Journal of Global Biosciences ISSN 2320-1355
Vol. 2(4), 2013, pp. 85-89 http://mutagens.co.in/jgb.html

EFFECTS OF BLANCHING AND FROZEN STORAGE ON THE PROXIMATE COMPOSITION OF FOUR LEAFY VEGETABLE WIDELY CONSUMED IN ILARO COMMUNITY, OGUN STATE, NIGERIA

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Abstract

Vegetables are edible parts of the plants which are usually cooked and salted before consumption with other foods. They also include leaves, stems, roots, flowers, seeds, fruits, bulbs, tubers and fungi. The proximate composition of four leafy vegetable widely consumed in Ilaro community of Ogun state, Nigeria, subjected to blanching and frozen storage were investigated in this present work. The result of the proximate composition calculated on dry weight basis indicated that the Ash contents ranged from 6.26 – 23.00% while the Fat contents ranged between 2.03 and 5.80% for all the samples. Protein contents also ranged from 17.44 – 32.83% with fibre content varying between 2.68 and 5.20% for the samples. The carbohydrate contents for the samples were between 46.00 and 60.03%. Except for the carbohydrate contents which showed a gradual increase in values, all other parameters evaluated decreased in values as the frozen day progressed.

Keywords: Proximate composition, leafy vegetables, blanching, frozen, pre-treatment.

INTRODUCTION

Vegetables are edible parts of plants, which are usually cooked and salted before consumption with other foods (1). They are living entities and are re-spring when they are freshly harvested. They have a high content of water and an abundance of cellulose (2). The cellulose is in a form which although not digested, serves a useful purpose in the intestine as roughage, thus promoting normal elimination of waste products (2). Vegetables also contain non- volatile acids, sugars, organic acid, mineral salts, and volatile sulphur containing compounds, tannins and non volatile acids such as malic, citric, oxalic and succinic acids which contributes to flavour (1).

The carbohydrates in vegetables consist mainly of indigestible fibrous materials such as cellulose, hemi cellulose and ligni, in addition to small quantities of sugars such as glucose, fructose, sucrose and in some cases starch (1). Vegetables are low in calories and they contribute fairly moderate quantities of protein, but they are rich sources of vitamins, minerals and contribute roughage or dietary fibre to the diet. The colour of vegetable depends on the pigments they contain. The green colour is due to the presence of pigment; chlorophyll. (3).

Blanching and frozen storage are the most widely practiced pre-treatment processing usually given to vegetable to prevent undesirable colour and chemical changes. Therefore, the objectives of this present work are to determine the proximate composition of four leafy vegetables as affected by these pre-treatments with a view of knowing how they affect their nutritional values and also to know their shelf stability.

MATERIALS AND METHOD

Collection of Materials: Four freshly harvested leafy vegetables viz: Tree Spinach, Egg plant, African spinach and black night-shade (*Cnidoscolus chayamansa*, *Solanum nodiflorum*, *Amaranthus hybridus* and *Solanum nigrum*) were obtained from a local farm in Ilaro community, Ogun state, Nigeria. They were collected early in the morning in clean polythene bags and taken to the Laboratories of Food Technology, Federal Polytechnic Ilaro for pre-treatment processing and analysis.

Preparation of Samples: The fresh leafy vegetable samples were destalked, sorted, sliced and washed with clean portable water to remove unwanted matters (4). Blanching was carried out by immersing the cleaned leafy vegetable in hot water maintained at 85^{o}C for 2 minutes after which they were cooled in cool water, allowed to drain and neatly packed in nylon bags (4).

The blanched vegetables were transferred to freezer maintained at -18°C for frozen storage (2). Samples were taken for analysis at intervals of 8 days.

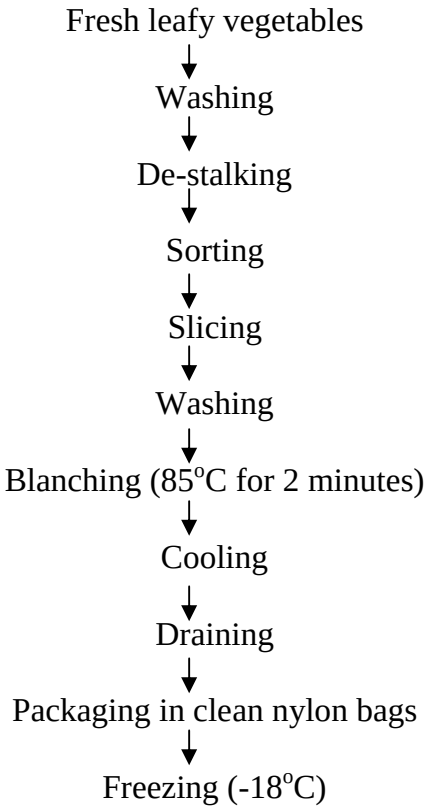

Fig 1: Flow chart for the Blanching and frozen storage of leafy vegetables

METHODS

Proximate analysis of vegetable samples: The proximate composition of each vegetable sample Viz: moisture, ash, fat, protein, fibre and carbohydrates were carried out using standard methods.

Analytical Procedure:

The moisture content was determined using procedure described by AOAC 1990 (5), with an AND-MF-50 moisture analyzer, at 105°C. The moisture content of each sample was determined by weighing 5g sample into a pre weighed aluminum drying dish. The sample was then dried to constant weight in moisture analyzer at 105°C for about 45 minutes after which the moisture was read off and recorded. Ash content was determined on a 10g sample by incinerating in a muffle furnace at 550°C for 4 hours, followed by cooling at room temperature (25°C). The remaining ash was weighed and the ash content calculated (5). Fat content of each vegetable sample was determined using methods described by Kirk and Sawyer, 1991 (6). Crude protein content was determined by using a Foss Tecator^{ft} protein digester and KJELTEC 2000 distillation apparatus (kjeldahl method) according to the procedure of AOAC, 1990 (5). Crude fibre was determined using the method described by Pearson, 1976 (6). Carbohydrate was calculated by difference. (AOAC, 1990) (5). All determinations were done in triplicate.

RESULTS

Figures 2, 3, 4 and 5 presents the results of proximate composition of four leafy vegetables subjected to blanching and frozen storage.

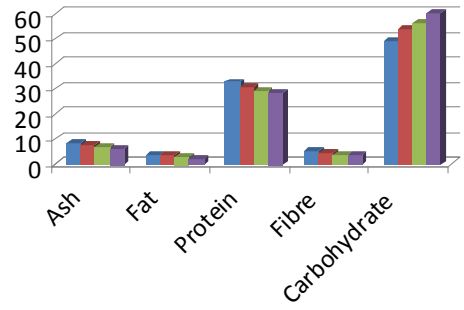

Fig. 2: Effect of blanching and frozen storage on proximate composition (%) of Tree Spinach

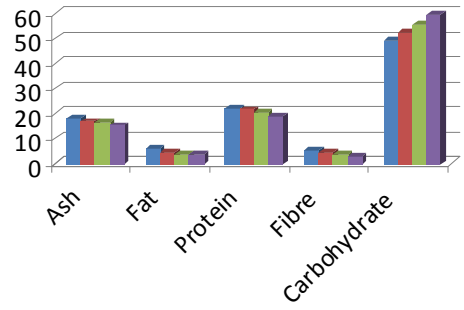

Fig. 3: Effect of blanching and frozen storage on proximate composition (%) of Egg plant

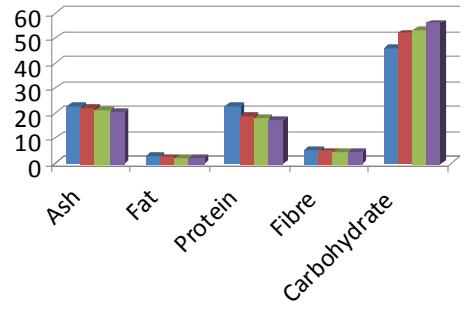

Fig. 4: Effect of blanching and frozen storage on proximate composition (%) of African spinach

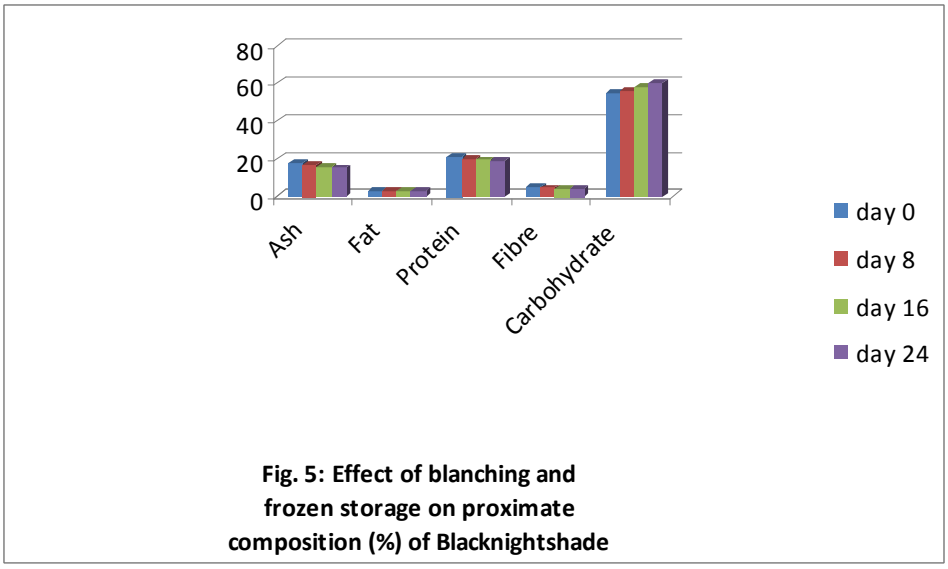

Fig. 5: Effect of blanching and frozen storage on proximate composition (%) of Blacknightshade

DISCUSSION

The results of the proximate composition of four leafy vegetables subjected to blanching and frozen storage are on dry weight basis as shown in figures 2, 3, 4 and 5 respectively. The ash contents, an index of mineral contents in foods ranged from 6.26 – 23.00% for all the samples. African spinach had the highest ash contents of all the samples, with 23.00%, 22.02%, 21.19% and 20.28% for day 0, 8, 16 and 24 respectively while Tree spinach had lowest ash values of 8.72%, 7.47%, 7.08% and 6.26% from day 0 to day 24 (figures 2, 3, 4 and 5). It was however observed that irrespective of the leafy vegetable under consideration, there was gradual decrease in ash values during blanching and eventual freezing operation. A similar result was reported earlier (7). Leafy vegetables are generally poor sources of fats, with some showing a reasonable amount of this nutrient. This was reflected in both African spinach and Black nightshade where fat contents of 2.85%, 2.49%, 2.34%, 2.03% and ; 2.94%, 2.86%, 2.63% and 2.41% were obtained on days 0, 8, 16 and 24 respectively in contrast to 4.00%, 3.58%, 3.03% and 4.34%, 4.02% 3.40% and 2.85% for the storage days (figures 2, 3, 4 and 5). Result in consistent with those reported in the previous work (8).

Leafy vegetables are known to contribute fairly moderate quantity of proteins (1,2). According to literature (5), plant foods that provides more than 12% of its caloric value from protein is considered a good source of protein. Therefore, the protein contents for all the samples determined ranged from 17.44 – 32.83% (Fig. 2, 4), and therefore agreed with a previous work (2). (Figs. 3, 4). Vegetables as reported in the literature contribute roughage or dietary fibre to the diets (3). The crude fibre ranged from 2.68 -5.20% for all the four samples.(Fig 3 & 4). The carbohydrates in vegetables consist mainly of indigestible fibrous materials such as cellulose, hemi-cellulose and ligni, in addition to small quantities of sugars such as glucose, fructose, sucrose and starch. (1). The values obtained ranged from 46.00-60.03% (figures 4 and 5) during the storage period. This is consistent with a similar work reported in the literature (10, 11). However, of all the nutrients determined, only carbohydrates showed increased values during storage period.

CONCLUSION

It is evident from this study that the two pre-treatment processing (Blanching and frozen) given to leafy vegetables serves to preserve them, thereby extending their shelf lives and not necessarily affecting their nutrients, making them to be available to the body when consumed.

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