PROXIMATE AND PHYTOCHEMICAL COMPOSITION OF WATERLEAF (*Talinum triangulare*) POWDER AND EXTRACT

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ABSTRACT
This study evaluated the nutritional and phytochemical properties of waterleaf (Talinum triangulare) in two forms: powdered waterleaf and its hydroalcoholic extract, with a focus on their potential applications in broiler production. Fresh waterleaf (Talinum triangulare) was purchased from Ose market, processed, and extracted with a 70:30 hydro-alcoholic mixture, concentrated, and stored. Proximate and phytochemical analyses were conducted using standard procedures to determine nutrient composition and bioactive compounds. Key components analyzed included moisture, ash, protein, carbohydrate, phenols, saponins, steroids, flavonoids, alkaloids, and tannins. Results revealed that waterleaf powder exhibited higher levels of crude protein (4.23%), crude fibre (30.60%), and saponins (7.1%), which are essential for growth performance and digestive health in broilers. Conversely, the hydroalcoholic extract demonstrated elevated concentrations of flavonoids (12.4%) and alkaloids (13.8%), bioactive compounds renowned for their antioxidant, anti-inflammatory, and antimicrobial properties, which enhance immune function and overall health. Both forms of waterleaf possess distinct nutritional and bioactive profiles, making them valuable dietary components that serve as nutrient-dense and functional feed ingredients for broiler production. While waterleaf powder is more effective in promoting growth and muscle development due to its higher protein and fiber content, the hydroalcoholic extract offers superior health benefits by boosting immune responses. This study concludes that the incorporation of waterleaf, in either form, into broiler diets can enhance productivity and health, presenting a cost-effective and sustainable alternative to conventional feed ingredients
Keywords: Waterleaf, Proximate Composition, Hydroalcoholic Extract, Nutritional Analysis

INTRODUCTION

Good nutrition is essential for achieving optimal poultry production. However, the high cost of conventional feed, which makes up about 80% of total production costs, remains a major challenge for poultry farmers (Longe, 2006). This has led to a growing interest in using natural products as affordable alternatives to improve growth and health in poultry. These natural products are rich in bioactive compounds, which can promote better performance in poultry (Windisch *et al*., 2008; Hong *et al*., 2012).

Waterleaf (*Talinum triangulare*), a leafy vegetable commonly found in tropical regions, is a promising option. It is well-known for its high protein content and beneficial phytochemicals, which have been shown to improve weight gain and overall health in broiler chickens (Ekine *et al.*, 2020). Waterleaf contains compounds such as flavonoids, alkaloids, and antioxidants, which support gut health, boost immunity, and reduce oxidative stress (Ezekwe *et al*., 2001; Mbaegbu, 2012).

In countries like Nigeria, leafy vegetables like waterleaf are widely available, affordable, and rich in nutrients (Aja *et al.,* 2010). They are an excellent source of protein and essential amino acids, making them a practical alternative to conventional feed ingredients (Fasuyi, 2006). Waterleaf is particularly valued for its high levels of vitamins, Omega-3 fatty acids, calcium, magnesium, and dietary fiber, which help reduce inflammation and oxidative stress—two common problems in broiler production (Yilni and Naanma, 2020; Alonge *et al.,* 2022).
This study aims to compare the nutritional and phytochemical properties of waterleaf in two forms: powdered waterleaf and its hydroalcoholic extract. The findings will contribute to developing more affordable and nutritious feeding strategies for poultry farmers.

MATERIALS AND METHODS

Preparation of waterleaf (*Talinum triangulare*) powder

Fresh waterleaf (*Talinum triangulare*) was sourced from Ose Market in Onitsha, Anambra State. The leaves were separated from the stems and thoroughly washed with a salt-water solution to eliminate impurities. The cleaned leaves were rinsed with water and left to air-dry at ambient temperature for 21 days. After drying, the leaves were pulverized into a fine powder using a laboratory blender.

Extraction of waterleaf (*Talinum triangulare*)

A total of 186 g of waterleaf powder was combined with a 1500ml hydro-alcoholic mixture (70:30 v/v, alcohol to water ratio) in enclosed flasks. The mixture was agitated occasionally and left to macerate for three days at room temperature. The solution was filtered using filter paper, and the residue was subjected to a second extraction using the same solvent mixture. The hydro-alcoholic extract of *Talinum triangulare* was concentrated by drying in a hot air oven at 40°C. The resulting lyophilized extract was stored in vials at 4°C for future use, following the procedure described by Zhang *et al.* (2009).

Proximate analysis of waterleaf powder and hydro-alcoholic extracts

Both the waterleaf powder and hydro-alcoholic extracts underwent proximate analysis to determine their moisture content (MC), ash, fat, crude fibber (CF), and crude protein (CP). The carbohydrate content was estimated by subtraction using the formula: Carbohydrate = 100 − (MC +Ash +Fat +CF+CP). Each sample was analyzed in triplicate, following standard analytical protocols.

Phytochemical analysis of waterleaf powder and hydro-alcoholic extracts

The phytochemical composition of both waterleaf powder and hydro-alcoholic extracts was assessed to identify active biological compounds using established analytical techniques.

Data Analysis

All collected data were subjected to statistical evaluation using a one-way analysis of variance (ANOVA) in SPSS version 23 Means with significant differences were separated using Duncan's Multiple Range Test (DMRT).

RESULT AND DISCUSSION

Table 1 shows the proximate analysis of waterleaf powder and its hydroalcoholic extract, revealing differences in their composition. The extract has a moisture content of 0.60%, which is higher compared to the powder's 0.10%, indicating that it retains more water. This finding contradicts Alonge *et al*. (2022), who found higher moisture content in waterleaf powder than in the extract. This discrepancy could be attributed to the different extraction methods and solvents used. The extract also shows a significantly higher ash content (56.50%) than the powder (33.30%), suggesting it contains more minerals. This supports the idea that hydroalcoholic extracts often have higher mineral levels due to alcohol being a polar solvent that can break down plant cell walls and membranes, releasing bioactive compounds, including minerals. On the other hand, the extract lacks fat and crude fiber, likely because these components are lost during the extraction process. Plant extracts typically have negligible fat content since lipophilic compounds are excluded during extraction. The protein content is higher in the powder (4.23%) compared to the extract (2.38%). This could be due to protein degradation or incomplete extraction, as noted by William (2019), who found that some proteins degrade or are not fully extracted during hydroalcoholic extraction. The study emphasizes that unwanted proteolysis can occur during the extraction and purification of active enzymes from plant tissues, leading to partial degradation of proteins. Additionally, the extract has a higher carbohydrate content (40.52%) compared to the powder (30.97%), possibly due to the concentration of soluble carbohydrates during extraction.

Table 2 presents the phytochemical composition of waterleaf powder and its hydro-alcoholic extract, highlighting notable differences between the two forms. The phenol content is higher in the powder (0.27%) compared to the extract (0.15%). Phenols are recognized for their antioxidant effects (Dillard and German, 2000) and play a role in managing bacterial, protozoal, fungal, and viral infections, as well as inflammation, diabetes, and cancer (Mahfuz *et al*., 2021). This suggests that the powder, with its higher phenol content, may offer stronger antioxidant benefits. Saponins are also more abundant in the powder (7.1%) than in the extract (1.2%). Saponins have cholesterol-lowering and immune-enhancing properties (Sparg *et al.,* 2004) and are associated with diuretic, digestive, and anti-plasmolytic effects (Zhao *et al*., 2018). The greater saponin levels in the powder suggest it might have enhanced therapeutic potential. The steroid content is higher in the powder (0.86%) compared to the extract (0.44%). Plant-based steroids can influence growth, development, and reproduction in animals, as reported by Feng *et al*. (2020). However, the extract contains more flavonoids (12.4%) and alkaloids (13.8%) than the powder, which has 2.9% flavonoids and 8% alkaloids. Flavonoids and alkaloids are known for their antioxidant,

anti-inflammatory, cardiovascular, and antimicrobial properties (Hollman, 2001; Cordell, 1981). The higher concentrations of these compounds in the extract may make it more effective for medicinal uses. Both the powder and extract contain the same level of tannins (0.005%). Tannins, while often considered anti-nutritional for monogastric animals, can positively influence gut health and improve productivity at low concentrations (Pandey *et al*., 2022). For example, Schiavone *et al.* (2008) found that incorporating 0.20% tannins in broiler diets can boost feed intake and growth, while higher levels (0.25%) may have adverse effects. Tannins also have astringent and anti-inflammatory properties (Scalbert, 1991). The equal tannin content in both forms suggests they may provide similar benefits, particularly in broiler production.

Table 1: Proximate composition of waterleaf powder and hydro alcoholic extract of water leaf

Parameters	Waterleaf Powder (%)	Hydroalcoholic Extract (%)
Moisture	0.10	0.60
Ash	33.30	56.50
Fat	0.80	-
Crude Fiber	30.60	-
Protein	4.23	2.38
Carbohydrate	30.97	40.52

Table 2: Phytochemical analysis of water leaf powder and hydro alcoholic extract of water leaf

Parameters	Waterleaf Powder (%)	Hydroalcoholic Extract (%)
Phenol	0.27	0.15
Saponin	7.1	1.2
Steroid	0.86	0.44
Flavonoid	2.9	12.4
Alkaloid	8	13.8
Tannin	0.005	0.005

CONCLUSION

The study highlights the nutritional differences between waterleaf powder and its hydroalcoholic extract. The extract contains higher moisture, ash, carbohydrates, flavonoids, and alkaloids, while the powder is richer in protein, fibre, phenols, saponins, and steroids. Both forms may have potential in broiler diets, with the powder offering a cost-effective option for large-scale production.

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