



## COMPARATIVE ANALYSIS OF THE NUTRITIONAL COMPOSITION OF TWO LESS KNOWN SEEDS: *THAUMATOCOCCUS DANIELLII* (BENTHI) AND *MEGAPHYNIUM MACROSTACHYUM* (BENTHI).

\*OGUNMOLA OLURANTI OLAGOKE & \*\*ADEYEMI SODÍQ  
OPEYEMI

\*Department of Chemistry, School of Science, EACOED, Oyo, Oyo State

\*\*Department of Biology, School of Science, EACOED, Oyo, Oyo State

### ABSTRACT

*Thaumatococcus daniellii* and *Megaphynium macrostachyum* are economic plant of the rain forest of West Africa, they belong to the family *Marantaceae*. The study examined the comparative analysis of the nutritional composition of the seed of the two plants. The seed of *T. daniellii* contained (per 100g) 18.47g protein, 1.72g fat, 21.90g fibre, 6.41g ash, 9.25g moisture and 51.44g carbohydrate. It has high mineral content (per 100g). 30.20mg calcium, 27.47mg magnesium and 29.67mg phosphorous. *M. macrostachyum* contained (per 100g) 17.60g protein, 2.96g fat, 22.11 fibre, 6.01g ash, 8.36g moisture and 42.94g carbohydrate. It is rich in minerals (per 100g) 14.17mg calcium, 19.66mg magnesium, 14.41mg phosphorus and 21.01 mg zinc. The amount of zinc in this sample is higher than that of *T. daniellii* and is been reported for the first time in this sample to the best of our knowledge.

**Keywords:** *Thaumatococcus daniellii*, *Megaphynium macrostachyum*, nutritional composition.

### INTRODUCTION

*Thaumatococcus daniellii* popularly called the “sweet prayers” plant and *Megaphynium macrostachyum* is a rhizomatous, monocotyledonous and perennial herb which belongs to the family *Marantaceae* (Jennings, Brown, Boshier, Whitmore & Lopes, 2001).

They are indigenous to coastal areas of West Africa (Yeboah, Hilger, & Kroschel, 2003). The two plants resemble each other and because it share

similar morphological and ethno botanical usage; there are a lot of controversies among local communities that utilizes these two plants (Nwodo-Chinedu Omohinmin, Dike, Omotosho, Osamor, Oyelade & Adebisi, 2008).

These plants have long slender stalks that can grow up to two or three meters high, each bearing a single tough, ovoid shape leaf of varying sizes depending on the age, habitat and plant species. The fruit is pyramidal or trigonal in shape and crimson or bright-red in colour when fully ripe, the fruit may weigh 6-30g depending on the number of seeds, usually one to three within it. The seed is black, hard and look like stone when dried (Onwueme, Onochie, & Sofowora, 1979). In West Africa, *Thaumatococcus* has only one specie (*T. daniellii*) and this grows well in Nigeria, *Megaphynium* has two species but *M. macrostachyum* is the only specie that grows well in Nigeria (Hutchinson & Dalziel, 1963, Arowosoge & Popoola, 2006).

*Thaumatococcus daniellii* and *Megaphynium macrostachyum* have similar ethno botanical usage. They are used for fetish purpose in Gabon, in Nigeria and Ghana; it is also used in wrapping and boiling food (White, 2001, Ojekale, Makinde & Osileye., 2007). The stalks are popularly used for weaving mats, basket and other valuables used for storing materials. The root in the recent times is used in curing many ailments (Oluwadare and Sotande, 2005, Ojekale, Makinde & Osileye, 2007).

These plants at maturity produce flowers, which later develop into an edible berry containing high amount of thaumatin. Thaumatin is a proteinous sweetener which is a potential sweetener in pharmaceutical, beverage and confectionery industries (Ojekale, Makinde & Osileye, 2007).

Several works have been conducted on these plants in Nigeria. Abayomi, Sefiu, Akinwumi, & Kehinde, 2017, worked on foliar anatomical study; Adebayo & Lawal, 2010 conducted in vitro activity of the leaf extracts of these plants on fungi and they found that the methanolic extract was active against the tested organism. Often people eat the berry like fruit of *T. daniellii*, but the seeds are thrown away. As a way of ensuring food security in the country and minimizing food waste, effort and attention is now shifted to less known fruits and seeds. In Nigeria, most of the work conducted on these two plants are mostly on the leaves and fruit but the seed is left unexplored, hence the purpose for this study. The objective of the study is to conduct a comparative analysis of the nutritional

composition of these less known seeds; *Thaumatococcus daniellii* and *Megaphynium macrostachyum*.

## MATERIALS AND METHODS

### Sample Identification

*T. daniellii* and *M. macrostachyum* were identified ab initio by local farmers and then by Forest Research Institute of Nigeria (FRIN) Ibadan.

### Sample Preparation

Fresh fruit of *T. danielli* and *M. macrostachyum* were obtained in a local farm in Afijio local Government Area of Oyo state. The fruits were washed and the fleshy part of the fruit was separated from the seed. The seeds were sun dried separately and ground into powder.

### Proximate Analysis

Proximate composition of the seeds of *T. danielli* and *M. macrostachyum* was determined by the official method of the Association of Official Analytical Chemist (AOAC, 1990). All analyses were carried out in triplicate.

### Analysis of Mineral Content

5 grams of each sample was burned on a muffle furnace at 550<sup>0</sup>C for 12 hours, the resulting ash was cooled in desiccator. The ash was dissolved in 2ml of concentrated HCl and few drops of concentrated HNO<sub>3</sub> were added, the resulting solution was evaporated almost to dryness in water bath. The content was diluted to mark in 100ml volumetric flask with distilled water. Bulk scientific atomic absorption spectrophotometer (AAS) was used to determine each metal reported for the samples.

## Results and Discussion

The result of the proximate composition of the seed of *T. daniellii* and *M. macrostachyum* is as shown in Table 1 and 2.

**Table 1:** proximate composition of *T. daniellii* and *M. macrostachyum* seed.

Parameter	Composition in <i>T. danielli</i> (%)	Composition of <i>M. macrostachyum</i> (%)
Crude protein	18.47 ± 0.03	17.60 ± 0.01
Crude fat	1.72 ± 0.01	2.96 ± 0.04
Crude fibre	21.90 ± 0.02	22.11 ± 0.02
Ash	6.41 ± 0.01	6.01 ± 0.01

Dry matter	90.74 ± 0.02	91.62 ± 0.03
Moisture	9.25 ± 0.04	8.36 ± 0.01
Carbohydrate	51.44 ± 0.03	42.94 ± 0.01

% carbohydrate was calculated by difference

**Table 2:** Mineral composition of *T. daniellii* and *M. macrostachyum*

Element	Composition (Mg/100g) in <i>T. danielli</i>	Composition(Mg/100g) in <i>M. macrostachyum</i>
Calcium	30.20 ± 0.01	14.17 ± 0.03
Magnesium	27.47 ± 0.04	19.66 ± 0.01
Iron	1.17 ± 0.02	1.94 ± 0.03
Phosphorus	29.67 ± 0.01	14.41 ± 0.02
Zinc	11.11 ± 0.00	21.01 ± 0.01

The proximate composition of the seed of *T. daniellii* and *M. macrostachyum* show that the moisture content is 9.25 ± 0.04/100g and 8.36 ± 0.01/100g. The moisture in food determines the characteristics keeping quality, facilitates the rate of digestion and assimilation with absorption within the body. The moisture content of both seeds are within the range of common seeds and cereals.

Ash content of both samples *T. daniellii* and *M. macrostachyum* are 6.4 ± 0.01/100g and 6.01 ± 0.01/100g respectively, this indicates that *T. daniellii* and *M. macrostachyum* contain some important mineral element. The crude fibre is 21.90 ± 0.02/100g and 22.11 ± 0.02/100g for *T. daniellii* and *M. macrostachyum* respectively and this value is higher than the sample of *T. daniellii* reported in Ekiti State (Chinedu, Oluwadamisi, Popoola, David & Epelle, 2014).

The crude fat in the seed of *T. daniellii* is lower 1.72 ± 0.01/100g than that of *M. macrostachyum* 2.96 ± 0.04/100g. The crude protein content of the two samples from Oyo state for both samples is significantly higher than that of the samples obtained from Ekiti state (Chinedu, Oluwadamisi, Popoola, David & Epelle, 2014). *T. danielli* and *M. macrostachyum* seed have a significant amount of protein 18.47 ± 0.03/100g and 17.60 ± 0.01/100g respectively, these are potential source of protein.

The seeds of the two samples are very rich in carbohydrate which is a good source of energy: *T. daniellii* 51.44 ± 0.03/100g and *M. macrostachyum* 42.94 ± 0.01/100g. The value reported above is in the same range with the sample

reported from Ekiti state (Chinedu, Oluwadamisi, Popoola, David & Epelle, 2014).

The ash content of *T. daniellii* is higher  $6.41 \pm 0.01/100g$  than that of *M. macrostachyum*  $6.01 \pm 0.01/100g$ . The seed has a high content of phosphorus  $29.67 \pm 0.01/100g$  (*T. daniellii*)  $14.41 \pm 0.02/100g$  (*M. macrostachyum*), magnesium  $27.47 \pm 0.04/100g$  (*T. daniellii*)  $19.66 \pm 0.01/100g$  (*M. macrostachyum*) and calcium  $30.20 \pm 0.01/100g$  (*T. daniellii*)  $14.17 \pm 0.03/100g$  (*M. macrostachyum*). The seed of *T. daniellii* is rich in calcium and this is important in bone development.

## CONCLUSION

In conclusion, the seeds of *T. daniellii* and *M. macrostachyum* have high nutritional value and the seed can be exploited for the high carbohydrate, protein and mineral content which they possess in abundance.

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