CHEMICAL COMPOSITION OF *GONGRONEMA LATIFOLIUM* LEAF MEAL AS A POTENTIAL FEED RESOURCE

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ABSTRACT
An analysis was carried out to investigate the proximate and phytochemical composition of Gongronema latifolium leaf meal using the AOAC methods of analysis. The fresh leaves were air-dried, milled and analysed in triplicates. The results showed that air-dried Gongronema latifolium leaf meal contains 17.16% crude protein, 5.14% ether extract or fat, 9.86% crude fibre and 10.97% ash while the phytochemicals present include: phytic acid, 0.25%; total oxalates, 5.26%; saponins, 0.57%; tannins, 3.85%; glycosides, 4.62%; alkaloids. 6.01%; mimosine. 0.18%; L-Dopa, 0.06%; haemaglutinins, 0.62% and trypsin inhibitor, 0.03%. High crude protein content and the presence of these phytochemicals have shown that this plant has nutritive benefits and potential as a feed resource.
Keywords: Proximate composition, Phytochemicals, *Gongronema latifolium,* meal

INTRODUCTION

Gongronema latifolium (G. latifolium) is a tropical rain forest plant belonging to the family *Asclepiadaceae*. It is called *Utasi* by the Annangs, Ibibios and the Efiks in South-South, Nigeria (Elijah *et al*., 2022); *Utazi* by Igbos in South-East and *Arokeke* by the Yorubas in South-West, Nigeria (Ugochukwu and Babady, 2002). *G. latifolium* is a perennial shrub with edible leaf. It has been reported to be effective in the treatment of various ailments in humans such as high blood pressure and diabetes, stomach problems, typhoid fever, dysentery, malaria, worm, cough and a lot more challenges (Mensah *et al.,* 2008). It is nutritionally high in iron, zinc, vitamins, protein and amino acids (Agbo *et al.*, 2009). Several researches have been carried out on the potential of *Gongronema latifolium* in animal nutrition. Ani *et al.* (2013) reported that *G. latifolium* had a positive effect on the growth, blood profile and carcass of chickens. However, Elijah *et al*. (2022) reported that incorporation of *G. latifolium* leaf meal into finisher diets improved growth and nutrient digestibility but did not improve growth at the starter phase of broiler chicken. The present study reports on the proximate and phytochemical composition of *G. latifolium* leaf meal in order to ascertain its potentials in animal nutrition.

MATERIALS AND METHODS

Fresh *Gongronema latifolium* leaves were purchased from Akpan Andem Market, Uyo, Akwa Ibom State. The leaves were washed, air dried and milled. The AOAC (2012) method was used for proximate and anti-nutritional composition analyses. Phytochemicals were analysed from the leaf extract.

RESULTS AND DISCUSSIONs

The proximate composition of *Gongronema latifolium* leaf meal is presented in Table 1

Table 1. Proximate Composition of air-dried *Gongronema. latifolium* leaf meal

Composition	Percentage (%)
Crude protein	17.16
Ether extract	5.14
Crude fibre	9.86
Ash	10.97
Nitrogen Free Extract	56.87
*Metabolizable Energy (Kcal/kg)	1487

*Calculated according to Pauzenga (1985)

The result shows that *Gongronema latifolium* leaf meal (GLLM) contains 17.16% crude protein, 5.14% ether extract, 9.86% crude fibre, 10.97% ash, 56.87% nitrogen free extract and 1487 Kcal/kg metabolizable energy. These results are in contrast to the findings of Eleyinmi (2007) who reported higher protein (27.2%), fibre (10.8%), fat (6.07%) and ash (11.6%) contents and that of Alobi *et al*. (2012) who reported 15.2% moisture, 6.3% fibre, 33.2% crude protein, 16% crude fat, 1.3% ash and 43.7% carbohydrate. Variations in the proximate composition could be adduced to differences in location, soil, season, age variations and washing. According to Windish *et al.* (2008), plant species and growth stage, the environment (e.g. harvest season, climate and stress condition), agricultural practices (e.g. plant density per cultivated area, fertilization, irrigation level) and growing region may affect chemical composition of herbs. GGLM could be a good source of protein in livestock diet as the crude protein content obtained (17.16%) surpassed those of cereals and tubers.
The phytochemical composition of *G. latifolium* leaf meal is as shown in Table 2.

Table 2. Phytochemical Composition of *Gongronema. latifolium* leaf meal

Phytochemicals	Percentage (%)
Phytic acid	0.25
Total oxalates	5.26
Saponin	0.57
Tannins	3.85
Glycosides	4.62
Alkaloids	6.01
Mimosine	0.18
L-Dopa	0.06
Haemaglutinins	0.62
Trypsin inhibitor	0.03

From the result, GLLM contain less than 1.0% each of phytic acid, saponin, mimosine, L-Dopa, haemaglutinin and trypsin inhibitor. However, it contains higher levels of total oxalate (5.60%), tannins (3.85%), glycosides (4.63%) and alkaloids (6.01%). Machebe *et al.* (2010) reported that GGLM contained 9.10% alkaloid, 2.23 mg/100 g phenol, 2.54% tannin, 6.5 mg/100 g phytate, 0.02 mg/100 g cyanogenic glycoside and 5.16 mg/100 g lycopene. The leaf extract of fresh *Gongronema latifolium* contains phytochemical compounds such as alkaloids, tannins, flavonoids, carotenoids, glycosides, phenols, cyanide (Osuagwu *et al.,* 2013; Offor and Uchenwoke*,* 2015). The presence of these phytochemicals confers the medicinal, and anti-nutritional properties of *G. latifolium*. Enemor *et al.* (2014) associated the hypoglycemic and anti-oxidation effects of *G. latifolium* to some of these biochemical compounds especially flavonoids, carotenoids and phenolic compounds.
Tannins have been reported by Serrano *et al*. (2009) to decrease the frequency of chronic diseases and tannic acid as a feed additive up to 15 mg/kg feed has been reported to be safe for all animal species (EFSA, 2014). Concentrations of 2-4% of dry matter increase nutrient utilization due to increased bypass while concentrations >7% usually reduce nutrient utilization (Yacout, 2016). Oxalate binds calcium, magnesium and other trace minerals such as iron, making them unavailable for assimilation. Musa and Obadoyi (2014) reported an acceptable level of 250 mg/100 g but <0.5% soluble oxalate may be acceptable for non-ruminants. Dietary saponins depressed growth, feed consumption and egg production in poultry (Jenkins and Atwal, 1994). However, *Yucca schidigera* plant (saponin-rich plant) extract used in South and Central America as animal feed has been found to improve growth, feed efficiency and health in ruminants (Francis *et al*., 2002). The European Food Safety Authority (EFSA) established an acceptable daily intake (ADI) of 3 mg saponin/kg body weight per day for quillaia extract (E 999) in 2019.
In livestock, mimosine is believed to induce alopecia, growth retardation, cataract, decreased fertility and mortality while alkaloids are considered to be anti- nutrients because of their action on the nervous system, disrupting or inappropriately augmenting electrochemical transmission. It has been shown that supplementing diets for pigs with isoquinone alkaloids reduces intestinal inflammation and improves the intestinal barrier function (Robbins *et al*., 2013) and thereby may increase absorption of essential nutrients. Trypsin inhibitor is characterized by reducing the biological

activities of proteolytic enzymes such as trypsin and chymotrypsin, interfering with protein digestion and causing pancreatic disorders (Li *et al*., 2017).

L-Dopa has been reported to have a profound effect on the growth response of some poultry species. Omidiwura *et al.* (2015) reported that L-Dopa extract, at 0.1 – 0.4% L-Dopa inclusion, had no detrimental effect on broilers; rather, it resulted in better serum cholesterol profile and improved bird performance. It equally had no deleterious effect on the overall performance of laying birds at grower stage.

CONCLUSION

G. latifolium leaf meal could be a good source of nutrients (protein) for use as feed ingredient in non-ruminant animal diets. The phytochemical constituents have medicinal values which if properly utilised would improve poultry and other livestock production owing to the hypoglycemic and anti-oxidation effects of flavonoids, carotenoids and phenolic components present in the leaf meal.

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