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## Comparative chemical constituents of some desert fruits in Northern Nigeria

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### ABSTRACT

Aqueous extract of the fruits of *Borassus aethiopum*, *Borassus flabellifer*, *Balanite aegyptiaca*, *Phoenix dactylifera* and *Tamarindus indica* were subjected to preliminary screening for chemical constituents using generally accepted laboratory technique for qualitative phytochemical screening. The constituents screened for were tannins, saponins, phlobotannins, terpenoids, flavonoids, cardiac glycosides, glycosides, phenol, anthracene, free-anthraquinone, carotenoids, steroid, reducing compounds and alkaloids. The distribution of these constituents were assessed and compared. All the plant specimen were found to contain saponin, flavonoids, reducing compound, terpenoids, alkaloids and free-anthraquinone. Phlobotannin, carotenoids, anthracene and glycoside was absent in all the plant specimen. All the plant specimen seem to potential as a source of useful drugs.

**Key words:** *Borassus aethiopus*, *Borassus flabellife*, *Balanite aegyptiac*, *Phoenix dactylifera*, *Tamarindus indica*, phytochemical, chemical constituents.

### INTRODUCTION

The awareness of the role of medicinal plants in health care delivery in developing countries has resulted in researches into traditional medicine, with a view to integrate it with the modern orthodox medicine (1). Plants in all facets of live have served available starting material for drug developments (2). The most important of these bioactive constituents of plants are tannins, flavonoids, steroids, terpenoids, carotenoids and glycosides. (3).

The identification, isolation and concentration of this constituents in plants have shown that each plant activity is due to these active components. These components have both physiological and biochemical effect on the body which often leads to the amelioration of diseases.

*Balanites aegyptiaca* Del. (*zygophyllaceae*) commonly known as desert dates has many traditional uses in the treatment of jaundice, intestinal worms, infection, malaria, syphilis, epilepsy, dysentery, constipation, diarrhea, hemorrhoid, stomach aches, asthma and fever (4). As an infusion, decoction, syrup or paste, *Phoenix dactylifera* (*Aracaceae*), commonly known as dates palm may be administered for sore throat, colds, bronchial catarrh, and taken to relieve fever and other complaints. One traditional belief is that it can counteract alcohol intoxication. Because of their laxative quality, dates are considered to be good at preventing constipation. (5). Extract of *Tamarindus indica* (*leguminosae*), commonly known as tsamiya in northern Nigeria is used as traditional medicine in Africa for the treatment of gastrointestinal disorders, gonococci, fever, jaundice and dysentery (6-8). The genus *Borassus*, with *Borassus flabellifer* and *Borassus aethiopum* as the major species, has many traditional uses. They

have been used in treating gonorrhea, dysentery, and respiratory disease. The young plants are valued as diuretic and anthelmintic agents. Sap from the flower stalk is prized as a tonic, diuretic, stimulant, laxative, anti-phlegmatic and amebicide. Sugar from the sap is a typical agent used to counteract poisoning and prescribed in treating liver disorders, and the pulp of the matured fruits is known to relieve dermatitis .

## MATERIALS AND METHODS

Plant collection: the fresh fruits of *Borassus aethiopum*, *Borassus flabellifer* and *Balanite aegyptiaca* were bought from a market in Kano state, *Phoenix dactylifera* was bought from Abuja and *Tamarindus Indica* was harvested from a farm in Taraba state. The fresh fruits were washed and air dried. Pods/bark of the fruit were removed, cut into pieces and blended. Aqueous extract of each was obtained, filtered and stored in a clean sample container in the fridge until needed for analysis.

### Phytochemical screening.

Chemical test were carried out on the aqueous extract and on the powdered samples using standard procedures to identify the constituents as described by (9,1 &10).

### Test for reducing compound

The aqueous ethanol extract (0.5 g in ml of water) was added to boiling Fehling's solution (A and B) in a test tube. The solution was observed for a colour reaction.

### Test for terpenoid

To 0.5 g each of the extract was added 2 ml of chloroform. Concentrated  $H_2SO_4$  (3 ml) was carefully added to form a layer. A reddish brown colouration of the interface indicates the presence of terpenoid.

### Test for flavonoids

Two methods were used to test for flavonoids. First, dilute ammonia (5 ml) was added to a portion of an aqueous filtrate of the extract. Concentrated sulphuric acid (1 ml) was added. A yellow colouration that disappears on standing indicates the presence of flavonoids. Second, a few drops of 1 % aluminium solution were added to a portion of the filtrate. A yellow colouration indicates the presence of flavonoids.

### Test for saponins

To 0.5 g of extract was added 5 ml of distilled water in a test tube. The solution was shaken vigorously and observed for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

### Test for tannins

About 0.5 g of the extract was boiled in 10 ml of water in a test tube and then filtered. A few drops of 0.1 % ferric chloride was added and observed for brownish green or a blue-black colouration.

### Test for alkaloids

0.5 g of extract was diluted to 10 ml with acid alcohol, boiled and filtered. To 5 ml of the filtrate was added 2 ml of dilute ammonia. 5 ml of chloroform was added and shaken gently to extract the alkaloidal base. The chloroform layer was extracted with 10 ml of acetic acid. This was divided into two portions. Mayer's reagent was added to one portion and Draggendorff's reagent to the other. The formation of a cream (with Mayer's reagent) or reddish brown precipitate (with Draggendorff's reagent) was regarded as positive for the presence of alkaloids.

### Test for cardiac glycosides

To 0.5 g of extract diluted to 5 ml in water was added 2 ml of glacial acetic acid containing one drop of ferric chloride solution. This was underplayed with 1 ml of concentrated sulphuric acid. A brown ring at the interface indicated the presence of a deoxysugar characteristic of cardenolides. A violet ring may appear below the brown ring, while in the acetic acid layer greenish ring may form just above the brown ring and gradually spread throughout this layer.

**Test for phenols**

Test extract was first extracted with ethyl acetate and then filtered with Whatman filter paper. The development of blue-black or brown colouration on the addition of ferric chloride reagent to the filtrate indicates the presence of phenol.

**Test for phlobatannins**

10 ml of the extract of each plant sample is boiled with 1 % HCl acid in a test tube or conical flask. If the sample of plant carries phlobatannins, a deposition of a red precipitate will occur and indicates the presence of phlobatannins.

**Test for Anthracene**

The extract is shaken with volume of chloroform and allowed to separate. Brick-red precipitate is formed with anthracene.

**Test for Anthraquinone**

0.5 g of powdered plant was boiled with 10 ml of ferric chloride (10 %) and 5 ml dilute HCl for 5 minutes. The mixture was filtered while hot, cooled and the filtrate was shaken with equal volume of chloroform. The layers were allowed to separate in a separating funnel, the chloroform layer was transferred into another test tube containing 5 ml of 10 % of ammonia solution and the upper aqueous layer was observed for a bright-pink colour showing the presence of anthraquinone.

**Test for Glycosides**

5 ml H<sub>2</sub>SO<sub>4</sub> was added to each of the test extracts in a separate test tubes. The mixture was heated in boiling water for 15 minutes. Fehling's solution was then added and the resulting mixture was heated to boiling. A brick-red precipitate indicates the presence of glycosides.

**Test for sterols**

0.2 ml of Concentrated H<sub>2</sub>SO<sub>4</sub> was added to about the same volume of each of the test extracts in a test tube separately. A red colour indicates the presence of steroidal ring.

**Test for carotenoids**

1 g of each specimen sample was extracted with 10 ml of chloroform in a test tube with vigorous shaking. The resulting mixture was filtered and 85 % sulphuric acid was added. A blue colour at the interface showed the presence of carotenoids.

**Table-1: Scientific, Family, English and local names of plant screened**

Scientific name	Family name	English name	Local name	Abbreviation
Borassus aethiopum	Aracaceae	African palmyra palm	Ginginya	B.A
Borassus flebellifer	Aracaceae	Sugar palm	Goruba	B.F
Balanite aegyptiaca	Zygophyllaceae	Desert palm	Aduwa	B.AE
Phoenix dactylifera	Aracaceae	Dates palm	Dabino	P.D
Tamarindus indica	leguminosae	Indian date	Tsamiya	T.I

**Table-2: Result of the phytochemical screening of the plants**

Plant name	TA	PHL	SAP	CAR	TERP	FLAV	F.ANT	RED	ALK	STER	GLY	ANTH	PHE	C.GLY
B.A	-	-	+	-	+	+	+	+	+	-	-	-	-	-
B.F	+	-	+	-	+	+	+	+	+	+	-	-	+	-
B.AE	+	-	+	-	+	+	+	+	+	+	-	-	+	-
P.D	-	-	+	-	+	+	+	+	+	+	-	-	-	-
T.I	+	-	+	-	+	+	+	+	+	+	-	-	-	+

+, present. -, absent. TA, tannin. PHL, phlobotanin. SAP, saponin. CAR, carotenoid. TERP, terpenoid. FLAV, flavonoid. F.ANT, free-anthraquinone. RED, reducing compound. ALK, alkaloid. STER, steroid. GLY, glycoside. ANTH, anthracene. PHE, phenol. C.GLY, cardiac glycoside.

**RESULTS AND DISCUSSION**

Table 1 shows the names of the plant screened for phytochemical. The screening of these different plant species namely *Borassus aethiopum*, *Borassus flabellifer*, *Balanite aegyptiaca*, *Phoenix dactylifera* and *Tamarindus indica*

for phytochemical constituents was performed using generally accepted laboratory technique for qualitative determinations. From table 2., The study indicates the presence of Saponin, Flavonoids, Reducing sugar, terpenoids, Alkaloids and Free-anthraquinone in all the aqueous extract of the fruits but none contains anthracene, glycoside, carotenoid and phlobotannin. Phenols was found to be absent in *Phoenix dactylifera* and *Borassus aethiopum*. All the seed except *Borassus aethiopum* were found to contain Tannin and steroids. Only *Tamarindus indica* was found to contain cardiac glycoside among all the five fruit extract subjected to this study.

The comparism of the phytochemical constituents of the plant seeds extract of *Borassus aethiopum*, *Borassus flabellifer* and *Phoenix dactylifera* belonging to the same family *Aracaceae* showed that all contain flavonoids, saponin, reducing sugar and alkaloids but none contain phlobatanin, carotenoid, glycoside , cardiac glycoside and anthracene. Tannin and phenol were found to be present in *Borassus flabellifer* but absent in both *Borassus aethiopum* and *Phoenix dactylifera*. Steroids was found to be present in *Borassus flabellifer* and *Phoenix dactylifera* but absent in *Borassus aethiopum*.

The similarities in the taste (bitter-sweet) of *Borassus flabellifer*, *Balanites aegyptiaca* and *Tamarindus indica* and also the sweet taste of *Borassus aethiopum* and *Phoenix dactylifera* shows a common trend in the constituents that are present and absent in them. *Balanite aegyptiaca* and *Phoenix dactylifera* with similar English names, desert dates and dates palm but different families shows similarities as they both contain saponin, free-anthraquinone, terpenoids, flavonoid, reducing sugar, alkaloid and steroids and none contain phlobatanin, carotenoids, cardiac glycoside, anthracene and glycoside. While *Balanite aegyptiaca* contains tannin and phenol, these were absent in *Phoenix dactylifera*. This suggests the similarities in the curative properties of these plants as used in traditional medicines.

### CONCLUSION

The presence of Saponin, flavonoid, reducing compound, free-anthraquinone, terpenoids and alkaloids in all the plant subjected to phytochemical screening suggest potential source for useful drugs and enhancer of health status to its users.

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