COMPARATIVE STUDIES ON THE PROXIMATE COMPOSITION AND SOME PHYSICAL CHARACTERISTICS OF DRY MATTER SAMPLES OF FERMENTED AND UNFERMENTED GROUNDNUT(*Arachis hypogaea* L.) SEED, PUMPKIN(*Curcubita pepo* L.) SEED AND PULP.

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ABSTRACT

Comparative studies on the proximate compositions of groundnut (Arachis hypogaea) seed, pumpkin(Curcubita pepo)seed and pulp and some physical characteristics were carried out to determine the effect of fermentation on these materials using the traditional method. Crude protein was determined by Micro-Kjeldahl techniques, ash by the Ranjhan and Krisma method; fat using the Saxhlet Extraction Apparatus, crude fibre by the Trichloroacetic Acid method and carbohydrate was calculated by summing up the results of the other components and substracting it from hundred. Results indicated that crude protein increased in the fermented products of groundnut and pumpkin seeds, fat contents increased in all the fermented products, ash showed increase in both fermented pumpkin products while crude fibre recorded an increase in the fermented pumpkin pulp only. This shows that fermentation helps siugnificantly, in improving the nutritive values of these products.

Keywords: Groundnut seed, Pumpkin seed and pulp, fermentation, condiments, physical characcteristics.

INTRODUCTION

Most foods consumed in Nigeria and West Africa in general lack variety and consist mostly of the staple foods e.g. maize, rice, yam, gari and so on. These foods provide only calories, hence they are poor nutritionally, both in quantity and quality, and as a result of these, there are problems of malnutrition and diseases [1, 2]. Furthermore, because of the poor economy, not many can afford the conventional protein source. The only option is the non-conventional sources which are plant materials. It has been observed that most of the soups eaten with such foods are the major sources of nutrients in our diets e.g protein, vitamin, fat, etc.hence they can be used to remedy these deficiencies since they are produced from different parts of plant materials such as the seeds, leaves and barks [3, 4]. These plant materials are processed and preserved in different ways among which is fermentation, employing the traditional methods which are normally used as food condiments to enhance aroma, flavour and taste of these soups [5, 6]. In Nigeria, there are different types of such food condiments depending on the region and the plant materials used. One of such is 'daddawa'(as called by the Hausas) and it is produced from different types of plants among which are African locust bean (*Parkia biglobosa*) seed [17]. Soyabean (*Glycine max*) seed [7] Kenaf (*Hibiscus cannabinus*) seed [8] groundnut (*Arachis hypogaea*), Pumpkin (*Curcubita pepo*) both seed and pulp [9]. Many work have been reported on the nutritional values of some of these products, but little or no work has been documented on the nutritional values

of fermented daddawa, groundnut seed and pumpkin. This work is therefore, intended to carryout the proximate analyses of these condiments.

METHODOLOGY

Sample Collection

Groundnut seeds were bought from Mubi main market, while pumpkin seeds and fruit were bought from Vegetable Market (Kasuwan Danye) Maiduguri. All the samples were kept in separate polythene bags and brought to the laboratory for the studies. The earthware pots were bought from Kasuwan Kuturu, Mubi, Adamawa State.

Fermentation

The traditional method of fermentation was employed for each of the sample. The groundnut seeds were boiled for 2 hr with little potash to soften. Thereafter, the excess water was drained off , wrapped in jute sac and then kept in warm place for 3 days. This was followed by removal of seed coats by pressing in-between the palms. The cotyledons were then boiled again for 1hr after which the excess water was drained-off again. The cotyledons were then ground into paste with little water added at (3:2 w/v). The paste was then mixed thoroughly, placed into the earthware pot, sealed and allowed to ferment for 8 days. The pumpkin seeds were pealed, boiled for 1hr and excess water drained-off which was allowed to cool which was later ground into paste. Little water was added (3:1w/v) and mixed thorougly then put into a separate pot, sealed and allowed to ferment for 8days. In the case of pumpkin pulp, the pericarps were peeled off using and the pulp cut into pieces (5cm x 3cm) and then placed into pot, sealed and allowed to ferment for 8 days. Other physical characteristics such as colours, state of solidness and smell were also noted.

Determination of Proximate Composition

The moisture content was determined by Consttant dry weight method using the Memmert Model oven, and 100g of each sample, that is, both fermented and non-fermented was measured out and each was placed in separate petri dish of known weight and kept in the oven to dry at 80^0C until a constant weight for each sample was obtained [10,11]. The moisture free samples were then used to determine the Proximate components. Crude protein was determined using the Microkjeldahl technique [11], fat content was by the Soxhlet Extraction Apparatus [12]. Crude fibre was determined by the Trichloroacetic acid method [11] and carbohydrate was obtained by summing up the values of other components and substracting it from hundred [12]. The composition of each sample was repeated three times and the averages calculated. The percentage composition for each component in each sample was then calculated based on the iniitial value taken. Other physical characteristics such as colour change, solidness, smell, were also observed.

RESULTS

After keeping the boiled groundnut seed in warmth for 3 days, it was found covered with mould. Also, after the 8 days of the fermentation of each sample, colour changes were observed in all the products. The fermented groundnut seed was brown and semi-solid,

pumpkin seed was ash-green and also semi-solid, Pumpkin pulp was pink and watery. All the products also produced pungent smell with the groundnut seed having a stronger smell.

Table 1:Percentage Proximate Composition of fermented and unfermented groundnut seed.

Composition	Fermented	Unfermented
Crude protein	36.7	24.4
Ash	03.0	03.5
Fat	45.0	36.3
Crude fibre	01.3	02.2
Carbohydrade	14.0	33.6

Table 2: Percentage Proximate Composition of fermented annd unfermented pumpkin seed.

Composition	Fermented	Unfermented
Crude protein	34.1	20.2
Ash	05.5	05.5
Fat	57.0	26.6
Crude fibre	01.1	02.7
Carbonhydrade	02.3	33.6

Table 3: **Percentage Proximate Composition of fermented and unfermented pumpkin pulp.**

Composition	Fermented	Unfermented
Crude protein	29.8	30.2
Ash	13.0	12.5
Fat	44.0	42.1
Crude fibre	11.0	08.1
Carbonhydrade	02.2	07.1

DISCUSSION

After keeping the wrapped groundnut seed in the warmth for 3 days, it was found to be overgrown with mould. The essence of allowing the fermenting organisms to build up is because in the traditional method of fermentation, no culture is added but the sources of inoculum come naturally from the microflora of such plant materials [2]. This is because fermenting organisms are normally present in sufficient numbers in the fermenting materials [13]. Also, the changes in colour, state of solidness and smell are normal characteristics associated with production of "daddawa". In fact, the degree of colour change and ammonia smell determines the quality of the product, that is, the darker the colour, and the stronger the smell, the better the quality. In terms of preservation, "daddawa" produced from groundnunt and pumpkin seeds are preserved by sun drying and in most cases, salt is added to reduce the water activity of such products [9,18] due to the fact that storage and

preservation technology in the developing countries are poor [19]. On the proximate composition, it can be seen that, crude protein increased in fermented groundnut and pumkin seeds except pumpkin pulp, although a marginal decrease was observed. Anosike and Egwatu [14,4] reported similar situation in the fermentation of castor oil bean and African locust bean seeds respectively. Similar increased was observed in the fermentation of Kenaf seed [8]. These can be attributed to the ability of the fermenting organisms to hydrolyze protein more especially in these type of high protein seeds, thereby liberating ammonia smell which account for the enhance food taste, flavour and aroma of such products [15]. Fat increased in all the fermented products while ash increased only in fermented pumpkin pulp and was constant in pumpkin seed and slightly in fermented groundnut seed. Other components such as carbohydrate and crude fibre decreased in most of the fermented products except the pumpkin pulp. These could be attributed to the fact that the fermenting organisms must have utilized these components as their major sources of nutrient during the process such as the situation reported in 'tempe' production an Indonesian fermented product from soya bean [16]. From the aforementioned observations, it can be seen that fermentation, among other functions, significantly improves the nutritive values of foods.

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