

Preliminary Study on the Phytochemical Constituents of *Gossypium Hirsatum* Leaves

Chinweuba A.J, Umetali O.P, Otuokere E.I, and Olisa M.C

Abstract—The preliminary analysis of the phytochemical constituent of *Gossypium hirsatum* leaves was carried out using standard methods to assay its active compounds and ascertain its possible use in the preparation of new drugs. The results of the analysis showed the presence of alkaloids, flavonoids, cardiac glycosides, reducing sugar, steroids and acidic compound. The micro-elemental analysis showed that leaves contained calcium(0.017mg/kg), Iron(0.020mg/kg), Magnesium(0.040mg/kg) potassium(0.010mg/g), and lead (<0.001mg/kg). A pure sample of alkaloid (Rf 0.5, mp 1530C) was obtained. The antimicrobial activity screening showed strong inhibitory effects against the following bacteria *Staphylococci aureus*, *Enterobacter*

aerogenes, and *Protease vulgaris*. These observations suggest the medicinal potency of the plant leaves as practiced by Traditional medical practitioners.

Keywords— Antimicrobial, Drugs, Phytochemical, and *Gossypium hirsatum*.

I. INTRODUCTION

THE potential of higher plants as source of new drugs is still largely unexplored[1]. Among the estimated 250,000-500,000 plant species only a small percentage has been investigated phytochemically and the fraction submitted to pharmacological screening is even smaller[2].

Even now, contrary to common belief, drugs from higher plants continue to occupy an important niche in modern medicine. Globally at least 130 drugs, all single chemical entities extracted from higher plants or modified further synthetically are currently in use, though some of them are now been produced synthetically for economic reasons[3]. Medicinal plants represent a rich source of antimicrobial agents. Plants are used medicinally in different countries and are sources of many potent and powerful drugs[4]. Considering the vast potentiality of plant sources of drugs, a systematic approach was taken to phyto-chemically screen and investigate the antimicrobial activity of *Gossypium hirsatum* leaf.

II. PLANT DESCRIPTION

Gossypium hirsatum also known as upland cotton or

Chinweuba A.J, Dept of Chemistry
Umetali O.P, Dept of Chemistry
Otuokere E.I, Dept. of Chemistry, Micheal Okpala University, Umuahia
Olisa M.C, Dept. of Medical Biochemistry, Anambra State University, Uli.

Mexican cotton is the most widely planted species of cotton in the United States. In warm climate it is biennial or perennial plant and grows to 15 inches tall, cordate leaves that are 3.5 lobed reaching up to 6 inches across[5]. *Gossypium hirsatum* is propagated by seed. The seed will germinate in 14-21 days at 20-230C temperature. The plant is also grown in a well drained soil[5].

III. MEDICINAL USES OF *GOSSYPIMUM HIRSATUM*

Investigations carried out earlier on the plant showed that the root extract was used as abortifacient, emmenagogue and parturient. The root extract was said to promote uterine contractions much better and safer than ergot and was used by slaves of the south for inducing abortion which is effected without any apparent detriment to the general system[6]. It was also reported that the root extract was used as aphrodisiac which is a substance that increases sexual desire[6]. The root extract is locally * administered as the antihemorrhagic agents, nervine and women contraceptive.

IV. MATERIAL COLLECTION AND PREPARATION

The plant leaves were collected from Otu-ocha Aguleri, in Anambra East local Government Area of Anambra State and were identified as *Gossypium hirsatum*. The plant leaves were air dried, pulverized by the use of an Electric Grinding machine and stored in a dessicator.

V. METHODS

The leaves were prepared and analyzed for organoleptic properties, phytochemical constituents, alkaloid and other fractions using standard methods[7]. The pure extract was subjected to chemical analysis using Thin layer chromatography and Atomic absorption Spectrophotometer. The anti-microbial activities of the alkaloid chloroform extract was also determined by standard methods[7].

VI. RESULTS AND DISCUSSION

The results of the tests, activities and analyses of the active constituents present in the leaves of *Gossypium hirsatum* are given in tables I-IV

TABLE I
RESULT OF ORGANOLEPTIC CHARACTERISTICS OF LEAVES OF
GOSSYPIUM HIRSATUM LEAVES.

PARAMETERS	OBSERVATION
Colour	light Green
Texture	Powdery and Soft
Taste	Slightly Salty
Odour	mild

TABLE II.
RESULTS OF PHYSIOCHEMICAL PROPERTIES AND THIN LAYER
CHROMATOGRAPHY (TLC) OF THE LEAVES OF GOSSYPIUM
HIRSATUM

Parameters	values
Ash Content	30%
Melting point	153°C
Moisture content	75%
TLC R _f Value of 0.07 in Methanol: NH ₄ OH (200:2)	

1. Alkaloid 0.08 in Chloroform, ethyl acetate water
2. Chloroform extract (90:45)

TABLE III.
RESULTS OF PHYTOCHEMICAL ANALYSIS OF LEAVES OF
GOSSYPIUM HIRSATUM

Phytocompound	Inference
Alkaloid	+
Acidic compounds	+
Carbohydrates	-
Flavonoids	+
Cardiac glycosides	+
Protein	-
Reducing sugar	+
Saponins	-
Steroids	+
Tannins	-

Key, + =present - =Absent

TABLE IV
RESULT OF TRACE ELEMENT CONTENT OF THE ASHED LEAVES
OF GOSSYPIUM HIRSATUM.

Elements	Concentration (mg/kg)
Calcium	0.017
Iron	0.020
Magnesium	0.040
Potassium	0.010
Lead	< 0.001

TABLE V.
RESULT OF ANTIBACTERIAL ACTIVITY OF THE LEAVES
EXTRACT OF GOSSYPIUM HIRSATUM ON SENSITIVITY TEST AGAR
(STA)

DIAMETER (MM) OF ZONES OF INHIBITION ON TEST ORGANISM

solvent extraction	Vol. (cm ³)	<i>S.aureus</i>	<i>Enterobacteria aerogenes</i>	<i>Proteus vulgaris</i>	<i>Pseudomonas pyocyania</i>	<i>Klebsiella aerogenes</i>	<i>Salmo. species</i>	<i>Bacillus species</i>
Chloroform	0.5	12	18	14	NA	10	NA	NA
Chloroform-methanol	0.5	18	20	10	NA	NA	NA	NA
Control 5% Acetone	0.5	NA	NA	NA	NA	NA	NA	NA

The photochemical constituents of the leaves of *Gossypium hirsatum* used as a herb in traditional medicine for inducing abortion, treatment of infertility in men, inducing birth and as contraceptives in women has been assayed. The results of the phytochemical analysis showed the presence of alkaloids, flavonoids, cardiac glycosides, steroids, reducing sugar and acidic compounds, which may be responsible for its used by trado medical practitioners in the treatment of above listed ailments. An alkaloid with melting point 1530C was isolated from the plant. A thin layer chromatograph of the alkaloid had an R_f value of 0.70 in methanol and ammonium hydroxide system.

The result of the analysis of trace element using Atomic Absorption Spectrophotometer showed the presence of calcium, iron, magnesium, potassium and lead.

The low concentration of lead in the leaf extract showed that it was not toxic; whereas the higher concentrations of calcium, iron, magnesium and potassium found in the leaf extract confirmed the nontoxic nature of the extract since these elements were useful for binding of the drug and for bone and teeth formation[8].

The extract was further tested for its potency against seven test organisms, namely; *S. aureus*, *Enterobacter aerogenes*, *Proteus vulgaris*, *Pseudomonas pyocyania* *Klebsiella aerogenes*, *Salmonella species* and *Bacillus species* and it

showed wide Zones of inhibition effect against *S. aureus*, *Enterobacter aerogenes* and *Proteus vulgaris*.

However, all these pharmacological activities observed in the leaf extract may justify the use of the plant by traditional medical practitioners.

VII. CONCLUSION

The phytochemical analysis on the leaves of *Gossypium hirsutum* showed that they contained some bioactive compounds which formed the main basis for the medicinal properties of the plant leaves. The anti-microbial assay confirmed that the leaf extracts had good antibiogenic activity on some bacterial tested.

However, these bioactive compounds in this plant leaves should be incorporated into the synthesis of new drug.

REFERENCES

- [1] Tompkins W.A.R (1978), *Medicine from Earth*. McGraw Hill Book Company, Maidenhead, United Kingdom. p.34.
- [2] Stockwell, C (1998). *Nature's Pharmacy*. Century Hutchinson Ltd London United Kingdom p.40
- [3] Newman, D.J, Cragg, M. and Snader, K.M. (2000). The influence of natural products upon drug discovery. *Journal of Natural Product Resources*. 17,215-234.
- [4] Srisvastra J., Lambert, J. and Vietmeyer, J.(1996). *Medicinal plants; an expanding role in development*. World bank technical paper. No 320, Washington DC 20433, USA. pp1-2
- [5] Iwu, M.M (1998). *Handbook of African Medicinal plants*. CRC press London pp 161-162.
- [6] Acharya, D. and Shivastava, A. (2008) *African herbal medicines Tribal formulations and Traditional Herbal practices*, Aavishkar publisher. Jaipur-India p, 440
- [7] Harbone J.B (1998). *Photochemical methods: A guide to modern techniques of plant Analysis*. 3rd Editions, Chapman and Hall publishers London. Pp 4-7.
- [8] Ajiwe V.I.E, Anekwe O.J and Ndukwe G.I, (2006) Preliminary study on the pharmaceutical constituents of *Costus afer* (Ker) Leaf. *Chemclass Journal, Nigeria*. Vol.3, 65-68