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Proximate evaluation of nutritional value of some soup thickeners

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ABSTRACT

The nutritional value of *Citrulus vulgaris* , *Brachystegia eurycoma, Dracaema fragrance, Cucubita pepo, Magnidera indica* and *Irvingia gabonesis* was studied by analysing collected samples of these soup thickeners for their concentrations of carbohydrate, protein, fat and oil, moisture, ash and fiber. The result of the analysis shows the percentage moisture in these soup thickeners to range from 4.45% (in irvingia gabonesis) to 11.71% (in *Brachystegia eurycoma*). The concentration of protein ranges from 4.49% (in *magnidera indica*) to 26.17% (in *citrulus vulgaris*). The range for the concentration of carbohydrate was 6.14(in *citrulus vulgaris*) to 72.52% (in *magnidera indica*). Percentage fat ranged from 8.30% (in *magnidera indica*) to 69.70% (in *irvingia gabonesis*) while the ash content ranged from 2.40% (in *irvingia gabonesis*) to 11.17% (in *cucubita pepo*). The observed values for the proximate parameters of the analysed soup thickeners were comparable to values reported for other soup thickeners. The soup thickeners were found to be a good source of nutrient.

Key Word: Proximate composition, soup thickeners, nutritional value.

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INTRODUCTION

The nutritional value of any food or food materials can be evaluated by biological, chemical and physical score [1, 2,]. The method of chemical score has proven to be very useful because it tend to assess the nutritional value of food based on the chemical composition (proximate composition) of the food. The proximate composition of any food will includes, its content of protein, carbohydrate, fat and oil, moisture and dietary fiber [3, 4, 5, 22]. In recent times, much emphasis on nutritional value of food is placed on the protein content and protein energy value of the food [6] because most food contained carbohydrate in sufficient quantity [1]. It has been proven that the combustion of 1g of protein yields 4kcal (17kJ), the combustion of 1g of carbohydrate yields 4kcal (17kJ) of energy while the combustion of 1g of fat yields 9kcal (37kJ) of energy. These values are called the physiological fuel value of food and are calculated by multiplying the concentration of protein, carbohydrate and fat by their respective Atwater value [8,9,10]. The nutritional role of carbohydrates, protein, fat and oil, dietary fiber, ash and water have been extensively studied and reviewed by many authors [4, 8, 21, 23, 24].

In the preparation of most soup, thickeners are normally added in order to make the soup to be thicker. Literature and research on the chemical composition of soup thickeners are scanty. However, Eneobong and Carnovale [11] have conducted studies on the proximate composition of *Afzelia africana, Deterium microcarpum* and *Mucuna ureus*. The present study is aimed at the determination of the proximate composition of *Citrulus vulgaris* (Melon seed), *Brachystegia eurycoma* (Achi) *Dracaema fragrance* (Ibaba or Ukpo) *Cucubita pepo* (Pumkin seed) *Magnidera indica* (Mango seed) and I*rvingia gabonesis* (Agbono).

MATERIALS AND METHODS

Samples of *Citrulus vulgaris, Brachystegia eurycoma, Dracaema fragrance, Cucubita pepo, Magnidera indica* and I*rvingia gabonesis* were purchased from some local markets located within Obot Akara local government area of Akwa Ibom State.

The protein content of the food samples was determined by using the Kjedhal method of nitrogen determination [12]. The carbohydrate content of the food samples was determined by the colorimetry method as reported by James [8]. The moisture content of the food materials was determined by the oven drying method [13]. The ash content of the food was determined by drying of the food sample in an oven at 200°C. The dry food sample was ash in a muffle furnace at a temperature of 550°C until the food sample

was completely ashed. The fat and oil content of the food samples was determined by extraction as reported by James [12]. While the method recommended by A.O.A.C [16] was adopted for the determination of the fiber content of the food samples.

Result and Discussion

The results of the proximate compositions of *Citrulus vulgaris* (A), *Brachystegia eurycoma* (B), *Dracaema fragrance* (C), *Cucubita pepo* (D), *Magnidera indica* (E) and I*rvingia gabonesis* (F) were as shown in Table 1.

The moisture content of the food thickeners was observed to follow the trend, F (4.45%) < A (4.68%) < E (10.48%) < C (10.99%) < D (11.48%) < B (11.71%). Onimawo and Egbekun [4] stated the present of water in food is essential because it serves as an ideal medium for the transportation of nutrient and is also actively involved in various metabolic reactions. Other functions of water in the human system are in the maintenance of heat within the body and in the control of body temperature. The observed moisture content of the food thickener are low when compared to the range of values reported for raw legumes (9-15%) and raw cereals (9-14%) [11,14]. The water requirement of the body is 2300ml per day or 400ml per kilogram body weight [9] which implies that the water content of these food samples are less than the required amount. The amount of water formed from the metabolism of carbohydrate, fat and protein are 0.06g/g, 1.07g/g and 0.41g/g respectively [9].

Table 1: Proximate composition of soup thickeners

Proximate parameters	A	B	C	D	E	F
Moisture	4.68	11.71	10.99	11.48	10.48	4.45
Ash	3.80	2.60	3.40	11.17	2.20	2.40
Fat	58.20	14.30	13.50	17.60	8.30	69.70
Protein	26.17	9.68	19.87	19.20	4.49	23.56
Dietary fiber	1.01	1.00	1.21	1.32	2.01	0.92
Carbohydrate	6.14	60.71	51.03	39.23	72.52	8.97

∗ Mean of three determination

A – *Citrulus vulgaris* (Melon seeed) B – *Brachystegia eurycoma* (Achi) C – *Dracaena fragranceu* (Ukpo/Ibaba)
D – *Cucubita pepo* (Pumkin seed) E – *Magnidera indica* (Mango seed) F – *Irvingia gabonesis* (Agbono)

The protein content of the soup thickeners analysed was observed to follow the trend, E (4.49%) < B (9.68%) < D (19.20) < C (19.87%) < F (23.56%) < A (26.17%). This implies that the metabolic water for sample A, B, C, D, E and F with respect to protein are 10.73g, 7.87g, 3.97g, 1.84g, 8.15g and 9.66g respectively. The PFV of the samples due to protein are 104.68kcal, 38.72kcal, 78.48kcal, 76.80kcal, 17.96kcal and 94.24kcal respectively. Protein is essential in the human system because it functions in the growth, support and movement [15]. It also needed in the transportation of gas, organ components, water and in metabolic regulation. Protein also plays vital functions in the body defense system, the production of energy and amino acid [16,17]. The observed values for the protein content of samples A, B and C were above the recommended safe protein intake required for children between the age of 1-5 but below the safe level of protein intake required for those between 5-10 years while the protein content of sample D, E and F were above these safe values [18]. The protein energy requirement increases with age [19] thus these soup thickeners are better recommended for adults than infants.

The trend for the carbohydrate content of A, B, C, D, E and F was A (6.14%) < F (8.97%) < D (39.23%) < C (51.03%) < B (60.71%) < E (72.52%). Most food contain carbohydrate in sufficient quantity however, the low carbohydrate content (6.14%) of *Citrulus vulgaris* might have been due to the high protein content (26.77%) of the sample. Similarly, the high carbohydrate content of M*agnidera indica* (772.52%) coincided with low protein (4.49%) and fat content (8.30%) compares to other samples. The metabolic water content of samples A, B, C, D, E and F due to carbohydrate are 0.37g, 2.35g, 3.64g, 4.35g, 3.06g and 0.54g respectively. Their PFV are 24.56kcal, 242.84kcal, 204.12kcal, 156.92kcal, 290.08kcal and 35.88kcal respectively. The values observed for the percentage carbohydrate in the soup thickeners are comparable to values reported by Eneobong and Carnovale [11] for A*fzelia africana* (8.70%), *Brachystegia eurocom* (4.40%), *Deterium microcarpum* (2.6%) and *Mucunna ureus* (7.5%).

The trend for the fat and oil content of the different soup thickeners was E (8.30%) < C (13.50%) < B (14.30%) < D (17.60%) < A (58.20%) < F (69.70%). The metabolic water content of samples A, B, C, D, E and F due to fat and oil are 62.27g, 18.83g, 15.30g, 8.88g, 14.45g and 72.49g respectively while

their corresponding fuel are 523.80kcal, 128.70kcal, 121.50kcal, 158.40kcal, 74.70kcal and 627.30kcal respectively. The concentration of fat reported for A*fzelia africana, Brachystegia eurocom, Deterium eurocom* and *Mucunna ureus* are 29.10%, 4.70%, 11.50% and 17.80% respectively [11,19]. The observed values are relatively comparable to those of the soup thickeners listed above.

The mean percentage dietary fiber in the samples was observed to follow the trend, F (0.92%) < B (1.00%) < A (1.01%) < C (1.21%) < D (1.32%) < E (2.01%). Dietary fiber (DF) is the portion of plant food that cannot be digested by human alimentary enzymes [9]. However, DF helps to form softer bulky stools [20] and has also been associated with protection against colon and rectal cancer [9]. The observed concentration of DF in samples A, B, C, D, E and F are low when compare to values reported by Hollyway *et al.* [14] in A*fzelia africana* (37.40%), B*rachystegia eurycoma* (77.20%), D*etarium microcarpum* (70.20%), M*ucunna* spp (51.10%) and *Pleurotus* spp (71.80%).

CONCLUSION

The study was conducted to evaluate the nutritional value of *Citrulus vulgaris, Brachystegia evrycoma, Dracaena fragranceu, Cucubita pepo, Magnifera indica* and *Irvingia gaboness* based on their proximate composition. The percentage concentration of moisture, ash, fat, protein, dietary fibre and carbohydrate were highest in *Citrulus vulgaris, Brachystegia eurycona*, *Cucubita pepo*, *Irvingia gabonesis*, *Magnifera indica* and *Cocubita pepo* respectively while their corresponding least values were found in *Irvingia gabonesis, Magnidera indica, Magnifera indica, Irvingia gabonesis* and *Citrulus vulgaris* respectively.

Comparison of the observed proximate parameter of analysed soup thickeners with that of other soup thickeners and the nutrient requirement of the body show that they are good source of nutrient supplement.

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