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Phytochemical Screening for Active Compounds in *Mangifera indica* Leaves from Ibadan, Oyo State

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Abstract: *Mangifera indica* (Edward variety) from Ibadan, Oyo State were screened for the presence of chemically active compounds by standard methods. The results revealed the presence of saponin, steroids, tannin, flavonoid, reducing sugars, cardiac glycosides and anthraquinone. Alkaloids was not detected from any of the leaves extract under study. We recommend further research on this plant leaves for possible isolation and characterization of the various chemical active substances.

Key words: *Mangifera indica* leaves, active compounds, edward variety, hexane extract, screening, Nigeria

INTRODUCTION

Medicinal plants are of great importance to the health of individual and communities. The medicinal value of these plants lies in some chemical active substances that produce a definite physiological action on the human body. The most important of these chemically active (bioactive) constituents of plants are: alkaloids, tannin, flavonoid and phenolic compounds. Many of these indigenous medicinal plants are also used for medicinal purposes (Edeoga, 2005).

Mangos belong to the genus *Mangifera* of the family Anacardiaceae. There are over 1000 named mango varieties throughout the world, which is a testament to their value to human kind. Mango is a common garden tree throughout the tropics. When ripe, this delicious desert fruit id particularly high in Vitamin A. The fruit is also, an important source of sustenance for birds, bats, insects and mammals.

Dried mango flowers, containing 15% tannin serve as astringents in cases of diarrhea, chronic dysentery and chronic urethritis. The bark contains mangiferine and is astringent when, used against rheumatism and diphtheria. Leaf decoction when taken is a remedy for fever, chest pains, diarrhea, diabetes and hypertention. Extracts of bark, leaves, stem and unripe fruits are used as antibiotics for many ills.

The plant is found abundantly across the Southern region of Nigeria. However, not much is known about the chemical composition of the plant leaves.

The aim of this study was to determine the phytochemical properties of *Mangifera indica* (Edward variety) leaves found in the Southwestern region of Nigeria with the aim of further isolation and characterization of the various chemically active substances and the possible use of these substances in industries and in medicinal science.

MATERIALS AND METHODS

Plant materials: *Mangifera indica* (Edo: Ogwi, Yoruba: Mangoro, Hausa: Mangwaro, Ibo: Mangolo) leaves were collected from the National Institute for Horticultural Research (NIHORT), Idi-Ishin, Ibadan. They were authenticated by the staff of the fruits section in NIHORT.

Preparation of the plant extract: The hexane, ethyl acetate and methanolic extract of the leaves of the plant were prepared according to standard methods. (Harborne, 1973; Sofowora, 1982). The plant samples collected were air dried and grinded using the milling machine at the Department of Chemistry, University of Ibadan. The powdered material was transferred into a Soxhlet apparatus and was extracted in the Soxhlet extractor using hexane, ethyl acetate and methanol successively for 72 h each. The extracts were concentrated to dryness and the residue were obtained as a greenish black solid, black gummy solid and brownish black solid, respectively after which, the residues were transferred into a pre-weighed sample containers and were stored and later used for Phytochemical screening.

Phytochemical screening: The leaves extract of *Mangifera indica* (Edward variety) were analyzed for the

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presence of alkaloid, saponin, anthraquinone, steroids, tannin, flavonoid, reducing sugars and cardiac glycosides according to standard methods (Odebiyi and Sofowora, 1978; Sofowora, 1982; Harborne, 1973; Onwukeame *et al*., 2007).

Screening for alkaloids: Three gram of extract war stirred with ethanol containing 3% tartaric acid. The filtrate was shared into 3 beakers and tested for alkaloids as follows: into the first beaker, Hagar's reagent was added, into the second beaker, Mayer's reagent was added and into the last beaker, Marquin's reagent was added. Precipitation in any of the 3 test indicates the presence of alkaloids.

Screening for saponin: About 0.5 g of the plant extract was shaken with water in a test tube. Frothing, which persist on warming was taking as a preliminary evidence for the presence of saponin. Few drops of olive oil was added to 0.5 g of the extract and vigorously shaken. Formation of soluble emulsion in the extract indicates the presence of Saponin (Odebiyi and Sofowora, 1978; Ngbede *et al*., 2008).

Screening for tannin: Water extract of the sample was treated with 15% ferric chloride test solution. The resultant colour was noted. A blue colour indicated the presence of hydrolyzable tannin. Or into 10 mL of freshly prepared potassium hydroxide (KOH) in a beaker, 0.5 g of the extract was added and shaken to dissolve. A dirty precipitate observed indicates the presence of tannin (Odebiyi and Sofowora, 1978; Sofowora, 1982).

Screening for steroids (Salkowski's test): About 100 mg of *Mangifera indica* extract was dissolved in 2 mL of chloroform. Sulphuric acid was carefully added to form a lower layer. A reddish brown colour at the interface is indicative of the presence of steroidal ring (Sofowora, 1982).

Screening for flavonoid: About 2 g of the powdered leaves was completely detanned with acetone. The residue was extracted in warm water after evaporating the acetone in a water bath. The mixture was filtered while, still hot. The filtrate was cooled and used.

Five milliliters of 20% NaOH was added to equal volume of the detained water extract. A yellow solution indicates the presence of flavonoid.

Screening for anthraquinone (Borntrager's test): About 0.5 g of the extract was taken into a dry test tube and 5 mL of chloroform was added and shaken for 5 min. The extract wsa filtered and the filtrate shaken with equal volume of 10% ammonia solution. A pink violet or red color in the ammoniacal layer (lower layer) indicates the presence of anthraquinone.

Screening for cardiac glycosides (Keller Killiani's test): About 100 mg of extract was dissolved in 1 m L of glacial acetic acid containing one drop of ferric chloride solution. This was then underlayer with 1 mL of concentrated Sulphuric acid. A brown ring obtained at the interface indicated the presence of a de-oxy sugar characteristic of cardenolides.

Screening for reducing sugar (in glycosides): The residue was re-dissolved in water in the waterbath. Two milliliters of the solution in a test tube was added 1 mL each of Fehling's solution A and B. The mixture was shaken and heated in a water bath for 10 min. A brick-red precipitate indicates a reducing sugar.

RESULTS AND DISCUSSION

This study on *Mangifera indica* leaves extract revealed the presence of steroids, flavonoid, reducing sugar and cardiac glycosides in the hexane extract; anthraquinone, tannin and reducing sugar in the ethyl acetate extracts and saponin, steroids, tannin, flavonoid, reducing sugars and cardiac glycosides in the methanolic extracts. The leaves did not show the presence of alkaloids in any of the extracts that were tested for its presence (Table 1).

The various phytochemical compounds detected are known to have beneficial importance in industrial and medicinal sciences.

There are records that show the benefits of these compounds detected from *Mangifera indica* for example:

Saponin is used as a mild detergent and in intracellular histochemistry staining to allow antibody access to intracellular proteins. In medicine, it is used in hyperchloles-trolaemia, hyperglycaemia, antioxidant, anti-cancer, anti-inflammatory and weight loss etc. It is also known to have anti-fugal properties.

Table 1: Phytochemical screening of Hexane, Ethyl acetate and methanol extracts of *Mangifera indica*

	Results		
Phytochemical constituents	Hexane extracts	Ethyl acetate extracts	Methanol extracts
Saponin	-	-	+
Anthraquinone	-	+	-
Steroids	+	-	+
Tannin	-	+	+
Flavonoid	+	-	+
Reducing sugars	+	+	+
Cardiac glycosides	+	-	+
Alkaloids	-	-	-

+ = Present; - = Absent

Tannin are reported to exhibit antiviral, antibacterial, anti-tumor activities. It was also reported that certain tannin are able to inhibit HIV replication selectivity and is also used as diuretic (Heslem, 1989) plant tannin have been recognized for their pharmacological properties and are known to make trees and shrubs a difficult meal for many caterpillars (Heslem, 1989).

Cardiac glycosides are known to work by inhibiting the Na^+/K^+ pump. This causes an increase in the level of sodium ions in the myocytes, which then lead to a rise in the level of calcium ions. This inhibition increases the amount of Ca^{2+} ions available for contraction of the heart muscle, which improves cardiac output and reduces distention of the heart; thus, they are used in the treatment of congestive heart failure and cardiac arrhythmia. They are also, used to strengthen a weakened heart and allow it to function more efficiently, though the dosage must be controlled carefully, since the therapeutic dose is close to the toxic dose (Denwick, 2002).

Plant steroids are known to be important for their cardiotonic activities, they possess insecticidal and anti-microbial properties. They are also used innutrition, herbal medicine and cosmetics (Callow, 1936) they are routinely used in medicine because of their profound biological activities (Denwick, 2002).

Flavonoid have been referred to as nature's biological response modifiers because of strong experimental evidence of their inherent ability to modify the body's reaction to allergies, virus and carcinogens. They show anti-allergic, anti-inflammatory, anti-microbial and anti-cancer activity.

Anthraquinone are generally used as dyes and are also, known as antibacterial agents.

CONCLUSION

In view of all these various uses associated with these compounds found in *Mangifera indica* leaves extract, we recommend further research on this plant leaves to quantify the concentration of these compounds per known amount for industrial use. We believe these compounds in *Mangifera indica* leaves could be harnessed for industrial and medicinal sciences utilization.

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