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Effect of Processing Methods on the Vitamin C Content of Fluted Pumpkin Leaves (*Telfairia Occidentalis*) And Waterleaf (*Talinum Triangulare*)

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Abstract : *This research work determined the effect of processing methods on the vitamin C content of Fluted pumpkin (*Telfairia occidentalis*) and waterleaf (*Talinum triangulare*). The idea was to ascertain which method would be most adopted in preparing vegetable for home use, and still retain its vitamin C level. The processing methods used were blanching, sun drying, and squeeze-washing with salt. Raw fluted pumpkin had the highest vitamin C content of 60.00mg/100ml \pm 2.00 while raw water leaf had 20.00mg/100ml \pm 2.00. Blanching (5-10mins) reduced the vitamin C content of fluted pumpkin to 6.00mg/ 100ml \pm 2.00 and waterleaf to 2.00mg/ 100ml \pm 2.00 while squeeze-washing with 10% salt had the value of 20.00mg/ 100ml \pm 2.00 in fluted pumpkin and 6.00mg/ 100ml \pm 2.00. Sun drying (48hrs) had the least effect on the vitamin content with the values of 36.00mg/ 100ml \pm 2.00 in fluted pumpkin and 16.00mg/ 100ml \pm 2.00 in waterleaf.*

Keywords: *Processing Methods, Vitamin C, Fluted Pumpkin Leaves*

INTRODUCTION

Fluted pumpkin (*Telfairia occidentalis*) and Waterleaf (*Talinum triangulare*) are grouped under class of food, vegetables (Green leafy vegetables). Leafy vegetables are commonly defined as the fresh and edible leaves of herbaceous plant which can be eaten raw or cooked (Oselebe et al., 2013). They are those herbaceous plants whose part or parts are eaten as supporting food or main dishes and they may be aromatic, bitter, or tasteless. Leafy are usually consumed in combination of starchy staples and represent a quality of food to the poor segment of population both in urban and rural areas. Vegetables are also an excellent source of dietary fiber, vitamins and minerals. They constitute an indispensable constituent of diet in South Eastern Nigeria, but they are not readily available all year round due to seasonal variations. When vegetables are out of season, they become scarce thereby limiting their utilization (Yaciuk, 2001).

The nutrient content of different types of vegetables varies considerably and they are not major sources of carbohydrates compared to the starchy foods which form the bulk of food eaten, but contains vitamins, essential amino acids as well as minerals and antioxidants (Mnzava, 1997; Fayusi, 2006).

Fluted Pumpkin (*Telfairia occidentalis*)

Fluted pumpkin is a tropical vine grown in West Africa as a leaf vegetable and for its edible seeds. Common names for the plant include fluted gourd, and ugu. Locally it is called 'ugu' by Igbos in Eastern part of Nigeria, 'egwusi iroko' by Yorubas in Western part of Nigeria and 'uwmenkhen' by Benin.

T. occidentalis is a member of curcubitaceae family and is indigenous to Southern part of Nigeria. The fluted gourd grows in many nations of West Africa, but is mainly cultivated in Nigeria, used primarily in soups and herbal medicines. Although the fruit is inedible but the seeds produced by the gourd are high in protein and fat and therefore can contribute to a well-balanced diet. The plant is dioeciously, drought tolerant, perennial that is usually grown trellised. The young shoot and the female plant are the main ingredient of Nigerian edikang ikong soup (Badifu et al., 1995). It is a creeping vegetable shrub spreads low across the ground with large lobe leaves and long twisting tendrils (Horsfall and Spiff, 2005). It thrives in humid climate and drained soil, it is usually cultivated in garden and in family farms around homes. It has a dark green veined leaf that is as wide as 18cm and as long as 35cm. The vegetable family (curcubitaceae) is reported to have been associated with man since 12,000 BC. The leaves are rich in iron and play a role in the cure of anemia. The leaves are also noted for lactating properties and are in high demand for nursing mothers. The leafy parts are mainly used for soups and salad.

Waterleaf (*Talinum Triangulare*)

Waterleaf also known as *Talinum fruticosum* is an herbaceous perennial coalescent and glabrous plant widely grown in tropical regions as a leaf vegetable. Its other common names are Philippine spinach, Surinam purslane, fameflower, water leaf, sweetheart, Florida spinach, Water lettuce (in English speaking countries), Senuma (Ghana), Verdolago France (Spain) and Ntuoka (Nigeria). Waterleaf (*Talinum triangulare*) belongs to the botanical family of portulacaceae, genus of *T. Adans* and has a long variety of economic importance which includes provision of food, income, employment and herbal medicine to the population (Opabode & Adeboye, 2005) as well as being a weed in some other instances. It is mainly used as a leafy vegetable for human consumption and its culinary use is most popular in local delicacies of Southern Nigeria (Odukoya, et al; 2007) (for example, in the well-known Afang, Edikang-ikong soup in Calabar) and some other parts of the country.

Material and Methods

Sources of materials

The vegetables (Fluted pumpkin and Waterleaf) used for this experiment were purchased from Eke market, Oko while the pieces of equipment (pipette, burette, glass beakers, volumetric cylinder, conical flask, retort stand, and electronic weighing balance) and reagents (indophenols, glacial acetic acid, and oxalic acid) were gotten from Food Technology Department Laboratory, Federal polytechnic, Oko, Anambra State, Nigeria.

METHODS

The edible part of the vegetables (fluted pumpkin and waterleaf) were plucked from their stalks and rinsed with clean water to remove dusts and dirt. The vegetables were divided into four (4) equal portions each. One portion was analyzed fresh which served as a control and the other portions were subjected to various processing methods as described below:

- **BLANCHING:** This technique involved dipping of the vegetable into boiled water for a specified period of time (5-10mins).
- **SUNDRYING:** This was done by spraying the vegetables in a tray and allowed heat from the sun to dry them (48hrs). The vegetable was turned at intervals to ensure evenly drying.
- **SQUEEZE-WASHED WITH SALT:** This process involved washing the samples with little amount of salt (10%) and in the process crushing and tearing apart the flesh/tissues of the vegetable with hand. The following were the procedures used in determining the vitamin c content of each samples alongside their raw samples. The procedure/method is as follows:

- 50g of each sample (either fresh, blanched, sundried or squeezed-washed with salt) was weighed using electronic weighing balance, and 50ml of distilled water was added to it.
- The mixture was blended and the juice was sieved/filtered out.
- 50ml of the juice was measured out and 0.5g of Oxalic acid was added as a stabilizing agent.
- Another 50ml of distilled water was added to make up the volume to 100ml and was thoroughly mixed together.
- 10ml of the mixture was measured out, poured into conical flask and 2.5ml of acetic acid was added to it.
- It was finally titrated against indophenol solution until a faint pink color persisted for 15secs. This method of ascorbic acid content determination using indophenols titration method was as prescribed by (AOAC, 2006)

Calculation

Ascorbic acid (mg/100ml) juice = $20(v) (c)$

Where v = ml indophenols solution in titration.

c = mg ascorbic acid/ml indophenols

Results

Tables 1. The vitamin C content (mg/100ml) of raw fluted pumpkin leaves and Waterleaf

Common /Local Name	Raw Samples		Mean Value
	Practical one	Practical two	
Fluted pumpkin leaves	59.00mg/100ml	61.00mg/100ml	60.00mg/100ml ± 2.05
Waterleaf	19.50mg/100ml	20.50mg/100ml	20.00mg/100ml ± 2.00

Table 2. The vitamin C content of processed ugu and waterleaf

Common/ Local Names	Sundried	Squeeze-washed with salt	Blanched
Fluted pumpkin leaves	36.00mg/100ml ± 2.00	20.00mg/100ml ± 2.00	6.00mg/100ml ± 2.00
Waterleaf	16.00mg/100ml ± 2.00	6.00mg/100ml ± 2.00	2.00mg/100ml ± 2.00

Table 3. Percentage loss (%) of vitamin C in each of the processed sample (fluted pumpkin and waterleaf)

Common/ Local Names	% loss in sundried sample	% loss in squeeze-washed with salt sample	%loss in blanched sample
Fluted pumpkin (ugu)	24.00mg/100ml	40.00mg/100ml	54.00mg/100ml
Waterleaf	4.00mg/100ml	14.00mg/100ml	18.00mg/100ml

Discussion

Table 1 showed that the values are generally high for the raw vegetables when compared with their processed counterparts.

Table 2 revealed that sun drying had the least effect on vitamin C content reduction when compared to other processing methods. The vitamin C content of sun dried ugu is 36.00mg/100ml ± 2.00 while that of waterleaf is 16.00mg/100ml ± 2.00. The losses observed when the vegetables were sundried are in agreement with the

work of (Oshodi, 1992), (Olorunfemi, et al; 2005) who confirmed that vitamin C levels in vegetables are temperature dependent.

Squeeze-washed with salt had the value of 20.00mg/100ml \pm 2.00 in ugu and 6.00mg/100ml \pm 2.00 in waterleaf. This loss concurs reasonably well with the work of (Fox and Cameron, 1980) who said that the process of tearing apart and crushing of the vegetables with hand by which oxidases contained within the cells are set to oxidize and thereby destroying the vitamin c content. The highest vitamin C content loss was observed in the blanched sample ranging from 6.00mg/100ml \pm 2.00 in ugu to 2.00mg/100ml \pm 2.00 in waterleaf.

Table 3 generally displayed the losses encountered in each of the processing methods. However, for any processing method used there is an inevitable loss of vitamin C in leafy vegetables, this is in accordance with the findings made by (Favell, 1998) which said that leafy vegetables are known to be very vulnerable to nutrient loss during processing (particularly vitamin C).

Conclusion

Fluted pumpkin leaves and waterleaf are good source of vitamin C, but however, the vitamin C is lost due to various processing methods. Apart from being used mainly for soups and salads, fluted pumpkin (*Telfaria occidentalis*) has some medicinal uses which include high value, cheap and fast remedy tonic for anemic and convalescent persons in view of its high ferrous content which is about 700ppm. Aqueous extract of fluted pumpkin is reported to increase hematological parameters. The method of squeeze-washing with salt and blanching have proven to lead to more loss than sun drying. Though blanching at a very short period of time (15-30 Secs) can also be used to inactivate enzymic activities that destroys vitamin.

Recommendation

From this research work, sun drying of vegetables has shown to incur less vitamin C loss than the other processing methods used. It is therefore recommended to sun dry vegetables than to blanch or squeeze – wash them with salt.

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