
PROXIMATE ANALYSIS OF *LEUCAENA LEUCOCEPHALA* (LAM.) DE WIT, *PARKIA BIGLOBOSA* (JACQ.) BENTH AND *PROSOPIS AFRICANA* (GUILL & PERR.) TAUB.

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Abstract

The potentials of *Leucaena leucocephala* leaf and seed as an alternative protein and condiment source for livestock and man was evaluated in comparison with *Parkia biglobosa* and *Prosopis africana* leaf and seed through proximate analysis. Matured seeds and young healthy leaves of these three plants were collected from respective parent trees in Ilorin, Kwara State, Nigeria and prepared for proximate analysis. Seeds with their testa removed and the leaves were air dried. The result showed that *L. leucocephala* had the highest leaf crude protein (21.42 %) and the seeds contain 24.14% crude protein close to that of *P. biglobosa* (26.44%) which had the highest for the three seeds but the least for leaf (16.68%). *L. leucocephala* contains highest amount of fiber (2.96%) well above 2.62% and 1.91% in *P. biglobosa* and *P. Africana* respectively. Fat and oil percentage observed in *L. leucocephala* seed was the highest (6.30%) compared to 6.21% and 6.18% obtain in *P. biglobosa* and *P. africana* respectively. *L. leucocephala* nutritional profile obtained in this study competes well with both *P. biglobosa* and *P. africana* which are commonly used as important food ingredients. High fiber content makes it a great source of roughages in feed formulation likewise the competing protein makes it a close substitute for sustainable and affordable source of protein due to its rapid vegetative development and mass seed production.

Keywords: condiment, crude protein, leaf protein, *Leucaena leucocephala*, *Parkia biglobosa*, *Prosopis Africana*.

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1. INTRODUCTION

Legumes offer a singular advantage of providing plant proteins with reduced cost of production, less difficulty of processing and provide higher energy value than those supplied by animal protein (Balogun and Fetuga, 1986). High cost of animal protein has directed the interest towards several leguminous seed proteins as potential sources of vegetable protein for human food and livestock feed. Among the plant species, legumes are considered as the major source of dietary proteins. They are consumed worldwide, especially among human settlements where consumption of animal protein may be limited as a result of economic and cultural factors.

Lack of protein in human and animal feed has been reported to have the capability to lead to malnutrition, which is directly responsible for over 300,000 deaths per year in developing

countries and contributes indirectly to over half the deaths in children worldwide (Block *et al.*, 2003). Protein-energy malnutrition is a direct consequence of poor food quality. It refers to an imbalance between the supply of protein or its metabolic building blocks, amino acids, and the body's demand for them to ensure optimal growth and function. It is however reported that, protein-rich foods have been in short supply, and thus not within the reach of low-income households which form the bulk of the population in developing countries (Block *et al.*, 2003).

African locust bean is a leguminous plant with an outstanding high protein quality and its protein and amino acid composition has been reported by several researchers (Margaret, 2002 and Block *et al.*, 2003). *P. biglobosa* is well known for its high commercial values as food and medicinal agent. The pod pulp of *P. africana* contains an energy value of 1168 J, 9.6% protein, 3% fat and 53% carbohydrate. It

contains 160 mg of calcium and 70mg of iron per 100 g of fresh weight (FAO, 2003). *Leucaena leucocephala* known as “multipurpose tree” (Jones *et al.*, 1976) due to its diverse use, is one of the numerous legume grains and shrubs that are in abundance in Nigeria playing a very important role in ecological and biodiversity conservation as well as in ruminant farming in the country. *L. leucocephala* was reported capable of producing about 3-5 tonnes seeds ha⁻¹yr⁻¹ and high crude protein (CP) value of 28 to 45% (Widin, 2004). It is promoted extensively for reforestation, rural development programmes and ruminant production. It has rapid growth with the overall leaves and twigs yield averaging 0.92 kg/plant after a year of establishment in pot with 23.34 percent of crude protein (Widin, 2004).

High valued condiment such as locust beans has been in use for century to add value to food. However, substitute will be required as it demand is increasing compared to the maximum supply especially in cities notably during dry season resulting into two major problem, either higher price or non-availability of locust bean condiment. These problems arise likely as a result to overdependence on *P. biglobosa* and *P. africana* seed as main sources of condiment or the time required for the first fruiting in these plant which was reported to be 8-10 years according to Margaret (2002).

2. MATERIALS AND METHODS

Matured fruits and young healthy leaves of *P. africana*, *L. leucocephala* and *P. biglobosa*

were collected from University of Ilorin Main Campus, Kwara state, Nigeria. Seeds were extracted from the pods, washed and sundried after which the seed coats were removed. The leaves were rinsed in distilled water and air-dried. The samples were ground into powder separately for each plant, passed through 0.2mm sieve and kept in air-tight covered bottles.

Moisture content, ash, ether extract and crude fiber contents of the samples were determined using the methods described in AOAC (2000). Total Nitrogen (N) was determined by the micro-Kjeldahl method (Pearson, 1976) while the crude protein was calculated by multiplying % N with a factor of 6.25. Nitrogen free extract (NFE) – Total carbohydrate was obtained by subtracting the sum of the percentage of protein, ash, ether extract and crude fiber from dry matter.

3. RESULTS AND DISCUSSION

The results recorded in Table 1 and 2 showed the proximate composition of *P. africana*, *L. leucocephala* and *P. biglobosa* seeds and leaves respectively. *L. leucocephala* had highest leaf crude protein (21.42 %) and the seeds contain 24.14% crude protein close to that of *P. biglobosa* (26.44%) which had the highest for seeds but the least for leaf (16.68%). *L. leucocephala* contains highest amount of fiber (2.96%) well above 2.62% and 1.91% in *P. biglobosa* and *P. Africana* respectively. High amount of fat and oil in *L. leucocephala* seed can make it energy rich diet.

Table 1: Proximate analysis of seeds of *P. africana*, *P. biglobosa* and *L. leucocephala*

Composition (%)	<i>P. africana</i>	<i>P. biglobosa</i>	<i>L. leucocephala</i>
Moisture Content	6.50	5.76	5.85
Ash Content	2.78	3.96	3.18
Fat and oil Content	6.18	6.21	6.30
Crude protein Content	15.92	26.44	24.14
Crude fiber Content	1.91	2.62	2.96
Carbohydrate Content	66.71	55.01	57.57

Table 2: Proximate analysis of leaves of *P. africana*, *P. biglobosa* and *L. leucocephala*

Composition (%)	<i>L. leucocephala</i>	<i>P. biglobosa</i>	<i>P. africana</i>
Moisture Content	5.82	5.68	4.96
Ash Content	2.85	3.64	3.56
Fat and oil Content	5.02	5.38	5.22
Crude protein Content	21.42	16.68	18.88
Crude fiber Content	1.87	1.94	1.66
Carbohydrate Content	63.02	66.68	65.72

Nutritional composition revealed through proximate analysis presented in table 1 and 2 indicate that the leaves of *Leucaena leucocephala* contain sufficiently high amount of crude protein (21.42%) which is the highest when compared with the other two plants leaves – *P. biglobosa* (16.68%), *P. africana* (18.88%) and it falls in range with other reported common plant protein sources such as *Gliricidia sepium* (22.4%) and Moringa (22.23%) reported by Aye and Adegun (2013). *L. leucocephala* seeds were also revealed through proximate analysis to have 24.14% protein which is closely in agreement with 24.6% reported by Rahim *et al.* (2012). Highest crude protein of 26.44% was obtained in *P. biglobosa* seeds very close to 27.01% reported by Christiana *et. al* (2008) but lower to 32.10% reported by Ademola *et. al.* (2011). In this study, crude protein was low in *Prosopis africana* seeds (15.92%) in comparison to seeds from other two plants (*P. biglobosa* and *L. leucocephala*) respectively. Lowest fat was recorded in seeds of *P. africana* (6.18%) and leaves of *L. leucocephala* (5.02%) respectively (Tables 1 and 2). Seeds and leaves of *P. biglobosa* shows the highest amount of ash content, 3.96% and 3.64% respectively (Tables 1 and 2).

4. CONCLUSION

Results of the proximate analysis in this study has revealed that *L. leucocephala* compares well in nutritive value with *P. biglobosa* and *P. Africana* which are more commonly used as

important food ingredients among almost all tribal groups in Nigeria. This singular attribute of *L. leucocephala* coupled with its rapid vegetative growth can make the plant to be a very good complementary legume plant for both human and animal diets.

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