PROXIMATE COMPOSITION OF RAW-DRIED AND HEAT TREATED *CANARIUM SCHWEIFURTHII* (ATILI) FRUIT AS NON-CONVENTION INGREDIENT IN BROILER DIET

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Abstract

The research work investigated the proximate, and some anti-nutritional content of *Canarium schewifurth* (atili) fruit as non-conventional ingredient in broiler diet. The moisture content of *canarium* fruit for both Raw-Dried (RD) and Warm-Dried (WD) were 4.68 and 6.95 %, respectively. The crude protein of *Canarium schweinfurthii* fruit for RD and WD were 6.62 and 3.64 % respectively. The value of the crude fibre content for Raw-Dried is 6.08% while for Warm-Dried is 3.64%. It was observed that the Crude Fat of RD *Canarium schweinfurthii* fruit was higher (37.93%) when compared with the value in the WD *Canarium schweinfurthii* fruit (21.88 %). The study revealed that heat reduced the anti-nutritional content of the fruit; phytic acid (mg/100g) value in the RD was 12.78 and WD was 7.30 while the oxalate and tannins content were also reduced by heat.
Keyword: *Canarium schweinfurthii* fruit, Raw-dried, Warm-dried, anti-nutrient, broiler diet

Introduction

Poultry industries in Nigeria are constantly experiencing shortage of feed resources and where these resources are available they are in higher demands by man which make them unavailable or too expensive to feed livestock. A possible way to reduce poultry feed costs is finding alternatives to conventional nutrient sources that are less expensive, efficient and locally available (Amandeep 2016). Non-conventional feedstuffs refer to all those feed resources that have not been traditionally used in animal feeding or are not used commercially in the production of rations for livestock (Adelowo, 2018). There is therefore need to research into the use of non-conventional feed resources. Example of such seed is *Canarium schweinfurthii,* it belongs to the family *Burseraceae* and the genus *Canarium* (Keay, 1989; Wikipedia, 2007). In Nigeria, (Nyam *et, al.* 2014), reported that it thrives well in the rocky and flatlands. It is common in Bauchi, Southern Kaduna, Niger, Oyo and Plateau States of Nigeria (Nyam, 2011). The fruit contains a hard fluted stone in which is a seed. Inside the seed are edible and oily nuts (Nyam and Wonang, 2004). The slightly greenish outer pulp of the fruit is oily and edible. It can be eaten raw or soften in warm water to improve palatability. The pulp oil contains about 71% palmatic acid and 18% oleic acid which is edible. The fruits are similar in structure and color to the well-known fruits of Olive plant (*Olea europaeae*) of Israel, though from different families (Nyam *et, al.* 2014). It is a plant which can be described as multipurpose economic plant whose broad utilization in the West Africa Region has been documented (Burkill, 1985 and Orwa *et, al.* 2009).

Several scientific researches have been carried out on *Canarium schweinfurthii*, in order to determine its chemical composition. The phytochemical screening of *Canarium schweinfurthii* revealed the presence of chemical active compounds in all its parts. From leave: Saponins, tannins, cardiac glycoside, steroids and flovonoid (Ngbebe *et, al.* 2008); From bark: triterpenes, steroids, saponins, lipids and glycosides (Kouambou *et, al.* 2007); from resin: Triterpenoic acids (Yousuf *et al*, 2011); from seed: Tannins, balsams, cardiac glycosides, phenols and flavonoids (Uzama *et, al.* 2012), canarene (Tamboue *et al*, 2000)**.** Some pure molecules have been isolated from this plant extracts. Yousuf *et al* (2011) isolated three triterpenoic acids, namely 3a- Hydroxytirucalla-8, 24-dien-21-oic acid, 3α- hydroxytirucalla-7,24-dien-21-oic acid (or

epielemadienolic acid) and 3β-fluorotirucalla-7,24- dien-21-oic acid, from the resin of *Canarium schweinfurthii* Engl.

Materials and methods

The sample of *Canarium schweinfurthii* fruit was obtained from Mangu Local Government area of Plateau state. The sample was divided into two. The first sample was the Raw-Dried (RD), it was processed by peeling the shaft and was oven dried at 37^0C or two days and crushed with mortal to powder in the laboratory. The second sample was Warm-Dried (WD); steamed and sun dried for ten day (10days) and crushed with mortal to powdery form.

The Laboratory analysis was conducted at the Biochemistry Division of the National Veterinary Research Institute Vom Plateau state. The Moisture content was determined using methods described by Karl-Fischer (AOAC, 1990). While the Kjeldahl revised by Johann Kjeldahl (1948-1900) (AOAC, 1990) was used to determine the Protein content. The mineral contents sodium, potassium, magnesium and iron of the fruit were determined based on the methods in AOAC (1990) using Unican 969 Atomic Absorption Spectrophotometer (AAS) with serial number 501361 V5:50. The phosphorus content of the fruit was analyzed using Hach DR240 machine. Twenty-five millilitres of the sample was taken and 1.0 mL molybdovanate reagent added then swirled to mix thoroughly for 3 min before measurement was taken. Carbohydrate content of the mesocarp fruit of *C. schweinfurthii* was determined using AOAC (1990) by subtracting the total ash content, crude fat plus crude protein and crude fibre from the total dry matter. Tannins and phytic acid of the fruits were determined by alkaline titration (AOAC, 1984). Total oxalate of the fruit was determined by the permanganate titration (Dye, 1956).

Results and Discussion

Table 1: Proximate Composition of *Canarium schweinfurthii* fruit

Parameter	RD(g/100g)	WD(g/100g)
Moisture	4.68	6.96
Crude protein	6.62	5.91
Crude fibre	6.08	3.64
Crude fat	37.93	21.88
Ash	3.49	2.24
NFE	41.20	59.38
Calcium	0.27	0.35
Phosphorous	0.01	0.04

NFE=Nitrogen Free Extracts

Table 2: Anti nutritional content in *Canarium schweinfurthii* fruit

Parameters	RD(mg/100g)	WD(mg/100g)
Phytic Acid	12.78	7.30
Oxalate	27.50	10.00
Tannins	1.02	0.07

Table 1 shows the result of proximate analysis of ***Canarium schweinfurthii* fruit**. The result shows that the RD fruit contains higher values of crude protein 6.62%, crude fibre 6.08%, ash 3.49% and crude fat 37.93% while the WD values crude protein 5.91%, crude fibre 3.64%, ash 2.24% and crude fat 21.88% were slightly lower when compared with the RD. But the values of Moisture content 6.96%, NFE 59.38, calcium 0.35, and phosphorus 0.01 for WD were higher when compared with those of the RD fruit. This result is similar to the findings of Nyam *et. al.*, (2014) who reported the moisture content of *Canarium*

schweinfurthii fruits to be 5.77%. High moisture content of fruits may speed up the deterioration of the fruit since excess water aids microbial spore germination (Nyam *et al.*, 2014). Ayoade *et al.*, (2015) also reported the fibre contents of *Canarium schweinfurthii* as 6.09%.

According to Agbo *et, al.* (1992), the *Canarium schweinfurthii* fruit pulp from Ivory Coast was found to contained 5.6% protein, 30–50% fat, 8.2% starch, 11.8% cellulose, potassium, 1.2% and calcium 0.4% which were similar to the value observed in the *Canarium schweinfurthii* fruit obtained in Plateau State Nigeria.

Table 2 shows the anti-nutritional contents of the RD and WD *Canarium schweinfurthii* fruit. It was observed that heat reduces the phytic acid, oxalate and tannin contents of the *Canarium schweinfurthii* fruit. Phytic acid in RD is 12.78 and WD is 7.30 respectively, while the Oxylate value was high in the raw-dried (27.50) compared with the WD (10.00), we can therefore conclude that heat treatment help to reduce the phytochemicals in the raw-dried fruit. Nyam *et. al.*, (2014) in their studies revealed that phytate, decreases the absorption of zinc, calcium, magnesium and iron. Tannins are complex phenolic polymers and the condensed ones are widely distributed in plants but pass through the digestive system unchanged. They are generally non-toxic but large doses can give rise to gastroenteritis (Nyam *et. al.*, 2014).They also play active roles in the healing of wounds and burns, also reduction of iron absorption. The result obtained may elicit adverse physiological responses, but initial processing such as pre-warming the fruit and fermenting fruit before oil extraction from the fruit is known to significantly reduce oxalate contents of vegetables (Akwaowo *et al.*, 2000). Fermentation processes as noted by Odunfa (1985) improves nutrient value and removes anti-nutritional factors of food. The oxalate level obtained in this study 26 mg/100g is far lower than that reported for *Solanum nigrum* leaf and seeds, 78.65.0 and 58.81, 0.01 mg/100 g; 800 mg of oxalate have been reported in whole grains (Garrow and James, 1993).

Conclusion

Canarium schweinfurthii fruit warm-dried can be used as a non-conventional feed resources in diet for broiler chicken.

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