

## Qualitative and Quantitative Phytochemical Analysis of Aqueous Extract of *Phoenix dactylifera* L. Seed (Date Seed)

Eze-Steven, P.E\*, Onyishi, C.K. and Mamah E.E.

Department of Applied Biochemistry, Enugu State University of Science and Technology, Enugu State, Nigeria.

\*Corresponding/Lead Author: [pejansej@yahoo.co.uk](mailto:pejansej@yahoo.co.uk); [peter.ezesteven@esut.edu.ng](mailto:peter.ezesteven@esut.edu.ng)

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### ABSTRACT

This study was carried out to evaluate the qualitative and quantitative phytochemicals of aqueous extract of *Phoenix dactylifera* L. seed using standard methods. The importance of phytochemicals has grown in recent years due to consumers increased awareness of their health beneficial effects. Results of the study revealed the presence of phyto-constituents in the aqueous extract of *Phoenix dactylifera* L. seed in various concentrations. The qualitative phytochemical analysis showed that the aqueous extract of *Phoenix dactylifera* L. seed contains tannins, alkaloids, saponins, glycosides, terpenoids, flavonoids, steroids and phenols. Result of the quantitative phytochemical analysis, revealed that the concentration of tannin in *Phoenix dactylifera* L. seed was 2.06mg/g while that of alkaloid was 1.39mg/g. The concentration of saponin was 0.65mg/g while that of glycoside was 1.92mg/g. And while the concentration of terpenoid was 0.82mg/g, flavonoid, steroid and phenol were 1.88mg/g, 0.24mg/g and 1.84mg/g, respectively. This analysis revealed that tannin has the highest concentration while steroid has the lowest concentration in aqueous extract of *Phoenix dactylifera* L. seed. This study showed the chemical contents of *Phoenix dactylifera* L. seed and hence, these constituents are behind the medicinal values of *Phoenix dactylifera* L. seed.

Keywords: *Phoenix dactylifera*, phytochemical, medicinal plants and Date palm

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### INTRODUCTION

Medicinal plants have been identified by man, in the course of development, and used in making chemical compounds for biological functions [1, 2, 3]. These chemicals work on the human body in exactly the same way as pharmaceutical drugs. Medicinal plants have continued to attract attention in the global search for effective antimicrobial agent that can combat resistant pathogens that have been rendering many conventional drugs obsolete in the treatment of infection [4]. Many important drugs used in medicine today are directly or indirectly derived from plant. The most important of these bioactive constituents of plants are alkaloids, flavonoids, tannins, terpenoids, steroids, glycosides, saponins and phenol compounds [5, 6]. In recent years, secondary plant metabolites, previously with unknown pharmacological activities, have been investigated as sources of medicinal agents [7, 8]. Thus, it is anticipated that phytochemicals with antimicrobial efficacy will be used for the

treatment of bacterial infections. *Phoenix dactylifera* L., commonly known as Date or Date palm, is a flowering plant in the palm family, *Arecaceae*, cultivated for its edible sweet fruit [9]. The species are widely cultivated and are naturalized in many tropical and subtropical regions worldwide. The seed of *Phoenix dactylifera*, which constitute 6-15% of the total weight of the ripe *Phoenix dactylifera* are actually a by-product of *Phoenix dactylifera* fruits and are largely produced in the middle East and especially in the United Arab Emirates [10]. It is normally discarded, used as animal feed ingredient or turned into non-caffeinated coffee by the Arabs. It has diverse effect in ethnomedicine, ranging from treatment against DNA damage, useful in treating blood sugar problems, can be used as an antiviral agent, prevention of kidney and liver damage to prevention of premature graying [10]. According to [11], the use of plants as therapeutic weapon against various

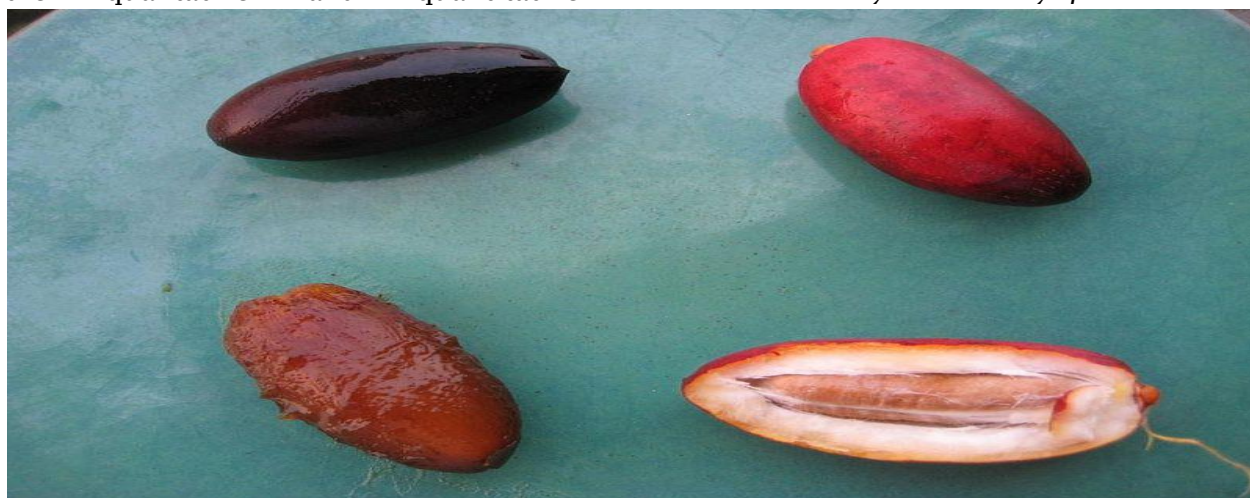
human, animal and even plant diseases and its role on nutrition has made plants invaluable and indispensable to human and animal lives. However, the widespread use and popularity of herbal medicines do not guarantee their efficacy and safety [12]. Therefore, there is need for detailed scientific analyses of adequate information on the toxicity of commonly used herbs [13,14]. Considering the above, there is need to evaluate the phytochemicals present in *Phoenix dactylifera* seed. In this study, the phytochemical activity of extract fraction of *Phoenix dactylifera* L. seed was carried

out with a view to provide scientific information on the claim by traditional medical practitioners of its uses in traditional medicine in the context of the search for active therapeutic agents from plants. Moreover, the information can be used as a reference for researchers and manufacturers that are interested in the phytochemistry of *Phoenix dactylifera* seed. This research activity will also contribute to new or renewed public interest in herbal medicine and raise health consciousness for the regulation of its continuous usage.

#### Aim of study

The aim of this research was to determine the qualitative and quantitative

phytochemical composition of aqueous extract of *Phyoenix dactylifera* L. Seed



**Figure 1: Sample photo of *Phoenix dactylifera* L. seed used**

#### MATERIALS AND METHODS

##### Sample Collection

The *P. dactylifera* L. fruit used in this study were bought from Ogbete main market, Enugu State, Nigeria. The Plant materials were identified and authenticated by Prof. Ezeh in Applied Biology and Biotechnology of Enugu State University of Science and Technology, Enugu State, Nigeria. Sample collection,

preparation and analysis were carried out in the Biochemistry Laboratory of the Department of Applied Biochemistry, Enugu State University of Science and Technology, Enugu State, Nigeria and the Project Development Institute (PRODA), Emene, Enugu State, Nigeria.

#### METHODS

##### Sample Preparation

Mature ripe fruits of *P. datylifera* were washed and cut open to obtain the seeds. The seeds were air-dried and ground to fine powder using a mechanical grinder.

Ground samples were sieved using a muslin cloth and stored in air-tight bottles.

### Extraction Methods

Distilled water was used as solvent for extraction. A 5g of the ground samples were soaked for 24 hours in 50mls of distilled water and later filtered using

Whatman number 1 filter paper. After the extraction the sample was concentrated using heating mantle to reduce the volume of liquid.

### Phytochemical Analysis

Phytochemical screening of the extract was carried out to identify the constituents, using standard

phytochemical methods as described by [14].

## RESULTS

### Results of Extraction/Yield

The yield obtained from the dry seed powder of *Phoenix dactylifera* weighing

350g is 2.58% and this is shown in the Table 1 below.

**Table 1: Yield of the seed of *Phoenix dactylifera* L.**

Solvent	Weight of sample (g)	Weight of extract(g)	Yield(g)	% Yield
Water	350	9.05	0.0258	2.58

### Qualitative Phytochemical Analysis of Aqueous Extract of *Phoenix dactylifera* L. seed

The qualitative phytochemical analysis of the aqueous extract of *Phoenix dactylifera* L. seed revealed the presence of Tannins,

Alkaloids, Saponins, Glycosides, Terpenoids, Flavonoids, Steroids and Phenols which is shown in Table 2. below.

**Table 2 Results of the qualitative phytochemical Analysis**

Parameter	Result
Tannin	+++
Alkaloid	++
Saponin	++
Glycoside	++
Terpenoid	++
Flavonoid	+++
Steroid	+
Phenol	++

#### Key:

+++ = Highly Present

++ = Moderately Present

+ = Slightly Present

--- = Absent

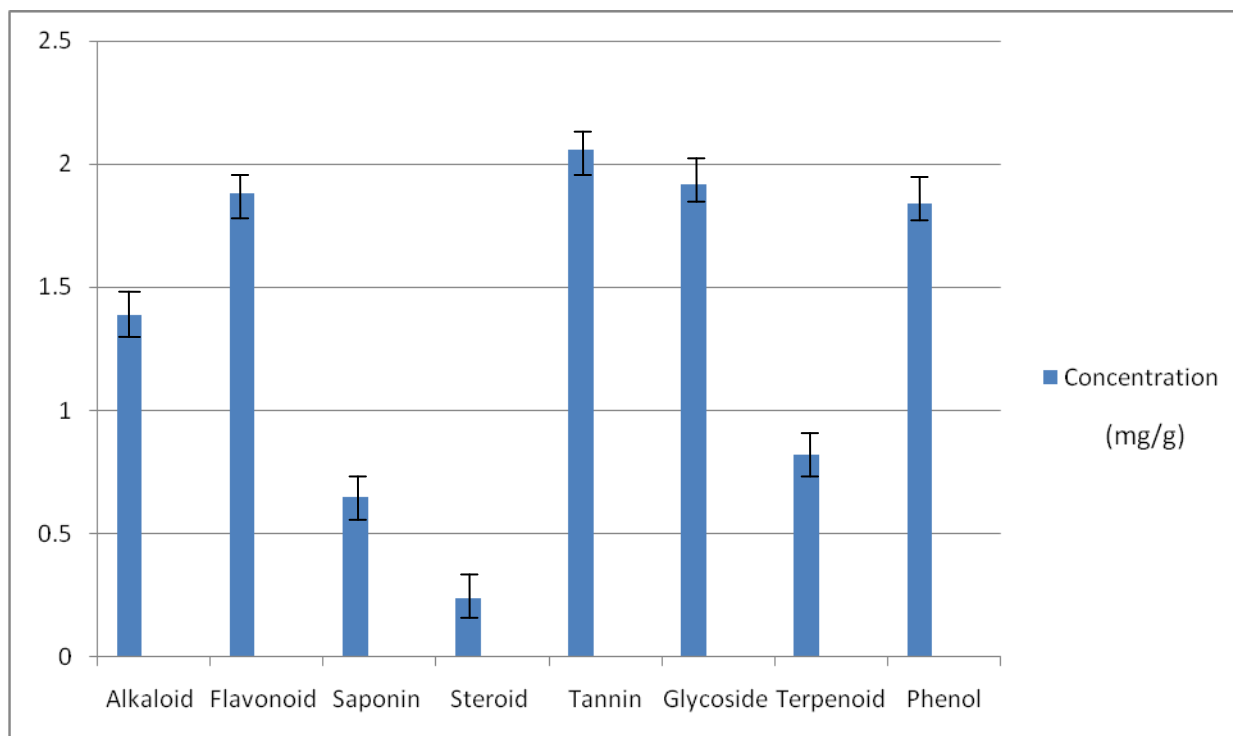
### Quantitative Phytochemical Analysis of Aqueous Extract of *Phoenix dactylifera* L. seed

The quantitative phytochemical analysis of the aqueous extract of *Phoenix dactylifera* L. seed revealed that Tannin has the highest concentration which is

2.06 mg/g and Steroid has the lowest concentration which is 0.24 mg/g as shown in Table 3 below.

**Table 3 Results of the Quantitative Phytochemical Analysis**

Phytochemicals	Concentration (mg/g) (mean $\pm$ SEM)
Flavonoid	1.88 $\pm$ 0.01
Alkaloid	1.39 $\pm$ 0.05
Steroid	0.24 $\pm$ 0.04
Tannin	2.06 $\pm$ 0.07
Saponin	0.65 $\pm$ 0.02
Terpenoid	0.82 $\pm$ 0.03
Glycoside	1.92 $\pm$ 0.03
Phenol	1.84 $\pm$ 0.06



**Figure 2: A bar chart showing the phytochemical concentrations of aqueous extract of *Phoenix dactylifera* L. seed.**

#### DISCUSSION

Phytochemicals are important chemical compounds found virtually in all parts of plants at different concentrations [2]. The result of qualitative and quantitative phytochemical analyses of aqueous extract of *Phoenix dactylifera* L. seed as shown in Table 4.2.1 and 4.2.2 in chapter four revealed the presence of Tannins (2.06mg/g), Alkaloids (1.39mg/g), Saponins (0.65mg/g), Glycosides (1.92mg/g), Terpenoids (0.82mg/g), Flavonoids (1.88mg/g), Steroids (0.24mg/g), and phenols (1.84mg/g). Tannins noted for astringency, hasten the healing of wounds and inflamed mucus membrane [7]. The presence of tannins in *Phoenix dactylifera* L. seed in this study may be responsible for their free astringency. Alkaloids are important therapeutic plant secondary metabolites. Isolated pure form of alkaloids and their synthetic derivatives are used as basic medicinal agents for their analgesic and bactericidal effects [3]. Some of the general characteristics of saponins include formation of foams in aqueous

solution, haemolytic activity, cholesterol binding properties, etc.

Glycosides play numerous important roles in living organisms. Many plants store chemicals in the form of inactive Glycosides [7]. Many such plant glycosides are used as medications. In animals and humans, poison are often bound to sugar molecules as part of their elimination from the body. Plant Terpenoids are used extensively for their aromatic qualities and play a role in traditional herbal remedies. Terpenoids contribute to the scent of eucalyptus, the flavours of cinnamon, cloves and ginger, the yellow colour in sunflowers and the red colour in tomatoes [6]. Flavonoids are potent water-soluble super antioxidants and free radical scavengers. They prevent oxidative cell damage, have strong anticancer activity and protect against all stages of carcinogenesis [4]. Flavonoids in intestinal tract lower the risk of heart disease, inflammation and represent the most common and widely distributed group of plant phenolic compounds. For many years now, it has been known that

plant steroids are antioxidants in vitro and have link with reproduction in humans [7]. Phenols have been extensively researched as disease preventives [5]. Phenols detected in

The importance of phytochemicals has grown in recent years due to consumers increased awareness of their health beneficial effects (John *et al.*, 2013). Scientific evidence on the health benefit of *Phoenix dactylifera L.* fruit in addition to their nutritional quality provides added value to the fruit. The fruits could be used as a dietary supplement or for medicinal purposes. Local herbal

### CONCLUSION

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*Phoenix dactylifera L.* seed as investigated in this study could further indicate their ability to act as anti-inflammatory, anti-clotting, antioxidants, immune enhances, etc.

practitioners have claimed that regular consumption of *Phoenix dactylifera L.* in addition to their biological and pharmacological activities, is beneficial in ameliorating cough, rheumatism, burning sensation, nephropathy, gastropathy, bronchitis and sexual debility. Therefore, it is recommended to consume adequate amount of *Phoenix dactylifera L.* together with their seeds for a healthy living.

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