QUALITY CHARACTERISTICS OF GARI PRODUCED IN THREE SENATORIAL ZONES OF EBONYI STATE, NIGERIA

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ABSTRACT

The quality characteristics of gari from three senatorial zones of Ebonyi State, Nigeria were investigated for chemical, physical and sensory attributes. The gari samples were coded for the three Senatorial zones in Ebonyi State. Proximate composition, Total titratable acid (TTA), Cyanide content (HCN), Aggregate size distribution, Swelling index, Bulk density, Floating fibre and Sensory evaluation were determined. Results were statistically analyzed at 5% significant level (P>0.05) using ANOVA. Values obtained ranged between 10.40-13.47% moisture, 0.2-2.8% fat, 2.1-277% protein, 0.9-2.6% ash, 4.33-6.66% crude fibre, 72.74-79.68% carbohydrate, 0.006-0.031% TTA, 0.08-0.33mg/HCN cyanide; 3.82-6.8mlg swelling index, 0.63-0.68g/ml RBD, 19.62-24.38% WAC, 2.4-5.2% floating fibre respectively. The particle size distribution showed that all the samples were found to be acceptable. The sensory evaluation of gari showed significant differences in colour, appearance, taste and acceptance after reconstitution but did not differ in extensibility and aroma. The differences observed in the gari samples may be attributed to the processing technique employed during production.

INTRODUCTION

Cassava (Manihot esculenta crantz) is an important root crop, widely cultivated in many developing countries of humid and sub-humid tropics in Africa. Cassava appears to be the major staple food that matches the population growth in Nigeria (Irtwange and Achimba 2009). It is produced under various agro-ecological conditions, some of which are quite unsuitable for many other crops. This makes it a reliable food security crop in combination with its efforts to alleviate African food crises through its efficiency in energy production and all year round availability, suitable to various farming and food system in African. (Anyaegbunam et. al., 2010).

In Nigeria today, about 90% of annually produced cassava are used for human food while others are used for animal feeds and as an industrial raw material. Cassava roots are amongst the most perishable of all the root crops. Its deterioration starts within 24 hours after harvest and detachment from the stalk. This deterioration helps in developing an offensive odour, giving low yield and poor coloured quality cassava products. The conversion of cassava into different products helps for stabilization, reduction of toxicity and also to meet the local and international needs, taste and traditional usage including storage of the products. Many products for human consumption derived from cassava root are chips, flour, starch, gari (Anyaegbunam 2010). Gari is a fermented coarse meal produced from cassava tuber that is extremely popular in Nigeria and most of the West Africa (Bencin, 1991). It is the cheapest form in which cassava is processed and utilized. Gari has presently gained the status of an urban and rural convenience food and is no longer classified as a poor man’s food. Its cheapness, ease of storage and preparation for consumption has combined to make it extremely popular especially among urban dwellers in Nigeria (Irtwange and Achimba 2009). Therefore, it is imperative to assess the quality of gari produce in parts of the country to ensure safety of local and international consumers.

Materials and Methods

Sources of the Material

Gari samples (white and yellow) were randomly collected from producers in six different communities - two from each of the three Senatorial Zones of Ebonyi State as shown in table I below. The samples were coded and stored in air tight containers to prevent moisture absorption before analysis. They were analyzed in the food BIOCHEMISTRY laboratory, Food Science and Technology department, Ebonyi State University, Abakaliki, Nigeria
Table I: Sources of Materials with their codes.

<table>
<thead>
<tr>
<th>Zones</th>
<th>LGA</th>
<th>Sample Code</th>
<th>Community</th>
<th>Cassava Variety</th>
<th>Fermentation hr</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebonyi North</td>
<td>Afikpo North</td>
<td>105</td>
<td>Ama mbana</td>
<td>Mixed variety</td>
<td>24 hours</td>
<td>Yellow</td>
</tr>
<tr>
<td>Ebonyi South</td>
<td>Izi</td>
<td>501</td>
<td>Nwophe Agbaja</td>
<td>Mixed variety</td>
<td>24 hours</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Ohaukwu</td>
<td>502</td>
<td>Okposhi Eshi Ngbo</td>
<td>Mixed variety</td>
<td>24 hours</td>
<td>White</td>
</tr>
<tr>
<td>Ebonyi Central</td>
<td>Ezza South</td>
<td>303</td>
<td>Amndu Ezza</td>
<td>Mixed variety</td>
<td>24 hours</td>
<td>Yellow</td>
</tr>
<tr>
<td>Ibwo</td>
<td></td>
<td>305</td>
<td>Welfare Nwakpa Alike</td>
<td>Mixed variety</td>
<td>24 hours</td>
<td>White</td>
</tr>
</tbody>
</table>

Analyses

Proximate composition
The samples obtained from each zones were analyzed for proximate composition as described by AOAC, (1990) was used.

Total Titrable Acidity (TTA)
This was determined using AOAC, (1990). 5 g of the sample was dissolved in a beaker with 100 ml of distilled water and allowed to stand for 3min. 20ml of the filtrate was measured into a conical flask with 3 drops of phenolphthalein as indicator and the solution was titrated with O.IN NaOH until a pink clouration was observed. The experiment was conducted in triplicate. The percent Titrable Acidity (TTA %) was calculated using the formula:

$$TTA (%) = 0.005Xx100x1000 = 0.01X$$

Where, X is the mean titre value

Determination of Hydrogen Cyanide
This was determined using Kamalu and Ogbome (2012) method with little modification. 15 g of the sample was measured into a beaker with 200ml of distilled water covered properly and stand for 3hrs. The mixture was transferred into a distillation flask and subjected to distillation process. 80-100ml of distillate was collected with conical flask containing 20 ml of 25% NaOH. The distillate was made up to 250ml with distilled water. 100ml was measured into a conical flask with 8ml of 6.ON NH4OH and 5ml of 5%KT and the mixture titrated with O.02N, AgNO3 until a turbid colour was observed, the reading was taking and result expressed in Mg/HCN.

Physical Properties Determination:

Grain Size Determination
The particle size distribution was determined using the method of Onwuka et al, (1997). 100 g of sample was measured in a descending mesh sizes: 10um, 20um, 40um, 60um, 80um and 100um respectively. It was covered on top with lid and shake manually for 30minutes. Sample retained on each Mesh were weighed and the average mean value after repeating the experiment was calculated as percentage retention.

Swelling Index:
This was determined using Ukpabi and Ndimele, (1990) method with slight modification. Ten grams (10g) of the sample was measured into 100 ml calibrated measuring cylinder and noted the volume, after tapping cylinder on the work bench. 50 ml of distilled water was added and allowed to stand for 1h. Its volume was recorded and the difference in volume calculated as swelling index.

Relative Bulk Density (RBD)
This was determined using the method of Onwuka, (2005). 10 g of sample was weighed into a 10 ml measuring cylinder and recorded the volume. They were tapped gently on the laboratory bench until no further diminution on the sample level. The final volumes were recorded and bulk density expressed as grams per ml.

Water Absorption Capacity (WAC)
This was determined using Onwuka, (2005) method. One gram of sample was weighed and mixed with 10ml of distilled water and shake manually for 30 seconds. It was stand for 30minutes at room temperature before centrifuging at 3,500 rpm for 30 min. The supernatant was decanted and the volume noted. The mass of water observed were calculated and expressed in percentage.

Floating Fibre Determination
This was determined by taking 5g of the sample into a beaker with addition of 50 ml of water and stirred for 2 mins, it was filtered with a known weight filter paper and was dried in an oven at 80°C until a negligible weight was achieved. The percentage of the floating fibre was calculated thus.
RESULTS.

Chemical properties of gari samples: Table 2 presents the results of chemical properties of gari sample obtained from six different local government areas of the three senatorial zones of Ebonyi State. The moisture content for all the gari samples varied between 10.4 and 13.47%. Sample 501 (yellow) gari from Izzi had the highest moisture content of 13.47% while 502, (white) gari from Ohakwu had the lowest moisture content of 10.4%. The protein contents ranged from 2.1 to 2.77% for 502s and 501 respectively. Fat content ranged between 0.2 and 2.8%. Sample 501 yellow from Izzi had highest while 305 (white) gari from Ikwo had the lowest protein contents of 0.2 and 2.8 respectively. The ash contents of the gari samples varied between 0.9 and 2.6%. Sample 303, yellow gari from Ezza South had the highest ash content while sample 502, (white) from Ohakwu had the lowest ash content. The crude Fibre values are 4.33, 4.92, 5.83, 6.34, 6.35 and 6.66%. The carbohydrate content varied between 72.74 and 79.87%. Sample 805, white gari from Afikpo South had the highest Carbohydrate Content of 79.87% while 501, yellow gari from Izzi had the lowest carbohydrate content of 72.74%. The total titratable acidity (TTA) calculated as lactic acid ranged from 0.006 to 0.031% for all the samples. Hydrogen cyanide contents of 0.08, 0.09, 0.093, 0.147, 0.296, 0.336mg/HCN respectively were obtained from all the six samples investigated. Sample 805, white gair from Afikpo North had highest Hydrogen Cyanide while sample 501 represent Izzi has the lowest value of 0.08mg/HCN.

Statistical Analysis: Analysis of variance (ANOVA) will be performed on data and mean value carried out using least significant difference (LSD) at 5% level (P > 0.05) as described by Okporie et. al.,(2007). All data generated were in triplicate (\( N=3 \)) and the mean values calculated.

### Table 2: Selected chemical properties of gari samples

<table>
<thead>
<tr>
<th>Sample Code</th>
<th>M.C%</th>
<th>Protein%</th>
<th>Ash%</th>
<th>Crude Fibre%</th>
<th>Fat%</th>
<th>CHO%</th>
<th>TTA%</th>
<th>HCN/mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>12.8</td>
<td>2.6a</td>
<td>1.8b</td>
<td>6.34b</td>
<td>0.2d</td>
<td>76.26b</td>
<td>0.012</td>
<td>0.147b</td>
</tr>
<tr>
<td>303</td>
<td>13.4a</td>
<td>2.73b</td>
<td>2.6a</td>
<td>6.66a</td>
<td>0.5d</td>
<td>74.41b</td>
<td>0.009a</td>
<td>0.093a</td>
</tr>
<tr>
<td>805</td>
<td>12.00a</td>
<td>2.4b</td>
<td>1.0b</td>
<td>4.33b</td>
<td>0.4d</td>
<td>79.87b</td>
<td>0.018a</td>
<td>0.336a</td>
</tr>
<tr>
<td>105</td>
<td>11.4b</td>
<td>2.7a</td>
<td>2.3a</td>
<td>4.92a</td>
<td>1.6b</td>
<td>77.18b</td>
<td>0.013b</td>
<td>0.296b</td>
</tr>
<tr>
<td>501</td>
<td>13.4b</td>
<td>2.77b</td>
<td>2.1b</td>
<td>6.35b</td>
<td>2.8a</td>
<td>72.74b</td>
<td>0.006b</td>
<td>0.08b</td>
</tr>
<tr>
<td>502</td>
<td>10.4b</td>
<td>2.1b</td>
<td>0.9b</td>
<td>5.83c</td>
<td>1.09b</td>
<td>79.68b</td>
<td>0.031b</td>
<td>0.094b</td>
</tr>
</tbody>
</table>

Values in column with the same superscript are not significant different at 5% level (\( P=0.05 \)); M.C = moisture content, \( \text{CHO}=\text{carbohydrate content}, \text{TTA}=\text{total titrable acidity}, \text{HCN}=\text{Hydrogen cyanide} \)

Physical Properties of Gari Sample: The results of physical properties of gari samples investigated are shown in table 3. Mesh size 10um, the percentage retentions ranged between 78.41 to 35.02%. Mesh size 20um had the highest retention among others in all the sample evaluated. The percentage retention recorded on mesh 40um are 32.06, 32.9, 40.64, 46.5, 50.73 and 53.83% respectively. Sample 303 from Ezza South had the highest retention while 502 from Ohakwu had the lowest retention on Mesh 40um. Mesh size 60 had retention between 3.20 to 7.8% while sample 303 from Ezza South had the highest of 7.8 sample 502 from Ohakwu had the lowest retention of 3.2% on the sieve mesh 60um. Mesh 80um varied its retention as 0.08, 0.22, 0.36, 0.42, 0.5 and 0.58% respectively. Sample 805 had the highest retention of 0.58 while sample 502 had the lowest retention of 0.08% on mesh size 80um. On mesh 100um, the percentage retention varied between 0.14 to 0.8%, 0.14% of gari from Ohakwu (502) was retrained while 0.8 of gari from Izzi (501) was retrained on mesh size hundred. The swelling Index recorded for all the gari samples are 6.8, 6.4, 4.1, 3.9, 3.85 and 3.82% respectively; sample 305 white gari from Ikwo had highest swelling index while sample 502 from Ohakwu had the lowest swelling index of 3.82%. Relative bulk density capacity varied between 19.62 and 24.38% and the
floating fibre values are 2.4, 2.6, 4.7, 4.9, 5.1 and 5.2% respectively. Sample 305 white sample 502 white gari from Ohaukwu had the highest floating fibre contents.

Table 3: Results of selected physical properties of gari samples

| Percentage Aggregate size | Code | 10um | 20um | 40um | 60um | 80um | 100um | SI mg | RBD gml | WAC % | F.F.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>305</td>
<td>10.75</td>
<td>49.78</td>
<td>32.9</td>
<td>5.56d</td>
<td>0.36a</td>
<td>0.71ab</td>
<td>6.8b</td>
<td>0.68b</td>
<td>24.38b</td>
<td>2.44a</td>
<td></td>
</tr>
<tr>
<td>303</td>
<td>2.12c</td>
<td>35.02c</td>
<td>53.8</td>
<td>7.8a</td>
<td>0.22d</td>
<td>0.6b</td>
<td>6.4b</td>
<td>0.66c</td>
<td>19.62c</td>
<td>2.6b</td>
<td></td>
</tr>
<tr>
<td>805</td>
<td>8.58b</td>
<td>78.41a</td>
<td>40.64d</td>
<td>7.78a</td>
<td>0.58a</td>
<td>0.76b</td>
<td>4.1c</td>
<td>0.63a</td>
<td>20.5b</td>
<td>4.9b</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>4.74d</td>
<td>40.44c</td>
<td>46.5</td>
<td>7.46b</td>
<td>0.5ab</td>
<td>0.78b</td>
<td>3.85d</td>
<td>0.64b</td>
<td>20.02d</td>
<td>5.1d</td>
<td></td>
</tr>
<tr>
<td>501</td>
<td>0.28e</td>
<td>41.28d</td>
<td>50.73b</td>
<td>6.5c</td>
<td>0.42e</td>
<td>0.8a</td>
<td>3.9ed</td>
<td>0.65e</td>
<td>20.41c</td>
<td>4.7e</td>
<td></td>
</tr>
<tr>
<td>502</td>
<td>6.12e</td>
<td>58.50b</td>
<td>32.06b</td>
<td>3.2c</td>
<td>0.08e</td>
<td>0.14e</td>
<td>3.82d</td>
<td>0.67e</td>
<td>22.37b</td>
<td>5.2e</td>
<td></td>
</tr>
</tbody>
</table>

Samples in column with the same superscripts are not significantly different at 5% level (P>0.05); codes 305, 303, 805, 105, 501, and 502 represents Ikwo, Ezza South, Afikpo South, Afikpo North, Izzi and Ohaukwu Local Government areas; and s, Index = Swelling Index, RBD= Relative bulk density WAC = Water absorption capacity and F.F = floating fibre.

Sensory Evaluation of the Samples: Table 4 shows the results of both phases of sensory Evaluation ratings of the gari samples obtained from the study area.

Reconstitution with hot water: In terms of colour sample 303 from Ezza South was most preferred while sample 805 from Afikpo South was the least preferred sample 305 was most preferred while 805 least preferred in terms of taste. All the samples evaluated showed no significant differences in extensibility when reconstituted with hot water. The appearance of sample 305 was most preferred while, 805 was least preferred in terms of taste. All the samples evaluated shows no significant differences in Extensibility when of gair reconstituted with hot water. The appearance of gari samples revealed that sample 303 was most preferred while 805 was least preferred. For the gen acceptability, sample 303 from South was highly ranked while sample 805 from Afikopo South was lowly ranked.

Reconstitution with cold water: The taste of the gari samples reconstituted with cold water showed that all the samples did not differ significantly at 5% level, the acceptance level were equal. The aroma/Flavour of all the six samples evaluated were generally accepted by consumers. Sample 501 from Izzi was most preferred in terms of appearance while 805 from Afikpo South was least preferred. Overall acceptability showed that sample 303 from Ezza South was the most preferred while sample 502, white gari from Ohaukwu was the least preferred.

Table 4: Sensory Evaluation rating of gari samples.

<table>
<thead>
<tr>
<th>Phase 1: Hot water Reconstitution</th>
<th>Codes</th>
<th>Colour</th>
<th>Taste</th>
<th>Extensibility</th>
<th>App</th>
<th>Gen Accept</th>
<th>Aroma</th>
<th>Taste</th>
<th>App</th>
<th>Gen accept</th>
</tr>
</thead>
<tbody>
<tr>
<td>305</td>
<td>6.45d</td>
<td>6.65a</td>
<td>6.65a</td>
<td>6.06b</td>
<td>6.7d</td>
<td>6.1a</td>
<td>5.3a</td>
<td>5.2d</td>
<td>6.0ab</td>
<td></td>
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<tr>
<td>303</td>
<td>7.55e</td>
<td>7.15e</td>
<td>6.75a</td>
<td>7.05e</td>
<td>7.3d</td>
<td>6.2a</td>
<td>6.2d</td>
<td>6.3b</td>
<td>7.0b</td>
<td></td>
</tr>
<tr>
<td>805</td>
<td>4.55b</td>
<td>4.85e</td>
<td>5.00b</td>
<td>4.35c</td>
<td>5.25b</td>
<td>5.6a</td>
<td>5.4a</td>
<td>4.9a</td>
<td>5.9ab</td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>5.5b</td>
<td>5.45c</td>
<td>5.35c</td>
<td>5.7b</td>
<td>6.05b</td>
<td>5.9a</td>
<td>6.0b</td>
<td>6.1ab</td>
<td>6.4ab</td>
<td></td>
</tr>
<tr>
<td>501</td>
<td>6.95e</td>
<td>6.75a</td>
<td>6.4a</td>
<td>6.7ab</td>
<td>7.05a</td>
<td>5.5a</td>
<td>6.5b</td>
<td>6.7a</td>
<td>6.6a</td>
<td></td>
</tr>
<tr>
<td>502</td>
<td>6.4ab</td>
<td>5.2c</td>
<td>5.8a</td>
<td>6.8ab</td>
<td>6.1ab</td>
<td>5.2a</td>
<td>4.7e</td>
<td>5.0e</td>
<td>5.4b</td>
<td></td>
</tr>
</tbody>
</table>

Values in column with the same superscript are not significantly different at (P>0.05)

Samples in column with the same superscripts are not significantly different at 5% level (P>0.05); codes 305, 303, 805, 105, 501, and 502 represents Ikwo, Ezza South, Afikpo South, Afikpo North, Izzi and Ohaukwu Local Government areas

DISCUSSION

There is no significant difference at 5% level, (P>0.05) on the moisture contents of the gari from all the three senatorial zones in Ebonyi State. The mean values of statistical analysis of moisture content of gari showed that it conforms to standard as gari regulation, Idowu I, (1990) stipulated 12.0% maximum moisture content. It is similar to 12.13% moisture level recommended by Okpugo et al, (1979) for locally produced gari. It is higher than values reported by irtwareg ad Achimaba, (2009) and Franklin et al, (2009). However the moisture level suggested that the gari can be stored safely for six months under normal condition without mould infection as reported by Ukpani and Ndimele, (1990). Moisture removal in gari is a function of different factors like temperature, time, humidity, pressure, age of cassava at harvest etc. The moisture level of gari depends on the degrees of dryness during frying which can affect the gari quality. For the protein content, there was significantly different at 5% level. Yellow gar from Izzi had the highest protein content followed by yellow gari from Ezza South while 502 white gari from Ohaukwu was the least.
The protein contents are higher than values 1.3% reported by Ihekoronye and Ngoddy (1985). The results showed that addition of palm oil might have prevented the denaturation of protein during roasting though generally, gari is not a good source of protein.

Ash content of all gari samples analyzed is within specification as regard to gari Regulation (1980). There was significant difference among the gari samples from each locality. All the yellow gari had higher ash content than white counterpart in each zone. The result is lower than Uzoma et al, (2001) and Olakunle et al, (2012); Similar to Irtwange and Achimba, (2009). Ash contents determines the level of mineral elements which dependent on the soil composition, Franklin et al, (2009); though some might lost during the rigorous processing stages. The results of the crude fibre contents showed a significant differences at (P>0.05). Some values are above specification level though within the range of nutritional maximum level recommended by Ibe, (1981); Higher than report from Olakunle et al, (2012) and Franklin et al, (2009). The increase in fibre content might be due to the variety of cassava, processing method and age of cassava at harvest.

Also, fat contents were significantly different at (P>0.05). The fat contents revealed similar value with that reported by Irtwange and Achimba, (2009); lower than values reported by Olakunle et al, (2012) and Bencini, (1991) which values varied between 0.4 and 0.1% respectively. Oil gari from Izza had the highest fat contents, this indicates that oil addition during processing of gari in most cases serves as an additive thereby enhancing colour and flavor but sometimes may not have direct import on the gari depending on the stage it was introduced during processing. All most all the samples analyzed for carbohydrate content had average carbohydrate content and are within the range reported by FAO, (1984). The white gari had higher carbohydrate contents than oil gari counterparts from the same zones; and white gari from Afikpo South having the highest carbohydrate content. The total titrable acidity (TCA) of all the gari investigated showed a significantly differences at 5% level. The values obtained indicates that they are within the safe level since it is lower than specification as gari regulation (1980) stipulated 0.6 to 1.0% level latic acid. The result is similar to Uzomah et al (2001); Olakunle et al, (2012) and Sanni et al (2008) but lower than Franklin et al (2009). The titrable acidity is depended on duration of fermentation and roasting process during preparation may course lactic acid to evaporate. The result of the hydrogen content showed low level of hydrogen cyanide compared to standard which is 0.6%. The cyanide contents of all the gari showed significant difference at 5% level. The rigorous processing method contributed to the reduction in cyanogenic glucosides as reorted by Olakunle et al., (2012).

Physical Properties: There is significant difference in particle size distribution of all gari samples evaluated at (P>0.05). The variations might be as a result of procedures employed during processing which may include garification process, extent of fermentation and moisture level Oduro et al, (2000). In all, there is acceptable grain size distribution irrespective of what was stipulated. Particle size distribution is one of the major attributes that determine the quality and use of gari. A gari sample with larger aggregate sizes tends to have higher moisture content which might affect storability. All gari evaluated were significantly different from each other in terms of swelling Index. However a good quality gari is that which swells 3 times its original volume (Ukpabi and Ndimele (1990). The samples did not differ in relative bulk density (RBD). Gari with low bulk density may not soak properly leading to consumer’s rejection. Plaami (1997) reported that bulk density is influenced by the structural polymers and loose structure or starch polymers result in loosened structure of starch polymers result in low bulk density.

Statistical analysis showed a significant difference in water absorption capacity or all sample at 5% level (P>0.05). A well dried gari should be able to absorb adequate water when soaked in water; this therefore indicates that moisture level has a close relationship with water absorption capacity, since the samples which contain high moisture level may not absorb water adequately. The floating fibre content had significant difference at (P>0.05). The high contents of floating fibre contribute in reduction of relative bulk density. Sanni et al, (2005) reported that high floating fibre of gari samples on top of water reduces the bulk density and this might cause consumers rejection.

Sensory Evaluation: From the statistical analysis carried out, the gari samples when reconstituted with hot water differs significantly in terms of colour, taste, appearance and overall acceptance and did not differ in extensibility, but cold water reconstitution of gari samples showed significant differences in terms of appearance and general acceptance but did not differ significantly in aroma and taste. In terms of colour for first phase, 303, yellow gari from Ezza South was most preferred followed by 501, yellow gari from Izza while 805 wite gari from Afikpo South was the least preferred. Observed differences in colour might be due to the oil addition. Also, the observed significant differences in taste might be due to the level of cyagenic glcoside in cassava tubers which produces desirable attributes on hydrolysis that consumers prefers while differences in appearance and overall acceptance observed, might be due to the producers skill and method employed during processing.

However, observed differences in appearance and acceptability of phase two might be due to inability to
soak properly in water and may be related to floating fibre contents which had direct relationship with relative bulk density of gari samples. Sample 501 (yellow) from Izzi was the most preferred followed by 303, yellow from Ezza South and 105, yellow gari from Afikpo North was the least preferred in terms of appearance. Above all, general acceptability showed that sample 303, yellow gari from Ezza South was the most preferred in most cases, followed by yellow from Izzi and 105, yellow gari from Ohaukwu while 502 from Afikpo South was the least preferred. This might be attributed to oil addition that could serve as additive and enhances the acceptance of the gari by the consumers.

CONCLUSION

The result of the study showed that, the gari samples collected from different senatorial district in Ebonyi State were not differ significantly in quality. The fat content were within an acceptable level and the excessive floating fibre and crude fibre contents detected in the gari sample from all the zones indicates that different processing methods might be employed by the processors such as variation in fermentation hours. Also the ash, cyanide, total titrable acidity contents and particle size distribution were found to be within the general acceptable limit. There is significant effect on sensory evaluation conducted on both the two phases evaluated in terms of colour, taste, appearance and overall acceptability.

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