

PROXIMATE ANALYSIS AND PHYTOCHEMICAL SCREENING OF DISCARDED SPOILT ORANGE INCLUDED IN THE FEED OF LIVESTOCK

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ABSTRACT

Discarded Spoilt Orange was evaluated for its proximate analysis and phytochemical composition. The phytochemical analysis indicated the presence of saponins, cardiac glycosides, tannins and flavonoids. Proximate analysis also shows that it has a high nutritional value such as carbohydrate (46.4 ± 1.50), fibre (46.4 ± 1.50), Ash (4.95 ± 0.35), fat (13.56 ± 0.00) and protein (12.70 ± 0.25). These results recommended the inclusion of discarded spoilt orange in the feed of animals in partial replacement for energy.

Keywords: Proximate analysis, Phytochemical Screening, Spoilt Orange, Livestock.

INTRODUCTION

The orange is a hybrid of ancient cultivated origin, possibly between pomelo (*Citrus maxima*) and mandarin (*Citrus reticulata*) (Nicolosi *et al.*, 2000; Peter *et al.*, 2013). Citrus is the most important fruit tree crop in the world (Spiege-Roy *et al.*, 1996). In addition to commercial production, it is widely grown for personal use in "indoor yards", roadsides, and small subsistence plots. Growing citrus for this use is extremely variable. The majority of citrus that are taken to the market are in the form of processed products such as orange juice and frozen juice concentrates. The distinct bright colour of citrus fresh fruit shows that in addition to being beneficial for healthy eyes, lungs and skin, they are also rich in wide varieties of nutrients that help prevent different kinds of disease conditions (Rinzler *et al.*, 1999).

Citrus pulp is used as a cereal substitute in ruminant feeds due to its high energy content and good digestibility in ruminant species. Fresh pulp is often used locally to feed animals. Fresh citrus pulp has natural acidity but it still is a perishable product due to its high energy content of water and soluble sugar (Rihani, 1991). Dried citrus pulp is sometimes used as a poultry bedding material and a mixture of dried citrus pulp and poultry litter have been used as a livestock feed (Gohl, 1978).

The phytochemical is often used to describe a diverse range of biologically active compounds found in plants. Phytochemical is providing

plants with odor, color, flavor and required for sustenance of life but confer extra health benefit against pathogens (Mathieu *et al.*, 2012).

In Nigeria, citrus fruit wastes are discarded carelessly in the environment, this lead to the release of odor's, serving as fertile ground for insect proliferation and generally the production of an unsightly environment with the reduced aesthetic outlook. This research was aimed at assessing the proximate, phytochemical and mineral elements composition of discarded spoil orange fruits from fruits markets in Kano State in Nigeria.

MATERIALS AND METHODS

Reagents

All reagents used in this study were of analytical grades with high purity.

Sample collection

The samples of spoilt *Citrus sinensis* (Orange) used for this research work were all bought from Yan Lemufruits market in Kano Metropolis, Kano State.

Sample preparation

The samples were cut into smaller pieces using a sharp knife which is then sundried. The sundried spoilt orange is grinded using grinding machine, the grounded samples were stored in a labeled air tight container kept in a cooler place and used immediately for subsequent analysis.

Proximate Analysis

Standard methods of the (AOAC, 1984), were used to determine the moisture content, crude

protein, crude fat, total ash and crude fiber content. Moisture content was determined by heating five grams of the sample to a constant weight in a crucible placed in an oven maintained at 105°C. The dry matter was used in the determination of the other parameters. Crude protein (% total nitrogen $\times 6.25$) was determined by using Kjeldahl method, using five grams; crude fat was obtained by exhaustively extracting five grams of the sample in a soxhlet apparatus using petroleum ether (boiling point range 40-60°C) as the extractant. Ash was determined by the incineration of six grams placed in a muffle furnace maintained at 550°C for five hours. Crude fiber was obtained by digesting four grams of sample with H₂SO₄ and NaOH and incinerating the residue in a muffle furnace maintained at 550°C for five hours. Total carbohydrate content was obtained by difference. Each analysis was carried out in triplicate.

Phytochemical screening

Qualitative assay, for the presence of plant secondary metabolites such as reducing sugar, saponins, anthracene glycosides, de-oxysugar cardiac glycosides, tannins, flavonoids and alkaloids were carried out on the grounded powder of discarded spoilt orange following standard procedure (Harbone, 1973; Trease and Evans, 2003) and adopted by Peter *et al.* (2013).

Statistical analysis

Data collected was subjected to WASP statistical software. The results are expressed as mean $\pm$ standard deviation (SD). One-way analysis of variance (ANOVA) was employed for between and within group comparison while student's *t*-test was used for paired comparison. 95% level of significance ($P=0.05$) was used for the statistical analysis.

RESULTS AND DISCUSSION

The proximate analysis result is shown in table 1, while the phytochemical screening result is shown in table 2 below. It represents the Mean triplicates and standard deviation.

The proximate analysis revealed high energy value that can replace energy feed ingredient used in feed formulation. Orange peel has been included in the diets of ruminant especially in those areas where its production is high (Megias *et al.*, 1993). Nutritional trials with monogastric animals have shown that the meal of sun dried

peels of *Citrus sinensis* can replace dietary maize in poultry diets for up to 20% (Agu, 2006) and 40% in rabbits (Oluremi *et al.*, 2005) without any adverse effect on their performance. Sweet orange fruit (peel) have been tested to contain a good source of calorie and protein comparable with maize from our research work and other sources (Oluremi *et al.*, 2006).

The phytochemical screening of discarded spoilt orange revealed the presence of cardiac glycosides, saponins, cardiac glycosides, tannins and flavonoids. Poly methylated flavonoids are class of compounds found in citrus peel and produce no negative side effect in the animals feed, the polymethylated flavonoids contain diets (Davies, 2004). The flavonoids have been reported to function as pigments and antioxidants (Kumar, 1991) and can inhibit enzymes in mammals (Holiman, 1997). Deoxysugars cardiac glycosides are oligosaccharides (carbohydrates) made up of between two and ten monosaccharides units joined together by glycosidic bond. It functions in animals system as follows; Source of heat and energy to their body, Spare protein, hence prevent its wastage, Add bulk to the bowel thereby acting as mild laxative. This is carried out by roughages or dietary fibres, Give flavor and variety to the animals; they assist in the complete oxidation of fats in the body, and finally, forms components of the hereditary principles e.g. deoxyribonucleic acid (DNA).

Methylated flavonoids are incomplete protein of plant origin vegetables, cereals and legumes. They are essential amino acid; this amino acid cannot be produced by the body and therefore must be present in the protein food consumed. There are nine essential amino acids which flavonoid and methionine are among others include valine, leucine, isoleucine, lysine, phenylalanine, tryptophan, threonine and histidine. The functions of flavonoids are; they promote growth, Repair worn out tissues, Serve as source of energy in the absence of carbohydrates and fats, Build hormones that assist in the regulation of body processes and Build antibodies that fight infections and diseases.

Tannins which usually give rise to dry, pickery, astringent sensation in the mouth was found in the sample. This is also found in the cereal and legumes reported to have depressed the growth

rate, resulted in a poor feed efficient ratio and ruminant dietary condensed tannins of 2-3% have been shown to impact beneficial effects because they reduce the wasteful protein degradation in the rumen by the formation of a protein tannin complex (Barry, 1987). Saponin are bitter and reduce the portability of livestock feeds, the saponin content of the peel meals were observed to be apparently below 3% where conferred the result of Kumar (1991). The ash content is also high which indicate the presence of minerals

CONCLUSIONS

It can be concluded that the discarded spoilt orange meal can fully replace any energy source (carbohydrate) including maize, sorghum, wheat in the diet of livestock. A further study should be carried out on the mineral content of the discarded spoilt orange meal and to encourage production of citrus fruit peel meal to replace maize during dry farming period and all year round.

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Table 1: Percentage proximate composition of discarded spoilt orange

Nutrient	Concentration (mean±SD)
Crude fibre	11.80 ± 0.20
Crude Protein content	12.70 ± 0.25
Ash content	4.95 ± 0.35
Total Moisture content	10.50 ± 0.20
Carbohydrate	46.4 ± 1.50
Crude Fat	13.56 ± 0.00
Calcium (cmol/kg)	4.05 ± 0.20
Phosphorus (mg/kg)	13.89 ± 0.5
Energy value = 359.85	

Table 2: Phytochemical Screening Analysis of Ethanol and Chloroform of Discarded Spoiled Orange

Reaction	Alkaloid	Flavonoid	Tannins	Saponin	Cardiac glycosides
Ethanol	-	+	+	+	+
Extract		++ve	++ve	++ve	++ve
Chloroform	-	+	+	+	+
Extract		++ve	++ve	++ve	++ve

Note key: + presence, ++ highly present and – absent