
EVALUATION OF PROXIMATE AND PHYTOCHEMICAL COMPOSITION OF *SYZYGIUM AROMATICUM* AND *TRIGONELLA FOENUM GRAECUM* AS PHYTOGENIC FEED ADDITIVES

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ABSTRACT

The study was carried out to evaluate proximate and phytochemical composition of *Syzygium aromaticum* and *Trigonella foenum graecum* as potential sources of phytogetic feed additives in poultry diet. *Syzygium aromaticum* and *Trigonella foenum graecum* were obtained, cleaned and milled into meal. Samples of the meals were subjected to laboratory analyses to determine proximate and phytochemical. Results showed that *Syzygium aromaticum* contained crude protein (CP), crude fibre (CF), ether extract (EE), ash and nitrogen free extract (NFE) of 16.40 %, 17.50 %, 16.86 %, 10.41 % and 38.83 %, respectively. *Trigonella foenum graecum* had CP, CF, EE, ash and NFE content were 5.19 %, 10.81 %, 6.13 %, 72.07 % and 4.28 % respectively. Both plants contain phytates, tannins, alkaloids, flavonoids, oxalates and saponins with flavonoids indicating the most abundant phytochemical present. In conclusion, results showed that *Syzygium aromaticum* and *Trigonella foenum graecum* contain nutrients that may be available when fed to animals in addition to their medicinal or ayurvedic properties. *Syzygium aromaticum* and *Trigonella foenum graecum* can be included in livestock diets for improved performance and balanced microbiota.

Keywords: Additives, Phytochemicals, Proximate

INTRODUCTION

Cloves (*Syzygium aromaticum*) are considered as one of the most versatile spices. They contain a large number of biologically active compounds such as eugenol acetate, and beta- caryophyllene (Jimoh *et al.*, 2017). Eugenol is the most biologically active compound in cloves and makes up 70-80% of clove (Al-Shaikh and Perveen, 2017). Clove, and its essential oil, is one of the plant extracts found useful in animal diets to improve growth performance by enhancing the intestinal microbiota population (Mohammadi *et al.*, 2014). Cloves contain high concentrations of phenolic components such as phenolic acid, flavonoids, hydroxyphenyl propane, hydroxycinnamic acid and hydroxybenzoic acids (Adefegha *et al.*, 2016). The content of these phenolic compounds may enhance many bioactivities of cloves (Ryu *et al.*, 2016).

Fenugreek (*Trigonella foenum graecum*) is an herb cultivated for its seeds majorly in Ethiopia, Morocco and other parts of the Mediterranean region. Apart from the flavouring properties of its seeds, it has been able to mark its presence in ayurvedic system of medicines since ages, owing to its nutritional and therapeutic benefits. (Khan *et al.*, 2018). The major bioactive compounds in fenugreek seeds are believed to be polyphenol compounds, such as rhaponticin and isovitexin (Khan *et al.*, 2018). Being rich in phytochemical like phenols, saponin, flavonoids, alkaloids and tannins, it has been tagged as antidiabetic, anticarcinogenic, hypocholesterolemic, antioxidant and immunological booster (Wani and Kumar, 2016). Fenugreek contains 23–26% protein, 6–7% fat and 58% carbohydrates of which about 25% is dietary fiber (Rao, 2003). Fenugreek seeds are rich in protein, fat, total carbohydrates and minerals viz. calcium, phosphorus, iron, zinc, magnesium (Weerasingha and Atapattu, 2013). Based on the medicinal value of fenugreek, it could be a possible replacement for synthetic antibiotics as a medicinal plant in monogastric diets to improve body weight gain, feed/gain ratio and reduce the cost of feed (Adil *et al.*, 2015).

MATERIALS AND METHODS

Sources and processing of *Syzygium aromaticum* and *Trigonella foenum graecum*.

Syzygium aromaticum and *Trigonella foenum graecum* were purchased from Samaru market, Zaria. The additives were cleansed of debris and milled into meal using a hammer mill before laboratory analyses

Chemical analysis of *Syzygium aromaticum* and *Trigonella foenum graecum*.

Samples of additives were analyzed for proximate composition following the methods of A.O.A.C (2005). Phytochemical composition such as phytic acid, tannin, alkaloids, saponin, phenols, flavonoids, trypsin inhibitor and oxalate were analysed. Both analyses were carried out at the Product Development Research Program of Institute for Agricultural Research (IAR), Ahmadu, Bello University, Zaria.

Result and DISCUSSION

Proximate compositions of *Syzygium aromaticum* and *Trigonella foenum graecum*.

The proximate composition of *Syzygium aromaticum* and *Trigonella foenum graecum* is presented in Table 1. The result showed that the crude protein (CP), crude fibre (CF), ether extract (EE), ash and nitrogen free extract (NFE) of *Syzygium aromaticum* were 16.40 %, 17.50 %, 16.86 %, 10.41 % and 38.83 %, respectively. This indicated that the plant contains some nutrients other than their phytochemical values. The values obtained in this study were higher than 9.17 % and 13.5 % for crude protein and crude fibre reported by Suliman *et al.* (2023). The ether extract was also higher than 16.33 % reported by Gamaliel *et al.*, (2023) and 6.40% reported by Suliman *et al.* (2023). The ash content was higher than 6.17 % reported by Suliman *et al.* (2023) but lower than 12.60% reported by Sulaiman and Anas (2017). The NFE obtained in this study is lower than the value (64.80 %) of Suleiman *et al.* (2023) and higher than 36.02 % reported by Gamaliel *et al.* (2023).

The proximate composition of *Trigonella foenum graecum* as shown indicates that the CP, CF, EE, ash and NFE were 28.55 %, 7.30 %, 4.10 %, 3.20 % and 56.85 %, respectively. This indicated that the plant contains some nutrients other than their phytochemical values. The CP was within the range (20 to 30 %) reported by Mullaicharam *et al.*, (2013). The CF value was similar to 7.40 % reported by Medina *et al.* (2020) but higher than 6.24 % reported by Kochhar *et al.* (2006). The EE content is lower than the value got by Elbushra (2012) who reported 9.49 % and higher than 6.33 % reported by Abdulrahman *et al.* (2015). Ash content was similar to 3.20 % obtained by Kochhar *et al.* (2006), lower than 6.12 % reported by Medina *et al.* (2020) but higher than 2.99 % obtained by Abdulrahman *et al.* (2015). High NFE content of fenugreek obtained from this study indicated it can be a good source of energy. NFE in spices have been suggested to be very essential in suppressing the negative effects of fatty acids and cholesterol in diets.

Table 1: Proximate composition of phytochemical feed additives

Parameters (%)	<i>Syzygium aromaticum</i>	<i>Trigonella foenum graecum</i>
Crude Protein	16.40	28.55
Crude Fibre	17.50	7.30
Ether Extract	16.86	4.10
Ash	10.41	3.20
Nitrogen Free Extract	38.83	56.85

The differences seen in the compositions of the two plants and those reported by other researchers may probably be due to various factors such as varieties, growth condition (Gamaliel *et al.*, 2023), location, climatic condition, harvest and storage (Huyghebaert *et al.*, 2011). It also could be because of the plant parts used and their physical properties (Yang *et al.* 2009).

Phytochemical composition of *Syzygium aromaticum* and *Trigonella foenum graecum*

Table 2 shows the phytochemical composition of the two plants. The components of *Syzygium aromaticum* revealed that phytate, tannins, alkaloids, flavonoids, oxalate and saponins were 0.19, 4.30, 2.00, 50.22, 0.18 and 23.45 mg/100g, respectively. These values were lower than the values reported by Sulaiman and Anas (2017) which may be due to varietal differences, location and stage of harvest. It showed that *Trigonella foenum graecum* contains phytate (0.14 mg/100g), tannins (1.15

mg/100g), alkaloids (1.64 mg/100g), flavonoids (69.25 mg/100g), oxalate (0.16 mg/100g) and saponins (21.50 mg/100g). The values obtained were lower than the values of alkaloids (1.8±0.1), tannin (63.69±1.67) saponin (25.65±0.65), but higher than the flavonoids (12.14±0.47) reported by Mahmood and Yahya (2017). The result of this study indicated that both *Syzygium aromaticum* and *Trigonella foenum graecum* had flavonoids as the most abundant phytochemical which may be responsible for their high aromatic properties. However, all the phytochemical components were within the safety level recommended for broiler chickens and rabbits according to Alagbe and Oluwafemi (2019). the concentrations of the phytochemicals are low to cause any health risk in human being. The variation in values could be due to the stage of harvesting of the plants and the methods of processing.

Table 2: Phytochemical composition of clove and fenugreek

Parameters (mg/100g)	Clove	Fenugreek
Phytates	0.19	0.14
Tannins	4.30	1.15
Alkaloids	2.00	1.64
Flavonoids	50.22	69.25
Oxalates	0.18	0.16
Saponins	23.45	21.50

CONCLUSION

In conclusion, *Syzygium aromaticum* and *Trigonella foenum graecum* contain levels of phytonutrients which may be available when fed to animals. More so, the plants contain phytates, tannins, flavonoids, alkaloids, oxalates and saponins which confer their medicinal properties. Both can be included in livestock diets for balanced microbiota and possibly improved performance.

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