

Original Research Article

PROXIMATE AND MINERAL COMPOSITION OF SPONGE SEED (*Luffa cylindrica*) GROWN IN SOUTH-WESTERN NIGERIA.

Abstract: *Luffa cylindrica* is locally a significant source of food, medicinal substances and have other traditional application. This study investigated the proximate and mineral analysis of *Luffa cylindrica*. The result of the analysis showed that the seed contain 35.83% of protein which is the highest in the proximate composition followed by fat (33.93%). The crude fibre, moisture and ash content are 4.58, 5.84 and 6.13% respectively, while 13.67% was found as the carbohydrate content which is determine by different methods. The mineral content showed that phosphorus is the most abundant mineral with 30.63g/100g. It also contains moderately high amount of other minerals such as Sodium (8.18 g/100g), Iron (4.72 g/100g), Zinc (3.43 g/100g), Calcium (2.12 g/100g), Magnesium (28.93 g/100g), Copper (3.33 g/100g), Manganese (2.77 g/100g) and Chromium (0.25 g/100g) which was found to be the lowest mineral content. The ratio of Na/K was 0.59, it depicts that the sample can be useful for the prevention of high blood pressure. Thus, *Luffa cylindrical* is recommended as an inclusion to man and animal diets.

Key words: Sponge seed, *Luffa cylindrica*, Proximate analysis, Mineral content.

INTRODUCTION

Luffa cylindrica also known as a vegetable sponge or sponge gourd is a sub-tropical plant belonging to the *Cucurbitaceae* family (cucurbits) which is a significant source of food and substances of medical importance [25]. It is an annual climbing plant that grows climbing on other physical solid materials. The plant produces fruit containing fibrous vascular system with black seeds. Its fruit (a gourd) is green that has a large cylindrical shape and smooth as shown in figure 1 below.

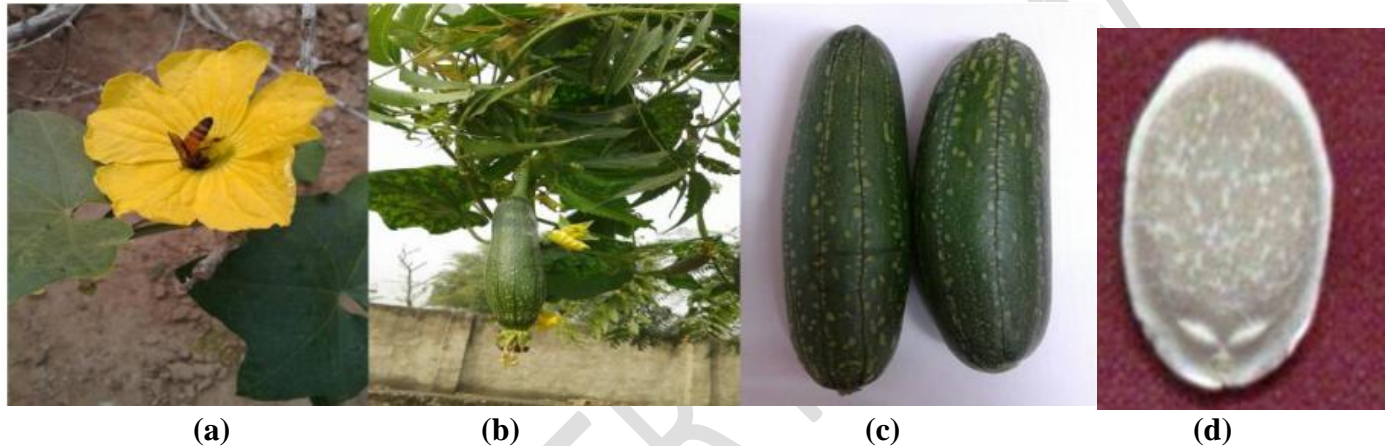
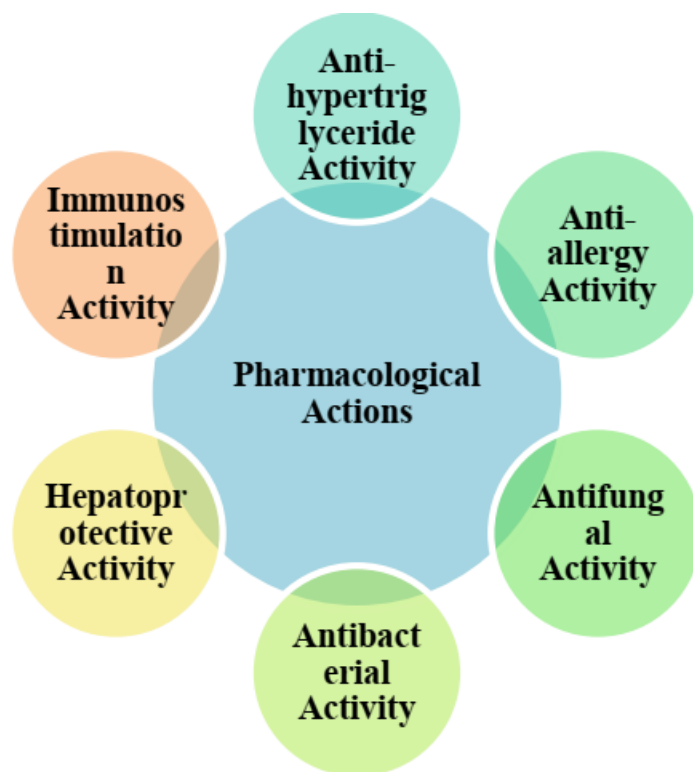


Figure 1: Picture of *Luffa cylindrica* (a) flower (b) plant (c) Gourd (d) Seed

It is used as edible vegetable and have a wide application in packing medium, shoes, mats, sound proof linings, bath sponges, utensil cleaning sponges, adsorbent for removal of heavy metal in waste water, and immobilization matrix for plant, algae, bacteria and yeast [24]. Pharmacological investigation on *L.cylindrica* showed its potential as immunostimulant [16 and 15] antibacterial [13], antiinflammatory agent, antitumour, antiviral effect and also induce uterine contraction to hasten child birth [26] as depicted in Scheme 1.



Scheme 1: Some Pharmacological Properties of *Luffa cylindrica* (Sunita & Rajbala, 2018)

In Nigeria, *Luffa cylindrical* plant grows in the wild and abandoned building structures and fences walls in towns and villages [14]. Locally in Nigeria, it is called Asisa (Igbo), Ekian (Edo), Kaankan (Yoruba) and Baska (Hausa). The locals use loofah as traditional medicine in curing feverish conditions, malaria, jaundice, swelling and tumor and unknown external growths. Seeds, leaves and pods are all used for these purposes.

The significance of seed legumes in the diets of animal and man in the developing countries is well documented [8,3]. They are rich in nutrients such as digestible proteins with good array of amino acids and minerals [10]. The percentage crude proteins of most legumes ranged from 20 to 50g/100g dry weight [5,20] and have been judged as good sources of minerals [8]. Leguminous seed have been reported to be excellent sources of energy [17,8] in animal and human diets. This explains reasons why researches have been directed to harnessing the potential of the seed in animal and human diets. Since, it had been observed that the ecological factors, location, season, nature of soil and age of plants greatly influence the phytochemical composition of a plant. It is imperatively necessary to investigate the proximate and mineral analysis of *Luffa cylindrical* grown within a geopolitical zone in Nigeria.

MATERIALS AND METHODS

Sample Collection and Preparation:

The *Luffa cylindrica* fruits were collected from a farmland in Ado-Ekiti, Nigeria. The gourds were broken and shaken to remove the seeds from the fibre mesh of the sponge manually. The seeds were removed from the fibrous interior and washed with water. The seeds were air-dried for four days and pulverized using an electronic blender. The powdered sample was stored at 5°C in air-tight container prior to further analysis.

Proximate Analysis:

The proximate analyses (moisture, fibre, ash, crude fats, proteins and carbohydrates) of the sample was determined in percentage according to AOAC (2005) [27]. The moisture and ash were determined using weight difference method. Moisture was determined by drying sample at 105°C to constant weight. Ashing was performed at 550 °C for 6 hrs in a muffle furnace. Fat content was determined via sohxlet extraction with petroleum ether and calculated by weight loss. Fibre content was estimated from the loss in weight of the crucible and its content on ignition. The nitrogen value was determined by micro kjeldahl method as described by Pearson (1976) [28]. The nitrogen value was converted to protein content by multiplying a factor of 6.25. Carbohydrate contents were estimated by differences.

$$\% \text{Carbohydrate} = 100 - (\% \text{moisture} + \% \text{ash} + \% \text{fat} + \% \text{crude protein} + \text{crude fibre})$$

Furthermore, the energy value was calculated from the carbohydrates, crude protein and crude fat of the sample.

Mineral Analysis

Mineral contents were determined by the method described by [27]. The digested sample was sub-sampled into a glass container for Atomic Absorption Spectrophotometer and Flame Emission Spectrometer analysis. The following metals; Ca, Mg, Fe, Zn, Cu and Mn were analysed using Atomic absorption spectrophotometer while flame emission spectrometer was used for Na and K. Phosphorus was determined using phosphovanado molybdate yellow method by spectrophotometer (Ghallenkamp).

RESULT AND DISCUSSION

TABLE 1: PROXIMATE ANALYSIS OF *Luffa cylindrica*

Analysis	Composition (%)
Moisture Content	5.84
Ash Content	6.13
Fat Content	33.93
Protein Content	35.8
Carbohydrate Content	4.54
Energy Value (KJ/100g)	2096.91

The proximate composition of *luffa cylindrica* is presented in Table 1 above. The analysis of the seed revealed 35.83% of protein, which have the highest content in the seed. The protein content reported in this research was higher compared to the previous report by [7] (22.90%) and *luffa aegyptiaca* seed 25.38% [16] but lower compared to report of [2] (45.06%). The variation could be attributed to various ecological condition affecting the growth of a plant. However, the values obtained for protein content in *Luffa cylindrica* (50.06%) by [2,11] is higher compared to the value in this report. However the values were high when compared with those reported for *Acacia robusta* (12.52%), *Acacia erubescens* (21.8%) and *Bombax glabrum* (10.23%) seed kernels [1]. Proteins are essential component of diet needed for the survival of animals and human and the basic function in nutrition is to supply adequate amount of amino acids [21]. *Luffa cylindrica* could therefore be used as alternative source of protein in diet supplement especially in the areas where majority of populace live on starchy food and cereals which function basically in nutrition by supplying adequate amounts of required amino acids [21].

The moisture content for powder was very low 5.84% which is within the acceptable range for a good keeping period. Moisture content is a major quality factor in food stability and preservation .The moisture content recorded for the seed is lower than those reported for soybean (11.07%) and coconut seeds (14.3%) [2]. This value is also lower to the value obtained for *luffa aegyptiaca* seed 7.50% [31]. The relatively low moisture content is an indication that this flour will have high shelf life and less-susceptible to micobial attack when properly packaged against external conditions.

The ash content was found to be 6.13% which was moderate and it compared favourably with the range value of 3.00-5.8% reported for those of legumes like cowpea, groundnut, and fluted pumpkin seed [22]. Since, ash content gives an idea about the inorganic mineral content, it implies that the seed could provide essential, valuable and useful minerals needed for good body development.

The fat content in the sample was in close agreement with 33.93% reported by [19]. The fat content is higher than range value of 14.05-20.30% reported for soybean, locust bean and cotton seed, which are commercially exploited and classified as oil seed.

Fibre is desirable in the maintenance of human health and has been known to reduce cholesterol level in the body [18]. The crude fibre content of 4.58% that was recorded for the *Luffa cylindrical* is low when compared with previous report by [2] (10.84 %) and reports for cottonseed (5%-25%), soybean (9.30%), watermelon seeds (29.7%-30.9%) and *Luffa aegyptiaca* seed (7.50%) [9,12]. The low level of fibre in *Luffa cylindrical* indicates that it might be desirable in their incorporation in weaning diet.

The carbohydrate content in *luffa cylindrical* was 13.67g/100g which is higher than 24.12% in *Luffa aegyptiaca* [9] and 6.93% reported for pumpkin but lower than 33.00% reported for *Bombacopsis glabra* [29]. The total carbohydrate of the luffa seeds powder suggests that, the powder could be used as an additive to other materials for forming gel in food products. The energy content obtained for powder was 2096.91 kJ/100g which was higher compared to previous research by [2] (1554KJ/100g). This depicts that the consumption of the seed can give adequate energy needed for the body's metabolic and physical activities.

TABLE 2: MINERAL COMPOSITION of *Luffa cylindrica*

Minerals	Composition (%)
phosphorus	30.63
Sodium	8.18
Iron	4.72
Zinc	3.43
Calcium	2.12
Magnesium	28.93
Copper	3.33
Manganese	2.77
Chromium	0.25

Table 2 depicts the mineral composition of raw *Luffa cylindrica*. The most abundant mineral in the sample was Phosphorous with 30.63g/100g. The value obtained for other mineral were Sodium (8.18 g/100g), Zinc (3.43 g/100g), Iron (4.72 g/100g), Magnesium (28.93 g/100g), Potassium (13.86 g/100g), Calcium (2.12g/100g), Manganese (2.77g/100g), Copper (3.33g/100g).

However, the phosphorous content is 30.63g/100g which is higher than the values reported by Amoo et.al [4] for luffa aegyptica (0.42g/100g) and Castenea Sp. (0.38g/100g) respectively. The luffa cylindrical seed sample show good mineral composition and therefore, the seed can therefore be said to be of good source of mineral elements needed by the body of both man and animals.

The magnesium content is 28.93g/100g which is higher than the values obtained in other luffa cylindrical seeds by [2] Mg (2.42) and in luffa aegyptica and Castenea Sp. By [4] 21.40g/100g and 21.51g/100g respectively. Magnesium (Mg) in samples is known to prevent growth retardation, muscle degeneration, impaired spermatogenesis and bleeding disorder.

The presence of phosphorous and magnesium makes *Luffa cylindrica* seed suitable for bone formation since the deficiencies of these minerals can lead to abnormal bone development [30].

Sodium content in the analyzed sample is 8.18g/100g which is lower than the values reported in defatted luffa cylindrical sample which was 10.80 g/100g [2].

Iron is reasonably high which is required for blood formation and also important for normal functioning of the central nervous system. It also combines with other elements are used in the

body as anti-oxidant micronutrients that boost the immune system of which the Iron content in the analyzed luffa cylindrical seed is 4.72g/100g which is approximately in agreement with reports of *Luffa cylindrica* (4.61 g/100g) by [2].

Zinc amount as dictated in the sample is 3.02g/100g which is higher than the amount reported for *Luffa aegyptica* (2.34g/100g) and *Castenea Sp.* (1.41g/100g) by [4].

Calcium contents in the body is necessary for the building of rigid structure such as bone and teeth, muscle contraction, transmit nerve impulses, blood clotting and as a co-factor in some enzyme catalysis [23]. The values are lower than 800-1200mg/daily recommended dietary allowance (RDA), by FAO/WHO [6] which means that *Luffa cylindrica* might not be good source of Calcium.

The ratio of Na/K (0.59) was less than one, which implies that the sample will not promote high blood pressure. Food is considered "good" if the Ca/P ratio is above one and "poor" if it is less than one, therefore, the Ca/P ratio of the sample were less than one, this implies that the samples could be consider "poor".

CONCLUSION

The *Luffa cylindrica* seeds are nutritious food that provide sufficient amount of nutrients needed for normal body function, maintenance and reproduction. The research re-establish its nutritional content via the proximate composition and mineral content. Thus, the seed is recommended for incorporation into diets of animal and man.

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