THE POTENTIAL OF GERMINATED AND FERMENTED PIGEON PEA FLOUR AS FOOD INGREDIENTS

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INTRODUCTION

There is growing interest in the use of bioprocessed pulse flour in food product development. Pigeon pea (*Cajanus cajan*) is an important legume crop grown in the semiarid tropics of Africa, Central America, and India (Oboh, Ademiluyi, & Akindahunsi, 2009). Pigeon pea is an under-utilized legume requiring tailored research with a view to expand its application in food systems.

MATERIALS AND METHODS

Pigeon pea seeds were procured from Crop Production Department, Federal University of Technology, Minna, Nigeria. Cleaned pigeon pea seeds were germinated for four days at room temperature. Germinated seeds were dried and milled into flour. Germinated and raw flour was separately fermented with lyophilised yoghurt cultures at 30°C for 24h, and dried to obtain germinated, germinated-fermented and fermented flour. The chemical composition, functional, antinutritional and antioxidant properties of flour samples were determined using standard method

RESULTS AND DISCUSSION

Germination and fermentation of pigeon pea flour significantly increased protein and mineral content, antioxidant and functional properties with reduction in antinutrients than raw flour. This variation could be attributed to the activation of endogenous enzymes during germination and fermentation of pigeon pea which induced significant changes in chemical composition with a

reduction in antinutritional factors. The higher antioxidant properties of the processed flours could be attributed to increased total phenolic content.

CONCLUSIONS

Germinated-fermented flour had the highest protein and mineral content, antioxidant properties and improved functional properties with minimum residual antinutrients. Germinated and fermented pigeon pea flour could serve as functional ingredients.

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Table 1: Effect of germination and fermentation on the chemical, antinutrient and antioxidant composition of pigeon pea flour

Parameter	Raw flour	Fermented flour	Germinated flour	Germinated-fermented flour
pH	6.10±0.04^{a}	5.64±0.09^{c}	5.90±0.05^{b}	5.42±0.02^{d}
Moisture (%)	7.59±0.17^{d}	8.25±0.23^{c}	8.72±0.14^{a}	8.41±0.10^{b}
Fat (%)	1.84±0.00^{a}	1.61±0.01^{b}	1.70±0.01^{ab}	1.52±0.03^{b}
Ash (%)	1.50±0.06^{d}	1.76±0.07^{c}	1.92±0.04^{b}	2.25±0.01^{a}
Crude fiber (%)	1.48±0.02^{a}	1.20±0.01^{b}	1.23±0.01^{b}	1.26±0.03^{b}
Protein (%)	20.15±0.13^{d}	21.27±0.10^{c}	21.59±0.18^{b}	21.84±0.14^{a}
Carbohydrate (%)	67.44±0.40^{a}	65.91±0.27^{b}	64.84±0.33^{c}	64.72±0.25^{c}
Iron (mg/100g)	2. 83±0.05^{d}	3.12±0.01^{c}	3.34±0.02^{b}	3.66±0.07^{a}
Calcium (m g/100g)	271.20±0.28^{d}	284.11±0.27^{c}	290.52±0.40^{b}	295.32±0.31^{a}
Zinc (mg/100g)	2.94±0.03^{bc}	2.80±0.01^{c}	3.13±0.00^{b}	3.34±0.00^{a}
Magnesium (mg/100g)	75.10±0.16^{d}	84.56±0.22^{c}	90.05±0.24^{b}	98.66±0.20^{a}
Phytic acid (mg/100g)	25.27±0.11^{a}	14.33±0.14^{c}	15. 40±0.05^{b}	9. 16±0.10^{d}
Saponin (mg/100g)	0. 46±0.00^{a}	0.20±0.01^{b}	0.27±0.00^{b}	0.18±0.01^{c}
Tannins (mg/100g)	3.05±0.08^{a}	1.94±0.04^{c}	2.16±0.06^{b}	1.53±0.05^{d}
WAC (g/g)	1.20±0.01^{c}	1.89±0.05^{b}	2.02±0.10^{a}	2.14±0.03^{a}
WBC (g/g)	1.53±0.00^{c}	1.78±0.01^{b}	1.90±0.01^{a}	1.99±0.05^{a}
OAC (g/g)	1.30±0.01^{c}	1.57±0.04^{b}	1.75±0.02^{a}	1.72±0.03^{a}
Foaming capacity (%)	50.14±0.19^{d}	58.90±0.13^{c}	63.10±0.21^{a}	62.85±0.12^{b}
Foaming stability (%)	45.30±0.11^{d}	51.00±0.18^{c}	55.29±0.14^{a}	52.10±0.10^{b}
TPC(mg GAE/g sample)	60.55±0.42^{d}	103.48±0.34^{c}	82.60±0.53^{b}	115.90±0.39^{a}
DPPH (% scavenging)	70.23±0.20^{a}	32.56±0.15^{c}	45.82±0.25^{b}	30.36±0.31^{d}
Antioxidant capacity(g/g)	0.95±0.03^{d}	1.48±0.07^{b}	1.20±0.11^{c}	1.77±0.08^{a}

Mean and standard deviation of three determinations
Values in the same row with different superscript are significantly ($p \leq 0.05$) different
WAC= Water absorption capacity; WBC = Water binding capacity; OAC = Oil absorption capacity.TPC= Total phenolic content and DPPH = 1,1-diphenyl-2-picryl-hydrazil