

# Phytochemical and Antimicrobial Screening of the Fruit Pulp of *Canarium schweifurthii* (ATILE)

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## ABSTRACT

From the phytochemical screening that was carried out, the methanolic extract revealed the presence of saponins, terpenoids, steroids, glycosides and carbonhydrates, tannins and flavonoids. n-hexane extract revealed the presence of steroids and glycosides, while saponins, terpenoids, tannins, carbonhydrates and flavonoids were absent. Chloroform and ethyl acetate extracts revealed the presence of terpenoids, tannins, steroids, glycosides, carbonhydrates and flavonoids. Alkaloids had the highest percentage (14.4%) and oxalate had the lowest percentage (1.06%). The antimicrobial screening indicates that methanolic extract was active against *E. Coli* (37mm) and *Klebsilla pneumonia* (32mm). It was inactive against against *Bacillus subtilis*, *Pseudomonas aeroginosa* and *Salmonella typhii*. n-hexane and Chloroform extracts were inactive against all the bacteria used. Ethyl acetate extract was active against *Bacillus subtilis* (12mm), *E. Coli* (27mm), *Pseudomonas aeroginosa* (21mm), *Klebsilla pneumonia* (28mm) and *Salmonella typhii* (22mm). The important of the plant in traditional medicine were discussed with respect to the role of this plant in ethnomedicine in Nigeria.

## INTRODUCTION

Medicinal plants are of great importance to the health of individuals and communities. Some chemical substances that produce a definite physiological action on the human body in plants determine their medicinal value. Many medicinal plants are used as spices and food plants. The leaves of the plant are added to foods meant for pregnant and nursing mothers for medicinal purpose<sup>1</sup>. In Nigeria, the resin is considered emollient, stimulating and diuretic in Gabon. The bark however contains only a small amount of tannin, 0.66%. It is taken in small quantity in Liberia for gonorrhoea. In Sierra Leone, a bark-decoction is consumed for cough, chest pain, dysentery, pulmonary affection, stomach complaints and food poisoning. The resin is used against roundworm infections and other intestinal parasites. It is an emollient, stimulant, diuretic and has an effect on skin-affections and eczema. The pounded bark is used against leprosy and ulcers, the roots

stem bark and leaves are used for treating fever, constipation, malaria, diarrhea, sexual infection

and rheumatism<sup>2</sup>. The people of Plateau state, Nigeria, claim that the leaves are used to treat chronic wound and Tuberculosis symptom. The rhizomes and leaves are used as stimulant and against fever, constipation and malaria<sup>2</sup>.

## MATERIALS AND METHODS

### *Collection of Samples*

Fruits of *Canarium schweifurthii* were bought from Kutigi market. The fruits were dried in a room temperature for some days, during the drying processes; the pulp was removed, then crushed and dried for further analysis.

### Sample preparation

The maceration method was used for the extraction. This was done by soaking the crushed plant with methanol as the extracting solvent for two weeks. Partitioning was done on the crude methanol extract with *n*-hexane, chloroform and ethyl acetate using a separating funnel. The *n*-hexane portion was carefully separated. Subsequently, the crude methanol portion thereof was partitioned with chloroform followed by ethyl acetate leaving behind the crude methanol. The portions were subsequently referred to as *n*-hexane, chloroform, ethyl acetate and crude methanol portions respectively.

### Phytochemical Screening (Qualitative analysis)

The qualitative tests were carried out on the aqueous extracts using standard procedures to identify the constituents such as flavonoids, tannins, saponins, carbohydrate, terpenoids,

steroids and glycosides using method as described by various authors<sup>3,4,5</sup>.

### Quantitative Determination of the Chemical Constituents

Standard methods were used for the determination of total flavonoids<sup>6</sup>, alkaloids, oxalate and tannins were determined using standard method as described by Harborne<sup>5</sup> while cyanide contents was determined using the method of Onwuka<sup>7</sup>.

### Antimicrobial Screening

The antimicrobial activity of the extracts was carried out in Microbiology laboratory of the Microbiology Department of Microbiology F.U.T Minna, Niger State of Nigeria using agar well diffusion method as described by Perez and Chanda<sup>8</sup>. The minimum inhibitory concentration and minimum bactericidal concentration was done according to Oyeleke *et al.*,<sup>9</sup>.

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## RESULTS AND DISCUSSION

**Table 1. Qualitative analysis of *Canarium schweinfurthii***

Constituents	Observation	Methanol	<i>n</i> -hexane	Chloroform	Ethyl acetate
Saponins	Froth	+	-	-	+
Teroenoids	Reddish brown	+++	-	+++	+
Tannins	Brownish green	-	-	-	++
Steroids	Blue	+++	+	++	++
Glycosides	Greenish ring	+	++	+++	++
Carbohydrates	Orange red ppt.	+	-	-	++
Flavonoid	Yellow	+	-	+++	+

**Key:** + (slightly present), ++ (present), +++ (highly present) and - (not present)

**Table 2. Quantitative Analysis of *Canarium schweifurthii* on the Crude Methanolic Extract**

Constituents	Content in %
Flavonoids	6.00
Alkaloids	14.4
Cyanide	6.05
Oxalate	1.06

**Table 3. Sensitivity test on *Canarium schweifurthii* (mm)**

ORGANISM	METHANOL	<i>n</i> -HEXANE	CHLOROFORM	ETHYL ACETATE	AMOXIL
Bacillus subtilis	-	-	-	12	15
Escherichia coli	37	-	-	27	10
Pseudomonas					
Aeruginosa	-	-	-	21	11
Klebsilla pneumonia	32	-	-	28	25
Salmonella typhii	-	-	-	22	23

**Table 4. Minimum Inhibition Concentration of *Canarium schweifurthii* ( $\mu\text{g/ml}$ )**

ORGANISM	METHANOL	<i>n</i> -HEXANE	CHLOROFORM	ETHYL ACETATE	AMOXIL
Bacillus subtilis	-	-	-	0.1	0.5
Escherichia coli	10	-	-	1	0.5
Pseudomonas					
Aeruginosa	-	-	-	10	0.5
Klebsilla pneumonia	1	-	-	0.1	0.5
Salmonella typhii	-	-	-	10	0.5

**Table 5. Minimum Bacteriocidal Concentration of *Canarium schweifurthii* ( $\mu\text{g/ml}$ )**

ORGANISM	METHANOL	<i>n</i> -HEXANE	CHLOROFORM	ETHYL ACETATE	AMOXIL
Bacillus subtilis	-	-	-	0.1	0.5
Escherichia coli	10	-	-	1	0.5
Pseudomonas					
Aeruginosa	-	-	-	10	0.5
Klebsilla pneumonia	1	-	-	0.1	0.5

From the phytochemical screening that was carried out, the methanolic extract revealed the presence of saponins, terpenoids, steroids, glycosides and carbohydrates, tannins and flavonoids as shown in table 1. *n*-hexane extract revealed the presence of steroids and glycosides, while saponins, terpenoids, tannins, carbohydrates and flavonoids were absent. Chloroform and ethyl acetate extracts revealed the presence of saponins, terpenoids, tannins, steroids, glycosides and flavonoids. The presence of saponins, steroids, glycosides, tannins and flavonoids in the methanolic extract agree with the results of the phytochemical screening carried out on the leaves of the plant<sup>10</sup>. Plant tannins have been widely recognized for their pharmacological properties<sup>11</sup> for this reason; the plant may be used for the synthesis of drugs. Steroids were found to be present in all the extracts of the plant. It should be noted that steroidal compounds are of importance and interest in pharmacy due to their relationship with compounds as sex hormones. This may be the reason why the leaves of the plant are used as vegetable for pregnant women or breast feeding mothers to ensure their hormonal balance<sup>1</sup>. Saponins have beneficial health effect as reported by AkeAssi and Guinko<sup>12</sup> and their presence in the plant may make it useful in medicines. Flavonoids have been reported to have antiviral, anti-allergic, antitumor and antioxidant activities which are health promoting effects. They play a role in the chemoprevention of cancer. Flavonoids and alkaloids are employed in medicine; their presence in the plant suggests that they can be used for medicinal purpose. The presence of terpenoids in the plant shows that it may be used to synthesize drugs. Table 2 revealed the percentage of some ant-nutrient such as flavonoids (6.00), alkaloids (14.4), cyanide

(6.05), oxalate (1.06) respectively which is in agreement with the report of Rahila *et al.*,<sup>13</sup> and Gill<sup>14</sup>. Table 3 shows the result of the antimicrobial screening which indicates that methanolic extract was active against *E. Coli* (37mm) and *Klebsilla pneumonia* (32mm). It was inactive against against *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Salmonella typhii*. *n*-hexane and Chloroform extracts were inactive against all the bacteria used. Ethyl acetate extract was active against *Bacillus subtilis* (12mm), *E. Coli* (27mm), *Pseudomonas aeruginosa* (21mm), *Klebsilla pneumonia* (28mm) and *Salmonella typhii* (22mm) as shown in table 4. Minimum inhibition concentration and minimum bacteriocidal concentration in tables 5 and 6 shows the range of 0.1µg/ml and 10µg/ml. Variations in the phytochemical constituents and the antimicrobial activity will depend on the type of solvent or method used to carry out the test.

## CONCLUSIONS

From the test carried out on *Canarium schweifurthii*, the fruit pulp of the plant contains some secondary metabolites which include saponins, terpenoids, tannins, steroids, glycosides, carbohydrates and flavanoids. The antimicrobial screening shows that some of the extracts inhibit the growth of some tested organisms using amoxil as the control. This indicates that the inhibition of the organisms depend on the type of extract. Further studies can still be done on this plant in order to isolate, identify and characterize its phytochemical constituents.

## REFERENCES

1. Okwu D. E., (2001). Evaluation of chemical composition of indigenous spices and flavouring agents. *Global. J. Oure Appl. Sci.* 7(3): 455-459.
2. Koudou, J., Abena, A. A., Ngaissona, P. and Bessiere, J. M., (2005). Chemical composition and pharmacological activity of essential oil of *Canarium schweinfurthii* Engl: *Fitoterapia.* 76, 700- 703.
3. Sofowora, E. A. (1993). Medicinal plant and traditional medicine in Africa. New York. John wiley and sons inc Pp 1-20, 256-257.
4. Trease, G. E. and Evans, W. C. (1989). Pharmacology. 11<sup>th</sup> Edition. Bleirretinda I publishers, London Pp 60-75. UNCTAD A survey by United Nations Commission For Trade and Development derived from plants.
5. Harbone, J. B. (1973). *Phytochemical method: a guide to modern techniques of plant analysis.* London Chapman and Hall, Pp 4-24.
6. Krishnaiah, D, Devi, T, Bano, A and Sarbatly, R , (2009). Studies on phytochemical constituents of six Malaysian medicinal plants, *Journal Medicinal Pl Research.* 3(2):67-72.
7. Onwuka, G.I. (2005). *Food Analysis and Instrumentation. Theory and Practice.* London Naphthali Prints. p. 140-146.
8. Perez, J. and Chanda, S. (1990). Antibacterial and Phytochemical Studies on Twelve Species of India Medicinal Plants. *Africa Journal of Biological resources,* 10:175-181
9. Oyeleke, S. B., Dauda, B.E.N. and Baye, O. A. (2008). Antibacterial Activities of *Ficus capensis*, *Africa Journal of Biotechnology.* 7(10), 1414-1417.
10. Ngbede, J., Yakubu R. A. and Nyam Nyam D. A., Phytochemical screening for active compounds in *Canarium schweinfurthii* leaves. *Res. J. Bio. Sci.* (9):1076-1078.
11. Haslem, E., (1989). Plant polyphenols. Vegetable tannins revisited chemistry and pharmacology and natural products.UK, *Cambridge University Press,* pp169.
12. AkeAssi, L. and S. Guinko, (1991). Plants used in traditional medicine in West Africa Editor Roche, Suisse. pp:151.
13. Rahila T., Rukhsandra N., Zaida A. A. And Shamishilia R. (1994). Phytochemical screening of medicinal plants belonging to *Euphorbiaceae* Pak. *Vet.* 14: 160-162.
14. Gills L. S., (1992). Ethnomedicinal uses of plants in Nigeria. University of Benin, press, Nigeria. p. 276.