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# Antimicrobial Activity of Bark Extract of *Ficus Platyphylla*

**Mudi SY[1], *Muhammad A[1] and Yelwa AM[2]**

[1]Department of Pure and Industrial Chemistry, Bayero University, Kano, Kano State.
[2]Federal College of Education (Technical), Potiskum, Yobe State.

**ABSTRACT**

The effects of stem bark extracts of *Ficus platyphylla* were investigated *in vitro* for their antibacterial activity. It was found that chloroform fraction (FP1-02) indicated a positive activity against *Salmonella typhi* at 8000µg/ml. Test for the presence of secondary metabolite showed the presence of alkaloid, reducing sugar, saponins, tannins, resins and flavonoids in ethanol soluble fraction (FP1).
**Key words**: *Ficus platyphylla*, extraction, secondary metabolite, and antibacterial.

***Corresponding author***
E-mail: amsar05@hotmail.com

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## INTRODUCTION

Folk healing, since ancient times, has always included medicines of plant origin. Traditional healing practices and herbal remedies have stood the test of time because of their strong cultural ties, and easy accessibility [1]. In most cases they use crude herbal remedies in the form of water-based extracts, tinctures, and concoctions [2]. In African settings, the tendency to self-medicate is highest in individuals afflicted with chronic diseases like cancer, Human immunodeficiency virus (HIV), diabetes and arthritis. This trend is aggravated by their poor social-economic situation, ignorance, and cultural beliefs, which are often prohibitive to easy access to western medicine. In recent years, in the search for new drugs and escalating public demand, researchers have turned to plant sources for the active molecules [3].

*Ficus platyphylla* is a large savannah tree, to 60 ft. high, with rusty or pinkish-brown bark and large grey scaly patches; foliage and figs often tinged pink; often epiphytic at first. Widely distributed in sub-Saharan Africa. The bark of the plant has been used in the treatment of asthma diseases; it also helps in flushing out contaminated blood from the body of newly delivered women [4].
This study is to assess the bioactivity of stem bark extracts of the plant against some selected bacteria.

## EXPERIMENTAL PROCEDURE

### Extraction and fractionation of plant material

The leaves of *Ficus platyphylla* were collected from Yako Village, Kiru Local government area, Kano State on 15$^{th}$ June, 2008. The leaves sample was air dried, grounded and soaked with 95% absolute ethanol at room temperature for 2 weeks. The ethanol extract obtained was partitioned into n-hexane, chloroform, ethyl acetate and aqueous methanol soluble fractions. All the solvents used were evaporated using Rotary Evaporator.

### Chemical analysis

Plants extracts were phytochemically screened using standard techniques for the qualitative detection of Alkaloid, Flavanoids, Resins, Sugars, Tannins and Saponins [5].

### Test organisms

The organisms - *Staphylococcus aureus, Escherichia coli, Streptococcus and Salmonella typhi*- were provided by the microbiology laboratory, Biological sciences, Bayero University Kano.

**Preparation of extract concentrations**

This was carried out using standard method [6]. Stock solution was prepared for each of the fractions obtained by weighing 10mg of it and dissolved in 1ml of Dimethylsulphoxide (DMSO) in Bijou bottle. This gave an extract concentration of 10,000µg/ml (stock solution). Three varied extract concentrations (500 µg/ml, 1000 µg/ml, 2000 µg/ml) were prepared from stock solution (10,000 µg/ml) using 10-fold serial dilution.

**Preparation of sensitivity discs**

The sensitivity discs were prepared using sterile Whatman's No. 1 filter paper [6]. The discs (6.0 ± 1.0 mm diameter each) were prepared by punching the filter paper appropriately. Ten discs were dispensed into each concentration (impregnation) by means of sterile forceps.

**Sensitivity testing**

Agar diffusion method was employed [7]. The freshly prepared nutrient agar plates were inoculated with the test organisms by streaking method. With the aid of a sterile forceps, impregnated paper discs containing the leaf extract of the plant at different concentrations were arranged radially and pressed firmly onto the inoculated agar surface to ensure even contact. Each discs was sufficiently spaced out and kept at least 15mm from the edge of the plate to prevent overlapping of zones. The plates were incubated aerobically at $37^0$C for 18 hours. Diameters of zones of inhibition were measured using millimeter rule, recorded and interpreted in accordance with Cheesbrough, [6].

**Thin Layer Chromatography (TLC)**

The TLC analysis of ethanol and chloroform extracts in solvent system revealed the presence of a number of different spots. The result is shown in table 8.

## RESULTS AND DISCUSSION

The air-dried plant material (200g) is grounded into powder, percolated with 95% ethanol (1.5L) for two weeks. This was drained and evaporated at reduced pressure to yield 27.23g of the ethanol extract (FP1). The extract (10g of FP1) was defatted with petroleum ether and was further fractionated using solvents of increasing polarity- chloroform, ethyl acetate and aqueous methanol. Physical appearance of the extracts/fractions obtained is recorded in table 1.

In this work, all the fractions obtained indicate presence of resins and reducing sugars. Ethanol extract, petroleum ether and aqueous methanol responded positively to a test on the presence of flavonoids. Alkaloids were detected in ethanol and chloroform extracts. The

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distribution of tannins and saponins were detected in all the extracts with exception of chloroform extract.

**Table 1: Weight of various fractions obtained and their appearances, leaves of *Ficus platyphylla***

| FRACTIONS | SYMBOL | WEIGHT | NATURE | COLOUR |
|---|---|---|---|---|
| Ethanol | FP1 | 10.00g | Gummy | Dark-Brown |
| Pet-Ether | FP1-01 | 2.30g | Gummy | Dark-Brown |
| Chloroform | FP1-02 | 1.24g | Sticky | Brownish |
| Ethyl acetate | FP1-03 | 3.23g | Solid | Brownish |
| Aq. MeOH | FP1-04 | 2.11g | Solid | Brownish |

**Table 2: Summary of the phytochemical result for *Ficus platyphylla*.**

| Fractions | Compound Present |
|---|---|
| FP1 | Alkaloid, Reducing sugar, Tannins, Saponins, Flavonoids, Resins. |
| FP1-01 | Reducing sugar, Tannins, Saponins, Flavonoids, Resins. |
| FP1-02 | Alkaloid, Reducing sugar, Resins. |
| FP1-03 | Reducing sugar, Tannins, Saponins, Resins. |
| FP1-04 | Reducing sugar, Tannins, Saponins, Flavonoids, Resins. |

**Table 3. Antibacterial activity of FP1 of *Ficus platyphylla*.**

| Test organism | Concentration (µg/ml) 500 1000 2000 Zone of inhibition (mm) |
|---|---|
| *Staphylococcus aureus* | 00 08 12 |
| *Escherichia coli* | 00 00 00 |
| *Streptococcus* | 00 00 00 |
| *Salmonella typhi* | 00 10 12 |

**Table 4. Antibacterial activity of FP1-01 of *Ficus platyphylla*.**

| Test organism | Concentration (µg/ml) 500 1000 2000 Zone of inhibition (mm) |
|---|---|
| *Staphylococcus aureus* | 00 00 00 |
| *Escherichia coli* | 00 00 00 |
| *Streptococcus* | 00 00 00 |
| *Salmonella typhi* | 00 00 00 |

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**Table 5. Antibacterial activity of FP1-02 of *Ficus platyphylla*.**

| Test organism | Concentration (µg/ml) 500 1000 2000 Zone of inhibition (mm) |
|---|---|
| *Staphylococcus aureus* | 00 00 00 |
| *Escherichia coli* | 00 00 00 |
| *Streptococcus* | 00 00 00 |
| *Salmonella typhi* | 09 13 18 |

**Table 6. Antibacterial activity of FP1-03 of *Ficus platyphylla*.**

| Test organism | Concentration (µg/ml) 500 1000 2000 Zone of inhibition (mm) |
|---|---|
| *Staphylococcus aureus* | 00 00 00 |
| *Escherichia coli* | 00 00 00 |
| *Streptococcus* | 00 00 00 |
| *Salmonella typhi* | 00 00 10 |

**Table 7. Antibacterial activity of FP1-04 of *Ficus platyphylla*.**

| Test organism | Concentration (µg/ml) 500 1000 2000 Zone of inhibition (mm) |
|---|---|
| *Staphylococcus aureus* | 00 00 00 |
| *Escherichia coli* | 00 00 00 |
| *Streptococcus* | 00 00 00 |
| *Salmonella typhi* | 00 00 00 |

**Table 8. TLC Analysis.**

| Fraction | Solvent system | No. of spots | Rf values |
|---|---|---|---|
| Ethanol (FP01) | PE/ETAC 1:1 | 2 | 0.04; 1 |
| | PE/ETAC 1:4 | 3 | 0.08; 0.15; 1 |
| Chloroform (FP01-02) | PE/ETAC 1:1 | 2 | 0.04; 1 |
| | PE/ETAC 1:4 | 2 | 0.10; 1 |

PE = Petroleum ether ; ETAC = Ethyl acetate

The antibacterial test was carried out on all the extracts/fractions obtained. The result of bioassay was shown in the tables' 3- 7. Harper et al., (1945)[8] reported that, susceptibility of bacterial culture to extract was determined by measurement in the following ranges: 0-7 mm indicates inactivity; 8-12 mm indicates weak activity and 12mm-above indicates strong activity.

From the result obtained in this work, the ethanol, chloroform and ethyl acetate extracts showed positive activity agaisnt S*almonella typhi* at 2000µg/ml. Ethanol extract has also demonstrated a positive activity against *Staphylococcus aureus* at 1000 and 2000µg/ml. Other organisms tested resist the attack of the plant extracts. TLC analysis revealed two

distinct spots for ethanol and chloroform extracts in PE/ETAC (1:1) solvent system, whereas in the ratio of 1:4 three and two spots were seen for the respective extracts. This therefore signifies that, the activity observed might be due to components in the extracts.

## CONCLUSION AND RECOMMENDATION

Based on the bioassay results of the present study, it could be said that the plant extracts contain phytochemicals responsible for the activity against *Salmonella typhi and Staphylococcus aureus*. Further research is therefore recommended to isolate and characterize the chemical compound responsible for the activity.

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