Proximate Composition and Aflatoxin Content in some Varieties of Locally Produced Groundnut (Arachis hypogaea L.) in Sokoto State, Nigeria

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Abstract:
The Proximate composition of three (3) different varieties of groundnut (Arachis hypogaea L.) kwankwaso, Erdakar and Kampala was investigated using standard procedures. The sample was purchased at Sokoto central market, Sokoto state and was dried at room temperature and homogenized using a blender, stored in an air tight container till time for the analysis. Proximate analysis was carried out on the sample in accordance using standard method and aflatoxin content using ELISA method. Statistical analysis was carried out using graphpadInstat version 3 and the results were expressed in mean ± SEM and also ANOVA test was carried out on the sample at (P< 0.05). Results showed that the groundnuts had 4.01-4.25% moisture, 1.50-2.03% ash, 15.77-23.01% fat, 50.72- 56.69% carbohydrate, 470.90-499.32 kcal of energy value and 2.92- 3.07% fibre. All the varieties analyzed showed an aflatoxin activities as 2.73-3.5ppb. The 3 different varieties shows a significant difference in their proximate and aflatoxin content except 2 pairs of the varieties having no significant difference based on their ash and aflatoxin content at (P< 0.05). Thus, these groundnuts can be considered useful foodstuffs in minimizing protein-energy malnutrition (PEM) and a good source of nutrients in Nigeria if properly utilized and effective storage system is improved.

Key word: Proximate Composition, Aflatoxin and Elisa.

I. INTRODUCTION

Adequate nutrition is a basic human right. In order to have a healthy population that can promote development, the relation between food, nutrition and health should be reinforced. In developing countries, one of the way of achieving this is through the exploitation of available local resources, In order to satisfy the needs of the increasing population (Achuet et al., 2005). Nutrition is the scientific study of nutritional components of food and their physiological importance in the growth and maintenance of the body. Nutrition is also the intake of food, utilized and effective storage system is improved.

consumption of nutrients. In developed countries, the diseases of malnutrition are most often associated with nutritional imbalances or excessive consumption. Although there are more people in the world that are malnourished due to excessive consumption, according to the united nations world health organization, the greatest challenge in developing nations today is starvation, but insufficient nutrition that is the lack of nutrients necessary or the growth and maintenance of vital functions. The causes of malnutrition are directly linked to inadequate macronutrient consumption and disease, and are indirectly linked to factors like “household food security, maternal and child care, health services and the environment” (WHO, 2018). Aflatoxins are a family of toxins produced by certain fungi that are found on agricultural crops such as maize, peanuts, cotton seeds and tree nuts. Aflatoxin-producing fungi can contaminate crops in the field, at harvest and during storage (NCFEH, 2012). Aflatoxins are a group of naturally occurring mycotoxins that are produced by Aspergillusflavus and Aspergillusparasiticus, species of fungi that typically affect groundnuts which are abundant in warm and humid regions of the world (Williams et al., 2004).

Aflatoxins are found in various cereals, oilseeds, spices and nuts (Reddy, 2010 and Iqbal et al., 2014). These aspergillus colonizes themselves and produces aflatoxins, which contaminate grains and cereals at various steps during harvesting or storage. Fungal contamination can occur in the field, or during harvest, transport and storage (Kader and Hussein, 2009). Aflatoxins affects humans following consumption of aflatoxins contaminated foods such as eggs, meat and meat products, milk and milk products, groundnut and so on (Bennett and Klich, 2003).
II. GROUNDNUT (ARACHIS HYPOGAEA L.)

Groundnut is one of the most important cash crops of our country. It is a low-priced commodity but a valuable source of all the nutrients. Groundnut is the sixth most important oilseed crop and eighth among nutritional crops in the world (Monyo et al., 2012). They are rich in nutrients (carbohydrates, proteins, lipids, vitamins, minerals, fibre and some organic acids) that are essential to human health and are adequate to meet energy and protein nutritional needs of populations at risk of malnutrition (Setalluriet et al., 2012). The groundnut protein is plant based, most of the fat is unsaturated which makes groundnut the best form of human nutrition. Since, groundnuts are legumes, they have higher protein content compared to other nuts with levels comparable to beans (Arya et al., 2016). Groundnut contains 48-50% of oil and 26-28% of protein, and is a rich source of dietary fiber, minerals, and vitamins. The worldwide groundnut is grown in 26.4 million hectares with a total production of 37.1 million metric tonnes and an average productivity of 1.4 metric t/ha. Worldwide groundnut is grown over 100 countries. Developing countries constitute 97% of the global area and 94% of the global production of this crop. The production of groundnut is concentrated in Asia and Africa with 56% and 40% of the global area and 68% and 25% of the global production, respectively (Badami, 1936). In most southern African countries, groundnuts and their products are used as weaning food for children, supplementing diets where maize is the major source in many rural communities especially infants and children who are most vulnerable to malnutrition (Patel et al., 2005).

III. MATERIALS AND METHODS

SAMPLE COLLECTION
The sample (groundnut) was purchased at Sokoto central market, Sokoto state and identified by a qualified botanist. The sample was dried at room temperature and homogenized using a blender, was stored in an air tight container till time for the analysis.

METHODS

PROXIMATE ANALYSIS
All the parameters of proximate composition were carried out using (AOAC, 2005)

AFLATOXIN CONTENT DETERMINATION
The determination of aflatoxin content of the sample (groundnut) was carried out in accordance with the procedure of (Romer, 2015).

IV. RESULTS

The results of Proximate and Aflatoxin compositions of Groundnut (Arachis hypogaea L.) is presented in Table 1 and 2 respectively.

Table 1. Proximate Composition (g/100g dry weight) of three varieties of Groundnut (Arachis hypogaea L.)

<table>
<thead>
<tr>
<th>Variety</th>
<th>% Moisture</th>
<th>% Ash</th>
<th>% Protein</th>
<th>% Fat</th>
<th>% Energy</th>
<th>% Crude Fibre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwankweso</td>
<td>4.25±0.03a</td>
<td>1.50±0.10c</td>
<td>18.76±0.08b</td>
<td>18.79±0.02a</td>
<td>470.90±0.4 0.46</td>
<td>3.35±0.14b</td>
</tr>
<tr>
<td>Erdakar</td>
<td>4.42±0.04a</td>
<td>1.94±0.03c</td>
<td>15.77±0.08b</td>
<td>24.97±0.38c</td>
<td>499.43±1.65</td>
<td>2.92±0.03b</td>
</tr>
<tr>
<td>Kampala</td>
<td>4.01±0.01a</td>
<td>2.03±0.00a</td>
<td>20.22±0.15a</td>
<td>23.01±0.09b</td>
<td>490.89±0.42</td>
<td>3.07±0.08b</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± standard error of mean (n =3).
Values with different superscript along the same column indicate significant difference but those with the same superscript along the same column indicates no significant difference (P<0.05).

Table 2. Aflatoxin composition of three varieties of Groundnut (Arachis hypogaea L.)

<table>
<thead>
<tr>
<th>Variety</th>
<th>Aflatoxin (ppb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwankweso</td>
<td>3.5±0.06b</td>
</tr>
<tr>
<td>Erdakar</td>
<td>2.73±0.12a</td>
</tr>
<tr>
<td>Kampala</td>
<td>3.07±0.03a</td>
</tr>
</tbody>
</table>

Values are expressed as mean ± standard error of mean (n =3).
Values with different superscript along the same column indicate significant difference but those with the same superscript along the same column indicates no significant difference (P<0.05).

V. DISCUSSION

From the result of proximate composition in Table 1.0 the moisture content was lower than the value (4.12-9.26% DW) reported by (Shokunbiet al., 2012) in “Nutrient composition of five varieties of commonly consumed Nigerian groundnut (Arachis hypogaea L.)” and also lower than (7.48% DW) recorded in the “chemical evaluation of food value of groundnut seeds” reported by (Ayoolael et al., 2012). The variation could be due to genetic variation as well as the climatic conditions in which the plant was grown. High moisture is associated with a rise in microbial activities during storage (Hassan and Umar, 2004). Hence the low moisture content makes the shelf-life to be long and contribute to the stability of (Arachis hypogaea L.)
prevent rancidity of the oil. The value obtained was relatively lower than (2.70-3.03%DW) reported by (Aslam Shad et al., 2009) in “Evaluation of biochemical and phytochemical composition of some groundnut varieties grown in Arid zone of Pakistan” and (Musa et al., 2010) recorded as (3.0-7.4%DW) in “Proximate composition of selected groundnut varieties and their susceptibility to Trogoderma granarium Everts attack”. Therefore, the value of ash content from table 1.0 shows an indication that it contains nutritionally important mineral elements and also a good source of nutrients for consumers. The fat content of groundnut have been reported as (33.6-54.95% DW) by (Asibuo et al., 2009) in “Chemical composition of groundnut, (Arachis hypogaea L.) Landraces” and (45.09-51.63%DW) by (Aslam Shad et al., 2009) in “Evaluation of biochemical and phytochemical composition of some groundnut varieties grown in Arid zone of Pakistan”. However, the value of fat content obtained from table 1.0 are slightly lower. Hence, the variation existing from the reports seem to reflect the difference in locations where the groundnuts were cultivated as well as differences in the cultivars/varieties evaluated in each study. The fat content in groundnut indicates high energy density that promotes fat soluble vitamin absorption without adding to the bulk of the diet (Ataise et al., 2009). The groundnut crude protein content as shown in table 1.0 is similar to the ranges (2.76-3.07%DW) reported by (Fekria, 2006) as different from the local due to the fact that improved varieties from research institutes were analyzed (Fekria, 2006) as (289.40-352.59kcal/100g) in Locations where the groundnuts were cultivated as well as their susceptibility to “Trogoderma granarium Everts attack”.

Hence, this variation could reflect from the difference in the locations where the groundnuts are cultivated as well as differences in the cultivars/varieties evaluated in the study.

V. CONCLUSION

The findings obtained from the current study revealed that groundnut are an excellent and affordable source of nutrition, supplementing vital nutrients to the human body such as carbohydrates, proteins, fats and so on. Groundnuts are often referred to as poor man’s nut but when taken in adequate amounts in any form and free from contamination by aflatoxin through proper harvesting and storage.

VI. REFERENCES


