

## AMINO ACID PROFILE OF THE OIL SEED OF *Guizotia scabra* HARVESTED FROM PLATEAU AND KADUNA STATES -NIGERIA

P. A. Chomo, R. M. Okunola and S. S. Suleiman

Department of Applied Chemistry, Kaduna Polytechnic- Nigeria  
Corresponding Author: [chomopam@gmail.com](mailto:chomopam@gmail.com); +234(0)8065752561

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### ABSTRACT

*Guizotia scabra* (L.F cass. composite) is an oil seed crop found wildly and in some areas cultivated at middle and higher elevations in Nigeria and other African countries. The medicinal importance attached to the plant and the acceptance of the seed in some of our rural areas for preparing different types of delicacies is the driving force of this research. The objectives of this study were to determine the amino acids profile. PTH Amino acid analyser was used to determine amino acids in the sample. Amino acid profile revealed that Glutamic acid in the sample from Plateau was 2.57 g/100g protein while Kaduna state was 3.14g/100g protein; arginine in the sample from Plateau was 1.72 g/100g protein while that from Kaduna was 2.06 g/100g protein. Leucine from Plateau was 1.69 g/100g protein while that of Kaduna was 2.10 g/100g protein; aspartic acid in the sample from Plateau was 1.55 g/100g protein while that of Kaduna was 1.80 g/100g protein. The sample from Plateau was 1.00-glycine per100 g protein while that of Kaduna was 1.17 g/100g protein, tyrosine in sample from Plateau was 0.52 g/100g protein while that of Kaduna was 0.34 g/100g protein, isoleucine in sample from Plateau was 0.49 g/100 g protein while that of Kaduna was 0.82 g/100g protein. In addition, Alanine in the sample from Plateau was 0.42 g/100 g protein while that of Kaduna was 0.53 g/100g protein as valine in the sample from Plateau was 0.41 g/100 g protein while that of Kaduna was 0.61 g/100g protein. The sample from Plateau has 0.41g proline per 100g protein while that of Kaduna was 0.51 g/100g protein. Glycine in the sample from Plateau was 0.38 g/100g protein while that of Kaduna was 0.50 g/100g protein, and phenylalanine in the sample from Plateau was 0.35 g/100g protein while that of Kaduna was 0.44 g/100g protein. The sample from Plateau has 0.24g cysteine per100g protein while that of Kaduna was 0.24 g/100g protein; threonine in the sample from Plateau was 0.19 g/100g protein while that of Kaduna was 0.28 g/100g protein. The sample from Plateau has 0.16g serine per g/100g protein while that of Kaduna was 0.22 g/100g protein. The concentration of tryptophan in the sample from Plateau was 0.16 g/100g protein while that of Kaduna was 0.23 g/100g protein and histidine in the sample from Plateau was 0.10 g/100g protein while that from Kaduna was 0.19 g/100g protein. The essential and non-essential amino acids from plateau state are 36.19% and 38.18% respectively while that from Kaduna state are 38.44% and 61.56% respectively. These therefore makes the seed a good source of protein and it is hereby recommended for the fortification of diets that are low in protein for both man and animals.

Keywords: *Guizotia scabra*, Amino Acids, Protein, Plateau, Kaduna

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## INTRODUCTION

*Guizotia scabra* is an erect, usually perennial, herbaceous plant growing up to 2 metres tall from a wiry rootstock. The plant is sometimes harvested from the wild for local use as a food, medicine and source of fibre. *Guizotia scabra* has been found, usually at middle and higher elevations, in Cameroon, DR Congo, Rwanda, Burundi, Sudan, Eritrea, Ethiopia, Kenya, Uganda, Tanzania, Malawi, Zambia, Zimbabwe and Mozambique. It has also been encountered in Yemen<sup>4</sup>.

In Nigeria, particularly on the Jos plateau, *Guizotia scabra* grow wildly in Riyom, Barkin Ladi, Bassa and Mangu local government areas while Bokokos local government area cultivates it. The seeds are usually eaten after they are roasted and pounded. Different tribes have their local names and peculiar cultural importance attached to it. It is called ‘Diaraliu’ in Berom, it is used as a spice in preparing occasional delicacies such as meat, gruel and some special vegetables. The leaves of the *Guizotia scabra* are used as vegetables. In the recent past the leaves are used to cure tooth ache when crushed and applied at the affected area.

The Ron people in Bokokos called it ‘Fwalal’, it is also used as a spice most especially in

preparing their local beans commonly known as ‘Bubal’ which is used in occasions such as weddings, cultural days and all festivities as well as the Kulere people of the same local government called it ‘Gbwinick’ used in the preparation of local delicacy called ‘shangam’ (local beans with the gbwinick). The Mwaghavul people from Mangu and Ngas from Pankshin local governments called it ‘Kudul’, it is used for the same purpose as the Ron people. It is called ‘Gwanki’ in Hausa. Irigwe from Bassa local government called it ‘Muu’, the leaves are used in preparing maize porridge (eti), it is mixed with boiled sweet potatoes and meat. Rukuba also from Bassa local government called it ‘Nso’, it has the same function as the Irigwe people. The Jarawa from Jos East and Foron Chen from Barkin Ladi local government areas called it ‘Npyeneng’ while the Anaguta from Jos North called it ‘Eliu’. It is served as a special delicacy with meat, beans and vegetables for very important visitors.

In Kaduna, the southern part of the state has been seen to produce the seed significantly. The Bajju people called it ‘mung’, Ikulu called it ‘Ikpung’ both from Zangon kataf local government area. Jabba from Jaba local government called it ‘tsuntsun’ it is used in preparing a delicacy called ‘har’ from Acha

(*digitaria exilis*). Chawe from Lere local government called it ‘mun’. The Atyap, Maro’a Atakar, from Zangon Kataf and Kaura local government areas called it ‘Nyung’. The Kadara people from Kachia and Jama’a local government areas called it ‘Ova’. These groups of people have peculiar uses to include ingredient in preparing potash soup for lactating mothers, eating the roasted seed and an ingredient in mixing boiled millet as a local delicacy.

## MATERIALS AND METHODS

### Determination Amino Acid Content

The Amino Acid profile in the known sample was determined using the method described by<sup>2</sup> with modifications. The sample was dried at 70<sup>0</sup>C to constant weight, defatted using chloroform/methanol mixture of ratio 2:1<sup>3</sup>. The nitrogen of protein and other compounds are converted to ammonium sulphate by acid digestion with boiling Sulphuric acid.

A known weight of sample (250mg) was placed in Kjeldahl flask and about 200mg of catalyst mixture (potassium sulphate, copper sulphate and selenium powder) was added. 10.0cm<sup>3</sup> of concentrated Sulphuric acid was added to the content of the flask. It was gently heated for few minutes until frothing ceases and the heat was increased and digested for 2

hours. It was allowed cool and made up to 100 cm<sup>3</sup> with distilled water. 10.0cm<sup>3</sup> of the aliquot of the diluted solution was distilled by pipetting the digest into distillation chamber of micro Kjeldhal distillation apparatus. 10.0cm<sup>3</sup> of 40% sodium hydroxide solution was added and steam distilled into 10.0cm<sup>3</sup> of 4% boric acid containing mixed indicator, the colour changed from red to green. The distillate was titrated with standard 0.01M hydrochloric acid to grey endpoint.

$$\% N = \frac{(a-b) \times 0.01 \times 14.0057 \times c \times 100}{d \times e} \text{ ----- } 1$$

Where, a = Titre value for the sample, b = titre value for the blank, c = Volume to which digest is made up with distilled water, d = Aliquot taken for distillation and e = Weight of dried sample (mg)

250mg of the defatted sample was weighed into glass ampoule. 7cm<sup>3</sup> of 6M HCL was added and oxygen was expelled by passing nitrogen into the ampoule (this is to avoid possible oxidation of some amino acids during hydrolysis e.g methionine and cystine). The glass ampoule was then sealed with Bunsen burner flame and put in an oven preset at 105<sup>0</sup>C ± 5<sup>0</sup>C for 22 hours. The ampoule was allowed to cool before broken open at the tip and the content was filtered to remove the humins. The filtrate was then

evaporated to dryness using rotary evaporator. The residue was dissolved with 5cm<sup>3</sup> to acetate buffer (pH 2.0) and stored in plastic specimen bottles, which were kept in the freezer. The amount loaded was 60

microlitre, this was dispensed into the cartridge of the analyzer. The analyzer is designed to separate and analyze free acidic, neutral and basic amino acids of the hydrolysate.

## RESULTS AND DISCUSSION

**Table 1. Amino Acid profile of *Guizotia scabra* from Plateau and Kaduna States (g/100g protein)**

Amino acids	Plateau	Kaduna
Leucine	1.69	2.10
Lysine	1.00	1.17
Isoleucine	0.49	0.82
Phenylalanine	0.35	0.44
Tryptophan	0.16	0.23
Valine	0.41	0.61
Methionine	0.13	0.16
Proline	0.41	0.51
Arginine	1.72	2.06
Tyrosine	0.52	0.34
Histidine	0.10	0.19
Cysteine	0.24	0.24
Alanine	0.42	0.53
Glutamic acid	2.57	3.41
Glycine	0.38	0.50
Threonine	0.19	0.28
Serine	0.16	0.22
Aspartic acid	1.55	1.80
Essential Amino Acid	36.19%	38.44%
Non-Essential Amino Acid	63.81%	61.56%

Table 1 shows eighteen (18) Amino acids present in *Guizotia scabra* seed oil from Plateau and Kaduna states. The essential amino acids are histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan, and valine while the non-essential amino acid identified were alanine, arginine, aspartic acid, cysteine, glutamic acid, glycine, proline, serine, and tyrosine. The table shows the essential amino acid content to be 36.19% while the non-essential amino acid content was 63.81% in the sample from Plateau state while that of Kaduna the essential amino acid content was 38.44% while the non-essential amino acid content was 61.56%.

The concentration of glutamic acid is higher than other amino acids in both samples. The sample from Kaduna state has higher levels of amino acids than that from Plateau state, except for tyrosine where the level of amino acid is higher in Plateau state and cysteine that has the same value in both states.

The nutritional quality of a protein is dependent upon many factors among which are; the effectiveness of the test protein in meeting the amino acid requirements with respect to (Essential Amino Acid (EAA) and Non Essential Amino Acid (NEAA) composition of the test protein<sup>4</sup>. Essential amino acids in oil seeds contribute to good health and wellbeing. Deficiency of lysine leads to physical and mental handicap<sup>5</sup>. Glutamic acid is the most abundant in the seed of *Guizotia scabra* in both samples; it is referred to as the building block of protein and plays a role in immune system, digestion and brain health<sup>6</sup>.

The antioxidant activity of these amino acids suggests a disease preventive role as exemplified by arginine that is beneficial for prevention of cardiovascular disease<sup>7</sup>. However all these values of amino acid composition of these seed oils under study were found to be in good agreement with their other varieties and other oil seeds reported earlier<sup>8, 9, 10, 11, 12</sup>. A safe level of protein intake of 0.55g/kg/day, an average value for men and women was given by FAO/WHO<sup>13</sup>.

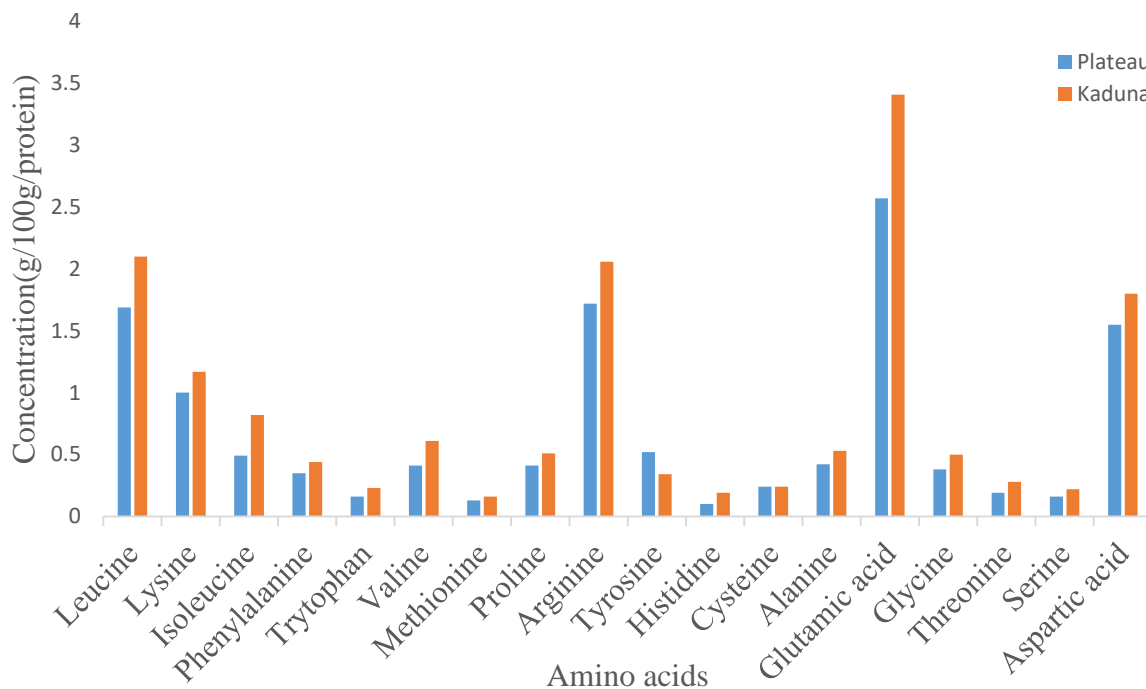


Fig. 1 Amino Acid Profile in *Guizotia scabra* from both Plateau and Kaduna States

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