EVALUATION OF PROXIMATE, MINERAL COMPOSITION AND PHYTOCHEMICAL ANALYSIS OF *GONGRONEMA LATIFOLIA* LEAF MEAL

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Abstact

An investigation was carried out to evaluate the phytobiotic potentials of Gongronema latifolia which is an indigenous medicinal plant in some African countries. To achieve this an evaluation into the proximate, vitamins, mineral elements and phytochemical compositions of the leaf was carried out using quantitative standard methods. G. latifolium showed high crude protein and fat contents but low in fibre, showed traces of some micro minerals such as Ma, Zn, Fe, Mg, Cu and Cr but selenium was not detected. It contained high Vit. A and Vit. C while others were low but present in the plant. Alkaloids, Flavonoids and lycopen were predominant in the plant while other phytochemical assesed were in trace amount. However Haemagglutin was not detected. Conclusions made from the study are: G. latifolium possess the phytochemicals that could provide livestocks with nutrients needed for growth and development, health improvement, as well as antioxidants benefits.

Key words: Proximate composition, Mineral, Phytochemical, *Gongronema latifolium*

INTRODUCTION

As a result of the phytobiotic potentials of some plants they have from ages past been used as sources of medication against various ailments (Farombi, 2003). In most rural areas where access to modern health facilities is limited due to underdevelopment, plants/herbs remain the mainstay of the health care system (TMP, 2007). Additionally, current research in medicinal plants is beginning to lend credence to their efficacy and potency and in most instances over and above the existing conventional and chemotherapeutic options particularly as it concerns degenerative disease complexes. Plant such as *Gongronema* have been reported to be an household leaf in diet of many Nigerians as a result of the phytobiotic potentials. *Gongronema latifolium* belongs to the family *Asclepiadaceae*, it is a non wooden, climbing plant with broad green leaf. It has a bitter and slightly sweet taste and its used mostly as spice and vegetable in traditional medicine (Ugochukwu and Babady, 2003). It is widely distributed in the tropical rain forest of most West African countries such as Nigeria, Ghana, Cameroon, Senegal, Guinea- Bissau, Sierra Leone and Cote d'ivoire. The leaf is used for medicinal and nutritional purposes Akuodor *et al.,* (2010). In Nigeria, it is popularly known as "Utazi" by the ibo people and popularly called "Arokeke" by the Yorubas. Various parts of the plant particularly the stem and the leaf are used as chewing sticks or liquour in places like Sierra Leone Akuodor *et al.,* (2010). The leaf is used to prepare food for mothers that have recently put to birth as it is believed that it has the potential to stimulate appetite for food, quickens the return of menstrual cycle and reduce post partum contraction, Nwanjo *et al.,* (2006). Previous studies carried out showed that *G. latifolium* possesses hypoglycemic effect and may be used in managing hyperglycemic conditions and Diabetes mellitus in Nigeria (Ugochukwu and Babady, 2003). The presences of certain phytochemica compounds found in *G. latifolium* suggest that it could be used as a therapeutic plant to combat some health conditions. Thus this study is aimed at assessing quantitatively the proximate, minerals, vitamins and phytochemicals properties of *Gongronema latifolium*.

MATERIALS AND METHODS

Location, Sample collection and preparation

This study was carried out in the Animal Science Laboratory, University of Benin, Benin City, Edo State. *Gongronema latifolium* plants were identified and authenticated by the researchers and fresh leaves of the plant were purchased from the local market in Benin City, Ovia North East Local government of Edo State, Nigeria. The leaves were seperated from the twigs and roots and were thoroughly washed to remove debris and the earth remains. It was dried at room temperature for 5-7 days until it breaks with a scrisp. They were blended into fine powder using an electrical blender. About Two hundred and fifty (300g) of the milled stored in an airtight container from where aliquots were used for the proximate, minerals, vitamins and phytochemical properties.

Proximate analysis

Moisture content was determined using the gravimetric methods (AOAC, 2002) and crude protein determined by the Kjeldhal method described and adapted by Chang (2003). Crude fat was extracted using the solvent extraction gravimetric method and ash content determined using the incineration gravimetric method of the Association of Official Analytical Chemists (AOAC,2002).

Mineral Analysis

The mineral content of *Gongronema latifolia* leaf meal was analyzed using atomic absorption spectrophotometer (AAS) for the following metals: Ca, Na, K, Cu, Fe, Zn, Mg and Mn while the Flame Photometer was used in the analyses of K and Na (Ahmed *et al.,* 2015).

Phytochemical analysis

Quantitative phytochemical composition of the leaves were determined using the methods variously described by Harbone (1973) and Trease and Evans (2002) and Sofowara (2008) including percentage composition of saponins, alkaloids, flavonoids, hydrocyanide and tannins (Atangwho et al., 2009).

RESULTS

Table1. Quantitative (a) proximate composition (b) vitamins (c) mineral elements (d) and phytochemical compositions of *Gongronema latifolium*

(a) Proximate composition.

Moisture (%)	Crude Protein (%)	Crude fibre (%)	Ether extract (%)	Crude ash (%)	NFE (%)
7.45± 0.08	27.53± 0.22	3.47± 0.03	9.26± 0.16	6.57± 0.10	45.72± 0.26

(b) Mineral composition

Manganese mg/100g	Selenium mg/100g	Zinc mg/100g	Iron mg/100g	Copper mg/100g	Magnessium (%)	Cromium mg/100g
0.03± 0.01	Not detected	0.05± 0.00	0.31± 0.03	0.08± 0.02	1.04± 0.06	0.04± 0.01

(c) Phytochemical composition

Alkaloids (%)	Phenols mg/100g	Tannins (%)	phytates	Haemagglutins mg/100g	HCN mg/100g	Lycopens mg/100g	Flavonoids mg/100g
10.03± .04	2.20± 0.01	2.46±0.02	5.60± .03	Not detected	0.03± 0.00	4.83± 0.02	7.26± 0.05

The proximate composition, vitamins, mineral elements and phytochemicals of *Gongronema latifolium*, are shown in Tables 1a-c respectively. Proximate compositions showed an average moisture content of (7.45± 0.08), crude protein value of (27.53 ± 0.22%), Crude fibre of (3.47 ± 0.03%), ether extract content of (9.26± 0.16), crude ash of (6.57±0.10) and calculated Nitrogen free extract of (45.72 ± 0.26%). Mineral compositions showed an average manganese content of (0.03 ± 0.08mg/100g), selenium was not detected, zinc recorded was (0.05 ± 0.00mg/100g), Iron was (0.31 ± 0.03mg/100g), copper recorded was (0.08 ± 0.02mg/100g), Magnessium recorded was (1.04 ± 0.06%) and cromium content of (0.04± 0.01mg/100g) was also recorded. Phytochemical composition showed an alkaloid content of (10.03 ± 0.04%), phenol content was (2.20 ± 0.01mg/100g), tannin recorded was (2.46 ± 0.02%), phytate value recorded was (5.6 ± 0.03mg/100g), haemagglutin was not detected, cyanogenic glucosides values recorded was (0.03 ± 0.00mg/100g), lycopen recorded was (4.83± 0.02mg/100g) and flavonoid content was (7.26± 0.05mg/100g) respectively.

DISCUSSION

The Phytobiotic potentials and medicinal properties of *Gongronema latifolia* have been attributed to the biochemicals present in the plant materials. On this premix we in this study quested on determining the proximate, vitamins, micronutrients and phytochemical compositions of *G. latifolium*. In addition to the role played in human and animal nutrition, knowledge of proximate, vitamins, micronutrients and phytochemical composition is fundamental to the understanding of modes and mechanisms of action of medicinal plants in general. The low level of moisture recorded is traceable to the fact that the leaf was properly dried during processing that reduces the moisture as higher moisture could give room for the growth of mould which could have detrimental effect on the health of the animals if consumed. The relatively high amounts of crude protein recorded shows that the leaf has the capacity to improve the nutrient composition of feeds which on the long run could support the growth of the animals as protein. This corroborate the findings of Karim *et al*., (2010) that reported high protein content in *Rubia Tinctorum*. The crude fibre and ash reorded shows that the leaf could support digestion and aid bowel movement. Dietary fibre has positively been implicated in the management of diabetes and postprandial hyperglycemia. It delays gastric emptying or increase viscosity of GIT content thereby suppressing digestion and carbohydrate absorption. This mechanism is selectively advantageous in that the threat or risk of hypoglycaemia, hyperinsulinemia and undue weight gain is absolved (Tiwari and Rao, 2002). The high fat content recorded negates the results of Ejoh *et al.* (2007) who concluded that leafy vegetables are poor sources of lipids and that this is worsened when the vegetables are processed. The quantitative presence of minerals elements such as Mg, Se, Fe, Cu, Mg and Cr have shown to posses antioxidant activities Yeh *et al.,* (2003). This in part may explain the reported antioxidant properties of *G. latifolium* (Ugochukwu *et al.,* 2003) and may also give an insight into the antidiabetic properties of these plant. It is interesting however to note the relative abundance and distribution of the various types of antioxidants in the leaf. It may also support the report of a higher efficacy in antidiabetic action when combined with scent leaf, bitter leaf and neem leaf as medicinal plants (Ebong *et al.,* 2008). Majority of antioxidants enzymes or defence systems of the body and proccesses involved in lipid metabolism in general make use of mineral elements (Gorman, 1992), and an imbalance in these mineral element would usually lead to nutritional disorders or nutritionally related diseases such as diabetes. For instance, copper deficiency leads to elevated serum cholesterol and triacylglycerol; selenium deficiency increases cholesterol synthesis (Gorman, 1992), noted complications of diabetes. The presence of these mineral elements in the medicinal plants would, therefore, be relevant in exerting their anti hyperglycemic action and amelioration of the attendent macrovascular complications. This provide an insight into the mode of action of these medicinal plants functioning as antidiabetics. Phytochemical constituents recorded in this study were Alkaloids, Phenols, tannins, phytate, haemagglutins, cyanogenic glucosides, lycopens, and flavonoids. The flavonoids and polyphenols components of Gongronema are well known antioxidants (Tiwari and Rao, 2002). For instance, the plant Ginkgobiloba is reported to owe its antidiabetic property to flavone glycocides, typical antioxidants (Shane-McWhorter, 2001). Besides these antioxidant properties, the phenols are reported to inhibit alpha-amylase, sucrase, as well as the action of sodium glucose-transporter 1 (SGLUT-1) of the intestinal brush border, hence their antdiabetic action (Tiwari and Rao, 2002). phytate, tannins, flavonoids and lycopens are also reported by these same authors to posses potent S-GLUT-1 mediated inhibition of glucose transport, hence antidiabetic activity.

CONCLUSION

It is clear from this study that, this plants possess the phytobiotic potentials to provide livestocks with nutrients needed for growth and development, its selective chemical composition, and that proper knowledge of the proximate, phyto-chemical and micronutrient composition is fundamental to understanding the mechanism as well as the the medicinal value of the plant.

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