Comparative Study on the Ascorbic Acid Content of Some Common Nigerian Vegetables (*Solanum gilo, Gnetum africanum, Gongomera latifolium,* and *Vernonia amygalina*).

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ABSTRACT

The ascorbic acid content of some commonly eaten vegetables in South Eastern State of Nigeria was measured using the titrimetric method with 2,6–dichlorophenol solution. Ascorbic acid content of the vegetables in fresh, air dried, and blanched formed was determined and compared with a standard.

From the results, fresh *Solanum gilo* gave the highest content of 180.27mg/100g, while fresh *Gnetum africanum* gave the lowest content of 97.68mg/100g. When these vegetables were blanched, *Solanum gilo* exchanged its position with *Gnetum africanum* with percentage loss of 96.29% and 92.29%, respectively, while others maintained theirs. The corresponding looses when these vegetables were air dried followed the trend in fresh ones. The method of determination was cheap, accurate, and can be used for routine analysis.

(Keywords: ascorbic acid, percentage, storage, vegetables, blanching)

INTRODUCTION

The ascorbic acid content of some commonly eaten vegetables in South Eastern State of Nigeria was done using titrimetric method with 2,6–dichlorophenol solution. Ascorbic acid content of the vegetables in fresh, air dried, and blanched formed was determined and compared with a standard. Analysis was performed on *Solanum gilo, Gnetum africanum, Gongomera latifolium,* and *Vernonia amygalina.*

MATERIALS AND METHODS

Samples of fresh vegetables were obtained from a farm land near Anambra State University, Uli, Nigeria. They were all packed in a polyethylene bags without sealing, to allow respiration, and then were brought to the laboratory. The samples were rinsed under running water to remove any adhering soil and then allowed to drain for about 10 minutes. 20g each of the samples was used for subsequent determination. Analysis was carried out within 2 hours of collection of the vegetable samples.

Blanching

20 g of each sample was chopped and blanched in 1000 ml of hot water and maintained at constant temperature of 100^{o}C for periods of 10 and 15 minutes using a water bath. The samples were cooled to room temperature and filtered. The filtrate was analyzed for vitamin C content which leached out into the water during boiling. The effect of blanching was detected by subtracting the values of vitamin C which leached out into the water from that obtained from fresh sample.

Air-Drying

Samples that would not be used immediately were air dried at room temperature for one and two days and were used for vitamin C estimation at the end of the drying days, respectively.

Extraction and Titration

20g each of the fresh vegetable samples was ground using a porcelain mortar and pestle until a fine paste was obtained. 5mls of 2% HCl was added and then the slurry was filtered into a 100ml flask. This was repeated for three times using 5mls of 2% HCl. Distilled water was used to make up the mark. 10mls each of the samples was tritrated using 0.001M 2,6-dichlorophenolindophenol solution from a micro burette until dropwise addition discharged a pink coloration persistent for 30 seconds. This was done in triplicate form and the average titre value was recorded. The ascorbic acid content of standard ascorbic acid was also determined following the procedure described above. The ascorbic acid content was calculated using the formulae below[10]:

Ascorbic acid content (mg/100g) =

$$\frac{V \times C \times 176 \times 100}{209.9 \times W} \quad \textbf{(1)}$$

Where
V = Ave. titre value of 2, 6 - dichlorophenolindophenol solution

C = Concentration of 2,6-dichlorophenolindophenol solution

W = Weight of sample used

176 = Molecular weight of Ascorbic Acid

209.9 = Molecular weight of 2, 6-dichlorophenolindophenol solution

The percentage retention and losses were determined as follows:

$$\% \text{ Retention} = \frac{\text{Ave. titre value of Vit C of stored sample}}{\text{Ave. titre value of Vit C of fresh sample}} \times \frac{100}{1} \quad \textbf{(2)}$$

$$\% \text{ Loss} = \frac{\text{Ave. titre of fresh} - \text{Ave. titre of stored}}{\text{Ave. titre value of fresh}} \times \frac{100}{1} \quad \textbf{(3)}$$

RESULTS AND DISCUSSION

The results of the fresh *Solanum gilo, Gnetum africanum, Gongomera latifolium,* and *Vernonia amygalina* samples have vitamin C contents (mg/100g) of 180.27, 97.68, 102.71, and 132.06, respectively, while the standard had a value of 104.81. From the result shown in Figure 1, *Solanum gilo* gave the highest content of ascorbic acid followed by the standard, *Vernonia amygalina, Gongomera latifolium,* and, then *Gnetum africanum.*

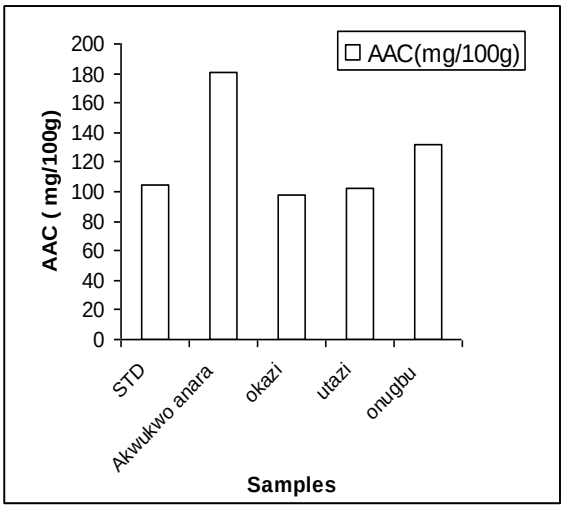

Figure 1: Bar Chart of Ascorbic Acid Content (AAC) of Fresh Samples in Comparison with Standard (STD).

Air drying the samples for one and two days lowered the ascorbic acid content of the vegetable samples significantly as shown in Figures 2 and 3, respectively. This could be as a result of oxidation since the vegetable samples were exposed to atmospheric conditions. The percentage retention of vitamin C content of the samples after air drying for one and two days as shown in Table 1 are 5.34, 21.45, 46.12, 16.18, and 4.18, 12.86, 21.63, 7.93, respectively.

On blanching for ten and fifteen minutes, it was found that ascorbic acid leached out into the water used in boiling. There was variation in the amount of vitamin C that leached out into the water of boiling among the vegetable samples determined as shown in Figures 4 and 5. The percentage loss of vitamin C content of the samples after blanching for ten and fifteen minutes are 96.29, 92.29, 93.89, 94.93, and

96.52, 94.01, 95.11, 94.93, respectively as shown in Table 2.

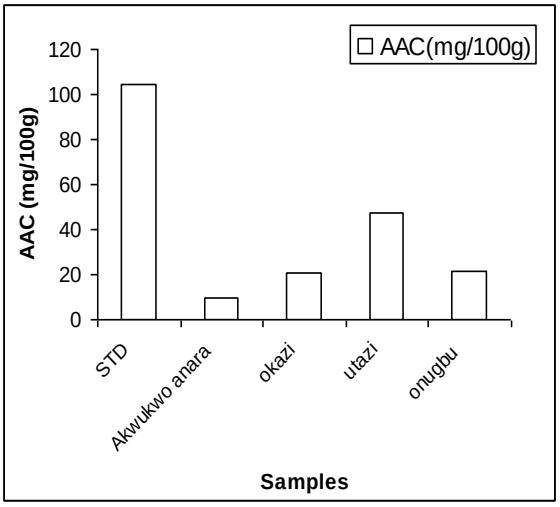

Figure 2: Comparative Bar Chart of Ascorbic Acid Content (AAC) of One Day Sample Air Drying.

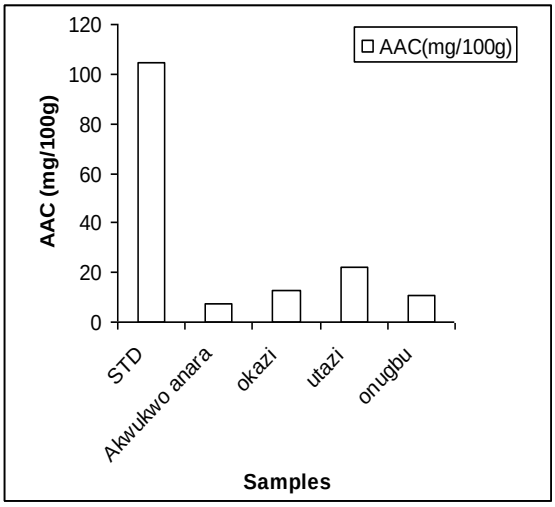

Figure 3: Comparative Bar Chart of Ascorbic Acid Content (AAC) of Two Days Sample Air Drying.

Table 1: Percentage Retention and Loss of Ascorbic Acids of the Samples with Respect to Air Drying.

Sample	Day 1 air drying		Load (kg)	Day 2 air drying	
	% Retention	% Loss		% Retention	% Loss
Solanum gilo (akwukwo anara)	5.34	94.66	720	4.18	95.82
Gnetum africanum (okazi)	21.45	78.55	770	12.86	87.14
Gongomera latifolium (utazi)	46.12	53.88	780	21.63	78.37
Vernonia amygalina (onugbu)	16.18	83.82	740	7.93	92.07

Table 2: Percentage Retention and Loss of Ascorbic Acids of theSamples with Respect to Blanching.

Sample	10 minutes blanching		Load (kg)	15 minutes blanching	
	% Retention	% Loss		% Retention	% Loss
Solanum gilo (akwukwo anara)	3.71	96.29	720	3.48	96.52
Gnetum africanum (okazi)	7.71	92.29	770	5.99	94.01
Gongomera latifolium (utazi)	6.11	93.89	780	4.89	95.11
Vernonia amygalina (onugbu)	5.07	94.93	740	5.07	94.93

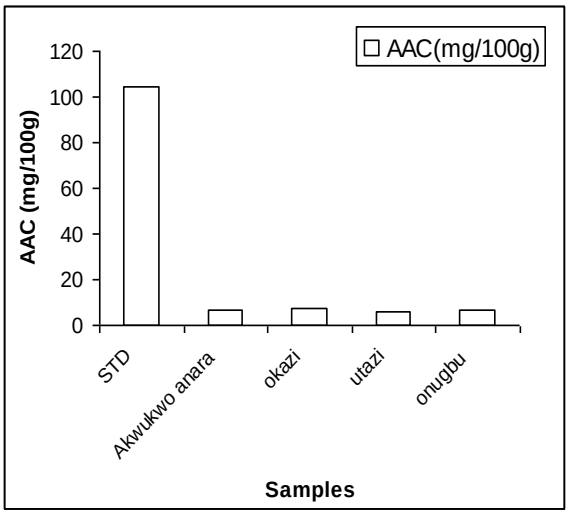

Figure 4: Comparative Bar Chart of Ascorbic Acid Content (AAC) of 10 mins Blanching.

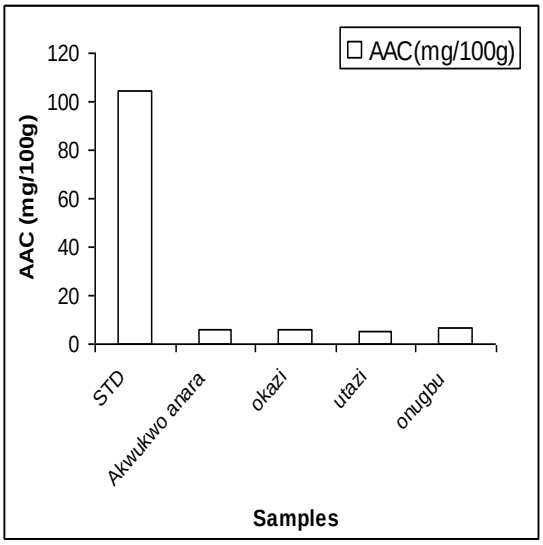

Figure 5: Comparative Bar Chart of Ascorbic Acid Content (AAC) of 15 mins Blanching.

From the results it was seen that the percentage losses of ascorbic for blanching were highest in *Solanum gilo* closely followed by *Vernonia amygalina*, *Gongomera latifolium,* and then *Gnetum africanum* while that for air drying *Solanum gilo* closely followed by *Vernonia amygalina*, *Gnetum africanum,* and then *Gongomera latifolium.* Vitamin C content of *Gongomera latifolium* vegetable sample showed the highest resistance to oxidation when exposed to air while that of *Gnetum africanum* showed the highest resistance to leaching when blanched.

CONCLUSION

The ascorbic acid content of the Nigerian vegetables studied showed a remarkable difference between the fresh and the blanched states as well the stored state. It is concluded from this work that for high ascorbic acid intake, these vegetables should be eaten when fresh.

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SUGGESTED CITATION

Enemo, R.E., U.E. Ekpunobi, D. Nnubia, and T.U. Onuegbu. 2010. "Comparative Study on the Ascorbic Acid Content of Some Common Nigerian Vegetables (*Solanum gilo, Gnetum africanum, Gongomera latifolium, and Vernonia amygalina*)." *Pacific Journal of Science and Technology*. 11(2):499-503.