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Estimation of Protein Content in Soyabeans Consumed In Abakaliki, Ebonyi State, Nigeria

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Abstract: *The percentage composition of protein, ash content and moisture present in soyabeans consumed in Abakaliki, Ebonyi state were studied. The result showed that sample A which is cultivated at International Institute for Rural Development (IIRD) Igbeagu, Izzi Local Government Area has the highest Percentage protein content of 39.23 with ash content of 5.30% and moisture content of 8.20% sample B which were bought from Benue State has a Percentage protein content of 37.68, ash content of 5.00% and moisture content of 10.33%. while sample C which were bought from Taraba State has the lowest protein content of 36.74%, ash content of 4.57% and moisture content of 10.97% all the soyabeans sample studied meets the protein standard value of between 36.50 -40 percent.*

Keywords: *Protein, ash content, soyabeans, Abakaliki and Ebonyi state.*

I. Introduction

Soybeans (Glycine max) is a legume that grows in tropical, subtropical, and temperature climates. Approximately half of the world's soyabeans are produced in the developing world and other half in the developed world (Mayhew and Penny, 1988; Millard, 1962; Derbyshire et al., 1976). Soybeans emerged first as a domestic crop in Northern China around 1700-1100 B.C, with trade advancement from North to Southern China, soybean slowly migrated to southern China. Later, it sread to korea, Japan and other Asian countries (Mayhew and Penny, 1988; FAO-UN, 2007; Raj, 2008). Today, it have become one of the most economical and valuable agricultural crops worldwide, people depend on soybeans for food, animal feed and medicine (Millard, 1962).

Soybeans are considered by many to be a source of complete protein (Thomas and Deman, 1989). A complete protein is one that contains significant amounts of all the essential amino acids that must be provided to the human body because of the body's inability to synthesize them. For this reason, soybeans ia a good source of protein, amongst many others, for vegetarians or for people who want to reduce the amount of meat or other sources of protein they consume (Matz, 1991; Hunter, 1998). Soybeans protein products can be good substitutes for animal products because unlike some other beans, soybean offers a complete protein profile and contains little fat unlike other animal protein that contains more fat, especially saturated fat (Sidney and Smith, 1972; Singh et al, 2006).

Other major constituents of soybeans apart from protein include oil, carbohydrates, minerals, vitamins etc. it contains about 20% oil, the second highest content among all food legumes (peanuts contain about 48% oil, the highest amount). Because of this, soybeans is considered to be oil seed aside protein (Hunter, 1998; Singh et al, 2006).

The protein in soybeans are contained in protein bodies, or aleurone grains, which measures from 2 to 20 micrometers in diameter. The protein bodies can be visualized by electron microscope, soy-protein is a good source of all the essential amino acids except methioamine and tryptophan. The high lysine content makes it a good complement to cereal protein which are low in lysine (Thomas and Deman, 1989); Kwok and Niranjan, 1995; Wolf, 1972). Hence, this work is aimed at establishing the protein content of different varieties of soybeans consumed at Abakaliki, Ebonyi State Nigeria.

II. Materials And Methods

Materials

The soybeans samples were collected from two different locations, International institute for Rural Development (IIRD) farming section situated at Igbeagu, Izzi Local Government Area and Traders in Abakaliki food stuff market which were said to be from Benue and Taraba States which are located in South East and North Central parts of Nigeria respectively were grinded into powdered form.

Methods

Determination of protein: Kjeldhal method was used in the determination of protein content in the samples of the soybeans flour. Kjeldhal method involves three principles; digestion, neutralization and distillation. The soybeans flour sample from IIRD was labeled A while the samples from Abakaliki Food stuff market was labeled B and C for soybeans from Benue State and Taraba state respectively.

1g of the soyabeans flour sample was put in a conical flask and mixture of K2SO4 and CUSO4 (in the ratio of 5-0.5) was added and 15mls of sulphuric acid was also added to the mixture. After shaking, the conical flask was placed inside a fume hood for digestion to take place.

After digestion, the mixture was cooled in a desiccation for 15-20 minutes, at the end of cooling, the mixture was with distilled water on a 100m/l volumetric flask and made up to the mark. 10mls of the digested solution was measured into a distilling flask and 15m/l of 40% NaOH was slowly added through separating funnel into the distilling flask to make the digestion solution alkaline.

The solution as distilled using distillation apparatus, 25m/l of boric acid with mixed indicator in the receiver flask was connected to the Kjeldhal apparatus. When the Kjeldhal apparatus. When the Kjeldhal apparatus was heated, the distillate was directed into receiver flask containing boric acid, the indicator (methylene blue and methyl red) change from red (acid) to colourless (alkaline).

At the end of the distillation 60m/l of the distillate was measured out and titrated with HCL. The end point of the titration was indicated at the appearance of a permanent red colour. The process was repeated three times for each soybean flour samples noting the record of each.

Determination of moisture content: Model analytical balance (AFP- 2100L England, UK) and dry oven (CP/SO/CUAD/250/HV England, UK) were used for determination of moisture content present in the soybean flour sample. The stainless steel moisture dish was dried to remove all water and dish was weighed, its weight was noted as Wo.

Then 5g of the sample was measured into the container and the sample + container was weighed, their weight was noted as W1. The sample was heated at 1050C for 2 hours and the lid was removed from the dish. The dish was then allowed to cool before the weight of the sample and the dish was noted again as W2. This process was reapeated three times and the percentage moisture content calculated.

Determination of crude ash content: Empty crucible was weighed and its weight noted as Wo. 3g of the soybean flour sample ashing crucible were weighed and their weight noted as W1. Then the ashing crucible and the sample were taken into muffle furnance at 5500C- 6000C for 5 hours, then they were cooled, crucible + ash were weighed and it weight noted as W2. This process was repeated using the three soybean sample A,B and C respectively. Finally the percentage crude ash was calculated.

III. Results And Discussion

Results

Table 1 : Showing Percentage of Protein Moisture and Ash Content of Sample A

Sample	% protein	% Moisture	% Ash
A1	39.18	8.10	5.30
A2	39.31	8.50	5.20
A3	39.20	8.00	5.40
Average	39.23	8.20	5.30

Table 2 : Showing Percentage of Protein Moisture and Ash Content of Sample B

Sample	% protein	% Moisture	% Ash
B1	37.76	10.60	5.00
B2	37.69	9.90	4.90
B3	37.58	10.50	5.10
Average	37.68	10.33	5.00

Table 3 : Showing Percentage of Protein Moisture and Ash Content of Sample B

Sample	% protein	% Moisture	% Ash
C1	36.81	11.00	4.60
C2	36.62	10.80	4.90
C3	36.80	11.10	4.20
Average	36.74	10.97	4.57

IV. Discussion

From the results obtained so far, it shows that sample A has the highest percentage protein content of 39.23% followed by sample B with 37.68% protein content and C with 36.74% protein. This shows that the percentage content is between 36.74% to 39.23%, which indicates that the protein content of soybeans

consumed in Abakaliki is not below the standard range of 36.5% to 40%. The difference between sample B and C are not so high but the value of sample A is far much higher than that of sample B and C. this may be because of the type of soil they were grown, the fertilizer used as well.

The type of soil in Ebonyi State where sample A is cultivated is different from the nature of the soil where sample B and C which were grown in Benue State and Taraba State respectively. Type of fertilizer used during cultivation also contribute to the percentage of protein present because fertilizer with higher percentage of nitrogen which is a major element in protein tend to contribute more to the percentage of protein fat that will be present in the crop grown.

All the varieties of soybeans do not have the same capacity to fix nitrogen from the soil and carbon dioxide from the atmosphere, this contributes to the amount of protein which will be synthesized. Sample C has the highest moisture content of 10.97% followed by sample B with 10.33% to moisture content while sample A has the lowest moisture content of 8.20%. this may be why sample A has the highest protein content. The higher the moisture content the lower the organic matter. Whereas the values obtained for ash content was 5.30% for sample A, 5.00% for sample B and 4.57% for sample C as contained in table 1-3. The ash value is an index of inorganic composition of the different samples. Sample C has the lowest value of ash indicating that some of inorganic components were occupied by the moisture.

V. Conclusion

The results from this study show that the soybeans cultivated in Igbeagu Izzi Local Government Area of Ebonyi State has the highest protein content. Its cultivated should be encouraged in large scale for export purpose not only for consumption around Abakaliki. Further research should be carried out to genetically combine sample A and B to obtain a variety with higher protein content

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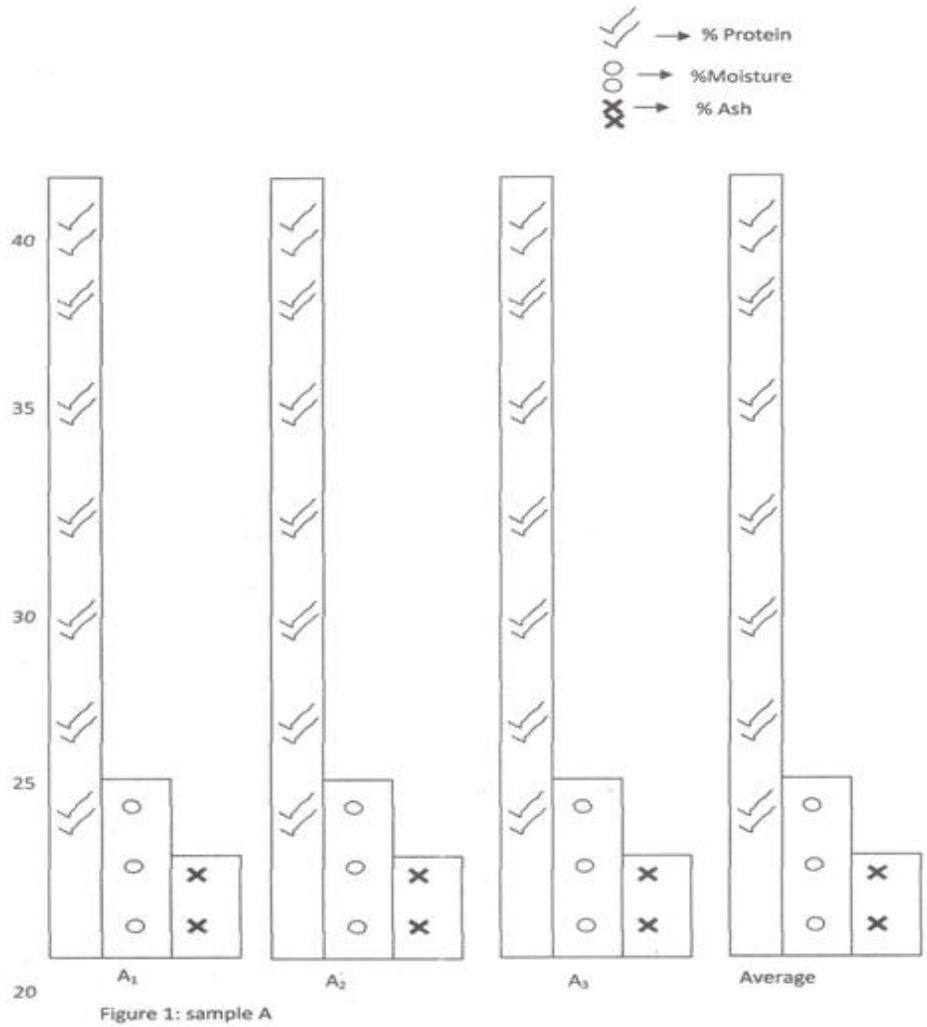

Figure 1: sample A

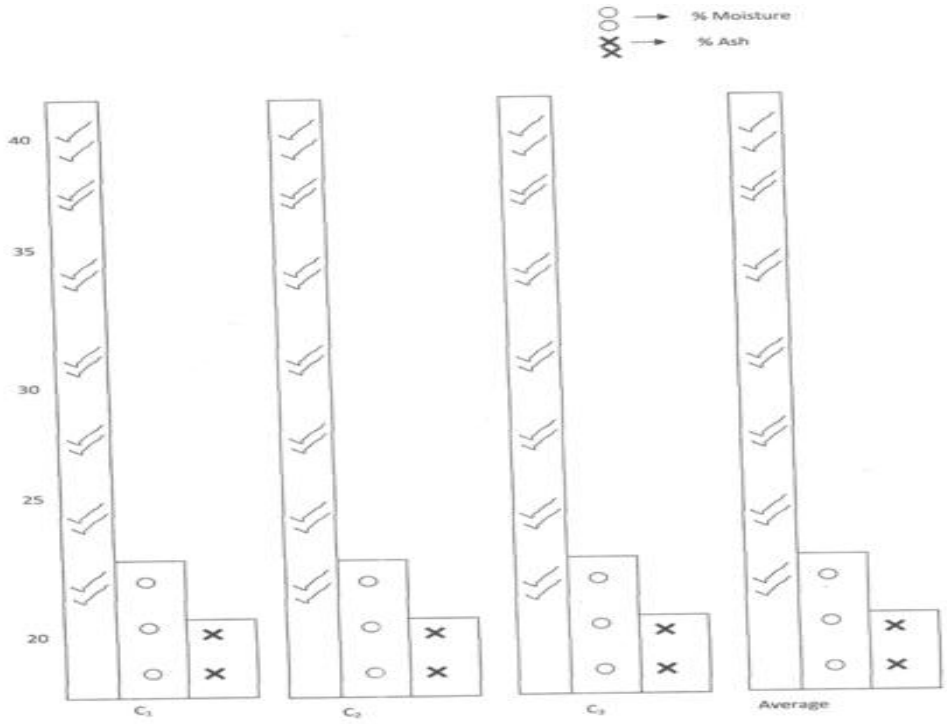

Figure 3: sample C

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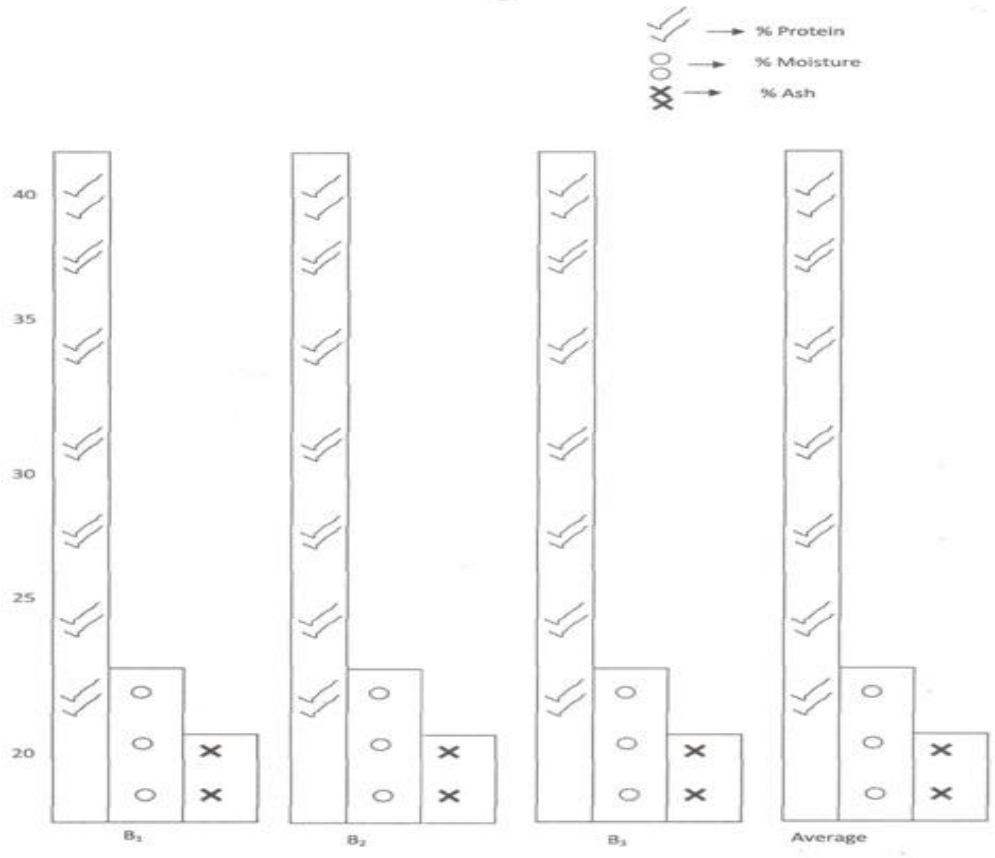

Figure 2: sample B

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