

Nutrient Composition Of Reconstitutable Yam/Cassava Starch Blend Compared To Commercial Yam Flour

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ABSTRACT

Yam (*Discorea rotundata*) and soybean (*Glycine max L Merrill*) were cleaned of dirt and other foreign materials. Soybean was tempered and cracked manually, winnowed and soaked overnight (12-72 hrs) in cold water. The soaked grits were washed, boiled (100°C) for 5 minutes and dried at ambient temperature (25-27°C). Yam was peeled, washed, sliced, dried and milled to pass a sieve mesh of 1mm. Yam flour was firming –up with cassava starch (25% w/w). The yam/cassava flour was then fortified with full fat soybean flour at 0–30% levels. The nutritional composition and sensory properties of the complementary blends were analyzed and compared with known commercial yam flour. The results showed significant increase ($p < 0.05$) in protein from 10% (yam flour/ cassava starch) to 58% (yam flour/ cassava starch at 30% level of soybean flour substitution). Carbohydrate decreased significantly ($p < 0.05$) from 77.5% to 59.9% with increase in soybean substitution. Amino acid profile of the samples showed significant ($P < 0.05$) increases in almost all amino acid evaluated especially with the 30% soybean substitution. Similar trend of result was recorded for the mineral composition of the samples evaluated. Sensory analysis showed that panelists preferred sample blend of 30% soybean to other samples. The results showed that fortification of yam flour and cassava starch with 30% soybean could be a means of improving the nutritional status of the yam/cassava meal. This popular staple could therefore become a means of reducing protein energy malnutrition as a special diet. The product has prospects for scale –up and commercialization.

Key words: Yam flour; Cassava Starch; soybean flour; and Pounded yam meal

1. BACKGROUND TO THE STUDY

Anuonye *etal* (2014) have reported the production of yam flour firming up with 25% cassava starch and enriched with up to 30% soybean flour. They reported that this blend had good nutrient composition and was widely accepted. This present work compares the nutrient composition, acceptability and functionality of the developed yam/cassava mixture enriched with soybean with available commercial yam flour.

2. STATEMENT OF PROBLEM

Presently production of yam flour and subsequent reconstitution leads to a dumping lacking in firmness, texture and rigidity of the conventional pounded yam. This witting down of the conventional pounded yam consistency makes many not to accept reconstituted yam flour meal as pounded yam. Thus this meal which reduces the drudgery of pounding faces limited local ethnic and regional acceptance.

It became necessary therefore to strengthen the texture of yam flour with available local firming agents to produce firm and consistent yam meal close to the conventional pounded yam.

3. OBJECTIVE

This present work compares the nutrient composition, and acceptability of the developed yam/cassava starch blend enriched with soybean with available commercial yam flours.

4. METHODOLOGY

4.1 The Research Design

Yam flour cassava starch and soybean flour and subsequent blending were prepared and blended as reported in Anuonye *etal* (2014).

Proximate Composition and Amino Acid Profile

Proximate composition (fat, moisture, protein, crude fibre, ash and carbohydrate) were determined according to the methods of AOAC (2006). Amino acid analysis was evaluated according to Spackman *etal* (1958) using a Techicon Sequential Multi-sample Amino Acid Analyzer (TSM).

Mineral Determination

The method described by AOAC (2006) was used to determine the concentrations of chromium, cadmium, lead, zinc, iron, calcium, potassium, sodium, magnesium and phosphorus in the samples using an atomic absorption spectrophotometer

Sensory evaluation

The blends were made into dumplings in aluminum pot using 200ml of clean tap water with 25g of each blend. The water was heated to 100°C after which the blend was poured into the boiling water. The porridge was continuously stirred for 10 minutes to obtain a solid gel and proper doneness. 25 untrained judges consisting of students and staff of Federal University of Technology, Minna who are familiar with pounded yam evaluated the yam meal. A 9-point hedonic scale according to Larmond (1977) where 1 represented disliked extremely and 9 represented liked extremely was used. The panelists were provided with 6 coded samples of the blends labeled A-F and were asked to assess the quality attributes in terms of colour, odour, texture, taste, moldability and overall acceptability using appropriate score and rating for each sample.

Data was analysed using one way annova.

5. DATA PRESENTATION

Table1: Proximate Composition of Yam Enriched with Cassava Starch/Soybean blend

PARAMETER	SAMPLES					LSD
	A	B	C	D	E	
Protein (%)	5.78 ^d	7.00 ^d	8.55 ^c	10.21 ^b	12.67 ^a	1.36
Fat (%)	1.14 ^d	3.49 ^c	4.057 ^{bc}	4.607 ^b	5.66 ^a	0.83
Moisture (%)	6.10 ^a	5.86 ^a	5.843 ^a	5.553 ^a	6.075 ^a	NS
Ash (%)	0.48 ^a	0.50 ^a	0.510 ^a	0.280 ^a	0.523 ^a	NS
Fiber (%)	1.16 ^a	0.68 ^b	0.68 ^b	0.68 ^b	0.68 ^b	0.30
Carbohydrate (%)	85.32 ^a	82.43 ^b	80.60 ^{bc}	78.54 ^c	74.40 ^d	2.14
Energy value(kcal/100g)	1591.12 ^d	1649.90 ^c	1665.51 ^{bc}	1679.20 ^{ab}	1689.79 ^a	1747.00 ^a

Key

A= Commercial yam flour

B= Yam flour/ Cassava starch without soybean flour

C= Yam flour/ Cassava starch fortified with soybean flour (10%)

D= Yam flour/ Cassava starch fortified with soybean flour (15%)

E= Yam flour/ Cassava starch fortified with soybean flour (20%)

6. DISCUSSION OF FINDINGS

The proximate composition of the samples is presented in Table 1. The results showed that protein, fat and energy values significantly ($P \leq 0.05$) increased with increased levels of soybean flour addition (Samples D-F). Similar trends of results have been reported for meals fortified with full fat soybean flour (Anuonye *et al.*, 2010; and Obatolu *et al.* 2002). However there was no Significant ($P \geq 0.05$) differences in the proximate values of the commercial yam flour (A) and the yam flour/ cassava starch sample (B) without soybean fortification. There were significant ($P > 0.05$) reductions in the carbohydrate content of fortified meals (C-F) with corresponding increases in their energy values. These trends of results are in conformity with earlier reports on similar meals fortified with full- fat soybean flour (Alabi and Anuonye 2000; Osho and Dashiell 1995).

7. CONCLUDING REMARKS

Results from this current study showed that the supplemented samples had enhanced nutritional and sensory qualities. Soybean flour addition even at 30% did not affect adversely the organoleptic quality of the meals. It is therefore concluded that yam flour/ cassava starch can be fortified with soybean up to 30% with good amino acids profile and organoleptic balance. The meal could be adopted for mass nutritional feeding programmes..

8. CONTRIBUTIONS TO KNOWLEDGE

This work show that scaling-up the nutritional quality of available staples to the point of commercialization is possible.

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