

Qualitative and Quantitative Phytochemical Screening of *Mangifera indica* and *Annona comosus* (Ripe Mango and Pineapple Fruits)

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ABSTRACT

Phytochemicals are natural bioactive compounds found in plant fruits, leaves or other parts that interplay with nutrient and dietary fibre to protect them. This study was carried out to evaluate qualitative and quantitative constituents of *Mangifera indica* (common mango) and *Annona comosus* (pineapple) fruits. The two fruits were sliced and pounded separately. Ten grams of each fruit were weighed into three different solvents namely water, ethanol, n-hexane and filtered after 24 hrs. Qualitative analysis revealed the presence of alkaloid, tannins, glycosides, flavonoid, phenol and saponin in the two fruits while quantitative assay showed notable differences. *Mangifera indica* had higher content of saponin (1.36%) than *Annona Comosus* (0.71 %); phenol content, 11.2 % for *M. indica* and 8.56 % for *A. Comosus*; tannin content, 2.34 % for *M. indica* and 1.09 % for *A. comosus*; flavonoid content, 12.20% for *M. indica* and 6.96 % for *A. comosus*. Alkaloid content was higher in *A. Comosus* (8.80%) than in *M. indica* (2.8 %). *Annona comosus* and *Mangifera indica* are good sources of health support for humans. This study recommends the isolation of these secondary metabolites on a large scale for commercial and therapeutic purposes.

Key words: *Mangifera indica*, *Annona comosus*, fruits, constituents, quantities, importance.

INTRODUCTION

Mangifera indica, the "common mango" is the specie commonly cultivated in many tropical and subtropical regions and belongs to the anacardiaceae family (Morfan, 2009). It is the largest fruit tree in the world capable of a height of one hundred feet and an average circumference of twelve to fourteen feet, sometimes reaching twenty

(sauer, 2012). The fruit is edible, ovoid in shape with a smooth rind and one flat seeded stone. The mango fruit is considered exotic and consumed worldwide.

Annona comosus (pineapple) is known as the fruit of kings and a member of the bromelaid family. It is a tropical plant and fruit, a medium tall (1-1.5m) herbaceous perenial plant with 30 or more trough-shaped and pointed leaves, 30-100cm long, surrounding a thick stem (oxford, 2010). The fruit looks like a pinecone covered with scales (okwu, 2011).

RATIONALE OF STUDY

Phytochemicals are non-nutritive plant chemicals that contribute to the colour, flavor and smell of plants and form part of a plant's natural defense mechanism against diseases. Claims of therapeutic values to human health and disease prevention abound. Thus the aim of this study was to ascertain qualitatively and quantitatively the phytochemical constituents of the common mango and pineapple fruits.

MATERIALS AND METHODS

Preparation of Extract

Fresh mango and pineapple fruits were purchased from Shoprite in Enugu, Enugu State, Nigeria and identified by the Director of Materials and Energy Department, Project Development Institute, Enugu State, where the research was carried out. The mango fruits were sliced, the seeds removed and the body pounded. The pineapple bark was removed, the fruit also sliced and pounded. Ten grams of each fruit were weighed into three different 250 ml conical flasks containing 100ml each of distilled water, 70 % ethanol and n-hexane. The six conical flasks were allowed to soak for 24 hrs and the samples first filtered through whatman No.4 filter paper and secondly through cotton wool.

Qualitative Phytochemical Screening

Qualitative study to reveal constituents was undertaken with the extracts. Analysis included tests for saponin, alkaloids, glycosides, flavonoids, phenol, tannins and essential oil.

Quantitative Phytochemical Analysis

These were carried out with standard procedures. Tannin content was determined with Vanburden and Robison method, alkaloid content by ammonium hydroxide method, flavonoid by method of Boham and Kocipai, glycosides and saponin with atomic absorption spectrophotometer and phenol content by modified gravitation method.

RESULTS

The results of the phytochemical screening of *Mangifera indica* and *Annona comosus* fruits showed the presence of some metabolites indicated in tables 1, 2 and 3.

Table 1: Qualitative Phytochemical Screening of Ripe *Mangifera indica* Fruit

Sample	Solvent	Saponin	Glycoside	Phenol	Flavonoid	Alkaloid	Tannin
Mango Pulp	Water	+++	+++	+++	ND	+++	+++
Mango Pulp	Ethanol	ND	+++	+++	+++	ND	+++
Mango Pulp	N-Hexane	ND	ND	ND	+++	ND	ND

Table 2: Qualitative Phytochemical Screening of Ripe *Annona comosus* Fruit

Sample	Solvent	Saponin	Glycoside	Phenol	Flavonoid	Alkaloid	Tannin
Pineapple	Water	+++	+++	+++	ND	+++	+++
Pineapple	Ethanol	ND	+++	ND	+++	ND	+++
Pineapple	N-Hexane	ND	ND	ND	ND	ND	ND

Key

+++ = Present

ND = Not Detected

Table 3: Quantitative Determination of Phytochemicals in Mango and Pineapple Fruits.

Sample	Saponin (% w/w)	Glycoside (Mg/L)	Phenol (%w/w)	Flavonoid (% w/w)	Alkaloid (% w/w)	Tannin (Mg/L)
Mango Pulp	1.36	6.90	11.20	12.20	2.80	2.40
Pineapple	0.71	6.10	8.60	6.96	8.80	1.09

Most of the phytochemicals were detected in water and ethanol (Table 1 & 2). The contents of Saponin, glycoside, phenol and flavonoid are higher in mango fruit than in pineapple while the quantities of alkaloid and tannin are higher in pineapple (Table 3).

DISCUSSION

Phytochemicals occur naturally in plants and possess properties that are of vital importance to both plants and animals.

Flavonoids, carotenoids and polyphenols have antioxidant activity that protects cells against oxidative damage (Ileverin and Matron, 2011). Other phytochemicals such as proanthocyanidins bind physiologically to cell walls interfering with the ability of pathogens to bind to cell receptors. This process may reduce the risk of infections such as urinary track and dental infections (Cabi, 2013).

Isoflavones are phytochemicals that enhance hormonal function. They imitate human oestrogens and help to reduce menopausal symptoms and osteroporosis (Barreto, 2008). Alkaloids are organic nitrogenous compounds with complex molecular structure and mostly basic in nature (H-Olemyl et. al., 2010). They are found in form of salts in organic acids used as medicinal agents because of their analgesic, antispasmodic and antibacterial properties (Choe et. al., 2012). They accumulate in actively

growing tissues, epidermal and hypodermal cell, vascular sheath and latex vessels (Trease and Evans, 2011).

Tannins denote substances present in plant extracts which are able to combine with proteins of animals hides to convert them into leather. They are readily soluble in water or alcohol to give astringent solution that is useful in medicines (Ihekezie et. al., 2008). They combine with ferric chloride to produce compound inks of greenish black to bluish black colours.

Flavonoids are the largest group of naturally occurring phenols and occur in the free state and as glycosides in cell sap of plants. They constitute the yellow, red and blue pigments of flowers and plants and therefore useful in industries. They are also soluble antioxidants and free radical scavengers that prevent oxidative cell damage (Mann et. al., 2010).

Saponins are one of the groups of glycosides found in many species with known foaming properties when mixed with water and allows the formation of small stable bubbles. The amount of foam created by the crushed sample shaken with water in a jar is a good indication of the amount of saponin present. Saponins are employed in the manufacture of fire extinguisher foam, tooth paste, shampoos, liquid soap, and cosmetics and in the foaming of beer and soft drinks. Saponins interfere with the replication of cell DNA thereby preventing the multiplication of cancer cells (Arouna, 2012).

Glycosides are non reducing substances that occur richly in nature and constitute the pigments that give colour to flowers and fruits (Middleton et. al., 2010). Glycoside formation is a means of storing certain organic compounds, for instance, phenols and some glycosides have a role in the defense against the invasion of the tissue by microorganisms subsequent to wounding since many aglycone are septic and hence bactericidal in character. Glycosides of plants can be used as

cardiac stimulants (e.g. digitoxin and guabian), sinusides and barbaloun or local irritants (e.g. sinigrin or analgesics (silicon) and against capillary fragility (Sofowora, 2012). *Mangifera indica* (common mango) and *Annona comosus* (Pineapple) are nutritional enrich plants and sources of secondary metabolites that are of great medicinal and nutritional value and should be explored on a large scale in food and drug industries.

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