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Research

PRODUCTION, NUTRITIONAL AND SENSORY PROPERTIES OF CASSAVA-WHOLE WHEAT PANCAKE

Ajiboso, Oreka Meka

Department of Food & Technology, Federal Polytechnic, P.M.B 55 Bida, Niger State.

Correspondence should be addressed to: semiuajiboso@gmail.com

Abstract: The study on nutritional and sensory properties of pancake using cassava and whole wheat flour blend of four (4) different ratios was carried out and the following parameters were determined; the proximate composition and sensory evaluation. Proximate analysis of cassava-whole wheat flour was evaluated on four samples at different ratio (100:0, 95:5, 90:10, 85:15) respectively. The % moisture content ranged from 52.00% to 60.00% where sample A had the highest value (60.00%) while sample B had the lowest value (52.00%) in moisture content, % cash content ranged from 0.50% to 1.01% in which sample D and B was having the highest value of ash content (1.01%) while Sample A had the lowest value, the percentage protein content ranged from 10.50% to 11.90% where sample B had the higher value (11.90%), while sample D had the lowest value (10.50%). The % fat content ranged from 11.00% to 13.50%, the highest value was sample C (13.50%) and the lowest value in sample B (11.50%), % crude fibre ranged from 0.05% to 1.50% with sample D having the highest value (1.50%) and sample A and B having the highest value (1.50%) and sample A and B having the lowest value (0.05%). The % carbohydrate ranged from 16.56% to 24.04% among the samples and energy value ranged from 215.3kcal/100g to 221.08kcal/100g. Thus, there were significant differences ($p<0.05$) in the proximate and sensory qualities among the samples. Nutritionally and organoleptically acceptable pancake was successfully produced from whole wheat-cassava flour. More research works should be carried out on whole-wheat cassava flour pancake in terms of its functional properties and physio-chemical properties.

Keywords: Local Snack, Organoleptic, Nutrition, Property.

INTRODUCTION

Pancakes are starch-based products prepared by pouring batter onto a hot solid surface and cooking until Solid. The batter usually consists of eggs, flour, milk or water and oil or melted butter. Pancakes consumed in Nigeria are product of family preparation. It is

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consumed on occasions and on holidays. Several names are given to this type of preparation such as Baghrir, Gharif, Korsa etc. The term pancakes refers to many preparations cooked traditionally in Nigeria and other countries of the world (Gocmen *et al.,* 2009).

Pancakes are also found in most restaurant breakfast menus across the united states and in most all-purpose cookbooks. There are numerous convenience commercial mixes available in grocery stores that require only the addition of liquid and eggs. They can also be found fully cooked and ready for microwave in the frozen section of grocery store (Birt *et al.*, 2010).

Cassava is a major staple crop in Nigeria, as cassava and its products are found in the daily meals of Nigerian. Currently, cassava is undergoing a transition from a mere subsistence crop found on the field of peasants to a commercial crop grown in plantations. This unprecedented expansion of this crop is attributed to its discovery as a cheap source of edible carbohydrate that could be processed into different forms of human delicacies and animal fees. Cassava is drought-tolerant, staple food crop grown in tropics and sub-tropical areas. Cassava is to Africa peasant farmers what rice is to Asian farmers or wheat and potatoes are to European farmers. Cassava (*Manihot esculenta)* is a perennial woody shrub with an edible roots which grown in tropical and subtropical areas of the world. Cassava plays a particular important role in agriculture in developing countries especially in Sub-sahara Africa, because it does well on poor soils and with low rainfall and because it is perennial crop that can be harvested as requires, it wide harvesting window allow it to act as a famine reserve and invaluable in managing labour schedules. It offers flexibility to resources poor farmers because it serves as either subsistence or cash crop (Stone, 2002).

Furthermore, cassava is the source of raw materials for a number of industrial products such as starch, flour and ethanol. The production of cassava is relatively easy as it is tolerant to the biotic and edaphic encumbrances that hamper the production of other crops. Cassava's root are used only to store energy unlike the root of sweet potatoes and yam that are reproductive organs. Despite their agronomic advantages, root crops are far more perishable than the other staple food crops once out of the ground. Some root crops have a shelf-life of only few days, roots has living organs of plants continue to metabolize and repair after harvest. Cassava has a shelf life that is generally accepted to be of the other of 24 to 48 hours after harvest (Andrew, 2002).

Wheat is the most important staple crop for more than one third of the world population and contributed more calories and protein to the world diet than any other cereal crops (Abd-El-Haleem *et al.,* 1998). It is nutritious, easy to store and transport and can be processed into various types of food. Wheat is considered a good source of protein, minerals, B-group vitamins and dietary fibre (Shewry *et al.,* 2007). Although the environmental conditions can affect nutritional composition of wheat grains with its essential coating of bran, vitamins and minerals; it is an excellent health-building food. Wheat flour is used to prepare bread, produced biscuit, confectionary products, noodles and vital wheat gluten or setan. Wheat is also used as animal feed, for ethanol production, brewing of wheat bear, wheat based raw materials for cosmetics, wheat protein in meat substitutes and to make wheat straw composites. Wheat germ and wheat bran can be a good source of dietary fibre helping in the prevention and treatment of some digestive disorders.

The aim of this research work was to determine the proximate and sensory properties of pancake produced from cassava and whole wheat flour blend.

MATERIALS AND METHODS

Sources of Materials

Cassava *(Manihot esculenta)* and wheat *(Triticum aestivan L.)* will be purchased from Bida central market, Niger State.

Other Ingredients

Milk, sugar, salt, egg and pepper were purchased from Bida central market.

Other Equipments

Other equipments to be used for the practical are:

Gas cooker, attrition mill, sieve, spoons, plates, whisker, frying pan and bowl.

Methods

Processing of Cassava flour

The cassava tubers was thoroughly washed to remove the adhering soils and the outer layers, it was peeled off using knives and subsequently processed. The peeled cassava was grated using traditionally improvised grater, thereafter, it was allowed to ferment by soaking for two(2) days and drained out and thoroughly washed, sun-dried and then milled into fine flour prior to use.

Processing of Whole-wheat flour

Wheat flour was prepared by using the method described by Rawl and Krojj (2003). Wheat was sorted to remove particles and thoroughly washed in clean tap water. It was then

soaked for 30 minutes and drained so as to inactivate the trypsin inhibitor, followed by dehulling using attirion mill, the wheat was winnowed to remove the hull and then sundried sample was milled into fine powder and sieved and finally packaged and store prior to use.

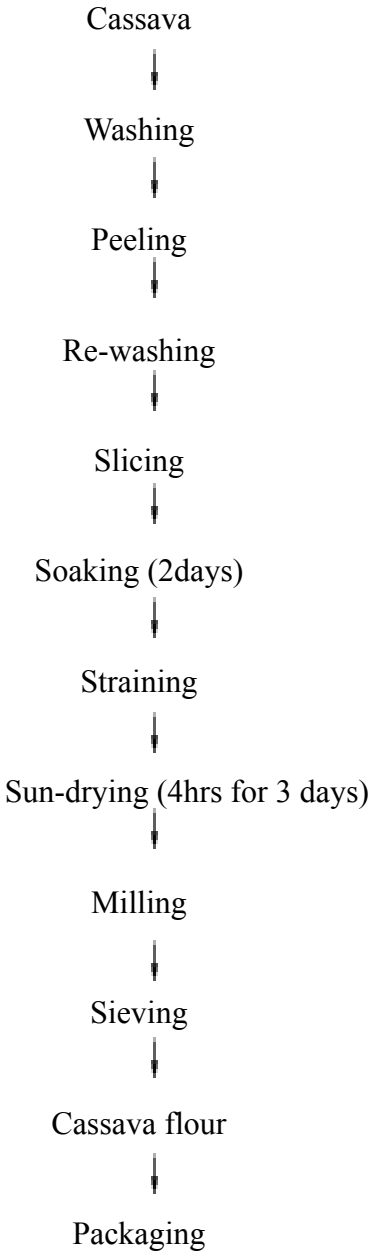

Fig. 3.1: Flow chart for the production of cassava flour (Birt, 2010).

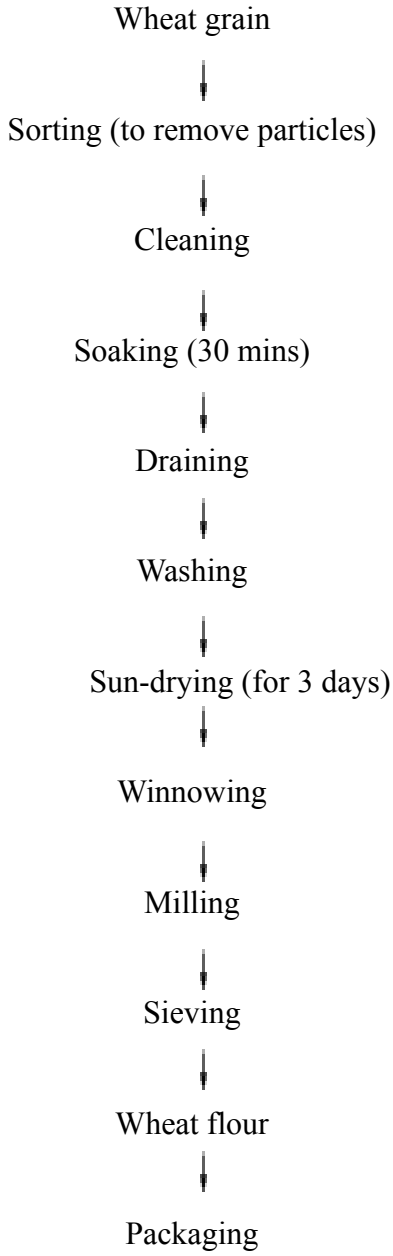

Fig. 3.2: Flow chart for the production of wheat flour (Birt, 2010).

Formulation of Blends

Samples	A	B	C	D
Whole wheat flour	100%	95%	90%	85%
Cassava flour	0%	5%	10%	15%

KEY: A = 100% whole wheat flour; B = 95% whole wheat flour: 5% cassava flour; C = 90% whole wheat flour: 10% cassava flour; D = 85% whole wheat flour: 15% cassava flour.

DETERMINATIONS

Proximate Analysis

Sensory Evaluation

Sensory evaluation of the blends was carried out for consumer acceptance and preference using 15 trained panelist consisting of students of Federal Polytechnic, Bida, Niger State who were randomly selected using nine (9) point hedonic scale.

STATISTICAL ANALYSIS

All experiment was conducted in duplicate. Data from sensory evaluation and proximate analysis was subjected to a one way analysis of variance to ascertain the level of significance difference between the mean.

RESULTS AND DISCUSSION

Proximate Composition of Composite Flour

As shown in Table 1, the moisture content ranged from 52.00% to 60.00% where Sample A has the highest value (60.00%) of moisture content and Sample B having the lowest value of (52.00%). However, there was significant difference ($p<0.05$), in the moisture content of the sample, the protein content of the samples ranged from 10.50% to 11.90% respectively. Sample B was recorded having the highest value of 11.90 in protein content while Sample D has the lowest value of 10.50 in the produced sample. However, there was decrease with increase in the addition of cassava flour. The ash content ranged from 0.50% to 1.01% where sample D and B had the highest value of Ash content (1.01%) and sample A having the lowest value (0.50%). Hence, there was significant difference ($p\leq0.05$) among the samples.

The fat content of the samples ranged from (11.00%) to (13.50%). Sample C was reported having the highest value of (13.50%) while sample B had the lowest value of 11.50.

The crude fibre ranged from 0.05% to 1.50%, Sample D was reported having the highest value of 1.50% while Sample A and B were recorded having the lowest value of 0.05% however, the samples were significantly (p<005) different.

Carbohydrate content of the produced sample ranged from 16.56% to 24.04%. sample B was reported having the highest value 24.05% while sample A has the lowest value of 16.56%, however, there was no significant different among sample C and D with 17.32% and 17.77% respectively. The energy value of the produced sample ranged from 215.3% to 242.8%, sample C was reported having the highest value of 234.9% while sample A had the lowest vale of 221.04%, however, the samples were significantly different.

However, there was significant different in moisture, ash content, crude fibre, crude protein, carbohydrate and energy values respectively.

Table 1: Proximate Composition of Pancake

Sample	% moisture content	% ash content	% crude fat	% crude protein	% crude fibre	Carbohydrates
A	60.00±0.00	0.51±0.01	11.50±0.00	11.38±0.00	0.05±0.00	16.57±0.01
B	52.01±0.01	1.00±0.00	11.00±0.00	11.90±0.00	0.05±0.00	24.05±0.01
C	58.6±0.00	0.50±0.00	13.50±0.00	11.03±0.00	1.05±0.00	17.32±0.01
D	57.4±0.00	1.01±0.01	12.00±0.00	10.50±0.00	1.50±0.00	17.77±0.01

Values are means ±standard error of two determinations of same letters of superscripts along the column are not significantly shows no ($p \geq 0.05$) means with same superscript are significantly different at $p \leq 0.05$.

The results of sensory evaluation of cookies produced from composite flour were presented in Table 2 below. The results shows that the score for taste, flavor, colour, appearance, mouth feel and general acceptability increased among the samples with increase in addition of malted sorghum. Sample B had the highest score in appearance (8.13) while sample C had the lowest (7.53). Sample B had the highest in taste (8.27) while sample C had the lowest in taste (7.40), Sample B had the highest in texture (8.47) and sample D was reported having the lowest score in texture (7.40). However, sample B had the highest in aroma (8.47) while sample C had the lowest score in aroma (7.40). The overall acceptability of the sample as shown in table 4.2 reveal that sample B had the highest value (8.33), sample C had the lowest score value (7.27) as was recorded by the panelist. Significant difference ($p<0.05$) existed among the samples. Thus composite flour produced from whole wheat flour and cassava flour could be used to produce acceptable based product such as pancake and cookie.

Table 2: Sensory Evaluation for the cookies

Sample	Appearance	Taste	Texture	Aroma	General acceptability
A	7.87 ± 0.83^{a}	8.13 ± 0.92^{a}	7.47 ± 0.74^{a}	7.87 ± 0.99^{ab}	7.93 ± 0.79^{ab}
B	8.13 ± 0.64^{a}	8.27 ± 0.70^{a}	7.73 ± 0.79^{a}	8.47 ± 0.64^{a}	8.33 ± 0.62^{a}
C	7.53 ± 0.99^{a}	7.40 ± 0.83^{b}	7.53 ± 1.19^{a}	7.40 ± 0.91^{b}	7.27 ± 0.59^{c}
D	7.53 ± 1.06^{a}	7.80 ± 1.01^{ab}	7.33 ± 1.11^{a}	7.67 ± 1.11^{b}	7.40 ± 0.91^{bc}

Moisture content of the produced pancake in this study was higher than the range reported in a similar study of where moisture content ranged between 52.00% to 60.00%.

However, the moisture content in this study was within the range reported to have no adverse effect on the quality attributes of the pancake. The ash content of the produced pancake in this study was lower than the ash content reported earlier. However, the ash content in the flour blends varies in each sample which may be attributed to the fact that addition of cassava flour altered the ash content, the ash content of a food material could be used as an index of mineral constituent of the food because ash is the inorganic residue remaining after the water and organic matter have been removed by heating in the presence of an oxidizing agent.

Moreso, the fat content of composite flour blends was higher than the fat content of whole wheat-cassava flour pancake which ranged between 2.5% and 9.3%. The fat content in this study ranged from 11.00% to 13.50%. The lower the fat content, the lower the rancidity level of the produced pancake. Also, the higher the fat content, the higher the level of rancidity.

The crude fiber of the produced pancake obtained in this study is lower compared to the crude fiber, the fiber content obtained in this study ranged from 0.05% to 1.50%. Hence, when the crude fiber is higher, it aids digestion of food because of residual content.

Moreso, the protein content of composite flour obtained was lower which ranged from (7.3% to 19.2%). However, higher protein content of the pancake signifies that the composite flour can serve as cheap source of protein to African populace and also products from this flour would have the potential of solving the problem of protein-energy malnutrition (PEM) in Africa.

Also, the carbohydrate content of the composite flour blends was lower for wheat-cassava flour indicates that products from the flour blends will be acceptable to patient with health related problems.

The sensory scores of the cookies produced from whole wheat-cassava flour composite flour revealed various significant differences in all the parameters evaluated. All the samples were equally rated by the panelist in terms of colour, taste, flavor, mouth feel, appearance and general acceptability. There was no significant difference ($p \leq 0.05$)

among the samples. Thus, composite flour produced from whole wheat-cassava flour could be used to produce organoleptically acceptable products.

CONCLUSION AND RECOMMENDATION

Nutritionally and organoleptically acceptable pancake was successfully produced from whole wheat-cassava flour. More research works should be carried out on whole-wheat cassava flour pancake in terms of its functional properties and physio-chemical properties.

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