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Nutritional Potential of *Citrus Sinensis* and *Vitis Vinifera* Peels

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ABSTRACT

The nutritional potential of the peels of *Citrus sinensis* and *Vitis vinifera* was assessed by determining proximate and mineral composition. Results indicate carbohydeate content of the peels of *Citrus sinensis* and *Vitis vinifera* as 61.07% and 71.77% respectively. Other findings are crude fibre, 13.51% and 4.96%, proten, 3.73% and 11.35%, fats, 10.34% and 1.16%, moisture, 9.78% and 6.52% and ash 1.57% and 4.24%, for the *Citrus sinensis* and *Vitis vinifera* respectively. Mineral analysis revealed the order K>Ca>Mg>Na>Fe in the *Citrus sinensis* and K>Mg>Fe>Na>Ca in the *Vitis vinifera*. These results suggest that peels of *Citrus sinensis* and *Vitis vinifera* to be nutritive.

Keyword: *Citrus peels, proximate and mineral composition*

INTRODUCTION:

Grapes and Sweet orange are citrus fruits which consist of two parts namely the peels (rind skin) and pulp. These two parts are easily separated from each other with the pulp serving as the edible parts of the fruit while the peels as waste. Citrus fruits are mainly used by juice processing industries while the peels are generally wasted in the industries. A large amount of oranges byproduct wastes arising from peels have given scientists some sense of concerns in ways this can utilize into useful products. From waste materials, there is always an increased attention in bringing useful products and citrus wastes are no exceptions. The citrus peels have been studied by many researchers in order to curtel environmental pollution from them as well as nutrient contents but none has been done on citrus peel from Ebonyi State, Nigeria as these parameters are being influenced by environmental factors [1]. Research has shown that citrus peels are rich in nutrients and phytochemicals; they can also be efficiently used as drugs or as food supplements [2].

Proximate contents	*Citrus sinensis*	*Vitis vinifera*
Moisture	9.78±0.04	6.52±2.44
Crude fibre	13.51±0.11	4.96±0.02
Crude protein	3.73±0.03	11.35±0.00
Ash	1.57±0.03	4.24±0.04
Fat	10.34±0.04	1.16±0.01
Carbohydrate	61.07±0.09	71.77±0.04

In the present study, the proximate and mineral constituents of peels of *Citrus sinensis* and *Vitis vinifera* were assessed for nutritional value.

MATERIALS AND METHODS

Materials

Fresh fruits of citrus sinensis and vitis vinifera were purchased at meat market in Abakiliki, Ebonyi State Nigeria in the month of August, 2014. The plant samples were identified and authenticated by Taxonomist in the Department of Applied Biology, Ebonyi State University, Abakaliki, Ebonyi State, Nigeria. All chemicals and reagents were of analytical standard.

Preparation of plant material

The peels of citrus sinensis and Vitis vinifera were cbtained from the fruits and shade dried at room temperature (28±3ºC). The dried peels were pulverized into fine powder using manual grinder.

METHODS

Proximate analysis:

The standard method of AOAC [3] was used. This was used to determine the major components of food, which include moisture, crude protein, lipids (fats), ash (mineral), crude fibre, carbohydrate and dry matter values.

Measurement of selected minerals

The selected minerals; sodium, potassium, calcium, magnesium and iron were determined using Atomic Absorption Spectrophotometer (AAS) based on Association of Official Analytical Chemist A.O.A.C., [3].

STATISTICAL ANALYSIS

The data was analyzed by ANOVA and results expressed as means and standard deviation.

RESULTS

Table 1: Results of proximate contents of C. sinensis and V. vinifera peels (g/100g) dry weight.

It showed that the peels contained variable amounts of proximate constituents with C. sinensis having high levels of carbohydrate, crude fibre, fat and moisture with low levels of ash and crude protein while V. vinifera had high levels of carbohydrate, crude protein and moisture, moderate levels of crude fibre and ash with low level of fat.

Values are mean±standard deviation of triplicate determination

Table 2: Results of mineral compositions of *C. sinensis* and *V. vinifera* peels (mg/kg) by AAS.

It indicated that *C. sinensis* contained higher amounts of K and Ca, moderate amount of Mg with low amount of Na and Fe while *V. vinifera* had higher amounts of higher amounts of K, Mg, and Fe with moderate amounts of Na and Ca.

Minerals	Citrus sinensis	Vitis vinifera
Na	2.67±0.06	12.47±0.01
K	204.33±0.58	280.05±0.07
Ca	151.00±1.00	8.45±0.00
Mg	18.33±1.15	95.84±0.04
Fe	0.74±0.01	22.60±0.00

Values are mean±standard deviation of triplicate determination

DISCUSSION

Proximate cntent of peels of *C. sinensis* and *V. vinifera* is as presented in Table 1. Crude fibre, fat and moisture contents were higher in the *C. sinensis* compared to the *V. vinifera* while in *V. vinifera* carbohydrate, crude protein and ash were higher. Thus, in both peels, carbohydrate content was higher when compared to other nutrients. It is quite clear from the result in table 1 above, that there is good reason why goat and other herbivous animals enjoy peels from citrus fruits. The carbohydrate, crude fibre, ash, moisture and fat content of the *C. sinensis* (61.07, 13.51, 1.57, 9.78 and 10.34%) are similar to the values reported by Adewole *et al*. [1] on orange peel from Ondo State, Nigeria but disagree with protein content. Also, the obtained results are in line with the work of Al-Saadi *et al*. [4] on orange peel from Baghdad. On the same hand, the results are in agreement with the work of Osarumwense *et al*. [5] who reported that orange peels contained high carbohydrate (42.90), fibre (26.50), and fat (10.00) with low protein (4.05). The results gotten are in contrary with research of Assa *et al*., [6] where he reported low fat content in green and yellow orange peels and in consonance with the same work on protein and ash contents. Also, the report of Sousa *et al*. [7] on chemical composition and bioactive compounds of grape pomace (*Vitis vinifera* L.), Benitaka variety, grown in the semiarid region of Northeast Brazil is not in consonance with the result obtained in this study.

Mineral element analysis as shown in Table 2 indicates that *V. vinifera* contains high levels of potassium, magnesium, iron and sodium but relatively low level of calcium when compared to C. sinensis. The results of mineral contents of orange peels agreed with the report of Assa *et al*. [6] who reported that green and yellow orange peels had high amounts of K (1565 and 1490), Ca (470.5 and 490.5) and Mg (62.98 and 41.83). The report of Muhammad *et al*. [8] on Elementals Composition of *Sclerocarya birrea* Fruit (mg/100g DW) compared favorably with the results obtained from C. sinensis and *V. vinifera. The result of* Sousa *et al*. [7] on mineral contents of *Vitis vinifera* L from Brazil disagree with the result obtained in this study. It was found that mineral contents of the study campared favorably with the report of Abara [9] on Mineral element content of *Dioscorea bulbifera* peels.

CONCLUSION:

This study showed that peels of *C. sinensis* and *V. vinifera* from Ebonyi state, Nigeria contain appreciable levels of nutrients. The study further revealed that it is a good source of proximate and mineral contents.

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