Proximate Composition and Acceptability of Moin-Moin Made From Cowpea (*Vigna Unguiculata*) and Asparagus Bean Seed (*Vigna Sesquipedalis*)

Nwosu, J. N.

Department of Food Science and Technology, Federal University of Technology, P. M. B. 1526 Owerri
Ifytina19972003@yahoo.com

Abstract: Asparagus bean (*Vigna sesquipedalis*) locally known as "*Akidi oji*" in some Eastern States and Cowpea (*Vigna unguiculata*) seeds were used to prepare moin –moin. The Asparagus bean were used to substitute cowpea at 10 %, 20 % , 30 %, 40 %, 50 % , 60 % , 70% , 80 %, 90 % , and 100 % levels, and used for the production of moin-moin which were evaluated according to firmness, appearance, taste and over all acceptability. The moin-moin was produced by grinding the dehulled beans, adding spices and cooking in the moral way till it is done. The result of the sensory evaluation and proximate analyses carried out showed that up to 50% substitution of cowpea was acceptable by the panel with no significant changes in taste and over all acceptability compared to the standard (100% cowpea). From this result, it could be stated that usage of Asparagus bean up to 50% is acceptable for use in the substitution of cowpea in the production of moin–moin.
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1. Introduction

Asparagus bean (*Vigna sesquipedalis*) also known as "akidi Oji" in the Igbo speaking regions is an annual vegetable that belongs to the leguminous family and sub – family of papilonaceae. The bean is mostly grown in far East, mostly for its immature pods. It is eaten in many part of Eastern Nigeria like Anambra and Enugu states. Like many other legumes, asparagus beans are important source of dietary protein which complements protein obtain from cereals.

Asparagus beans are vital food resources which contribute to the nutritional well being of humans. These products provide essential nutrient and high level of protein with moderate level of energy and dietary fibre. It is very interesting to know that Asparagus beans, though rich in the essential nutrients also contain compounds which are actually toxic. Lack of knowledge of functional, chemical and nutritional properties of Asparagus bean grown in developing countries are responsible for the reduced and under utilization of these crops in different food formulations.

The different processing methods of legumes like asparagus bean and their subsequent derivation into different food product affect their acceptability characteristics. They are usually cooked and eaten as food, they can be processed into akara (fried bean balls) or moin-moin (seamed cowpea paste) for both household and commercial purposes. The mature seeds are consumed in a variety of ways such as whole or dehulled seeds, cooked in boiling water for varying period and consumed after addition of salt and other spices.

Asparagus bean has been found to have functional properties similar to those of cowpea, soy bean and other popular beans. It is a common and conventional belief that Asparagus bean is very rich in protein and low in carbohydrate. The starch or carbohydrate component of Asparagus bean is not as significant as widely believed. Different factors which could be physical, physiological and agronomical affect the over all carbohydrate content of asparagus bean. These differences could be in texture, colour and thickness of the bran, percentage of carbohydrate, percentage and fraction of starch of the different grains, however, the chemical composition of foods should be an important factor influencing foods choices. With adequate analyses, asparagus bean can be easily blended to existing diet without major changes in the consumption pattern of the people.

Moin–moin is a popular snack food which serves as breakfast on the meals of most Nigerian homes where it is consumed with pap (Ogi) or alone or with other cereal foods like rice. It is made by steaming of bean paste which is of a higher viscosity than other gruels.

The objective of this research work therefore is to evaluate the suitability of asparagus bean as a substitute for cowpea in the production of moin –moin. It is hoped that this will help to diversify the use of asparagus bean seed and at same time reduce the pressure on cowpea commonly used for these foods.

2. Materials and Methods

The dry seeds of cowpea and asparagus bean used in this study were purchased from a local market in

Enugu state. The seeds were carefully selected and sorted before packaging and storing at ambient temperature until used.

The chemicals and equipment that were used in this study were of analytical reagent grade and were all obtained from the Department of Food Science and Technology, Federal University of Technology, Owerri.

2.1 Production of Moin-moin from Asparagus Bean and Cowpea

The asparagus bean and cowpea seeds were sorted and cleaned by removing chaff and dirts. Fifty grams (50g) of wholesome asparagus beans were then steeped in hot water (70 – 80^0C) for 20 minutes in a clean container and that of cowpea in cold water for the same time in a different clean container.

After that period, the seeds were removed from the steep water for dehulling. Dehulling of the seeds were achieved by rubbing the soaked seeds in between palms till every hull was completely removed. The dehulled beans were ground separately using 0.5 litres of portable water for 58.5g of seeds.

Asparagus bean and cowpea paste at different levels of substitution (10: 90, 20: 80, 30: 70 etc) were used in preparing moin–moin by adding two table spoonful of life vegetable oil, 5g of each of ground crayfish, onions (5g) and tomato sauce (5g). 2g of salt and pepper, 8.03g of maggi was also added and was mixed till a homogenous mix (Slurry) was obtained. The paste was then put in aluminum cups, covered and steamed for 2 hours using a kerosene stove. After steaming, it was allowed to cool for 10- 15 minutes before analyses of the sensory and proximate properties were carried out.

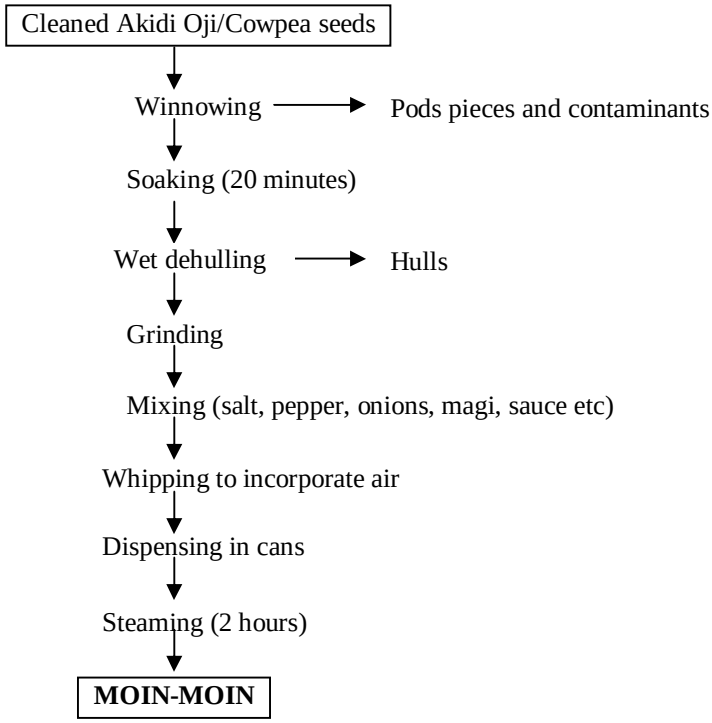

Fig 1: ***Flow diagram for the processing of 'Akidi oji'/ cowpea seeds into moin –moin.***

3. Sensory Evaluation

A 20 member panel consisting of students was used to evaluate the product (moin–moin). Selection of the panel was based on interest, familiarity with 'Akidi Oji', cowpea and availability of panel (students). The panel tested the products by eating it, then rinsing their mouth with water after testing each product and ranked them on the basis of colour, texture of the crumb, taste and over all acceptability on a 9- point hedonic scale. 9 = Like extremely; 8 = Like very much; 7 = Like moderately; 6 = Like slightly; 5 = Neither like nor dislike; 4 = Dislike slightly; 3 = Dislike moderately; 2 = Dislike very much; 1= Dislike extremely.

The row scores were assembled and the mean scores used to calculate the ANOVA. ANOVA is the statistical calculation of the raw data obtained from sensory scores to know whether each product varies from another.

4. Proximate Analysis:

Proximate analyses of the samples (protein content determination, ash content, moisture content, fat, crude fibre and carbohydrate determinations) were all carried according to A.O.A.C. (1990).

5. Sensory Evaluation

The method of A.O.A.C. (1990) was used for sensory evaluation. The samples were presented in transparent packs and coded. Then questionnaires were presented to the panelists. They were requested to observe and test each sample as coded. A 20 member panel consisting of students was used to evaluate the product (moin-moin). Selection of the panel was based on interest, familiarity with 'Akidi oji', cowpea and availability of panel (students). The panel tested the products and ranked them on the basis of colour, texture of the crumb, taste and over all acceptability on a 9-point hedonic scale. 9 = likely extremely; 8 = like very much; 7 = like moderately; 6 = like slightly; 5 = neither like nor dislike; 4 = dislike slightly; 3 = dislike moderately; 2 = dislike very much; 1 = dislike extremely.

The raw scores were assembled and the mean scores used to calculate the ANOVA. ANOVA is the statistical calculation of the raw data obtained from sensory scores to know whether each product varies from another.

6. Results

The result of proximate composition of the raw sample is shown in Table I, while that of the product is shown in Table 2. Also Table 3 shows the mean ANOVA for sensory analysis.

The crude protein content ranged from 4.88 to 5.73%. The crude protein for moin–moin substituted with 100% Asparagus bean were slightly higher than the control (100%cowpea) Table 2, due to higher protein content of Asparagus bean seed. The fat content of all the moin – moin samples were in the range of 4 .98 – 5.80%. The ash content varied between 0. 67 – 0.93%. The moisture content of the samples were in the range of 52.06 – 55. 06%. Crude fibre content ranged from 0.75- 0.83%. The carbohydrate content of the raw sample was from 60% to 33% after moin-moin production.

Table 1: Proximate Composition of the Raw Cowpea and Asparagus Flour Samples

Samples	Moisture	Ash (%)	Fat (%)	Crude content (%)	Crude Protein (%)	CHO (%)
Raw cowpea flour	11.48	3.20	1.25	20.13	3.50	60.44
Raw Asparagus flour	8.26	2.98	2.07	22.43	2.24	61.52

Table 2: Mean ANOVA Table for Proximate Scores of Moin-Moin made from Cowpea Substituted with Asparagus Bean

Samples	Ash	Fibre	Moisture	Crude Protein	Crude Fat	CHO
Asp(10%):Cp(90%)	0.91[a]	0.82[a]	55.06[a]	4.90[a]	5.52[a]	32.79[a]
Asp(20%):Cp(80%)	0.89[a]	0.83[a]	54.14[a]	5.01[a]	5.35[a]	33.78[a]
Asp(30%):Cp(70%)	0.78[a]	0.83	54.19[a]	54.19[a]	5.48[a]	33.56[a]
Asp(40%):Cp(60%)	0.83[a]	0.75	52.06[a]	52.06[a]	5.33[a]	35.53[a]
Asp(50%):Cp(50%)	0.80[a]	0.79	54.12[a]	54.12[a]	5.65[a]	33.35[a]
Asp(60%):Cp(40%)	0.75[a]	0.79[a]	54.56[a]	5.40[a]	5.48[a]	32.05[a]
Asp(70%):Cp(30%)	0.73[a]	0.80[a]	53.80[a]	53.80[a]	5.02[a]	34.09[a]
Asp(80%):Cp(20%)	0.70[a]	0.79[a]	53.69[a]	53.69[a]	5.06[a]	34.22[a]
Asp(90%):Cp(10%)	0.69[a]	0.79[a]	54.04[a]	54.04[a]	4.98[a]	33.83[a]
Asp bean (100%)	0.67[a]	0.77[a]	53.18[a]	53.18[a]	5.80[a]	33.85[a]
Cowpea (100%)	0.93[a]	0.81[a]	55.03[a]	55.03[a]	5.50[a]	32.85[a]
LSD	-	-	104.48	104.48	-	11.67

Mean with similar superscript on the same column are not significantly different (P<0.05)
Asp = Asparagus; Cp = Cowpea

Table 3: Sensory Scores of Moin–Moin made from Cowpea Substituted with Asparagus Bean.

Sample	Color	Firmness	Taste	Overall Acceptability
Asp(10%):Cp(90%)	6.90^{a}	6.65^{a}	6.25^{b}	6.70^{ab}
Asp(20%):Cp(80%)	7.00^{a}	6.50^{ab}	7.15^{a}	6.80^{ab}
Asp(30%):Cp(70%)	4.40^{c}	6.70^{ab}	5.25^{bc}	6.45^{ab}
Asp(40%):Cp(60%)	7.15^{a}	6.20^{b}	6.75^{ab}	7.15^{a}
Asp(60%):Cp(40%)	6.75^{a}	6.05^{b}	6.75^{ab}	7.45^{ab}
Asp(70%):Cp(30%)	7.00^{a}	6.30^{b}	6.35^{b}	5.45^{c}
Asp(80%):Cp(20%)	6.45^{ab}	6.15^{b}	5.85^{bc}	5.80^{bc}
Asp(90%):Cp(10%)	6.75^{a}	6.25^{b}	5.95^{ab}	6.30^{b}
Asp bean (100%)	5.95^{b}	6.25^{b}	5.80^{bc}	5.35^{c}
Cowpea (100%)	5.95^{b}	7.10^{a}	6.45^{ab}	6.45^{ab}
LSD	0.778	0.672	0.793	0.781

Mean with similar super script on the same column are not significantly different (P< 0.05)

7. Discussion

7.1 Proximate Composition Changes:

The protein of the raw sample was higher than the moin-moin. This could be attributed to the pre – processes involved in the processing of the raw samples into product (moin–moin). Also leaching into the cooking water could cause reduction in the protein content of the product. If the fat content is compared to the fat content range of legumes known to be within 0.6 – 5.00%: the increase in fat may be as a result of oil added during mixing.

The ash content for samples (moin-moin) substituted with higher Asparagus bean did not vary much (60% to 80%), but ash content increased slightly with 80% to 100% substitution with cowpea. This could be attributed to the mineral content of cowpea.

The moisture content of all the samples were higher than the raw sample and did not vary much due to the absorption of moisture during soaking , and also due to the quantity of water used , both in wet milling and in preparation of moin–moin .

The crude fibre content of the samples were low due to the dehulling of seeds prior to millng. Dehulling of legume seeds increased protein and ash but reduced crude fibre (12, 13).

Legumes are valuable source of carbohydrates with Asparagus bean having 327kcal metabolizable energy per 100g edible portion (9). Hence, blend of cereal – legume diet will satisfy both the protein and carbohydrate requirement of man.

From the results of the proximate composition, it could be said that moin–moin made from Asparagus bean still contains appreciable nutrients as those made with the cowpea normally used by most consumers.

From the sensory evaluation, the colour of moin–moin samples did not change significantly (P<0.05) up to 20% substitution with asparagus bean but was noticed in 30-40% substitution, then no significant difference existed in 50% substitution and above (Table 3). At higher substitution levels however, there was no significant difference in colour of the moin–moin compared to controls. Colour changes during moin–moin processing are partly due to the direct effect of heat, and partly due to Maillard browning which is affected by the level of protein (amino acid) in the product. There was no significant difference between the controls. In term of taste, no significant difference existed between the controls and also between 100% and 90% asparagus bean. However, the taste of moin–moin was still acceptable to the panelists at all levels of substitution. It was reported by Akpapunam (1985) that supplementation with maize up to 50% yielded acceptable moin–moin. It appears that within this level of substitution, the peculiar flavor of Asparagus bean was masked by the flavor of cowpea and other ingredients Ossai *et al.* (1989). The probable reason the beany off-flavor was not noticed in moin–moin could be because of the dehulling process and various spices including tomato sauce used for the preparation Philips (1988).

The crumb (firmness) of moin – moin with asparagus bean was well appreciated by the panel. A significant difference (P < 0.05) however was seen to exist between the controls (100% cowpea) and those substituted with higher Asparagus bean due mainly to the hot water used in steeping Asparagus bean seeds. Firmness of moin–moin is affected by the oil and fat content.

For overall acceptability, a significant difference (P< 0.05) existed between the controls, but there was no significant difference between 10% up to 50% substitution with asparagus bean. Also, no significant difference existed between the 100% asparagus bean (Control) and 70% substitution. Nevertheless, the panelists accepted the samples except the 70 and 100% asparagus bean.

8. Conclusion

Asparagus bean seed can be used to partially substitute cowpea in moin–moin preparation up to 50%. However, the acceptability of the resultant product is affected by the method of preparation. Steeping of asparagus bean in hot water produced acceptable moin–moin at 50% substitution with cowpea, although the 100% Asparagus bean were significantly different ($P< 0.05$) from the firmness and over all acceptability of 100% cowpea.

The use of asparagus bean (Akidi oji) as a partial substitute in the production of moin-moin was acceptable up to certain levels and is obviously cheaper than using 100% cowpea. The different conditions utilized in the pre-treatment of the asparagus bean seeds should be optimized in order to promote the acceptability of asparagus bean as a substitute for the production of moin- moin or even 'akara' (bean ball). More studies should be geared towards using 100% Asparagus bean to make moin–moin since it had acceptable qualities even up to 50% substitution. Again, incentives should be given to farmers so that they can cultivate more asparagus bean and distribute them to other areas effectively.

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