PROXIMATE, PHYTO-MINERALS AND ANTIOXIDANT POTENTIAL OF *TETRACARPIDIUM CONOPHORUM* LEAVES HARVESTED FROM THE SOUTHWESTERN PART OF NIGERIA: POTENTIAL BENEFIT IN POULTRY PRODUCTION

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ABSTRACT

The study was conducted to determine the proximate , phytochemistry and antioxidant potentials embedded in *Tetracarpidium conophorum* leaf extracts (TCLE) as a potential herbal supplement to boost cockerel performance under tropical conditions.The antioxidant potential, phytochemical screening and qualitative analysis of TCLE was evaluated. Results showed that the crude protein, moisture, ash and crude fibre content of TCLE are low, while the carbohydrate content is high. Also TCL contains essential compounds such as saponin, tannin, phenolics, flavonoids, alkaloids, steroids, glycosides, coumarins, triterpenes, terpenoids and fixed oils, while some compounds were not present. The alkaloid, flavonoids, phenolic terpenoids and steroids content of TCL are increased in comparison to values recorded in some past studies. TLC contain low amount of hydrogen peroxide (H_20_2) and higher scavenging potential at 50 Ferric Reducing Antioxidant Power (FRAP). *T. conophorum* leaves has an appreciable quantity of minerals needed by animals for proper growth and development. The highest observable mineral is sodium (8.20ppm), while phosphorus had the least value (0.28 ppm). The results showed that the percent inhibition at 50mg/ml had the highest value 106.07, while the percent inhibition at 10m g/ml had the lowest value of 39.42. In conclusion, TLCE could be a potential herbal supplements to improve the performance of cockerels.

Keywords: Antioxidant, *Tetracarpidium conophorum* leaves, proximate composition, phytochemical, Cockerels

INTRODUCTION

An increased interest is developing in the use of a natural molecules and plant extracts with beneficial effects on chicken and hen performance (Cross *et al.*, 2007) due to its known antioxidant properties (Fellemberg and Speisky, 2006; Mansour *et al.*, 2006). Surai (2002) has reported about African walnut fruits, leaves bark and roots as a phytogenic antioxidant compound which play an important role in bird reproduction and health. Studies showed that the nuts of African Walnut (*Tetracarpidium conophorum*) are rich in protein, carbohydrate, fats and oils, vitamins and minerals (Ojobor *et al.*, 2015). Evidence has alo confirmed the use of African walnut as potential herbal supplemets that can boost male fertility and treatment of dysentery Noh *et al*. (2020). Ikpeme *et al.* (2014) reported that *Tetracarpidium. conophorum* (TC) seed extract increased the viability and sperm output of male albino rats and suggested that the seed could be included in the formulation of male fertility drugs. Several experimental trials have been conducted to improve fertility in male chickens using different phytogenic supplements. However, reports on the phytochemical, proximate and antioxidant analysis of TCL as a potential herbal supplement to boost the performance of cockerels in the tropics is scanty in literature, therefore this work was conducted to determine this potential..through various *in vitro* studies.

MATERIALS AND METHODS

Source and preparation of experimental materials

Matured African walnut leaves in the fresh form were obtained from the environs of Ore in Ondo State, Nigeria, dirt and contaminants, were removed to obtain a properly cleaned leave sample. *Tetracarpidium conophorum* leaves (TCL) were dried under the shade and grounded using electronic blender and the powdery form was kept in an airtight container till use. All analyses in this study were done in duplicates

Statistical analysis

Data obtained were analysed using Analysis of Variance (ANOVA). Means compared with Duncan multiple range test.

RESULTS AND DISCUSSION

Proximate composition of *Tetracapidium conophorum* leaves

Table 1 shows the proximate composition of *Tetracapidium conophorum* leaves (TCL). The results showed that TCL had crude protein content of 7.24 %, crude fibre (2.49 %), crude lipids (10.56 %), carbohydrate (65.30 %), moisture content (4.66), Ash (9.75%) and calorific value (1609.69KJ/100g). TCL contained low amount of protein. Low amount of protein (8.76) and ash content (9.75%) were also reported by Ojobor *et al.* (2017) in TCL. This is an indication that TCL contains a low amount of inorganic nutrients. A very low moisture content (4.66%) of TCL observed in this study indicated that a high storage capacity that will prevent microbial attack is present. This is in line with the findings of Chikezie (2018), who also reported low moisture content of 5.46%. Protein is an important part of animal structure and metabolism as they constitute a major part of the body structure as component of muscle, connective tissue and cell membrane (Ojo, 2017). The carbohydrate content is high (65.30%) indicating that TCL is a good source of energy. The value for carbohydrate in this study is higher than 24.36% reported by Ojobor *et al.* (2017) in TCL. The crude fibre content is low, lower value of 1.24 has also been reported by Chikezie (2018). The crude lipid and energy value observed in this study are higher compared with the value of 3.77% (crude lipid) and 234.57 kj/100g (energy value) reported by Ojobor *et al.* (2015).

Table 1: Proximate composition of *Tetracapidium conophorum* leaves

Parameters	**Values (%)**
Moisture	4.66 ± 0.20
Ash	9.75 ± 1.25
Carbohydrate	65.30 ± 4.50
Crude Lipids	10.56 ± 1.45
Crude Fibre	2.49 ± 0.31
Crude Protein	7.24 ± 0.90
Calorific Value	1609.69 ± 20.80 (KJ/100g)

Table 2 shows the mineral composition of TCL. The results showed that TCL has an appreciable quantity of minerals needed by animals for proper development. Sodium had the highest value (8.20), followed by magnesium (1.60), calcium (0.78), potassium (0.42), iron (0.28) and phosphorus (0.28) parts per million (ppm) in descending order. Some of these values are comparable to those reported by Nwaoguikpe and Ujowundu C.O., (2016) and are relatively higher than those reported by Ayoola *et al.* (2011) in the study he conducted on TCL. For effective muscle activity, skeletal development and normal growth, an appreciable amount of minerals (e.g calcium) is required in the diet. Iron is needed for red blood cell formation. When iron is deficient in the body, it will manifest itself as iron-deficiency anemia (Neji *et al.*, 2017). Phosphorus is required in the regulation of acid-base balance in heat stressed animals, Magnesium is needed in the intestinal absorption, while Sodium and potassium are very important for nerve transmission and osmolality of body fluids.

Table 2: Mineral composition of *Tetracapidium conophorum* leaves

Parameters	Potassium (K)	Sodium (Na)	Calcium (Ca)	Magnesium (Mg)	Phosphorus (P)	Iron (Fe)
Mineral values (ppm)	0.42 ± 0.03	8.20 ± 1.50	0.78 ± 0.03	1.60 ± 0.01	0.02 ±0.01	0.28±0.04

Ppm-part per million

Quantitative Analysis of *Tetracapidium conophorum* leaves

Table 3 shows the quantitative analysis of TCL**.** There is high concentration of steroids (289.27), alkaloids (183.56), flavonoids (182.49), phenolics (163.40), terpenoids (141.83) and triterpenes (120.93) while coumarins (29.35), saponin (23.80), tannin (6.67) and the glycosides (2.42) are present in appreciable amount. Alkaloid, flavonoids and steroids content of TCL are very high. Generally alkaloids have medicinal and physiological function, pure isolated alkaloids from plants and their derivatives possess analgesic, anti-spasmodic and anti- bacterial effects (Okwu and Emelike, 2006). Alkaloids are the effective plant substances used therapeutically as analgesic, anti-microbial and antibacterial properties. Steroids have been reported to have antibacterial properties (Raquel, 2007),

and they are very important compounds especially due to their relationship with compounds such as sex hormones (Okwu, 2001). Ajaiyeoba and Fadare (2006) reported that the walnut has been shown to cure male infertility problems. Some plant steroids are also useful for their effects when consumed by human beings, because their presence decreases the amount of cholesterol in the blood stream. (Wisegeek, 2013). Flavonoids have been reported to have anti-oxidative property, free radical scavenging capacity, coronary heart disease preventions and anti-cancer activity (Salah *et al.*, 1995). The leave also contain a high amount of phenols. Phenols and phenolic compounds have anti-microbial and anti-oxidant protective effects and are anti-tumor agents. There were appreciable quantity of saponin and tannin. The presence of tannins suggest the ability of this plant to play a role as antidiarrhoeic and antihaemorrhagic agent. Parekh and Chanda (2007) reported that tannins are known to react with proteins to provide the typical tanning effect which is important for the treatment of inflamed or ulcerated tissues. Tannins bind to proline – rich protein and interfere with protein synthesis. The presence of tannin in the diet of poultry form complex bond with metal ions and complex compounds such as protein, thereby negatively influencing feed conversion and depressing growth (Dei *et al.*, 2007). Tannin level (6.67) shows that *Tetracapidium conophorum* leaves can be used in feeding poultry without affecting the feed efficiency because of its low tannin content. The values obtained in this study are higher than the values of 1.77 (alkaloids), 164 (flavonoid), 1.44 (steriod), 1.48 (phenols), 0.96 (tannins) and 0.86 (saponins) obtained by Igara et al. (2017) on TCL.

Table 3: Quantitative Analysis of *Tetracapidium conophorum* leaves

Phyto constituent	Saponin	Steroids	Flavonoid	Phenolics	Terpenoid	Coumarin	Glycosides	Alkaloids	Triterpenes	Tanin
Qantitative abundance	23.80± 4.00	289.27 ± 30.0	182.49± 21.0	163.40 ± 23.0	141.83+ 20.0	29.35 ± 4.00	2.42 ± 0.50	183.56 ±23.00	120.93 ± 26.00	6.67 ± 1.30

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Antioxidant Potential of *Tetracapidium conophorum* leaves

Table 5 shows the antioxidant potential of *Tetracapidium conophorum* leaves. The result showed that the level of hydrogen peroxide at 50 in the leave was 4.66 mg/dl while that of ferric reducing antioxidant power FRAP was 9.75 µg/100g with the record of number of scavenging at 50 as 65.30 mg/ml. The lower amount of hydrogen peroxide and high number of scavenging free radical indicated that *Tetracapidium conophorum* is a very good antioxidant and was effective in scavenging high number of reactive oxygen species (ROS) that causes oxidative stress in birds. FRAP is used to measure the reducing potential of an antioxidant reacting with a ferric tripyridyltriazine complex and producing a ferrous tripyridyltriazine. The breaking of free radical chain takes place through the donation of hydrogen atom. The higher the FRAP value the higher the reducing ability and the stronger the antioxidant capability. The values of FRAP in this study is within the range of 0.36-18.28 reported by Nilima and Hande (2011) and can be adjudge as been strong.

Table 5: Antioxidant Potential of *Tetracapidium conophorum* leaves

Parameters	**Values (%)**
H_2O_2 mg/dl at 50	4.66 ±1.20
FRAP µg/100g	9.75 ± 2.30
NO Scavenging at 50 mg/ml	65.30 ± 12.50

FRAP = Ferric reducing antioxidant power, H_2O_2 =hydrogen peroxide

CONCLUSION AND RECOMMENDATION

In conclusion, TLC might improve growth performance. It is recommended that poultry farmers could incorporate *Tetracarpidium conophorum* leaf into chicken diets.

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