

Short Communication

Nutrient content and anti-nutritional factors in shea butter (*Butryospermum parkii*) leaves

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Sample of shea-butter leaves were analyzed for, anti-nutrients and proximate composition. The proximate result showed that the leaf has high content of carbohydrate (13.82%) compared to other types of leaves. The content of anti-nutrients observed is low; phytate (0.19%), tannic acid (1.50%) and oxalate (0.80%) and these can be tolerated by the body system. The low level of these constituent will not pose a serious nutritional problem in consumption of shea-butter leaves. The leaf extract was also observed to be a good source of iron (3.80 mg/kg), magnesium (19.16 mg/kg) and potassium (0.61 mg/kg). Three amino acids; valine, phenylalanine and leucine were as well found in the leaf extract.

Key words: Shea-butter, nutrients, anti-nutrients, vegetables.

INTRODUCTION

The shea-butter tree (*Butryospermum parkii*) occurs in the West Africa savannah, it can grow to 40 ft or more depending on the protection given to it. The tree bears fruits at maturity and start flowering by early November. The fruit, which is green in colour has a fleshy edible pulp that contains carbohydrate (41.3 g/100 g), protein (0.7 - 1.3 g), ascorbic acid (196.1 mg/100 g), iron (1.93 g/100 g) and calcium (36.4 mg/100 g) respectively (FAO, 1988).

Ayeh (1981) observed that shea-butter which is extracted from the nut contains the B vitamins and sugar content which varies from 3 - 6% equally distributed between glucose, fructose and sucrose. Shea-butter is the main edible oil for the people of Northern Ghana. It is the most important source of fatty acid and glycerol in their diet (Frimpong and Adomako, 1989). Some ethnic groups make the flowers into edible fritters. The fruit pulp being a valuable food source is also taken for its slightly laxative properties (Soladoye et al., 1989).

Shea nut cake is used for cattle feed (Salunkhe and Dessai, 1986) and also eateng raw by children (Farinu, 1986). The sticky black residue which remains after the clarification of the butter is used for filling cracks in hut walls, and as a substitute for kerosene (Wallance-Bruce, 1995). The husk reportedly make a good mulch and ferti-

lizer, the leaves are used as medicine to treat stomach ache in children (FAO, 1988).

Abbiwo (1990) reported that the extract from the leaves are used as a vapour bath for headache and eye bath. Indigenes of Yewa, South western and Benue, North central Nigeria consume this leaf as vegetable which is inexpensive and readily available to them. Most works that have been reported are on the medicinal use of this leaf, the chemical and anti-nutritive potentials are yet to be adequately studied. The present study therefore aimed at evaluating the levels of chemical composition and anti-nutrients of this tropical leafy vegetable.

MATERIALS AND METHODS

Proximate composition determination

Shea butter leaves were collected from a small farm at Adigbe, Abeokuta, Ogun State, Nigeria. The leaves were destalked, washed and drained. The proximate composition (ash, fat, moisture content, fibre and protein) of the leaf was determined using the AOAC (1999) method. Carbohydrate was obtained by difference (100 - (%ash + %fat + %moisture + %fibre + %protein)) while the protein content was determined using the micro Kjeldahl method.

Anti-nutrient determination

The phytate content was determined by the Marfo et al. (1990) method. Oxalate was determined by titrating against boric acid

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Table 1. Comparison of proximate composition of raw shea-butter leaf with some raw Nigerian leafy vegetables.

Common/local names	Botanical name	Description	Moisture (%)	Protein (%)	Fat (%)	Crude fibre (%)	Ash (%)	Carbohydrate (%)
Shea butter (Ewe Emi)	<i>Butyrospermum parkii</i>	Raw	80	2.45	0.33	1.39	2	13.82
Amaranthus (Tete)	<i>Amaranthus hybridus</i>	Raw	86.6	4.6	0.2	1.8	2.2	5.1
Water leaf (Gbure)	<i>Talinum triangulare</i>	Raw	87.8	2.4	0.4	1	1.5	6.01
Cassava (Ewe Ege)	<i>Manihot utilisima</i>	Raw	72	7	1	4	ND*	ND*
Celosia (Sokoyokoto)	<i>Celosia argentium</i>	Raw	76.8	5.8	0.4	3.5	1.5	9.22
Fluted pumpkin (Ugwu)	<i>Telfaria occidentalis</i>	Raw	86	4.3	0.8	1.6	1.6	4.88

ND* = Not Detected

solution (AOAC, 1999). Tannin was determined using spectrophotometer. 25 g of the sliced leaves were boiled, soaked in solvent mixture for 5 h. The absorbance was read at 500 nm (Lucas, 1988).

Amino acid determination

Paper chromatography (Romeran and Clifton, 1981) was used to identify arginine, leucine, valine, and phenylalanine. The leaf extract and the amino standards were spotted on the chromatographic paper (No. 1 whatman filter paper). The paper was air dried and developed in water-saturated phenol, the developed paper was air dried, sprayed with 1% ninhydrin solution. The R_f values were used to confirm the presence of the amino acids.

RESULTS

The result of proximate composition of Shea -butter leaf is shown in Table 1. The moisture content was high (80%). This is similar to other observations reported in literatures (FAO, 1990 and Irvine, 1969). *Amaranthus hybridus* (Tete) 84%, *Celosia argentina* (Soko) 71%, *Talinum triangulare* (Gbure) 81%, and *Cnodoscolus acoitofolus* (Iyana ipaja) 81%.

The proximate analysis showed the ash content to be 2%, this falls within the 1.5 - 2.5% range which is the acceptable range for edible vegetables in Nigeria (Lucas, 1988). The fat content of the leaf is low (0.34%) but also falls within the acceptable range for leafy vegetables in Nigeria. The result obtained for protein is normal for edible vegetables. The protein range falls between 2.50 - 6.00% for edible vegetables. Shea -butter leaf is very rich in carbohydrates (13.82%) when compared with other edible vegetables; *Teleferia occidentalis* (ugwu) 4.88%, *A. hybridus* (Tete) 5.59%, *C. argentina* (Soko) 11.22%, *T. triangulare* (Gbure) 6.01%.

The result on the analysis of mineral content of the shea-butter leaf presented in Table 2 revealed that magnesium content is very high (19.16 mg/kg) and the value observed for iron fall within the range of 0.19 - 4.22 mg/kg of earlier published for edible vegetables (Romeran and Clifton, 1981). The potassium value is 0.61 mg/kg; which is low when compared with the value of 13.61 mg/kg reported for edible vegetables.

From the result of paper chromatography in Table 3, it

Table 2. Mineral content of shea-butter leaf.

Parameter	Composition (mg/kg)
Iron	3.803 ± 0.12
Magnesium	19.16 ± 0.25
Potassium	0.61 ± 0.19

Table 3. Anti nutrients in shea-butter leaf.

Component	Means concentration
Oxalate	0.80 ± 0.1%
Tannin	1.50 ± 0.20%
Phytate	0.19 ± 0.05%

was observed that shea butter leaves contains four essential amino acids namely; valine, leucine, phenylalanine and arginine which is non-essential. Analysis also revealed that the leaf contains oxalate, tannin and phytate which are anti nutritional factors. Figure 1 compares the nutritive and antinutritive component in shea butter leaf. The value of 1.5% obtained for tannic acid is lower than the value of 6.22% obtained from cotton leaves but a little higher than values observed for some edible vegetables such as *T. triangulare* with 0.32% and *Hibiscus esculentus* with 0.75% (Apena et al., 2004). The phytate and oxalate contents (0.19 and 0.80%) in shea butter are low compared with that of *T. triangulare* (6.93 and 7.4%) *H. esculentus* (0.28 and 23.4%) (Oyesiku, 2006).

DISCUSSION

The high moisture content of shea-butter leaves will encourage microbial growth, increase the rate of enzymatic reaction and hence deterioration. The implication of this is that the vegetable cannot be stored for more than 24 h before it starts to deteriorate. The low fibre content of shea-butter may decrease the absorption of bile (Marfo et al., 1990), but its protein content makes it nutritionally a good source of plant protein; this validates its use in diet

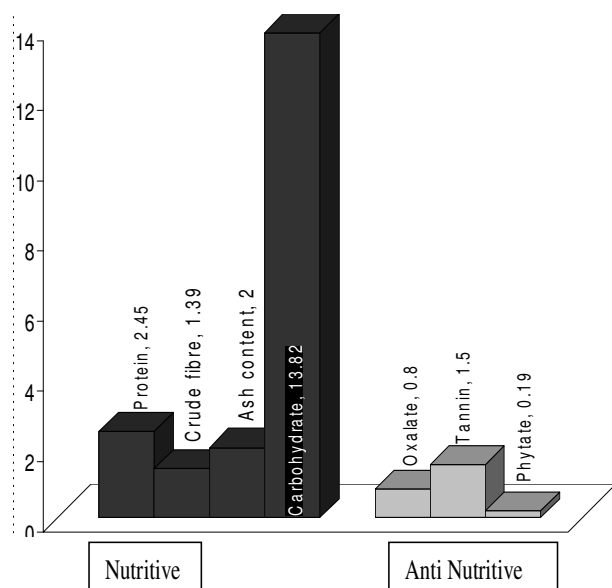


Figure 1. Comparison between nutritive and antinutritive component in shea butter leaf.

as a plant protein which can supplement animal protein thereby alleviating kwashiorkor and marasmus. Its palatability however, depends on handling when prepared as vegetable or soup.

By inference, shea-butter leaves will supplement other sources of dietary iron in man if eaten, and since its magnesium content is very high, it implies that adequate consumption of the leaf would satisfy the recommended daily allowance when eaten in conjunction with other sources of dietary magnesium. Potassium is very vital in maintaining the body fluid volume and osmotic equilibrium. Coincidentally, shea-butter leaves are low in potassium content relative to the value reported for other edible vegetables; which implies that it has to be supplemented with other sources of potassium.

Some anti-nutritive factors such as oxalate, tannin and phytate were detected from the result of the analysis. These were present in small quantities; these factors may not pose any serious nutritional problem in consumption of shea-butter leaves. It is established that only high content of these anti-nutrients prevent the absorption of mineral like, iron, magnesium, potassium, and calcium which are essential for metabolism of the body. High content of the anti-nutrients would also affect homeostasis of zinc and iron, inhibit enzymatic digestion of proteins by forming complexes with large quantities of protein and would therefore be toxic to the body (AOAC, 1999; Munro and Bansir, 1969).

Conclusion

This work has shown that the leaf contains three essential amino acids (valine, phenylalanine and leucine), low

content of anti-nutrients and the nutrient levels falls within those of edible vegetables. Nigeria needs a lot of protein supplement in order to successfully tackle the nutritional deficiency caused by high cost of animal protein from beef, milk, fish and eggs. The alternative means of solving the nation's nutritional deficiency is to continue in search of alternatives to animal protein in plants. At the moment, fluted pumpkin (*Teleferia occidentalis*) has been discovered to be a very rich source of plant protein after soybean. This study has established that shea-butter (*Butyrospermum parkii*) leaves are yet another route out of the nutritional "wilderness" presently experienced by many in Nigeria and perhaps West Africa.

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