



ABSTRACT

Vegetables being seasonal products become very scarce and expensive when they are out of season. They also deteriorate rapidly after harvesting; as such they are preserved in dried form using different methods of drying. This research is aimed at knowing the difference in the nutritional content of the fresh and dried vegetables

NUTRIENT LOSSES IN NIGERIAN DRIED VEGETABLES (FLUTED PUMPKIN AND BITTER LEAF)

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Introduction

Vegetables are eaten by almost every human in one form or the other throughout the world. Leaf vegetables also called potherbs, green vegetables or leafy vegetables are leaves eaten as vegetables, sometimes accompanied by tender petiole and shoot. Although, they come from very wide variety of plants. vegetable most often come from short-lived herbaceous plant such as lettuce, spinach, alfafa, clover etc. Some are dried and pound into powder form or pulping for use (Ashebir and Ashenafi, 2015). Vegetables are typically low in calories, low in fat, high in fibre, high in iron, calcium and very high in phytochemicals such as vitamin C, carotenoids, lutein and folic acid etc. They constitute a group of food that are essential to a well balance diet. Green and yellow leafy vegetable supply an important part of amino acid and vitamins required in the body as well as other 'B' vitamin. (Gruda, 2014). Spinach contains iron, folic acid, vitamin A and essential amino acids in major qualities



(fluted pumpkin and bitter leaf) and the best method used in drying vegetables. The leaves of fluted pumpkin and bitter leaf were collected from a vegetable farm at Gwalameji Bauchi and were dried using sunlight and room temperature. The fresh and dried vegetables of fluted pumpkin and bitter leaf were analyzed for their nutritive content. The result of the analysis obtained showed the protein content of fresh, sun, and room dried fluted pumpkin to be 17.79%, 20.50%, and 22.4%, moisture 75%, 6.50% and 8.36%, Ash 0.94%, 11.4% and 10.24%, lipid 4.20%, 8.86% and 13.04%, crude fibre 5.90%, 14.20% and 11.50%, carbohydrate 5.70%, 38.24% and 34.46% respectively. While the protein content of fresh, sun, and room dried bitter leaf was found to be 18%, 21.69% and 23%, moisture 72%, 5% and 7.5%, Ash 1.23%, 12.48% and 12.4%, lipid 3.40%, 5.66% and 8.30%, crude fibre 3.24%, 8.80% and 6.50% carbohydrate 2.13%, 46.37% and 46.30% respectively. From the result obtained there is a loss in the nutritional content of sun-dried fluted pumpkin and bitter leaf. Hence, it could be said that both fresh and dried fluted pumpkin and bitter leaf are rich in nutritional content. But should be preserved using room drying method and should be stored for a short time, (a season) and be kept in bags in a well-ventilated place.

Key; Nutrient, losses, vegetables, fluted pumpkin, bitter leaf

along with potassium, Sulphur, silicon, magnesium and sodium in minor quantities (Ajushveda, 2008).

Vegetables can be eaten in fresh form as supplementary food, side dishes, sandwiches or salad. Leafy greens can also be used to wrap other ingredients. They may also be stir-fried, stewed or steamed. Leafy vegetables stewed with pork are a traditional dish in soup food in southern US Cuisine (Gruda, 2005). They are also commonly eaten in a variety of South Asia dishes such as Sasia (Gruda, 2005). Spinach is regarded as the most esteemed green leafy vegetable.



Vegetables can be stored (preserved) through winter, cool, and dry place to prevent mold growth and spoilage. They can last through to early spring and can still be nutritious as when fresh (Decu, 2010).

Justification

Vegetables being seasonal products become very scarce and expensive when they are out of season. They also deteriorate rapidly after harvesting, as such they are preserved in dried form using different methods of drying. Therefore, there is need to know the difference in the nutritional content of the fresh and dried vegetables (fluted pumpkin and bitter leaf) as it is mostly used, as well as the best method used in drying vegetables.

Aim

This research is aimed at knowing the difference in the nutritional content of the fresh and dried vegetables and the best method used in drying vegetables.

Objectives

To determine the nutritive content of fresh and dried vegetable (Bitter leaf and Fluted pumpkin).

To determine the best method for preserving the vegetables using two drying methods (Sun drying and room temperature drying).

MATERIAL AND METHOD

Sample Collection

The fresh vegetables of fluted pumpkin and bitter leaf were collected from Gwallameji village in Bauchi metropolis using clean containers.

Sample Preparation

According the method of Hazu *et al.*,(2002),

The vegetables were selected, washed and rinsed thoroughly with tap water to remove accompanying dirt particles sticking to the vegetable. The vegetables were divided into three parts; the first part was analyzed fresh, the second part was dried under the sun before the analysis was carried out, and



the third part was dried at room temperature before the analysis was carried out.

Sun Drying

The vegetables were dried under the sun by spreading them on separate trays and placed on an elevated top where the sun rays was able to reach them very well for seven (7) days.

Room Temperature Drying

The vegetables were spread on separate trays inside the room and the windows were opened for proper entrance of air and turned with hand from time to time to enable proper drying for twelve (12) days. After drying the vegetables were pounded into fine powder, sieved and for further analysis.

Proximate Analysis

All parameters were analyzed according to methods recommended by AOAC (1990),

Determination of Crude Protein

Two grams (2g) of each prepared sample was accurately weighed into the Kjeldahl flask, 1g of potassium sulphate, 0.6g copper sulphate and 20ml of concentrated tetraoxosulphate (VI) acid were added to the flask. The flask with its content was placed in an inclined position on a heating mantle inside a fume cupboard and heated. After cooling the digested mixture was transferred into a round-bottomed flask and the digest was diluted with 20ml of distilled water and 40ml of 50% NaOH was then added carefully. 20ml boric acid was measured into the receiver flask and 3 drops of mixed indicator (methyl red and methylene blue) was added to the boric acid. The distillation apparatus were assembled below such that the top of the receiver tube was a little below the surface of the standard solution of 20% Boric acid in the receiver flask. The content was heated on a heating mantle at 50°C until the ammonia was distilled into the boric acid.

25ml of each distillate was pipetted into 250ml conical flask 2 drops of mixed indicator (methyl red and methylene blue) was added to the distillate and then titrated with 0.1N hydrochloric acid (HCL) until there was a colour change.

The total nitrogen percentage was calculated.



$$\% \text{ nitrogen} = \frac{0.014 (V_2 - V_1) N_A}{W_t} * \frac{100}{1}$$

0.014 = 1g mole of nitrogen

% crude protein = % nitrogen * 6.25

6.25 is the factor for conversion of Nitrogen value to the protein content of the composite.

Determination of Crude Lipid

A clean thimble was weighed empty (W_1), it was further reweighed when filled with 4g of the sample (W_2). The thimble was covered with cotton wool and placed into the extraction barrel of the Soxhlet kit fitted with a small round bottom flask of known weight (W_3) containing the solvent (diethyl ether). The condenser was tightly joined in place and the round flask was fitted to the Soxhlet extraction kit and was placed on the heating mantle. The solvent was boiled gently, evaporated and refluxed into the barrel. After six hours, the condensers were then detached from the apparatus and the flask was then dried in an oven at a temperature of 100°C until a constant weight was obtained (W_4).

$$\% \text{ oil extracted} = \frac{\text{Weight gained by flask}}{\text{Weight of sample}} * \frac{100}{1}$$

Determination of Crude Fibre

2g of the sample residue obtained from the lipid determination was transferred to a one liter beaker having 200ml mark on it, boiled water and 25ml of 10% H_2SO_4 were added and was made up to the 200ml mark with distilled water. The mixture was boiled for thirty (30) minutes. The acid solution was then removed by suction. The residue was washed three times with boiled water after which it was transferred to a beaker. Boiled water of 10% NaOH was added and diluted to 200ml mark. The content and the beaker was heated to boil for another thirty (30) minutes. It was then filtered and washed three times.

The resulting residue was then transferred into a large porcelain crucible where the fiber cake was extracted by moistening with a small portion of ethanol that was permitted to drain between additions. The crucible was dried with the material at 100°C in an oven to a constant weight. The content was then



incinerated in a muffle furnace at 600°C two hours. The crucible containing the ash was cooled in a desiccator and weight.

$$\% \text{ crude fiber} = \frac{\text{weight of Crucible} + \text{weight of shed crucible}}{\text{Weight of sample}} * 100$$

Determination of Moisture Content

The crucible were dried at 100°C in the oven, cooled in a desiccator and weighed. 4g of each sample were weighed into the pre-heated and weighed crucible. These were dried to a constant weight in the oven, maintained at a temperature of 100°C. the weight was expressed as a percentage of weight.

$$\% \text{ moisture content} = \frac{\text{Loss in weight due to drying}}{\text{Weight of sample}} * 100$$

Determination of Ash Content

The porcelain crucible were pre-heated in a muffle furnace, cooled in a desiccator and weighted 2g of each sample were weighed into each dish and burnt first to remove the smoke on a Bunsen burner, it was ignited in a muffle at 550°C for four (4) hours. Heating was discontinued after the set time and crucible was removed, cooled in a desiccator and reweighed with the ash residue.

$$\% \text{ Ash content} = \frac{\text{Weight of Ash}}{\text{Weight of sample}} * 100$$

Determination of Carbohydrate (Nitrogen Free Extract)

The method used was described by AOAC (1980) was used when the total percentage of moisture, protein, lipid, crude fiber, ash content was subtracted from 100%, the remainder accounts for the nitrogen free extract.

Nitrogen free extract = 100 – (crude protein + lipid + moisture + ash + crude fiber)

RESULT

Table I: Proximate Composition of Fresh and dried fluted pumpkin

Parameters	Fresh	Sun dried	Room dried
Moisture	75	6.50	8.36



Protein %	17.079	20.50	22.4
Fiber %	5.90	14.20	11.50
Ash %	0.94	11.4	10.24
Lipid %	4.30	8.85	13.04
Carbohydrate %	5.70	38.24	34.46

Table II: Proximate Composition of Fresh and dried Bitter Leaf

Parameters	Fresh	Sun dried	Room dried
Moisture	72	5	7.50
Protein %	18	21.69	23
Fiber %	3.24	8.80	6.50
Ash %	1.23	12.48	12.4
Lipid %	3.40	5.66	8.30
Carbohydrate %	2.13	46.37	46.30

Table III: Difference in Nutritional content of sun dried and room dried fluted pumpkin and bitter leaf

Parameters	Fluted pumpkin		Bitter leaf	
	Sun dried	Room dried	Sun dried	Room dried
Moisture	6.50	8.32	5	7.50
Protein %	20.5	22.4	21.69	23
Fiber %	14.20	11.50	8.80	6.50
Ash %	11.4	10.24	12.48	12.4
Lipid %	8.86	13.04	5.65	8.30
Carbohydrate%	38.24	34.24	46.37	46.30

Discussion

The fresh vegetables of fluted pumpkin and bitter leaf obtained from Bauchi metropolis at Gwallameji village were analyzed for the effect of preservation methods on its nutritional contents. From the result the protein content of fresh fluted pumpkin was found to be 17.79%. It increased in the sun and room dried form to 20.50% and 22.4% respectively. The same observation was also seen in bitter leaf. The fresh bitter leaf protein content was 18% and it increases in the sun and room dried form to 21.59% and 23 respectively. This increase is in line with the observation of Oshodi (2006) and Aderonke (2011), who stated that vegetables such as bitter leaf preserved by sun drying help to concentrate



the protein due to the decreased in moisture content. However, some nutrients are destroyed in the process.

Of the two methods used for preserving (drying) the vegetables, the room drying method was found to be the best method as it does not contribute to nutrients loss.

Conclusion

The result of the analysis carried out shows that fluted pumpkin and bitter leaf contains the necessary food nutrient within the required dietary levels.

Furthermore, that there is losses in the nutritional content of sun dried fluted pumpkin and bitter leaf in protein and lipid content.

Hence, it could be said that both fresh and dried fluted pumpkin and bitter leaf are rich in nutritional content.

Recommendation

On the basis of the above findings, the following recommendations are made.

- Vegetables should be preserved using room drying method instead of sun drying method.
- The preserved products (room drying) should be stored in a tight bag to prevent further nutrient loss.

However, further work can be carried out to determine the vitamin, mineral and amino acid content

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