PROXIMATE COMPOSITION AND FUNCTIONAL PROPERTIES OF BLENDS OF PRE-TREATED RICE GRITS, DEFATTED GROUNDNUT FLOUR AND DATE PALM FLOUR

*[1]Maude, M.M., [2]Alimi, B.A., [2]Ojo, M.O. and [2]Ocheme, O.B.

[1]Department of Food Science and Technology, Ibrahim Badamasi Babangida University, Lapai.
[2]Department of Food Science and Technology, Federal University of Technology, Minna.
*Corresponding author's email: maryammohammed187@gmail.com

The proximate and functional properties of different blends of pre-treated rice grits, defatted groundnut flour and date palm flour were investigated. Ground nut and date palm were processed to flour. Rice paddy was pre-treated using three treatments: fermentation, maltingand pre-gelatinization.These were followed by de-husking and millinginto flour. The resulting grits were mixed together in the following ratios; 70:20:10, 60:30:10 and 50:40:10 of rice, defatted groundnut and date palm respectively whilewhile locally produced *kunun shinkafa* flour from blend of untreated rice and groundnut was used as a control.The results obtained showed a significantly ($p<0.05$) variations across the blends. The crude protein, fiber and ash content of the fermented rice was higher compared to other treatment while the fat and moisture content was low. Also, the water absorption capacity was high in the fermented rice.However, FD2 (Fermented rice and defatted groundnut and date palm 60:30:10) had better functional properties.

Keywords: Proximate properties, Functional properties, Instant *kununshinkafa* mix, Groundnut flour, Date palm flour

Introduction

Kunu is the generic name for all kinds of non-alcoholic beverages that are cereal based with specifications usually attached to denote the base cereal grain (Nahemiah*et al.,* 2014). There are various types of *kunu*that are processed and consumed in Nigeria. These include *kununzaki, kunungyada, kununshinkafa, kununtsamiya, kunun baule, kununjiko, kununakamu and kunungzakimba. Kununshinkafa*is a non-alcoholic beverage made from rice grits and groundnut with added spices to improve its flavour and taste. Itis traditionally produced by roasting the ground nut, removing the skin, wet milling, sieving, boiling, addition of broken rice and continued cooking until a thick paste is achieved. *Kununshinkafa*is served at home and in public gathering as a refreshing drink and appetizer. They are also important weaning foods and are used extensively during Muslim fasting period of Ramadan. Some tribes in northern part of Nigeria (Hausa, Kilba, Marghi, Kajis and others) usually add groundnut paste or tiger nut milk to improve the nutritive value of the porridge. Spices are added to improve variety and flavours of the product, thus promoting appetite and aiding consumption. The spices are usually added in small quantities, though not to contribute to the nutritional quality of the food but to add to taste

and preserve the food as it contains phenolic compounds. Where ground nut paste is added, it substantially increases protein content. (Musa *et al.,* 2016). *Kununshinkafa* is cheap and nutritious when compared to carbonated drinks because it contains all the essential nutrients such as carbohydrates, fat, protein, minerals and vitamins (Ugwuanyi*et al.,* 2015). The inclusion of groundnut in the mix will make *kunushinkafa* to be an energy dense food because of their oil, and they are rich in vitamins and minerals (Eke-Ejiofor *et al.,* 2012). Foods containing roasted groundnuts have high consumer acceptance because of their unique roasted groundnut flavour. The aim of this study was to determine the proximate composition and functional properties of instant *kununshinkafa* mix from blends of pre-treated rice grits, defatted groundnut flour and date palm flour.

Materials and Methods

Rice paddy, ground nut and date palmwere purchased from Kure Ultra-Modern Market Minna, Niger State Nigeria.

Rice paddy and groundnut were cleaned to remove stones, damaged grains and other extraneous materials. This was achieved through winnowing, sieving and hand picking. Rice paddy were fermented and malted as described by Ocheme *et al.* (2007) while pre-gelatinization was done as described by Bagirei *et al.* (2020). Defatted groundnut flour was prepared as described by Ochemee*t al.* (2018) with little modification. The nuts were sorted to remove extraneous materials and pretreated for 5minutes with a mixture of 5.25% sodium hypochlorite and deionized water (1:10 v/v) to control microbial growth. The nuts were then be rinsed with deionized water (1:3 w/v) and oven dried at 50°C for 24h. The nuts were roasted at 140°C for 6min, de-coated manually and milled in a laboratory blender.

Date palm fruits were sorted, cleaned, washed, deseeded and oven dried at 50^{0}C for 8h. The rice grits, defatted groundnut flour and date palm flour were blended in varying ratios. Rice and ground nut ratio werevaried between 60%-90% with rice having 60% or more as the major ingredient. All the treated samples were blended as follows; 70:20:10, 60:30:10 and 50:40:10 for rice grits to, defatted groundnut flour and date palm fruits flour respectively.Proximate properties were determined according to (AOAC, 2005) whileFunctional properties was determined according to the method described by Alimi*et al.*(2016). Data collected was subjected to analysis of variance using SPSS version 20.0 statistical package.

Results and Discussion

The proximate composition of the blends is outlined in Table 1. The results show that the varying ratios of the mix significantly ($P<0.05$) affected all the parameters. Majority of the blends containing fermented rice had higher protein, crude fibre and ash but lower fat and moisture contents. This suggests that fermentation had a more beneficial effect than the other treatments in this regard. Additionally, samples with fermented and malted rice had higher carbohydrates than samples with pre-gelatinized rice. From the results obtained in Table 2, the

water absorption capacity (WAC) was significantly higher ($P<0.05$) across the blends. Water absorption capacity is the measure of the water sucked up and held. Blend FD1 and FD3 had the highest WAC which could be attributed to the higher ratio of rice in the blend in comparison to other blend samples which is similar to a report by Chandra *et al.*, (2015). WAC is essential in bulking and consistency of product. Oil absorption capacity ranged from 0.20 to 0.86, there was significant difference ($P<0.05$) across the blends. OAC is an indication of the rate at which the protein binds to fat in food formulations. Flour's oil absorption ability is essential as it enhances mouth sensation and retains flavour (Bello and Ekeh, 2014). The Foaming capacity varied from 1.78 to 6.48% which was significantly higher ($P<0.05$) across the blends respectively than other blends. Both emulsion capacity (EC) and emulsion stability (ES) shows no notable difference ($P<0.05$) across the blends. Bulk density of the formulated blend varied from 0.57 to 0.97%. Blend CT had the least bulk density. Diet of lower density is required to allow swallowing with ease without choking or suffocation (Ikujenlola*et al.*,

2013). Lower density also enhances more intake or consumption of the food material thereby delivering more nutrients to the consumer.

KEYS

CT= Control (Traditional method) untreated rice and ground nut 50:50
FD1= Fermented rice and defatted groundnut and date palm 70:20:10
MD1= Malted rice and defatted groundnut 70:20:10

Table 2.0: Functional properties of the blends

PARAMETERS	Water absorption capacity	Oil absorption capacity	Foam capacity	Emulsion capacity	Emulsion stability	Bulk density
CT	0.80 ±0.01^{e}	0.57±0.02^{b}	2.78±0.01^{f}	50.60±0.02^{e}	43.58±0.02^{c}	0.57±0.01^{e}
FD1	1.00±0.00^{ab}	0.85±0.00^{a}	5.45±0.10^{d}	47.94±0.06^{f}	40.41±0.02^{e}	0.72±0.00^{abc}
MD1	0.96±0.01^{c}	0.46±0.02^{b}	1.78±0.01^{g}	59.14±0.15^{b}	43.55±0.02^{c}	0.74±0.01^{ab}
PD1	0.63±0.01^{f}	0.48±0.02^{b}	9.80±0.02^{a}	58.85±0.04^{b}	46.04±0.04^{a}	0.68±0.02^{cd}
FD2	0.99±0.10^{bc}	0.60±0.04^{a}	2.80±0.10^{f}	47.85±0.03^{f}	41.42±0.03^{d}	0.69±0.02^{cd}
MD2	0.79±0.01^{e}	0.54±0.02^{b}	4.69±0.02^{e}	62.27±0.28^{a}	46.55±0.46^{a}	0.66±0.10^{d}
PD2	0.76±0.02^{e}	0.42±0.02^{b}	6.77±0.02^{b}	55.13±0.08^{d}	40.64±0.14^{e}	0.65±0.03^{d}
FD3	1.04±0.02^{a}	0.86±0.02^{a}	6.57±0.03^{c}	47.83±0.02^{f}	41.61±0.06^{d}	0.73±0.02^{abc}
MD3	0.78±0.00^{e}	0.57±0.02^{b}	9.80±0.04^{a}	47.92±0.06^{f}	41.75±0.25^{d}	0.75±0.02^{bcd}
PD3	0.88±0.02^{d}	0.20±0.20^{c}	6.48±0.03^{c}	57.72±0.07^{c}	44.34±0.11^{b}	0.79±0.01^{a}

Values are means ± standard deviation of triplicate determination. Values in the same column with different superscripts are significantly different ($p \leq 0.05$).

Table 1.0: Proximate analysis of the blends

PARAMETERS	Moisture content	Crude fiber	Crude protein	Ash	Fats	Carbohydrate
CT	8.21±0.90^{d}	1.00±0.00^{d}	15.55±0.23^{c}	1.03±0.05^{e}	2.00±0.00^{f}	72.22±0.10^{a}
FD1	10.18±0.70^{c}	1.27±0.02^{c}	15.66±0.00^{bc}	2.95±0.05^{a}	1.29±0.06^{g}	68.20±0.59^{bc}
MD1	10.22±0.01^{c}	0.95±0.02^{d}	12.45±0.15^{g}	1.05±0.02^{e}	3.83±0.16^{d}	71.23±0.57^{a}
PD1	11.55±0.36^{a}	0.99±0.02^{d}	16.17±0.05^{a}	1.42±0.08^{d}	5.00±0.00^{c}	64.88±0.46^{d}
FD2	10.15±0.13^{c}	2.15±0.05^{a}	16.03±0.03^{ab}	2.83±0.16^{ab}	1.62±0.03^{fg}	67.17±0.04^{c}
MD2	10.26±0.05^{abc}	1.01 ±0.01^{d}	12.65±0.20^{g}	2.60±0.1^{b}	4.75±0.25^{c}	68.67±0.60^{bc}
PD2	10.82±0.59^{bc}	0.94±0.04^{d}	13.25±0.95^{f}	1.98±0.02^{c}	9.45±0.48^{b}	63.24±1.29^{de}
FD3	10.36±0.09^{bc}	0.99±0.00^{d}	14.60±0.70^{d}	1.48±0.03^{d}	4.00±0.00^{d}	68.34±0.09^{bc}
MD3	10.36±0.06^{bc}	1.01±0.01^{d}	14.45±0.11^{d}	1.51±0.06^{d}	2.99±0.05^{e}	69.31±0.45^{b}
PD3	10.99±0.06^{ab}	2.00±0.00^{b}	13.82±0.07^{e}	1.48±0.03^{d}	10.09±0.07^{a}	61.56±0.05^{e}

Values are means ± standard deviation of triplicate determination. Values in the same column with different superscripts are significantly different ($p \leq 0.05$).

PD1=pre-gelatinized rice and defatted groundnut 70:20:10
FD2=Fermented rice and defatted groundnut and date palm 60:30:10
MD2=Malted Rice, defatted ground nut date palm fruits 60:20:10
PD2=pre-gelatinized rice and defatted groundnut 60:30:10