals.



**Plate1.** Antimicrobial activity of ethanolic leaves extract of *Musa paradisiaca* 

This study is the first scientific report that provides convincing evidence for antimicrobial activity of *Musa paradisiaca leaves* and thus providing scientific validity

to its traditional consumption by the local populace of south India. The present studies showed that Musa paradisiacal leaves extract have a good potential for therapeutic use against the bacterial and fungal pathogens.

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