Comparative Study of Properties and Compositions of Three Varieties of Melon Seed Flour in Ebonyi State of Nigeria

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ABSTRACT

A comparative study of the functional properties, proximate compositions and phytochemical compositions of white, black and isekele varieties of melon seed flour that are cultivated in Ebonyi State of Nigeria was determined in this study. The results showed that the isekele melon variety has higher emulsion, water absorption and foaming capacities than the other two varieties.

The foaming capacity of the melon seed flours was the lowest among the functional properties. The white melon variety has the highest carbohydrate, fat and crude fibre contents. The black melon variety has higher flavonoid and alkaloids contents more than the other two varieties. The saponin content was higher in the isekele melon variety. The findings indicated that the melon seed flour could be a good aroma agent, and a flavour retainer that could be used to improve mouth feels for food. It could be a good source of food and dietary oil, and could be helpful in the protection of blood vessels against rupture and leakage, as well as in the treatment of hyper calcium in human beings.

Keywords/ Index Term— Melon seed flour, Functional properties, Proximate composition, Phytochemical composition.

1. INTRODUCTION

Melon seed is an excellent vegetable protein that contains essential vitamins and minerals in proper proportion. It complements starch and grain diet in African homes and is ideal for battling nutritional debilitations. Melon is cultivated in West Africa [1, 2] as a major source of food [3]. Numerous researchers [4-13] have contributed greatly towards knowing more about the properties and composition of melon seed.

Egbebi [14] carried out proximate and mineral analyses to determine the chemical composition of Cucurbit species of melon seeds in Osun State. The results showed that protein, fat, ash, and moisture contents of the flour ranged from 33.09 - 39.82 %, 44.00 - 55.00 %, 3.15 - 3.75 %, 1.41-1.55 %, respectively with significant differences in the values for the varieties. The findings showed that oil sample from L. siceraria is more nutritious than oil from the other two samples (C. vulgaries, and C. manni) due to its high protein content and ash content.

Akusu and Kiin-Kabari [15] conducted a comparative study on the physicochemical and sensory properties of watermelon and melon seed flours in Rivers State. The results indicated that the equal proportions of watermelon/melon seed flours had higher crude protein of 27.73 % and crude fat of 47.85 % than the watermelon seed and melon seed flours. There was no significant difference in the sensory properties: in appearance, taste, thickness and overall acceptability of egusi soup from melon seed flour and 50:50 flour sample, which indicated that watermelon seed flour can be used to replace 50 % melon seed flour in of egusi soup preparation.

Peter-Ikechukwu et al. [16] compared the natural fermentation process of five melon seed varieties (citrullus vulgaris, citrullus lanatus, colocynthis citrullus, cucurbita pepo, and cucumeropsis edulis in Imo State. The results of functional properties showed variations in behaviour.

Although previous researchers have studied melon seed flour, there is little literature on the properties and compositions of the melon seed flour that is cultivated in Ebonyi State, Nigeria. Therefore, this study seeks to compare the functional properties, proximate composition and phytochemical composition of the three varieties of melon seed flour in Ebonyi State of Nigeria.

2. MATERIALS AND METHODS

Three melon varieties, namely: white melon (ahu ocha), black melon (ahu agba) and isekele melon seeds that were sourced from the local farms in Ngbo town in the Ohaukwu local government area of Ebonyi state were used for the study. The melon samples were de-husked, sieved, screened, sun-dried, ground using a mechanical grinder; the obtained flour stored in an airtight polyethylene bag, kept inside containers and labelled. The test programme is shown in Figure 1.

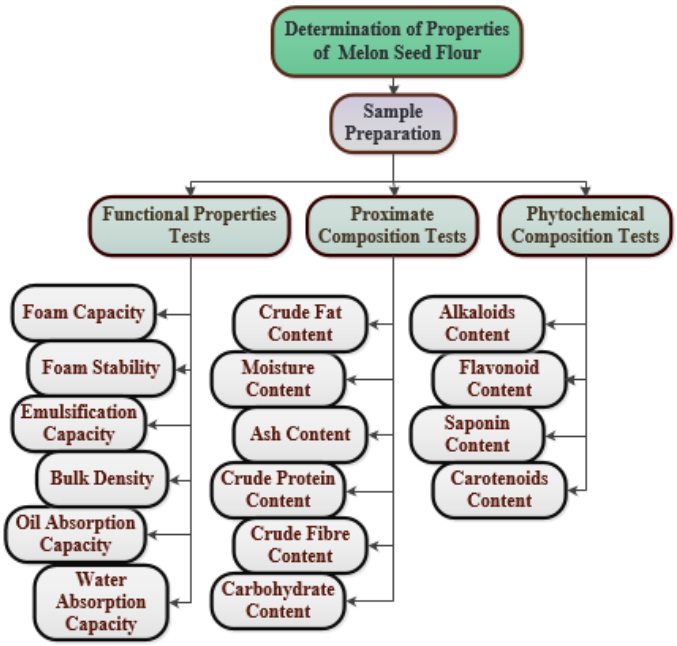

Fig - 1: Test program for determining properties of melon seed flour

Foam capacity, foam stability, and emulsification capacity, were determined according to the method described in Abbey and Ibeh [17], Ahmad and Chmidt [18], and Padmashree et al. [19] respectively. The water/oil absorption capacity and the bulk density were determined in line with the method adopted in Onwuka [20]. The moisture, ash, crude protein, crude fat, and crude fibre contents were extracted according to AOAC [21]. The carbohydrate content was determined using the method of Cordenunsi and Lajolo [22]. The flavonoid, saponin and alkaloid determination were in line with the method described by Harborne [23].

3. RESULTS AND DISCUSSION

The results of the functional properties of the three varieties of melon seed flour are presented in Figure 2. The results showed that the isekele melon variety has higher emulsion, water absorption and foaming capacities than the other two varieties. The white melon variety has a higher oil absorption capacity and bulk density more that the other two varieties. The emulsion, oil absorption, water absorption, and foaming capacities of the three varieties of the melon seed flour ranged from 60.5 – 70.5 %, 32.5 – 34.1 %, 18.6 – 30.9 %, 0.02 – 0.07 % respectively. The bulk density ranged from 1.29 – 1.62 g/ml.

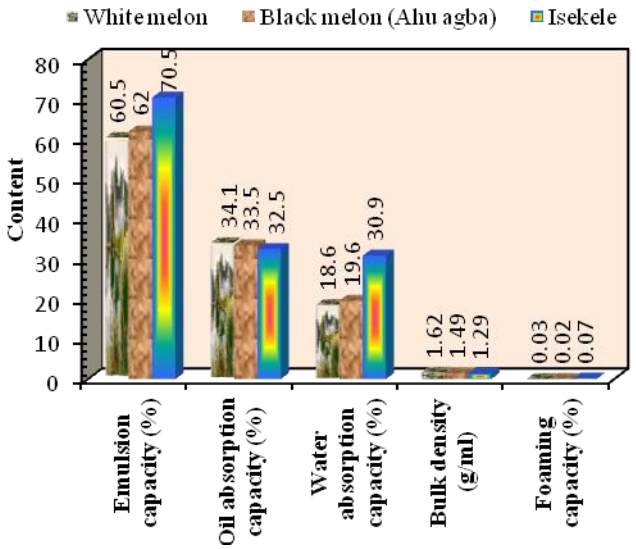

Fig - 2: Functional properties of three varieties of melon seed flour

The foaming capacity of the melon seed flours was the lowest among the functional properties, probably due to the inadequate electrostatic repulsions, less solubility and excessive protein-protein interactions as reported earlier in [24]. The emulsion capacity of the three varieties is higher than the values recorded in [25] for calabash seed flour; the foaming capacity value was lower relative to the value submitted by Arawande and Borokini [26]. The difference could be because of the peculiarity of the melon seeds that are that are cultivated in Ebonyi State of Nigeria, and the geographical region difference coupled with changes in climate condition. The oil absorption capacity is near to the value reported in [27]. The functional properties of the three

varieties suggest that the melon seed flour could be a good aroma agent, and a flavour retainer that could be used to improve mouth feels for food. The melon seed flours could be an essential component of confectionery products where hydration to improve handling is desired [28].

The results of the proximate composition of the three varieties of melon seed flour are presented in Figure 3. The results indicated that the white melon variety has higher carbohydrate, fat and crude fibre contents more than the other two varieties. Protein and ash contents were higher in the isekele melon variety relative to the other varieties. The moisture content was higher in the black melon compared to the white and isekele melon varieties. All the three varieties recorded low moisture content values, which is a good indication that the three varieties of the melon seed flour have a long shelf life, which is a desirable advantage of the product stability when packaged and stored properly as supported by Sanful et al. [29].

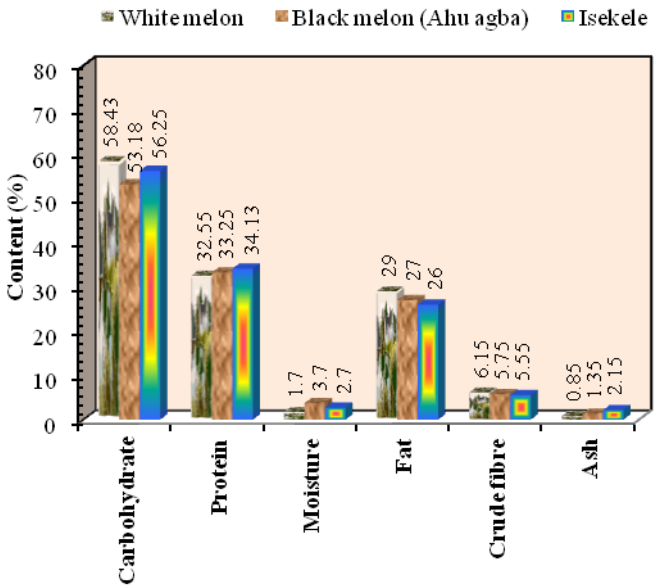

Fig - 3: Proximate composition of three varieties of melon seed flour

The protein and fat contents are within the range reported in [3, 30]. The crude fibre content is higher than the values reported in [31], while the ash content is lower than the value recorded in [30]. The proximate composition of the three varieties of the melon seed flour proved that the melon could be a good source of food and dietary oil.

The results of the phytochemical composition of the three varieties of melon seed flour are presented in Figure 4. The results showed that the black melon variety has higher flavonoid and alkaloids contents more than the other two varieties. The saponin content was higher in the isekele melon variety, while the carotenoid content was higher in the white melon variety relative to the other melon varieties.

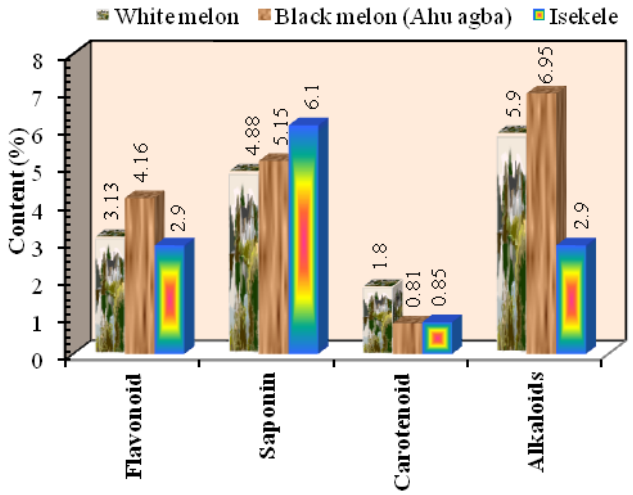

Fig – 4: Phytochemical composition of three varieties of melon seed flour

The flavonoid content in the three varieties is higher than the value reported in [32] for African eleme. The findings suggest that the flour could be helpful in the protection of blood vessels against rupture and leakage. It could be useful in the treatment of hyper calcium in humans [33]. Nevertheless, the flour should be cooked very well to avert the danger of contracting cardiovascular disease due to the alkaloid content, since food with high content of alkaloid has a negative effect on humanity [34-36].

4. CONCLUSIONS

A comparative study on properties and compositions of the three varieties of melon seed flour in Ebonyi State in Nigeria was conducted. The results showed that the isekele melon variety has higher emulsion, water absorption and foaming capacities than the other two varieties. The findings indicated that the melon seed flour is a good aroma agent, and a flavour retainer that could be used to improve mouth feels for food. It could be a good source of food and dietary oil, and could be helpful in the protection of blood vessels against rupture and leakage, as well as in the treatment of hyper calcium in human beings.

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