EVALUATION OF AIR-DRIED LEAF OF AFRICAN ALMOND (*TERMINALIA CATAPPA)* AS A SOURCE OF NATURAL ANTIOXIDANT

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ABSTRACT
Terminalia catappa possesses several phyto-constituents associated with its antimicrobial, antiinflammatory, antioxidant and hepatoprotective activities. This research was carried out to determine the antioxidant activity of air-dried African Almond leaves by using ascorbic acid as standard, and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) as a free radical. The results of the study showed the notable antioxidant potential of air-dried Almond leaves, as evidenced by their scavenging activity, which ranged from 29.74 % to 75.48 %, exhibiting a dose-dependent relationship, with increased inhibition activity observed at higher extract concentrations from 0.2 mg/ml to 1.0 mg/ml, respectively. The findings of this study show that Almond leaves are a promising natural source of antioxidants, offering a sustainable alternative to the synthetic antioxidants widely used in foods and livestock feeds. Natural antioxidants like those found in Almond leaves are increasingly valued for their safety and potential health benefits, such as reducing the risk of chronic diseases associated with oxidative stress.

Keywords: African Almond leaf; feed additive; natural antioxidant; air-drying

INTRODUCTION
Leaf meals from local plants are gaining attention as potential additives, given their nutritional and bioactive compounds that can enhance rabbit performance while replacing synthetic antioxidants with natural sources that are easily available and safe (Windisch *et al*., 2008). Among these alternative feed sources is the African Almond (*Terminalia catappa*), known for its abundance in the tropical and subtropical regions. The leaves of *Terminalia catappa* contain bioactive compounds such as tannins, flavonoids, and saponins, which have antioxidant and antimicrobial properties (Ayoola and Adeyeye, 2010). However, drying methods of leaf meals can influence their nutritional and bioactive composition, potentially affecting their efficacy as feed ingredients. Different drying techniques, such as air drying, sun drying, and oven drying, may impact the nutrient retention of the leaf meal and the bioavailability of its phytochemicals (Nadeem *et al*., 2015). There is a rising need for the replacement of synthetic antioxidants with natural sources that are easily available and safe. Therefore, the present research work was carried out to evaluate the antioxidant potential of the African Almond leaf meal and the possibility of its inclusion as a natural food and feed additive in livestock feed.

MATERIALS AND METHODS
Source of experimental test material

African Almond leaves were collected from Gidan Kwano area, Minna, Niger State. The leaves were air-dried under shade for 7 days, and stored in polythene bags for laboratory analysis.

Preparation of the samples extract

The extract preparation of the samples was carried out by weighing (1g) of the grounded samples each into a separate conical flask. Afterwards, 100ml of ethanol was measured and added to the weighed samples in the conical flasks. The extraction was conducted for 40 minutes with the use of a digital 4-hole water bath (Model: E-Track England) at 70 degrees centigrade. The resultant extracts were allowed to cool at room temperature and filtered using a Whatman filter paper (No. 1).

Determination of antioxidant activity of test samples using the free radical scavenging assay

In the determination of the antioxidant potential of African Almond leaves, 2, 2-diphenyl1picrylhydrazyl (DPPH) was used as the standard free radical using the method outlined by (Mukherjee *et al*., 2011) with minor adjustments (by utilizing different sample extract concentrations 0.0, .0.2, 0.4, 0.6, 0.8 and 1.0 mg/ml). Ascorbic acid (vitamin C) was used as the standard control antioxidant. The concentration of 100 µM of 2, 2-diphenyl-1-picrylhydrazyl was used to dissolve methanol to a final concentration of 0.03mM. Serial dilution was made to determine the IC50 inhibitory concentration value, which is the concentration of the sample to produce 50 % reduction of free radicals. Different concentrations (0.20, g/ml) of the test material extract and ascorbic acid (the standard antioxidant) was used. An ultraviolet spectrophotometer was used to determine the absorbance at 517nm. The percentage inhibition of the samples at the different doses was calculated using the formula below;

$$\% \text{ Inhibition} = \frac{Ac - As}{Ac} \times 100$$

Where Ac = absorbance of the control

As = absorbance of the test samples

RESULTS AND DISCUSSION

Antioxidant activity of air-dried African Almond leaf is presented in Figure 1. This study highlights the prominent antioxidant potential of air-dried African almond leaves, as evidenced by their scavenging activity, which ranged from 29.74% to 75.49%. This activity is largely attributed to the presence of bioactive compounds, including phenolic acids, flavonoids, and tannins, which are well-recognized for their capacity to neutralize free radicals and alleviate oxidative stress (Balasundram *et al*., 2006). Variations in scavenging activity may be linked to differences in extract concentration and the availability of these compounds. The findings demonstrate a clear dose-dependent relationship, with increased inhibition activity observed at higher extract concentrations (0.2 mg/ml to 1.0 mg/ml). This pattern is consistent with prior studies showing that higher concentrations of plant extracts enhanced the availability of antioxidant compounds, thereby improving their free radical scavenging ability. For instance, Prior *et al.* (2005) reported similar dose-dependent responses when evaluating the antioxidant capacity of various fruits and plant extracts. Moreover, Rababah *et al*. (2011) identified high levels of flavonoids, such as quercetin and kaempferol, in Almond leaves, which might have contributed to this concentration-dependent increase in antioxidant activity. These findings suggest that African Almond leaves are

a promising natural source of antioxidants, offering a sustainable alternative to the synthetic antioxidants widely used in the food and pharmaceutical industries. Comparable dose-dependent trends have been reported in studies on Olive and Grape leaves, where higher extract concentrations were linked to enhanced antioxidant activity, further supporting the potential applications of Almond leaves in similar contexts (Silva *et al*., 2021). Additionally, natural antioxidants like those found in almond leaves are increasingly valued for their safety and potential health benefits, such as reducing the risk of chronic diseases associated with oxidative stress.

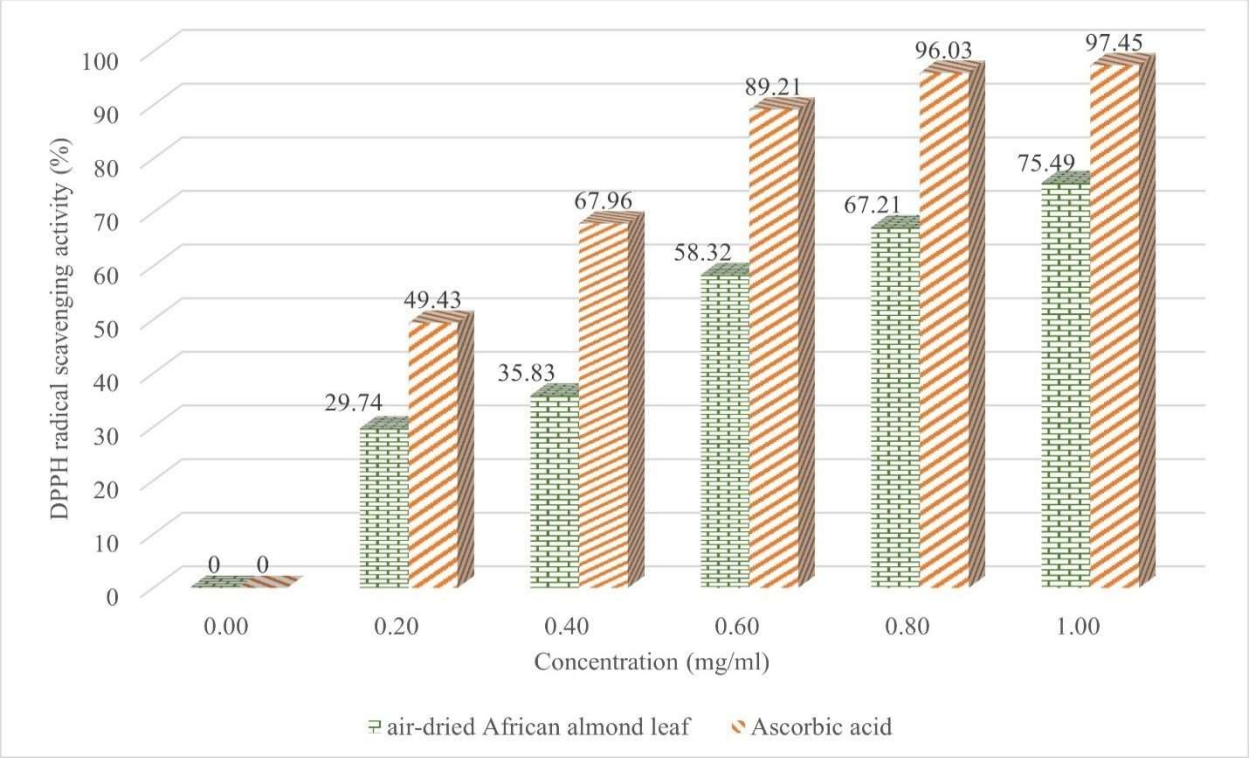

Figure 1: Antioxidant activity of air-dried African Almond leaf

CONCLUSION AND RECOMMENDATIONS

The dose-dependent scavenging activity of African Almond leaf extracts, ranging from 29.74% to 75.49%, emphasizes their potential as a valuable antioxidant source. These findings show that air-dried African Almond leaves can be used as a natural source of antioxidants in animal feed and food preservation. Future research may be conducted on isolating and characterizing the specific compounds responsible for these effects, this could enhance their practical application in commercial products.

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