# Nutritional Composition of Yam Flour Fortified with Soy-Pomace

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***Abstract*:-In an attempt to improve the nutritional quality and quantity of yam flour [Elubo] a local dish from yam, soybean pomace was produced and added to the yam flour at different ratios. Two supplemented samples were obtained, SAMPLE A [50:50] and SAMPLE B [70:30] of yam flour and soybean pomace respectively. The samples were subjected to proximate analysis. SAMPLE A [50:50] contained 7.026 %, 2.07 %, 4.06 %, 23.07 %, 6.04 %, 57.71 % and 377.57 kcal of moisture, fibre, ash, protein, fat and carbohydrate respectively while SAMPLE B [70:30] contained 7.10 %, 1.21 %, 2.49 %, 17.33 %, 4.17 %, 67.69 % and 377.661 kcal of moisture, fibre, ash, protein, fat and carbohydrate respectively. Therefore enriched yam flour with pomace is of high protein and it will reduce the problems of malnutrition were yam flour is consumed as staple food.**

***Keywords:*** **Yam flour, Soybean pomace, proximate, carbohydrate, malnutrition.**

## I. INTRODUCTION

Intake of the right kinds and amount of foods has impact on our health, which may be evident in appearance and productivity. Malnutrition is prevalent in most parts of the world and is caused mainly by poverty, cultural taboo against production and consumption of certain foods, supplementation and fortification enrichment [1].

Fortification is a process deliberately increasing the content of essential nutrient in a food irrespective of whether the nutrients were originally in the food before processing or not, in order to improve its nutritional quality and to provide a public health benefit with minimal risk to health and enrichment [2]. The levels of food fortification depend on the nutritional needs of the population, amount consumed, and regulations in the country [3]. Some research has been reported on the fortification of yam flour with different fortificants [1], [4-5].

Soybean, a legume of the pea family is an extremely rich source of protein and fat, and a good source of energy, vitamins, and minerals with great potential in overcoming protein-calories malnutrition. It is probably the world's most valuable crops used as feed for livestock, as a source of dietary protein and oil, and in the industrial manufacture of thousands of products. Although, not indigenous to Africa, it has received tremendous popularity as a cheap protein source in Nigeria.

The addition of soy ingredients to products can improve the protein quality of the product. And consumption of soy foods is increasing because of reported beneficial effects on nutrition and health, such as lowering of plasma cholesterol, prevention of cancer, diabetes and obesity and protection against bowel and kidney diseases [6].

Meanwhile, yam tubers which consist of about 21% dietary fibre are rich in carbohydrates, vitamin C, and essential minerals. Studies have shown that the worldwide annual consumption of yam is 18 million tons, with 15 million in West Africa which is 61kg per/capital. However, due to its perish-ability and bulkiness, It is processed into yam flour (Dioscorearotundata) or water yam (Dioscoreaalata) [7]. In particular, protein energy malnutrition is prevalent in rural populations where yam is a staple, especially among women and children. Therefore, this research is aimed at the improvement of yam flour with soy pomace to overcome protein-calories malnutrition.

## II. MATERIALS AND METHOD

The yam tubers were obtained from the entrepreneurs' centre of Federal Polytechnic Ede and soybean used were purchased from Oja-Ede Market. The proximate composition (carbohydrate, protein, crude fat, crude fibre, crude ash, moisture ede) of the flour were determined according to the standard method of AOAC 2012 [8] and the energy kilocalories were multiplied by the water factors of 4, 9,4 for carbohydrate, fat, and protein respectively.

### *2.1 Production of Yam Flour*

The yam tubers were selected, washed to remove adhering sands, dirt, and other foreign materials then peeled and sliced to 0.02mm thickness. It was then transferred into water containing sodium metabisulphite so as to arrest the browning reaction, sieved to remove excess boater after which they were cooked for 10mins at $100^0$c. The cooked yam was then sun dried for 7 days. After drying, the dried yam chips were milled using a hammer mill, sieved, packaged into a Ziploc bag and was stored prior to analysis. [9]

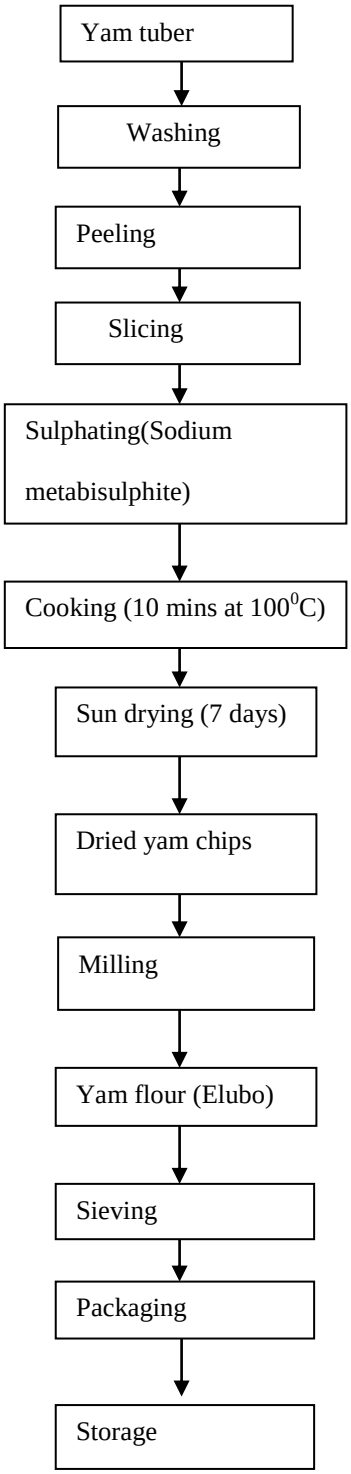


Figure 1: Flow Chart For The Production Of Yam Flour. [6]

*2.2 Production of Soybean Pomace.*

The soybeans were sorted to remove particles, defective seeds, and stones. It was then cleaned and washed thoroughly using a tap water. The seeds were boiled for 30 minutes and drained so as to inactivate the trypsin inhibitors and dehulled using manual method i.e. hand rubbing within two palms. After dehulling, they were washed, cleaned and were milled using attrition milling machine which is wet grinding. The grounded soy was then sieved using Muslin cloth in other to obtain the pomace i.e. filtration method. The shape was then sun dried for 7 days, milled/blended using milling machines and packaged into a Ziploc bag for storage prior to analysis.

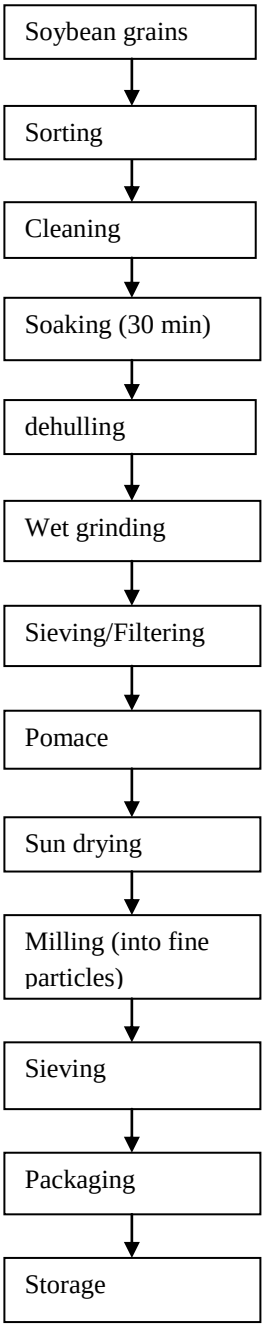


Figure 2: Flow Chart for the Production of Soybean Pomace. **[7]**

*2.3 Composite Flour*

The yam flour and soybean pomace were blended together using a wiring Blender at different ratios of 50:50 and 70:30 of yam flour and soybean pomace respectively. The composite

which was prepared in percentage ratio of 50:50 of yam flour to soybean pomace was labeled sample A and that of 70:30 of yam flour to soybean pomace was labeled sample B.

## III. RESULT AND DISCUSSION

The Proximate Composition depicted as mean±standard deviation of two blended yam soy- bean pomace for the two samples is shown in Table 1 below:

| SAMPLE/ PARAMETERS | A | B |
|---|---|---|
| % MOISTURE | 7.02 ± 0.03 | 7.10 ± 0.04 |
| % FIBRE | 2.07 ± 0.03 | 1.21 ± 0.00 |
| % ASH | 4.06 ± 0.02 | 2.49 ± 0.21 |
| % PROTEIN | 23.07 ± 0.03 | 17.33 ± 0.35 |
| % FAT | 6.04 ± 0.00 | 4.17 ± 0.21 |
| % CARBOHYDRATE | 57.71 ± 0.07 | 67.69 ± 0.31 |
| KILOCALORIE | 377.54 ± 0.20 | 377.61 ± 2.07 |
| TOTAL | 477.51 ± 0.38 | 477.6 ± 3.19 |

The supplemented samples are a good source of protein. The protein was raised from 17.33 to 23.07 for the supplemented samples. All these supplementations produced yam flour (elubo) of higher nutritional value. This beneficial effect of soybean pomace (vegetable protein supplementation) had been confirmed by earlier reports of [10] and has been recommended as a means of providing high nutrient and protein density foods. The protein content of the blends appeared adequate to supplement yam flour as a convenient food at family levels. The protein was higher than earlier report of [10] for protein value of 13.7 for soy-fufu.

The table shows the proximate result of the composite flour produced from yam flour and soybean pomace. The result indicates that Sample A has the moisture content of 7.02 ± 0.03 while Sample B has 7.10 ± 0.04, Sample A has the fiber content of 2.07 ± 0.03 while Sample B has 1.21 ± 0.00, Sample A has the ash content of 4.06 ± 0.02 while Sample B has 2.49 ± 0.21, Sample A has the protein content of 23.07 ± 0.03 while Sample B has 17.33 ± 0.35, Sample A has the fat content of 6.04 ± 0.00 while Sample B has 4.17 ± 0.21, Sample A has the carbohydrate content of 57.71 ± 0.07 while Sample B has 67.69 ± 0.31. Kilocalorie for Sample A is 377.54 ± 0.20 while the kilocalorie for Sample B is 377.61 ± 2.07.

Therefore, the total for sample A is 477.51 ± 0.38 and the total for sample B is 477.6 ± 3.19.

The results indicated that the soybean pomace used in enriching the yam flour was able to increase the protein content as well as other proximate compositions except for carbohydrate in the various combinations [11].

## IV. CONCLUSION

Fortifying yam flour with soybean pomace at levels of 50:50 resulted in a notable increase in the protein content which improves the nutritional quality and quantity of yam flour. Also, there was slight in the fibre content. This enrichment will reduce the problem of malnutrition in places where yam is consumed as a staple food and consequently provide a public health benefit with minimal risk to health and reduce the risk of protein malnutrition, especially in the rural Population.

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