Phytochemical Screening of Some Selected *mangifera indica* (mango) Leaves in North Central Nigeria

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ABSTRACT

Mangifera indica leaves, like other herbal plants leaves have been in use for a long time in traditional medicine for the treatment of various diseases. The leaves are also used as animal feeds. This research is aimed at phytochemical screening of some selected mangifera indica (mango) leaves in North Central Nigeria. The mango leaves were plucked in Lafia and Makurdi in Nasarawa and Benue States respectively and shade dried, then pounded into powder form. The powdered leaves were divided into two equal parts. The first part was extracted with water while the second part was extracted with ethanol. The extracts were subjected to phytochemical screening by the Harbone Standard Method (HSM). The mass percentage composition of each was also determined via Quantitative Method (QM). Results of the phytochemical screening showed positive for Mangiferin, Tannins, Flavonoids, Alkaloids and Glycosides. A negative result was obtained for terpenoids$_{(aq)}$, steroids and saponins. Similarly, higher values in mg/100g for most of the selected mangoes while few showed lower values, especially the ethanolic extract. The result also indicated higher presence and masses (mg/100g) in the cultivated grown mango trees compared to the wildly grown trees due to the adequate care given to the cultivated ones.

Key Words: *Phytochemical, Quantitative Method, Screening, Polyphenolics and Ethanolic Extract*

1.0 INTRODUCTION

Plants have been used since ancient times for food (nutrition), economic purposes, shelter, defense (fencing) and as medicinal herbs for the treatment and management of different diseases in the world and particularly in Africa (FOA, 2005, Hirt and M'pia 2008). Medicinal plants usage has attracted the attention of government and the entire scientific communities recently which has resulted in increased isolation and identification of metabolites produced by plants and used as active ingredients in the preparations of many medicines (Galadima, 2018; Luis, 2010).

This research is focused on *Magnifera indica* L., a large evergreen tree of the family Anacardiaceae, commonly called "Mango" in English (Ekeanyanwu, 2011; Omotayo, 2015; Wenji, 2017; Galadima, 2018) and also aimed at screening its phytochemical parameters. In Nigeria, Mango leaves have been used as nutritional feed and in the traditional medicine industry for the treatment of some human illness conditions such as cough, diarrhea, diabetes etc., due to the different chemical parameters or constituents found in it especially the polyphenolics, flavonoids, triterpenoids, which are some of the different constituents of the plant. (Ubwa *et al*, 2011; Galadima, 2018).

However, the traditional medicine practitioners do not have any idea or knowledge of the phytochemical parameters of the mango plants and other herbal plants used as medicinal herbs. (Dhuha, 2016) Therefore, the screening of the phytochemical parameters of the mango plant leaves found in the study areas thus will bring more ideas or knowledge of its phytochemical parameters (constituents). Nigeria's most rural dwellers who's most accessible and affordable source of healthcare is herbal medicine (Nwanwo and Osaro, 2014) can also learn to find out the phytochemical constituents of mango which forms part of the herbal products used daily (Morsi *et al*, 2010 and Masud, 2016).

1.1 BACKGROUND OF THE STUDY

Mangifera indica leaves like other herbal plants leaves were used since ancient times in traditional medicine for the treatment and prevention of many diseases (Masud, 2016 and Galadima, 2018). Unfortunately, these traditional medicine practitioners do not have any idea or knowledge of the phytochemical parameters of the medicinal plants.

The study was concentrated on the phytochemical screening of the parameters of mango leaves extracted in Lafia and Makurdi, North Central Nigeria, where most inhabitants have limited knowledge on its phytochemical parameters and little knowledge on the plant usage. Mango plants like most plants are used as main sources of food and traditional medicines (Morsi *et al*, 2010).

In Nigeria, particularly in the rural areas, herbal medicine is the most accessible and affordable source of health care presently with estimated 80% to 90% users depending on it for the management of both communicable and non-communicable diseases (Okwu and Ezenagwu, 2008). However, large populations of herbal medicine users care less to find out the phytochemical parameters of the herbal products used daily.

1.2 AIM AND OBJECTIVES

This study is aimed at the phytochemical screening of *mangifera indica* L. leaves extracted from different randomly selected mango plants. The major objectives were to:

i.   Screen the phytochemical parameters of *mangifera indica* L. leaves
ii.   Determine quantitatively the phytochemical parameters (in mg/100g)
iii.   Find out if the cultivators / users have knowledge of the types of phytochemical constituents and their side effects if any.

1.3 SIGNIFICANCE OF THE STUDY

i.   Results obtained from the study will assist mango cultivators and users to know the phytochemical constituents of *mangifera indica* L.
ii.   Assist traditional medicine practitioners to update their knowledge on the phytochemical constituents of mango leaves.
iii.   Arouse users' curiosity on the importance of mango leaves as food and medicine.

1.4 SCOPE OF THE STUDY

This work is limited to randomly selected mango leaves found either wildly or cultivated in Lafia North, Lafia East Local Government Development Area and Makurdi Local Government Area in Nasarawa and Benue States respectively.

2.0 MATERIALS AND METHODOLOGY

The following materials were used for the work:

a.   Mango leaves
b.   Solvents; water and ethanol
c.   Weighing apparatus
d.   Steam bath
e.   Conical flask
f.   Beaker
g.   Stirring rod
h.   Foiled paper
i.   2 ml syringes and needles
j.   Reagent bottles
k.   Mortar and pestle
l.   Filtration apparatus
m.   Blender
n.   Titration apparatus
o.   Reagents; ethanol, dilute NaOH and distilled water.

2.1.1 SAMPLE COLLECTION

The *mangifera indica* L. leaves were randomly collected from mango plantations and wild grown mango trees from Lafia North development area of Nasarawa State and Makurdi Local Government area of Benue State, North Central Nigeria.

2.1.2 SAMPLE PREPARATION AND EXTRACTION

The *mangifera indica* L. the leaves collected were taken to the Isa Mustapha Agwai Polytechnic Chemistry Laboratory, washed with clean water, air dried under shade at room temperature for three weeks and pounded using pestle and mortar then blended in an electric blender into fine powder. The finely powdered leaves were divided equally into two portions by weighing on a weighing balance, which were poured into two beakers. The first part was soaked in distilled water while the second portion in concentrated ethanol and labeled. These were then covered with foil paper and kept in the polytechnic laboratory for 48 hours and filtered. The filtrates were then steam evaporated in an electric water bath to paste form, stored in air tight brown coloured bottles which were screened for phytochemical parameters. The results were tabulated and the parameters of each were determined in grams per mole (g/mol) by mass quantitative analysis method in the laboratory.

2.1.3 STATISTICAL ANALYSIS

The Statistical Package for Social Science (SPSS) version 2012 was used.

3.0 RESULTS AND DISCUSSION

3.1: RESULTS

Table 1(a): Phytochemical Parameters of Aqueous and ethanolic extracts of cultivated mango leaves

Phytochemical Parameters	Aqueous Extract	Ethanolic Extract
Mangiferins	++	++
Tanins	++	++
Flavonoid	++	++
Alkaloids	++	++
Terpenoids	- -	- -
Saponins	- +	- -
Glycoside	++	+
Phenol	++	+
Steroids	- -	- -
Xanthoprotein	++	++
Cardiac glycoside	++	++

Key: (+) present (-) absent

Table 1(b): Phytochemical Parameters of Aqueous and ethanolic extracts of wild grown mango

Phytochemical Parameters	Aqueous Extract	Ethanolic Extract
Mangiferins	+	+
Tanins	+	+
Flavonoid	+	+
Alkaloids	+	+
Terpenoids	-	-
Saponins	- +	-
Glycoside	+	+
Phenol	+	+
Steroids	-	-
Xanthoprotein	+	+
Cardiac glycoside	+	+

Key: (+) present (-) absent

Table 2(a): Evaluated Amounts of Phytochemical Parameters of Cultivated Mango Leaves Extracted

Phytochemical Parameters	Amount (mg/100g)
Mangiferin	6.74 ± 0.10
Tanins	1.00 ± 0.01
Flavonoid	11.12 ± 0.12
Alkaloids	7.8 ± 0.10
Saponins	0.01 ± 0.02
Glycoside	8.66 ± 0.20
Phenol	0.73 ± 0.20
Xanthoprotein	1.40 ± 0.21
Cardiac glycoside	8.46 ± 0.10

Table 2(b): Evaluated Amounts of Phytochemical Parameters of Wild Grown Mango Leaves

Phytochemical Parameters	Amount (mg/100g)
Mangiferin	3.37 ± 0.15
Tanins	0.50 ± 0.01
Flavonoid	5.56 ± 0.06
Alkaloids	3.93 ± 0.05
Saponins	0.01 ± 0.02
Glycoside	5.33 ± 0.10
Phenol	0.37 ± 0.10
Xanthoprotein	0.80 ± 0.20
Cardiac glycoside	5.22 ± 0.10

3.2: DISCUSSION

From the aqueous and ethanolic extracts analysis, Table 1(a) shows the phytochemical parameters detected in cultivated mango leaves. It indicated the presence of most of the phytochemical parameters in mango ranging from Mangiferin, Tannins, Flavonoids, Alkaloids and Saponnins. Others detected were Glycoside, Phenol, Xanthoprotein and Cardiac glycoside, while Terpernoids and Steroids were completely absent. Saponin was faintly detected in the aqueous extract. This is similar to the findings of Masud (2015); Nadella (2016) and Galadima (2018). These main phytochemical parameters of mango leaves extract are useful for both animal and human nutrition, health and food industries. Other applications include pharmaceutical, agricultural and traditional medicines industries worldwide including North Central Nigeria (Okwu and Ezenagwu, 2008). This knowledge would contribute a lot to the traditional medicine sector in Nigeria and greater use of the mango tree parts resulting in potential benefit for health and pharmaceutical industries (Glehil, 2001).

Most of the phytochemical parameters tested showed double present (higher) in aqueous extracts than in the ethanolic extracts in the cultivated mangoes while single present was detected in the wild grown mango trees (Table 1a and 1b).This may be due to the fact that most of the parameters are more soluble in polar solvents than in ethanolic solvents. A similar result was reported by Okwu *et al* (2008), Galadima (2018) and Maldonado-Celis *et al* (2019).

Table 2(a) and (b) indicated the phytochemical parameters (mg/100g) in both cultivated and wild grown mango tree leaves with flavonoids having the highest weight (11.12mg/100g) for cultivated mango leaves and (5.56mg/100g) for wild grown mango leaves while saponin recorded the least in both (0.01mg/100g and 0.01mg/100g) respectively).other parameters of high content amount were Glycoside (8.66mg/100g and 5.33mg/100g), Cardiac glycoside (8.46mg/100g and 5.22mg/100g), Alkanoids (7.86mg/100g and 3.93mg/100g) (Table 2a and b). Similarly, Okwu and Ezenagwu (2008) reported that the Alkanoid parameters in mango leaves were small compared to that contained in the bark. Alkanoid parameters in plants were used as basic medicinal agents due to their analgesic, antiseptic, antispasmodic and bacterial effects. Also, most of the mango plant bark ability to cure diseases were traced to alkanoids' presence. The quantifications in Table 2 are supported by other findings that these phytochemical parameters have also been isolated from other parts of mango, example the bark, fruits, stem and pulps (Okwu and Ezengu, 2008; Rajandra *et al*, 2013; Galadima, 2018). Okwu and Ezenagwu (2008) opined that Flavonoids, Polyphenol, Alkanoids, Tannins, Glycosides, etc., have several biological functions and that some appeared to greatly enhance the effectiveness of certain vaccines. For example, plant Saponnins and Tannins help humans to fight fungal infections, combat microbes and viruses, boost the effectiveness of certain vaccines and knock down tumor cells, especially blood and lung cancer. This also contributed the antioxidant and antiproliferative effects of glioma cells. The volatile phytoconstituents also have antiparasitary effect against P.faciparum, the treaded malaria causative agents which may be responsible for the use of the mango tree stems, bark and leaves as local infusion in malaria treatment.

3.2.1: CONCLUSION AND RECOMMENDATION

As a result of the phytochemical parameters found in mango plants, it is now being widely cultivated in larger hectares in most tropical countries (Galadima, 2018 Rajan *et al*, 2011) and is greatly used in herbal medicine. Further studies may be carried out on mineral and vitamins composition of the fruits and pulps. Also, the nutritional composition of the fruits, the harmful (negative) effects of the phytochemical parameters should be investigated.

The findings in this study justify the increase in the use of mango parts (the roots, barks, stems, leaves and fruits) in traditional or herbal medical practice.

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