

QUANTITATIVE ANALYSIS OF TWO COCOS NUCIFERA FRUITS.

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Abstract

A quantitative analysis of two species of coconut fruit aimed at determining the levels of alkaloids, saponins, tannins, flavonoids, iodine, iron, phosphorus, zinc, calcium, fats, protein, vitamin A and C were carried out using standard methods. The results show that the alkaloid content was 0.6% and 1.1%, saponins (0.2% and 2.8%), tannins (0.5% and 3.0%), flavonoids (0.03% and 0.01%), iodine (7.40mgI/g and 6.30mgI/g), iron (3.47ppm and 5.00ppm), zinc (0.97ppm and 0.76ppm), phosphorus (1.15ppm and 1.26ppm) and calcium (5.66ppm and 7.17ppm). Others were include vitamin A (61.55mg/kg and 147.40mg/kg), vitamin C (5.24mg/kg and 7.84mg/kg), fat (16.0% and 9.0%) and protein (4.8% and 1.1%). The study shows that the samples contain phytonutrients in varying proportions and therefore highly recommended for human consumption.

Introduction

Cocos nucifera, the coconut palm, is a monocot perennial member of the Aracaceae (palm family) cultivated in tropical areas worldwide for its fruit and fibre[1]. It has been spread widely by man but also by natural means[2]. The plant is originally from South East Asia and the Island between the Indian and pacific oceans. From that region, the fruit of coconut palm is believed to have been brought to India, East African, West Africa and to other tropical regions of the globe[3].

The coconut fruit is almost spherical to oval in shape and measures between 7 – 12 inches in width. Its rough outer husk which is the exocarp is light green but turns gray when it becomes dry. The exocarp is about 1 – 2 inches in thickness and made of tough fibres. Underneath the husk, there is woody shell enclosing the inner edible meat[4].

The main fruit comprises an outer epicarp, a mesocarp and an inner endocarp. The epicarp is the outer skin of the fruit while the mesocarp is the heavy fibrous layer, usually tanned when dry and has many industrial uses. The endocarp is the hard dark core, inside is a solid white albumen of varied thickness (depending on the age of the fruit) with an oily pulp consistency and a luquid albumen called coconut water that is thick, sweet and slightly acidic[5].

There are two main varieties of coconut tree. Tall coconut (Typica) and dwarf coconut

(Nana). The Tall coconut trees which is sometimes called ‘the six year coconut tree’ grows tall and naturally cross pollinate. They may grow more than 1-5 feet 50 centimeters annually and grow between 65-70 feet high. Tall coconut flower and produce their first fruit at six to ten years & and their economic life is between 60-70 years. They bear fruits throughout the year at an average of 40 fruits (nuts) per year. They are slower in growth, less common, has longer leaf at the bottom and tapers slightly along the leaf up the tip[6].

Dwarf coconuts usually grow 26-32 feet (8 – 10 meters) high. They self-pollinate and start flowering at three years thus the name “the three year coconut tree” and they bear fruit seasonally with an average of about 80-100 nuts per year. They have economic life of 30-40 years and are more common than the typical variety. The leaves of this dwarf type are more uniform in shape, being as slender at the base of the leaf up to about four to five inches from the tapering tip[6].

There is another variety of coconut known as hybrid coconut.this can be formed naturally or bred internationally to produce nut size of tall coconut and volume output of dwarf coconuts. A hybrid variety combines the sought after characteristics of abundant fruit yield and fast growing nature[6].

Coconut fruits are highly nutritious and rich in fibre, vitamins C, E, B1, B3, B5 and B6; and also minerals like iron, selenium, sodium, calcium, magnesium and phosphorus[7]

Experimental

Sample Collection and Preparation

Two varieties of coconut were purchased at Oko in Aguata Local Government Area of Anambra State. The samples were broken and the epicarp and mesocarp removed, washed and ground with a mortar separately for analysis.

Quantitative Analysis

The phytochemical parameters – alkaloids, saponins, tannins and flavonoids were analyzed using standard methods as enumerated in Harbone, 1998; the iodine, phosphate and heavy metals were determined using APHA, 1998 while vitamins A and C, proteins and fat were from Kirk and Sawyer, 1991.

Results and Discussion

Table 1: Phytochemical composition of tall and dwarf varieties of *Cocos nucifera*.

Parameters	Sample A (%)	Sample B (%)
Alkaloids	0.560	1.140
Tannins	0.450	3.000
Saponins	0.200	2.800
Flavonoids	0.026	0.006

Sample A = Dwarf variety

Sample B = Tall variety

The alkaloid content of both species were very low (0.6% and 1.1%), however the greater amount of the tall variety shows more antimalarial, antiasthma and anticancer properties.

The tannin content of the tall specie of *Cocos nucifera* (3.0%) was found to be higher than that of the dwarf species (0.5%). This indicates that it is less likely to be attacked by pests because tannins play a role in plant protection

from predation and also in its growth regulation.

The higher percentage of sample B in terms of the saponin level makes it easily digestible than sample A because saponins enhances nutrient absorption¹¹.

The low flavonoid content of the two varieties (0.03% and 0.01%) is an indication that they are not rich in flavonoid content.

Table 2: Mineral composition of the tall and dwarf varieties of coconut in ppm.

Parameters	Sample A (Value in ppm)	Sample B (Values in ppm)
Calcium	5.66	7.17
Iron	3.47	5.00
Zinc	0.97	0.76
Phosphorus	1.15	1.26

The calcium, iron and phosphorus values for the tall variety (7.17ppm, 5.00ppm and 1.26ppm) were higher than that of the dwarf variety (5.66ppm, 3.47ppm and 1.15ppm) except for zinc; the dwarf variety has a zinc

value of 0.97ppm while the tall variety has 0.76ppm. These metals, though varying concentration, are very useful for human growth and development.

Table 3: Proximate composition of the two varieties of *Cocos nucifera*.

Parameters	Sample A	Sample B
Vitamin A (mg/kg)	61.55	147.40
Vitamin C (mg/kg)	5.24	7.84
Protein (%)	4.8	1.1
Fats (%)	16.0	9.0

The vitamin A content of Sample A (61.6mg/kg) was lower than that of Sample B (147.4mg/kg) thereby making the tall species a very rich source of this vitamin. The same was applicable to vitamin C, the value for the tall species was higher than that of the dwarf species. These vitamins are necessary for good vision, growth, development and repair of body tissue.

The values of the protein and fat contents for sample A were higher than that of sample B making sample A is a better source of proteins and fats.

Conclusion

In this study, both species of *Cocos nucifera* have comparable values in the parameters analyzed with the tall variety having much higher concentrations of alkaloids, tannins, saponins, vitamin A, vitamin C and some mineral elements. Significantly, the varieties contain quality phytonutrients useful to humans.

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