CHEMICAL COMPOSITION OF COUNTRY ONIONS
(Afrostyrax lepidophyllus Mildbr. seed)

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ABSTRACT
This study was carried out to determine the proximate composition, amino acid, minerals, anti-nutrients and the vitamin contents of country onion (Afrostyrax lepidophyllus Mildbr.) to ascertain its suitability as an additive in animal feed production. Proximate analysis was performed using standard AOAC methods, mineral contents were determined using atomic absorption spectrometry while the anti-nutrients were analysed using standard methods. The results revealed that the seed had moisture content of 3.35 %, crude protein content of 2.82%, ash content of 1.77%, ether extract content of 0.60% and crude fibre content of 2.35%. Amino acids, minerals, vitamins and anti-nutritional factors were also determined. The results obtained indicate that the seed has nutritive benefits and can increase the efficiency of feed utilization, boost the overall performance of animals, thus reducing cost and increasing profitability in animal production.
Keywords: Proximate composition, Mineral, Vitamin, Anti-nutrients, *Afrostyrax lepidophyllus*.

INTRODUCTION
Country onions (*Afrostyrax lepidophyllus*), also known as rondelles or bobimbi, are onion-shaped seeds which originate from Central and West Africa. It is characterized by a strong onion-garlic-like aroma. It is a member of the Huaceae family, and it is used as spices, and flavorings due to its strong aroma. The seed is used trado-medicinally to treat venereal diseases and gastro-enteric diseases and as a laxative and mouthwash. It also has antioxidant, antimicrobial, anticancer, and insecticidal properties (Toumnou *et al.,* 2014). These effects have been attributed to its contents of phytochemical compounds such as polyphenols, flavonoids, glycosides, saponins, alkaloids, and anthocyanins. Both bark and fruits contain polyphenolics compounds possessing significant antioxidant properties with many other attributes including digestive enzymes stimulation, lipid metabolism and modulation of microbial populations (Moukette, 2021). It fruits and bark are popular spices in Cameroon and most African countries. It is brown to pale brown in colour. Integral to cultural and culinary heritage in Africa, it is often used in traditional recipes, rituals and celebrations. The seeds are used as spices and are generally roasted in order to improve their flavor or aroma. In south-west Cameroon, country onion grows natural and the seeds and bark are harvested and sold as medicine to remedy for child`s cough, worms, constipation, hermia abscesses, and boils (Hervet *et al., 2014*).

MATERIALS AND METHODS
Proximate Analysis
Proximate analysis was carried out according to the procedure of Association of Official Analytical Chemist (A.O.A.C., 1990).

Amino acid determination
Amino acid was determined using High-Performance Liquid Chromatography (HPLC): This method separates amino acids based on their chemical properties and is also commonly used for amino acid analysis. The amino acids in the sample were hydrolyzed and separated using an HPLC column. The separated amino acids were then detected and quantified using a UV detector.

Vitamin determination
Vitamins were determined using High-Performance Liquid Chromatography (HPLC), which involved extracting the vitamins from the feed sample, then separating and quantifying them based on their retention time on a chromatographic column, detected by UV absorbance.

Mineral determination
Atomic Absorption Spectroscopy (AAS) was used to determine the mineral composition. The sample was digested with acid to break down organic matter, then the resulting solution was analysed using Atomic Absorption Spectroscopy (AAS) which allowed for the identification and quantification of specific minerals based on their unique spectral characteristics; this process involved drying the sample, ashing it to remove organic material, and then dissolving the ash in a suitable acid before analysis. The digested sample was introduced into

the AAS flame, where the minerals were atomized, and the absorption of light at specific wavelengths measured to determine the concentration of each mineral.

Determination of Anti-Nutritional Factors

Saponin

Saponin was extracted from the acetone extracted residual matter for 3 h using methanol in Soxhlet extraction unit. To 1 ml of methanolic extract, water and organic solvent (chloroform and methanol) was added at the ration of 1:2 and allowed to separate the layers after mixing thoroughly. The upper aqueous layer (1 ml) was kept at 60 110°C in hot air oven till complete evaporation of solvent. To which 0.1 ml and 0.4 ml of vannilin reagent and perchloric acid were added, respectively and kept at 70°C for 10 min. The intensity of colour developed was read at 540 nm in UV-spectrophotometer (Shimadzu, UV-1800) after adding 2.5 ml acetic acid. Diosgenin was used as a standard at different concentration to calculate the saponin content.

Tannin

Vanillin-HCl assay (Price et al. 1978) was used to determine the quantity of tannin content after extracted with absolute methanol for 20 min. The content was centrifuged at 3000 g and the supernatant was used for analysis. To the 1 ml of extracted aliquots, 5 ml of vanillin-HCl reagent was added and kept in a water bath for 20 min. The intensity of colour developed was read at 500 nm in UV-spectrophotometer (Shimadzu, UV-1800) against 4% hydrochloric acid as a blank. Catechin as equivalent to tannin was used as a standard with different concentration.

Phytic acid

The estimation of phytic acid was carried out by Davis and Reid (1979) method after extracting the samples with 0.5 N nitric acid for 3 h. To the known volume of extract, 1ml ferric ammonium sulphate was added and placed in a boiling water bath for 20 min followed by 5 ml of amyl alcohol. The test tubes were shaken well, and then centrifuged at 3000 rpm for 10 min. Finally, the colour intensity was read at 465 nm in UV-spectrophotometer (Shimadzu, UV-1800) against amyl alcohol blank exactly after 15 min of addition of ammonium thiocyanate.

RESULTS AND DISCUSSION

Afrostyrax lepidophyllus seed contains Anti-microbial properties. It shows the ability to combat bacterial infections. Its extract can effectively inhibit the growth of harmful bacteria. Research suggests that Country onions may possess anti-inflammatory properties that can potentially aid in the reduction of inflammation and associated health conditions (Ngenge *et al.,* 2019). Abundant in Country Onions, dietary fibre is crucial for maintaining digestive health. It facilitates regular bowel movements, prevents constipation, and supports overall digestive well-being. Fongang *et al.,* 2014, revealed that *Afrostyrax lepidophyllus* bark contains sulfur and phenylpropanoid (eugenol) which have the ability to stimulate the function of pancreatic enzymes (lipases, amylases and proteases) and increase the activity of digestive enzymes of gastric mucosa (Kana, *et al.,* 2017). Both bark and fruits contain polyphenolics compounds possessing significant antioxidant properties with many other attributes including digestive enzymes stimulation, lipid metabolism and modulation of microbial populations (Muneendra *et al.,* 2014). It has been reported that *Afrostyrax lepidophyllus* bark contains sulphur compounds and phenylpropanoids responsible for the garlic-onion taste or odour. Also, this spice contains polyphenolic compounds (Ngenge *et al.,* 2019) possessing significant antioxidant and has protective potential on liver enzymes.

Table 1: Proximate composition and Fibre fraction of *Afrostyrax lepidophyllus* Mildbr. seed

Composition	Percentage (%)
Crude Protein	2.82
Ash Content	1.77
Ether Extract	0.60
Crude Fibre	2.35
Dry Matter	96.65
NDF	42.10
ADF	28.80
ADL	4.40
NFE	89.11
ME (kcal)	3316.83

Source: Laboratory Analysis

Table 2: Amino Acid composition of *Afrostyrax lepidophyllus* Mildbr. seed

Composition	Percentage (%)
Lysine	1.04
Methionine	0.30
Leucine	0.66
Threonine	0.23

Source: Laboratory Analysis

Table 3: Vitamin composition of *Afrostyrax lepidophyllus* Mildbr. seed

Composition	
Vitamin A (IU/100g)	7.49
Vitamin C (mg/100g)	15.25
Vitamin B1 (mg/100g)	1.18
Vitamin B2 (mg/100g)	1.54
Vitamin B3 (mg/100g)	3.91
Vitamin B4 (mg/100g)	2.96
Vitamin B5 (mg/100g)	2.77
Vitamin B6 (mg/100g)	5.40
Vitamin B9 (mg/100g)	2.90
Vitamin B12 (mg/100g)	4.64
Vitamin H (mg/100g)	3.63

Source: Laboratory Analysis

Table 4: Mineral composition of *Afrostyrax lepidophyllus* Mildbr. seed

Composition	
%K	0.57
%Na	0.195
%Ca	0.211
%Mg	0.237
%P	0.344
Fe(mg/kg)	26.60
Mn(mg/kg)	8.40
Zn(mg/kg)	15.70
Mo(mg/kg)	0.26
Co(mg/kg)	0.69
Se(mg/kg)	0.015
Cl(mg/kg)	1976.55
S(mg/kg)	2155.56
Cu(mg/kg)	6.60

Source: Laboratory Analysis

Table 5: Antinutritional Factors of *Afrostyrax lepidophyllus* Mildbr. seed

Antinutritional Factors	
Phenol (mg/100g)	18.31
Saponin (mg/100g)	1.37
Tannin (mg/100g)	3.67
Oxalate (mg/100g)	1.11
Phytate (mg/100g)	15.91
Flavonoid (mg/100g)	6.07
Steroid (mg/100g)	0.15
Alkaloid (mg/100g)	4.30
Terpenoid (mg/100g)	7.02
Cyenogenic Glycoside (mg/100g)	4.76
Capsaicins (mg/100g)	20.87
Piperazine (mg/100g)	7.22
Anthocyanins (mg/100g)	10.02

Source: Laboratory Analysis

CONCLUSION

The proximate composition, amino acid, minerals, anti-nutrient and the vitamin contents of country onion have shown that the seed is worthy of being exploited outside its local uses. Country Onions contain compounds with potent antioxidant abilities that shield the body from oxidative stress. These antioxidants neutralize harmful free radicals and then mitigate oxidative damage to cells and tissues. It contains polyphenolics compounds possessing significant antioxidant properties with many other attributes including digestive enzymes stimulation, lipid metabolism and modulation of microbial populations, and therefore should be incorporated in animal feed formulation.

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