Proximate Composition of the Four Acacia Taxa Seeds in Central Sudan

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KEYWORDS	A B S T R A C T
Acacia Taxa Seeds, Composition, central and western Sudan	The aim of this study was to evaluate the proximate composition and mineral content of mature seeds of four acacias taxa grown in central and western Sudan (*A.nilotica ssp. adansonia, A.nilotica ssp. nilotica, A. seyal var. seyal and A. sieberiana var. sieberiana*). The composition of the seeds moisture, ash, fat, protein, fiber and carbohydrate were expressed as follow. Moisture content ranged between 5.94 to 6.37% for *A.seyal var. seyal* and *A. nilotica ssp. adansonia*, respectively. Whereas, ash content varied from 4.02 to 4.94 %for *A. sieberiana var. sieberiana and A.seyal var. seyal,respectively*. Fat content ranged between 4.09% for *A.seyal var. seyal* to 7.78% *A. sieberiana var. sieberiana*. Protein content varied from 20.22 to26.44%for *A. nilotica ssp. adansonia and A.seyal var. seyal*, respectively. Whereas, fiber content value ranged from 22.42% for *A.seyal var. seyal* to 32.74% for *A. nilotica ssp. adansonia*. Carbohydrate content ranged from 30.76% to 40.77%for *A. nilotica ssp. Adansonia* and *A. sieberiana var. sieberiana*, respectively. Obviously in four Acacias the contents of the some trace and essential mineral elements are low in comparison by others seeds studied in others countries. The values range of copper, zinc, chromium, lead, manganese and iron elements in four acacias seeds were copper between 4.65 to 7.56 µ /100gm, zinc between 27.75 to 47.52 µ /100gm, chromium between 0.67 to 1.32 µ /100gm, lead between 0.00 to 0.08 µ/100gm, manganese 8.54 to 42.06 µ /100gm and iron between 9.26 to 89.98 µ /100gm.Hence, concluded that high amount of protein, fiber and moderate amount from carbohydrate encourage utilizing acacias seed as livestock fodder.

Introduction

Acacia is the most significant genus of the subfamily *Mimosoideae*. It is estimated that there are roughly 1380 species of *Acacia* worldwide, about two-third of them native to Australia and rest spread around tropical and subtropical regions of the world (Saini et al, 2008). *Acacia seyal* is usually found near riverbeds at lowland sites and near

water holes or seasonally flooded black cotton soils. Large herbivores may play an important role in seeds dispersal (Razanamandranto *et al.,* 2004).

Acacia is effective when used as a coating on pills to make the bitterness easier to swallow or digest. It is important to the food industry as a flavor fixative and emulsifier. This plant has been used in traditional medicine to treat high cholesterol, diabetes, cancer, gingivitis, mouth sores, pharyngitis, and indigestion in children (Troup, 1983). Fodder for livestock in Sudan, as in developing countries, suffers from protein deficiency, which is attributed to the lack of forage (Azim *et al.,* 2011).

In addition to its fodder's nutritional values for the livestock, *Acacia seyal* has additional various benefits. *Acacia seyal*is essential for adding natural fertilizers to the soil through symbiotic association with compatible rhizobia and mycorrhizal fungi (Dommergues, 1995; Fall *et al.,* 2009). In addition, *Acaicaseyal*is used for gum production, which is commercially known gum *Talha*. It is also an important source of fuel-wood and charcoal (Mohammed and Röhle, 2011). Furthermore, in the arid and semiarid zones, crude protein content in forage is poor, which is the major limiting factor for livestock's production. This issue increases the cost of conventional protein supplements for livestock particularly for ruminants, which leads to the loss of weights and high mortality rates especially among the young and poorly fed pregnant females (Babiker and Mohamed, 2003).

Acacia species, in general, recorded such medicinal benefits as antidiabetes (Babiker, I. A. and Mohamed *et al.,* 2013), antimicrobial (Babiker, I. A. and Mohamed *et al.,* 2012), anti-bacterial (Olajuyigbe and Afolayan, 2012), antimalarial (Okokon *et al.,* 2010), and anti-inflammatory activities

(Adedapo *et al.,* 2008), besides gastrointestial and respiratory activities (Imran *et al.,* 2011). (N R C, 1978)Reported that *Acacia seyal* var *seyal* leaves have a crude protein content (34.6%), crude fiber (16.2%) and have deficiency in Sodium, Potassium, Phosphorus, Zinc, Manganese, Iron and Copper.

The objectives of this study was focus on: to evaluate the nutritive value of four acacias and determination the percentage of minerals content , because these acacias have high amount of protein and fiber and reasonable amount of carbohydrate.

Materials and Methods

Materials

Acacia seeds (4 taxa): *A cacianilotica s*sp. *adansonia*, *A.niloticasspnilotica*, *A. seyal* var *seyal* and *A. sieberiana* var *sieberiana.* The voucher specimens are kept at Herbarium of Botany Department, Faculty of Science and Technology, Omdurman Islamic University. The identification of the studied taxa was done according to (AL-Amin, 1990).The taxa under investigation were brought from Soba Research Centre, Khartoum.

Seeds Collection

The taxa under investigation were brought from Soba Research Centre, Khartoum. Seeds were collected from various areas of central Sudan. These seeds were identified by the plant taxonomist of Soba Research Forests,Ustaz Hassan Al-Bager, Ministry of Science and Technology, Khartoum.

Methods

Proximate Composition

The determination of moisture, ash, fat and fiber contents were carried out on the

candidate *Acacia* samples according to (A. A. C. C, 2000) methods. Whereas, crude protein content of candidate Acacia taxa was carried out according to (AOAC, 1984) methods. The total carbohydrates content were calculated carried out by difference. The sum of moisture, fat, protein and ash contents was subtracted from 100 as it was described by (West *et al.,* 1988).Minerals of fourth *acacia* taxa samples were extracted according to Pearson's method.

Samples Preparation for Proximate Composition

Investigated seeds sample were cleaned from dust and foreign matter, then were milled into fine flour to further analysis (proximate composition, and mineral content)

Results and Discussion

Proximate Composition

Table (1) showed that moisture content values of four acacia taxa seeds ranged from 5.94% to 6.37 %. *A. nilotica s*sp. *adansonia* gained the highest value 6.37% compared

with other acacia studied. Whereas, *A. seyal* var *seyal* obtained the lowest value 5.94%. Ash content of acacia taxa values ranged between 4.02 to 4.96%. These results Similar to those obtained by who stated that ash content in acacia seeds was 4.55% these results indicated that higher minerals content. While fat content of four acacia taxa ranged between 4.09% to 7.78 %.These results were higher than the results obtained by who mentioned that lipid content was lower in pod (5.03 and 4.75%) than in seeds. The proximate composition of plants and crops seeds varies depending on the cultivars, climatological condition, and maturity and collection time of seeds. Water and fertilizer application as well as acceptability, selectivity and intake of nutrients by plants and crops (Zia-UL-Haq *et al.,* 2011). The results indicated that protein content values of four acacia seeds ranged between 20.22 to 26.44 %. Highest value noted in acacia *seyal var seyal*, flowed by acacia *sieberiana var. seiberiana, acacia nilotica ssp. nilotica and the* lowest value obtained by *acacia nilotica ssp. adansonia.*This is an indication that these acacias seed scan be grouped as a part of plants rich legume seeds.

Table.1 Proximate Composition of Four *Acacia* Seeds Taxa

Acacia taxa	Moisture %	Ash %	Fat %	Protein %	Fibre %	Carbohydrats %
Acacia nilotica ssp. *Adansonia*	6.37 ±0.39	4.40 ±0.20	5.52 ±0.07	20.22 ±0.63	32.74 ±0.14	30.76 ±0.71
Acacia nilotica ssp. *Nilotica*	6.06 ±0.07	4.45 ±0.1	5.41 ±0.07	20.51 ±0.62	26.66 ±1.03	36.92 ±0.83
Acacia seyal var. seyal	5.94 ±0.00	4.96 ±0.22	7.78 ±0.59	26.44 ±0.62	22.42 ±0.10	32.46 ±0.85
*Acacia sieberiana*var. *sieberiana*	6.28 ±0.08	4.02 ±0.14	4.09 ±0.19	21.66 ±0.65	22.88 ±0.14	40.77 ±1.06

Table.2 Minerals Content in Four *Acacia* Seeds Taxa µ/100gm

Acacia taxa	Cu	Zn	Cr	Pb	Mn	Fe
Acacia nilotica ssp. *adansonia*	4.97	29.94	1.32	0.00	38.28	9.26
Acacia nilotica ssp. *nilotica*	7.56	33.54	0.94	0.03	42.06	39.87
Acacia seyal var. seyal	6.03	47.52	0.67	0.08	18.33	89.98
Acacia sieberiana var. *sieberiana*	4.65	27.75	1.10	0.00	8.54	12.31

The most interesting value is that of protein content which is considered high. Fiber content of the present samples studied ranged from 22.42%to 32.74%. These results were in agreement with who stated that fiber content was found in seed 6.70%. Carbohydrates content ranged from 30.76% to 40.77%, these values obtained were lower than the value observed by Zia-UL-Haq *et al.,* 2011. Who stated that carbohydrates content of acacia seed was 52.30%.

Mineral Content

The main content of trace and essential mineral element (µ/100gms DW) in the mature dry seed of fourth acacia samples are shown in table (2).The order depending on the contents of elements µ/100gm in four acacia seeds samples in sudan studied were Cu, Zn, Cr, Pb, Mn and Fe. Copper content of four acacia seeds ranged from 4.65 µ/100gm for A. *sieberiana* var *sieberiana* to 7.56 µ/100gm for A. *nilotica* ssp. *Adansonia.* Zinc element content was found to be between 27.75 for A. *sieberiana* var *sieberiana* to 47.52 µ/100gm for *A.seyal*var *seyal*. The results appeared that Cr and Pb elements values considered the lowest values among the sample investigated. The Mn element seemed to be slightly high in A. *nilotica ssp.Nilotica* 42.06µ/100gm followed by *nilotica s*sp. *Adansonia*38.38µ/100gm. Fe element was found to be very high in *A.seya l*var *seyal*.(89.98 µ/100gm) whereas, the lowest value obtained by A. *nilotica s*sp. *Adansonia* (9.26 µ/100gm). Minerals help maintain acid-base balance, to keep the body pH neutral (3). Minerals help regulate body processes, such as in enzyme systems. They also function in nerve impulse transmission and muscle contraction.

Conclusion and Recommendation

The result of this work shows that *Acacia nilotica s*sp. *adansonia*, *A.niloticas spnilotica*, *A. seyal*var*seyal* and *A. sieberiana* var *sieberiana* could be an important trees crop in Sudan region (economically and nutritionally). It has relatively an average mineral content and rich in protein content which can serve to reduce the protein shortage in the region.
Base on our findings we recommend the following:-

There is a growing concern about human destruction of vegetation, it is necessary to collect the germplasm of this untapped nutritive and economically important tree species for conservation before it becomes extinct. The seeds should be incorporated in agricultural development programmes placing special emphasis on its nutritional value and production potential.

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