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Phytochemical Constituents and Proximate Analysis of Orange Peel (*citrus Fruit*)

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ABSTRACT

Orange peels obtained from unripe oranges were analyzed for its proximate and phytochemical constituent's present using standard recommended procedure. The moisture content was found to be 10.00%+0.01, ash content 5.51%+0.02, fat 14.35%+0.01, protein 16.40%+0.39, crude fiber 12.47%+0.54 and carbohydrate 40.47+0.37%. The phytochemical constituents indicated alkaloid 0.60%+0.10, phenol 0.07%+0.06, tannin 7.40%+0.06, flavonoid 0.16%+0.01 and saponin 1.70%+0.06. The presence of secondary metabolites in the orange peels are good indication that if the peel is subjected to intensive research, bioactive compounds with strong biological activities may be isolated, characterized using various spectroscopic techniques and novel compounds may also be discovered.

Keywords: orange peel, proximate, phytochemicals.

INTRODUCTION

Orange (citrus fruits) trees are widely grown in tropical and subtropical climates for their sweet fruit. Traditionally, the epicarp, when dried, it can be burnt in the room to serve as mosquito repellant. A lot of research work has been carried out on the citrus lemon depending on the source, but the peel of the unripe fruit in my locality has not been examined for its proximate and phytochemicals as these parameters are being influenced by environmental factors such as soil nature, climate etc.

MATERIALS AND METHODS

Source of the sample: the orange fruits were bought in our local market in Isinigbo, Ondo State, Nigeria on the 10th of November, 2013.

Proximate Analysis

Standard methods of the [1], (AOAC) 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^{0}C. The dry matter was used in the determination of the other parameters. Crude protein (% total nitrogen ×6.25) was determined by the 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^{0}C) as the extractant. Ash was determined by the incineration of six grams placed in a muffle furnace maintained at 550^{0}C for five hours .Crude fiber was obtained by digesting four grams of sample with H_2SO_4 and NaOH and incinerating the residue in a muffle furnace maintained at 550^{0}C for five hours. Total carbohydrate content was obtained by difference. Each analysis was carried out in triplicate and Anova statistical method was used for the statistical analysis.

PHYTOCHEMICAL ANALYSIS

(a)**Tannin determination**: Finely grounded sample was weighed (0.2g) into a 50ml sample bottle. Ten of 70% aqueous acetone was added and properly covered. The bottle was put in an ice bath shaker and shaken for 2hours at 300oC .The solution was then centrifuge and the supernatant stored in ice, 0.2ml of the solution was pipette into the test tube and 0.8ml of distilled water was added. Standard tannin acid solution was prepared from a 0.5mg/ml of the stock and the solution made up to 1ml with distilled water, 0.5ml of Folinciocateau reagent was added to the sample and standard followed by 2.5ml of 20% Na_2CO_3 the solution was then vortexed and allow to incubate for 40minutes at room temperature, its absorbance was read at 725nm against a reagent blank concentration of the same solution from a standard tannic acid curve prepared[2], (Markkar).

(b) Saponin determination: The spectrophotometric method of[3], (Bruneton). Two gram of the finely grinded sample was weighed into a 250ml beaker and 100ml of Isobutyl alcohol was added. Shaker was used to shake the mixture for 5hours to ensure uniform mixing. The mixture was filtered using No 1 Whatman filter paper into 100ml beaker containing 20ml of 40% saturated solution of magnesium carbonate. The mixture

obtained again was filtered using No 1 Whatman filter paper to obtain a clean colorless solution. One (1ml) was added into 50ml volumetric flask using pipette, 2ml of 5% iron (iii) chloride ($FeCl_3$) solution was added and made up to the mark with distill water. It was allowed to stand for 30min for the color to develop. The absorbance was read against the blank at 380nm.

$$\text{Saponin} = \frac{Absorbance of sample \times concentration of standard}{Absorbance of standard} \quad \text{--1.}$$

(c) Alkaloid determination: Five gram of the sample was weighed into a 250ml beaker and 200ml of 10% acetic acid in ethanol was added and allowed to stand for 4minutes, this was filtered and extract was concentrated on a water bath to one quarter of the original volume. Concentrated ammonium hydroxide added drop wise to the extract until the precipitation was completed. The whole solution was allowed to settle and the precipitate was collected and washed with dilute ammonium hydroxide and then filtered. The residue was alkaloid which was dried and weighed[4], (Harbone).

$$\% \text{ Alkaloid} = \frac{W_3 - W_2}{W_1} \times 100\% \quad \text{----------2.}$$

Where: W1 =initial weight of sample, W2 =weight of the extract, W3 = final weight of the residue.

(d) Total Flavonoid Determination

Ten gram of the sample was extracted repeatedly with 100ml of 80% aqueous methanol at room temperature. The whole solution was filtered using Whatman filter paper No. 42 (125mm). The filtrate was transferred into crucible and evaporated into dryness over water bath and weighed to a constant weight [5] (Bohm).

(e) Determination of Phenol

The fat free sample was boiled with 50ml of ether for the extraction of the phenolic component for fifteen minutes. Five ml of the extract was pipette into a 50ml flask and then 10ml of distilled water was added. Two milliliter of ammonium hydroxide solution and 5 ml of amyl alcohol were added to the sample and made up to the mark. It was left to react for 30 minutes for colour development; the absorbance was measured at 550nm.

RESULTS AND DISCUSSION

Table 1: Result of the proximate analysis of the Orange peel

Parameters	% Composition
Moisture content	10.30 ± 0.01
Ash content	5.51 ± 0.02
Fat	2.78± 0.01
Protein	16.51±0.40
Crude fiber	12.47± 0.54
Carbohydrate	40.47 ± 0.37

The result of proximate composition (Table 1) shows that the moisture content of the sample was (10.00±0.01). This is expected since the sample has been subjected to drying for five days to reduce the moisture content. High moisture content is an index of spoilage, the protein content was (16.40 ±0.39), also the crude fiber was (12.47±0.54), the fat content was (14.35±0.42) which showed that the orange peel contained much oil and the carbohydrate content by difference was (40.47 ± 0.37).

Table 2: result of the phytochemical analysis of the Orange peel

Parameters	% phytochemicals
Alkaloid	0.60±0.01
Phenol	0.07 ±0.06
Tannin	7.40±0.06
Flavonoid	0.16± 0.01
Saponin	1.70±0.06

The result of phytochemical analysis in percentages (table 2) shows that orange peel has alkaloid (0.60±0.01), phenol (0.07±0.06), tannin (7.40±0.06), flavonoid (0.16 ±0.01) and saponin (1.70 ±0.06). The phytochemical test of orange peel showed that the plant peel is very rich in secondary metabolites especially tannin and the secondary metabolites were present in different concentrations [3&6] (Bruneton and Amabeoku).

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