

NUTRITIONAL AND SENSORY EVALUATION OF DISHES PREPARED FROM THREE LEGUMINOUS GRAINS

*Folorunso, A. A. and Popoola, B.R.

Department of Family, Nutrition and Consumer Sciences,
Faculty of Agriculture,
Obafemi Awolowo University, Ile-Ife, Nigeria.

*Corresponding author: Kunlefolly2@yahoo.com

ABSTRACT

Legumes are common staple foods produced in Nigeria hence the study was carried out to evaluate the palatability and proximate composition of three selected beans varieties used in producing six food dishes. The palatability was determined using sensory evaluation while the proximate analysis was carried out on the dishes to determine the percentage moisture, ash, fiber, fat, protein carbohydrate and energy value. The data collected were analyzed in line with the study objectives using descriptive statistics and percentage nutrient determination. The result revealed that cowpea dishes are generally accepted having mean scores of 4.70 ± 0.47 for pudding and 4.60 ± 0.68 for pottage while pigeon pea pudding is least accepted having a mean score of 1.75 ± 0.97 and soya bean pottage having a mean score of 2.40 ± 1.31 respectively. It was also evident from the result that beans dishes contribute to the nutrient intake of individuals. However, soya bean pottage has the highest protein content of 24.17% and energy value of 190.15kcal among the dishes prepared. The study recommends that nutrient education should be carried out to enlighten people on the cooking and consumption of beans for improved nutritional status. Information materials should be in place to promote the use of dishes prepared from soya beans for vulnerable groups because of its high protein content.

Key words; *Nutritional, Sensory, Evaluation, Dishes, Leguminous grains.*

INTRODUCTION

There are over 13,000 species of plants belonging to the family of leguminous and some are cultivated as crop plants whose seed are edible. Over years, wild varieties of legumes have been domesticated. In this process ancient Indian and Chinese civilization seem to have played an important role in the domestication of Bengal gram (*cicer Arietium*) and Soybeans (*Glycine max*) respectively (Manay & Shadaksaraswamy, 2003).

The world's production of pulses from China in 1997-1998 was 56 million tonnes. China is the largest producer of pulses in the world. Pulses are defined by United Nation food and Agricultural Organization (FAO, 1994) as annual leguminous crops yielding from one to twelve grains or seeds of variable size, shape and color within a pod and used for human consumption and animal feeds. There is a wide spread protein malnutrition in developing countries and beans (pulses) can play an important role in bridging the protein gap.

Sales and Roddrigues (1987) stated that pulses are an important source of calories, protein, vitamins and minerals. They provide about 50% of dietary protein of the less favoured economic class.

Philip and Adams (1983) revealed that because they are deficient in the essential amino acids like methionine and cystine legume protein is considered inferior to animal protein. In addition dry seeds often contain many anti-nutritional factors, although these are heat liable and therefore, destroyed through common cooking methods.

Legumes are a good source of the vitamins B, thiamin and nicotinic acid. Although pulses, like cereals, contain no ascorbic acid, it is produced during germination. So sprouted legumes are an excellent preventative against scurvy and they also supply useful amounts of carbonyl acid and iron. Legumes are important source of dietary protein and have unique property of maintaining and restoring soil fertility through biological nitrogen fixation as well as consuming and improving physical properties of soil by virtue of their of their deep root system and leaf fall. Legumes are regarded as “poor man’s meat” and one of the staple foods in alleviating protein malnutrition.

OBJECTIVES OF THE STUDY

- To prepare the selected legume dishes;
- To determine the proximate analysis of the prepared legume dishes;
- To assess the acceptability of dishes prepared from bean pulses using sensory evaluation methods and
- To assess nutritional significance of the legume dishes to consumer.

METHODOLOGY

Three varieties of beans were used, the varieties are cowpea (*vigna unguiculata*), pigeon pea (*cajamun cajan*) and soya bean (*Glycine max*). The beans were locally purchased from Bida market and six dishes were prepared. They are; Soya bean pudding, Pigeon pea pudding, Cowpea pudding, Soya bean pottage, Pigeon pea pottage, Cowpea pottage.

Recipe and Methods of Preparation of Beans Pudding

Recipe:-

- Beans varieties - 300g (each) i.e. soya bean, cowpea, pigeon pea.
- Onion- 1 bulb
- Red pepper- 10g
- Hot pepper- 10g
- Groundnut oil- 10cl
- Bouillon cubes -2 cubes
- Crayfish-20g
- Salt- to taste.
- Thyme-1/4 teaspoon
- Curry-1/4 teaspoon
- Warm water

Preparation

The beans were blanched, soaked, washed and the skin dehulled. The dehulled beans were ground into paste. Vegetable oil was added to the blended paste with other ingredients and salt to taste. The paste is stirred very well and poured into wrapping leaves with cooking spoon and place in a sauce pan, half filled with hot water, covered and steamed for 45 minutes. It was then removed from hot water and allowed to cool, before unwrapped.

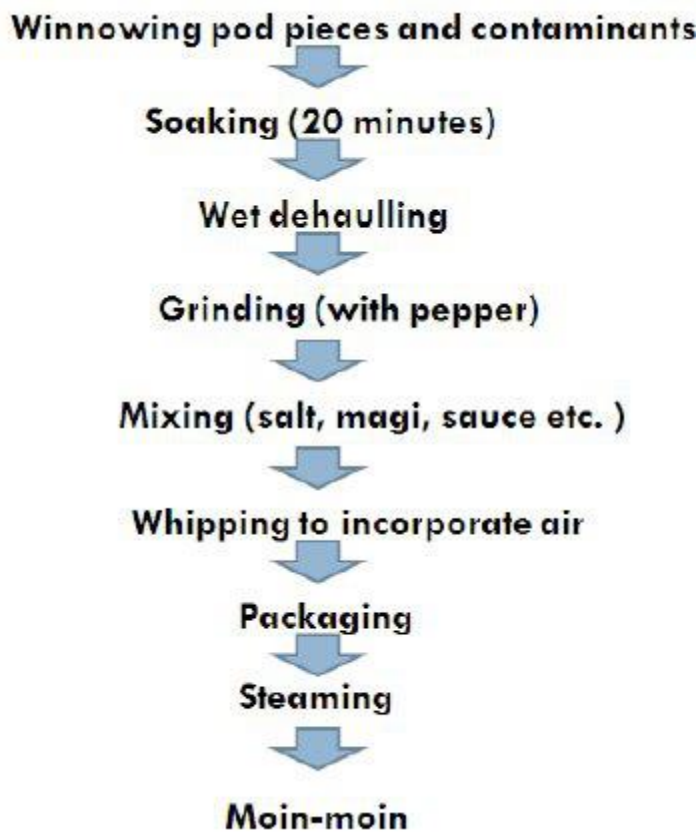


Figure I: Methods of Preparation of Beans Pudding

Recipe and Methods of Preparation of Bean Pottage

Recipe:-

- Beans varieties- 300g (each) i.e. soya bean, cowpea, pigeon pea
- Tomato paste- 30g
- Fresh pepper paste-30g
- Onion-1 bulb
- Bouillon cubes - 2 cubes
- Salt to taste
- Curry-1/4 teaspoon
- Groundnut oil- 10cl
- Smoked fish- Medium size

Preparation:-

The beans were picked, washed and blanched. Soya bean was soaked for 10 hours. The beans were covered with water and steamed to boil for 45 minutes and the water strained out. The bean was steamed with water until it was soft.

The tomato paste, fresh pepper and onion were fried and the beans poured into the sauce. Water and seasonings were added and allowed to simmer for 10 minutes.

RESULTS AND DISCUSSION**Sensory evaluation**

The dishes were subjected to sensory evaluation for colour, taste, texture, flavour and general acceptability using a 5-point hedonic scale by 50 panelists with 1 as the minimum and 5 as the optimum score. This is shown in Table I.

The table shows that cowpea dishes are generally accepted having the highest mean score of 4.70 ± 0.47 for pudding and 4.60 ± 0.68 for pottage. However, soya bean pudding is more accepted than pigeon pea pudding having mean score of 2.27 ± 1.46 and 1.75 ± 0.97 respectively. Pigeon pea pottage is more accepted than soya bean pottage having mean scores of 4.05 ± 0.79 and 2.40 ± 1.31 respectively. The sensory preference of the cowpea dishes which cut across culture and tribes of the panelists confirmed Ison (1994) assertion that 'sensory preference of a particular food is an expression of emotional state or reaction of an assessor which lead him/her to find one product better than another and could not be a predictor of the consumers behavior or cultural belief'.

Table I: Sensory Evaluation of the Prepared Legumes Dishes

Sample	Taste	Texture	Appearance	Flavour	General Acceptability
SOYABEAN PUDDING	2.65±1.18	2.90±1.23	3.15±1.35	2.85±1.39	2.27±1.46
PIGEONPEA PUDDING	1.90±1.02	3.00±1.34	2.25±1.55	2.00±1.03	1.75±0.97
COWPEA PUDDING	4.40±0.88	4.60±0.61	4.30±0.73	4.70±0.47	4.70±0.47
SOYABEAN POTTAGE	2.40±1.27	2.05±1.10	3.45±1.28	2.60±1.50	2.40±1.31
PIGEONPEA POTTAGE	4.20±0.83	3.25±0.99	3.50±0.95	4.10±0.79	4.05±0.79
COWPEA POTTAGE	4.40±0.68	4.30±0.87	4.40±0.75	4.20±0.62	4.60±0.68

Values are means \pm standard deviation

Proximate analysis for moisture, ash and fibre

The sample of the prepared legume grains dishes were evaluated for proximate analysis using AOAC (2005) methods at the National Cereals Research Institute Baddegi, Niger State. The samples were analyzed for percentage moisture, fat, crude protein, crude fibre, ash and carbohydrate. The energy value was also determined for each sample.

The result is shown in Tables II & III. The Table reveals that soybean pudding has the highest moisture percentage of 74.13%. This is due to its tenderness and ability to absorb water during cooking while pigeon pea pottage has the lowest moisture percentage of 51.33%. This is due to its texture when grinded. Moreover, there is no significance difference between the pudding dishes the pottage dishes respectively.

Generally the percentage ash content is low but the percentage ash values of the pottage dishes are greater than those of the pudding dishes. The low values of ash contents in the puddings could be attributed to the method of processing which includes dehulling, soaking etc. and is in line with the values recorded for Bambara moinmoin by Solomon, Aliyu & Mohammed (2009).

Similarly, the fibres value for soya bean, cowpea and pigeon pea pottage varies from 6-8% while those of the pudding vary from 2.5-3.0% respectively. This implies that pigeon pea dishes have the highest indigestible part of the food; this is useful during constipation while soya bean dishes have the lowest fibres.

Table II: Proximate Analysis for Moisture, Ash and Fibre

Sample	%Moisture	%Ash	% Fibre
COWPEA POTTAGE	64.60	2.85	7.75
SOYABEAN POTTAGE	52.06	2.01	6.73
PIGEONPEA POTTAGE	51.33	2.85	8.95
PIGEONPEA PUDDING	65.75	1.51	3.00
SOYABEAN PUDDING	74.13	1.20	2.59
COWPEA PUDDING	70.52	1.75	2.75

Proximate analysis for Protein, Fat, Carbohydrate and Energy value

Sample of the prepared bean dishes were also evaluated for protein, fat, carbohydrate and energy value. This is shown in Table III. Cowpea pottage has the highest percentage value of protein with 15.40%, while cowpea and soya bean puddings have the same value of 9.28% respectively, which are the lowest.

The cowpea pottage has the lowest percentage of carbohydrate while pigeon pea pottage has the highest percentage of carbohydrate (17.60%). This report supports the result of Bressain (1985).

There is slightly variation in fat content of the dishes respectively. The cowpea pudding and pottage has the highest fat content, while the soya bean pottage has the lowest fat content. The energy value of dishes prepared from bean shows that soya bean pottage has the highest calories value of 190.15 kcal while pigeon pea has the lowest value of 130.81 kcal. Although the dishes had lower carbohydrate values the caloric values of some were high due to the contributions of other nutrients such as lipids. Vegetable oils are good sources of carotenoids and tocopherols. They are therefore especially good sources of low priced oil for populations, where vitamin A deficiency is prevalent. The use of vegetable oils in the dishes analyzed is therefore in agreement with the FAO/WHO/UNU (1985) guidelines which say that at least 17 percent of the energy in the ration should be provided in the form of fat.

Table III: Proximate Analysis for Protein, Fat, Carbohydrate and Energy Value

Sample	% Fat	% Protein	% Carbohydrate	Fat×9+Protein×4+CHO×4=Ev
COWPEA POTTAGE	8.80	15.40	0.60	143.20
SOYABEAN POTTAGE	6.67	24.17	8.36	190.15
PIGEONPEA POTTAGE	7.37	11.90	17.60	184.33
PIGEONPEA PUDDING	7.97	13.97	0.80	130.81
SOYABEAN PUDDING	8.53	9.28	4.27	130.97
COWPEA PUDDING	9.96	9.28	5.73	149.68

CONCLUSION

The nutritional and sensory evaluation of legumes grains dishes revealed that dishes are very palatable and accepted among Nigerian. However, bean dishes have a very high protein content if well prepared, therefore it can serve as a substitute for animal protein, thereby reduce malnutrition. It is also good source of protein for vegetarians.

RECOMMENDATION

The study recommends that bean dishes should be well utilized among low and medium income earner as substitute for animal protein. The recipes and methods of cooking beans dishes should be standardized. Also, there must be good advocacy of how best to prepare the bean dishes in order to exploit protein potential in it.

REFERENCES

- AOAC (2005). Official methods of Analysis of the Association of analytical chemists, international (18th ed). Gaithersburg, Maryland, USA.
- Bressain, R.C. (1985). Nutritive value of cowpea production and utilization. New York, Willey and son ltd.
- FAO (1994). Definition and classification of commodity pulses and derived products .<http://www.fao.org>. Retrieved 6/11/11
- FAO/WHO/UNU (1985). Energy and Protein Requirements, *WHO Technical Reports Series*, Geneva.
- Ison, O.R. (1994). Sensory Analysis- Vocabulary. Revised Canada Proposal. Pp. 20-23.
- Manay S. N. & Shadaksharawamy, M. W. (2003). Food facts and Principles (2nd ed.). Delhi, New age International ltd.
- Solomon, M., Aliyu, R. & Mohammed, R. (2009). Nutrient Composition of food stuffs and Dishes/Foods of Indigenous Population of Jos Plateau, Nigeria. *West African Journal of Food and Nutrition*, 2 (3) 23-38.
- Philip, R. D. & Adams, J. G. (1983). Nutritional and physiological response of rate diet Containing whole decorticated and steamed cowpea .*Rep Int.* pp 949-958.
- Sales, M. G. & Roddrigues, M. A C. (1987). *Cowpea nutritional quality and preparation in Brazil*. Brazil International Institute for Agriculture. pp 333-345.