

**EVALUATION OF SOME NUTRITIONAL PROPERTIES OF WATER – YAM
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Wilberforce Island, Bayelsa State, Nigeria.

ABSTRACT: *The objective of this study is to evaluate some nutritional properties of fourteen water yam (D. alata) cultivars. Samples collected were subjected to proximate analysis expressed in percentage and mg/100g. The investigation revealed that moisture content ranged from 76.08% to 55.10% with a mean value of 63.03%, ash from 3.54% to 0.34% and mean result 1.81%, protein from 9.87% to 4.54%, while the mean 7.89%, lipid from 1.86% to 0.86% with an average of 1.46%, fibre from 4.64% to 1.66% and mean 2.60%, dry matter from 44.90% to 23.92% and mean 36.97%, carbohydrate from 88.22mg/100g to 80.71mg/100g, average value of 86.17mg/100g, calcium from 44.56mg/100g to 16.48mg/100g and mean 22.67mg/100g, magnesium (Mg) from 13.80mg /100g to 8.84 mg/100g and mean 10.83mg, sodium(Na) from 27.78mg/100g to 8.76mg/100g, mean value 14.07mg/100g, potassium (K) from 14.67mg/100g to 4.85mg/100g, average 8.79mg/100g, iron (Fe) from 3.48mg/100g to 0.36 mg/100g, average 1.08mg/100g, manganese (Mn) from 0.546 mg/100g to 0.256mg/100g average 0.36mg/100g, copper (Cu) from 0.45mg/100g to 0.14mg/100g, mean value 0.25mg/100g, zinc (Zn) from 0.75mg/100g to 0.33mg/100g, average value 0.44mg/100g, and for phosphorus (P) from 0.54mg/100g to 0.32mg/100g, mean level 0.41mg/100g respectively of all the cultivars evaluated. These results are unique to the individual cultivars, so the average values are only representing the number of cultivars investigated in the statistical measure.*

KEYWORDS: Water Yam, Dioscorea Alata, Cultivars, Nutrition, Food Crop Production

INTRODUCTION

Yam is an important food crop produced in the tropics mostly in Africa and Asia with tuber sizes varying from 2.5 to 5kg and vine length 10 to 20 meters long (Kay 1987). Although yam is widely cultivated in the tropics, it originated in South East Asia before introduction to West Africa in the 16th Century. In Nigeria, it serves as one of the major source of food energy besides cassava and serves as one of the major tuber crops in its economy. Research records shows that Nigeria is one of the leading producers of yams in the world (FAO 2005 and IITA 2009). Research record shows that the world yam production recorded 48.7 million tonnes of which 97% was from Sub- Saharan Africa, that is 70% of the world production in a land area of 2.83 million hectares of land (IITA 2009). Report indicated that in 2005, Nigeria produced 34 million tonnes of yam and in the subsequent year (2006) increased its production by 8%, that is 36.7 million tonnes (FAO 2007). However, the increase in production was mainly due to increase in the area of production (Nwosu et al 2010). The specie of water yam (Winged yam or Purple yam) is the largest distributed grown yam in Asia, the Pacific Island, Africa and West Indies (Mignouna, 2003). The level of yam production is considered low because of the use of crude implements in yam producing areas. In addition, problems of transportation, susceptibility to diseases and insect pests, storage and processing are all added negative

characteristics to its production. However, other areas of interest for scientists were, processing physiology, productivity, biochemistry and genetics of yam. With these mentioned negative characteristics, more scientists became interested in the development and production of yam in a more advanced level.

Yams are classified as monocots under the Order Dioscoreale, family Dioscoreaceae and Genus Dioscorea. Majority of the cultivars required additional investigation to ascertain their characteristics. The most commonly cultivated species are *Dioscorea rotundata* (White yam), *D. cayenensis* (Yellow yam), *D. alata* (Water yam), *D. dumetorum*, (Trifoliate yam), *D. bulbifera* (Aerial yam), *D. esculenta* (Lesser yam or Chinese yam), *D. trifida* (American yam), *D. opposita*, (American yam), *D. japonica* and *D. hispida* (Bitter yam). The genus *Dioscorea* is further separated into groups within which the species are grouped. The groups *Enantiophyllum* is made up of the most economically cultivated species such as *D. rotundata*, *D. alata*, *D. cayenensis*, *D. opposita* and *D. japonica*. This group is morphologically characterized by their vines twinning in a clock-wise direction whereas, the remaining four groups comprises of *Lasiophyton* (*D. dumetorum* and *D. hispida*), *Opsophyton* e.g. *D. bulbifera* (Aerial yam), *Combilium* e.g. *D. esculenta* (Chinese yam) and *Macrogynodium* e.g. *D. trifida* with all their trailing pattern as anti clock-wise i.e. the initial point of trailing as you face the stake is by your right twining upwards. (Okonkwo, 1986).

LITERATURE REVIEW

Hawkes 1978 reported that there was a serious problem of proper classification of yam species – cultivar as a major food source in many parts of the world. Another impeding problem is the nomenclature of the various cultivars endemic in a given region. As a result, our research is based on the biochemical compositions of the different cultivars of water yam (*Dioscorea alata*) that are cultivated in the Niger Delta region of Bayelsa State, Nigeria.

Beside cassava, yam is the major source of energy in Nigeria which requires a special attention in its production and improvement in its biochemical composition. On this note the biochemistry of yam can be used as an effective tool to characterize the different cultivars cultivated in a particular region.

Researchers have made several attempts to identify yams by using their morphological characteristics by growth or sprouts in tubers (Martin and Rhodes, 1978). In another instance, Poiret is the name given to *D. rotundata* for tubers collected from Puerto or Jamaica whereas, *D. rotundata* was introduced to Puerto and Jamaica from Africa (Chevalier, 1936). Although, Research records show that there are existing five morphologically known groups of *D. rotundata* in National Root Crop Research Institute (N R C R I), Umudike in Nigeria (N R C R I 1975). More grouping research was done by Waitt (1965) by classifying 99 typical cultivars of *D. rotundata* and *D. cayenensis* into 38 groups on the basis of such characteristics from tubers, sprouts, leaves and stems etc all total 14 traits. Glaring work on numerical taxonomy was done by Martin and Rhodes (1978), on collections of 97 cultivars of *D. rotundata* and *D. cayenensis* from West African countries. The cultivars were subjected to 75 characteristics of which only 16 were found to be distinguishing factors that can be effectively used between groups. Based on their observations, the yams were segregated into 9 groups with related characteristics.

In an attempt to classify yams to their appropriate groups, scientists did further research on electrophoresis of total protein. Ikediobi and Igboanusi (1982) worked on electrophoretic pattern of five common species of edible yams. From their results, all five species yielded unique protein pattern in terms of positions, intensity and number of bands revealed by the staining procedure. Also, Adeniran (1982) used the same method on species of yam and 25 cultivars of *D. rotundata* from different regions in Nigeria. He observed that by using disc polyacrylamide electrophoresis of *D. rotundata* cultivars, there were both similarities and differences among them that can aid separation of cultivars from one another.

The genus *Dioscorea* is made up of 600 species in the tropical (IITA 2009) and subtropical regions in the world, out of which six are economically useful in food and medicinal values. Liu and Yan (1936) carried out a study on chemical composition of *D. cirohosa* and obtained the following results, for moisture, solid matter and vitamin C (Ascorbic acid) as 89%, 11% and 92% mg/kg yam, respectively. Further investigations by Gabriel and Balansard (1936) on *D. macabila* (wild yam) showed that accumulation of poisonous substances (toxicants) such as tannins, sterols, choline and sponins were present in yam tubers with exclusion of cyanogenic glycosides and alkaloids.

A study carried out by De Moura Compos et al (1938) on two varieties of yam (*D. brasillensis* and *D. triloba*) connotes protein level to be 1.35%, calcium 0.018% and iron 0.00057% which also indicates that they are rich in vitamin B but low in protein. (De Moura et al 1938). The nutritive value of some food substances; Protein, calcium, iron, vitamin B complex. O – Hospital 14, 227 – 240. Chemical Abstract, 33, 8829).

In Reports from FAO (1972) on proximate composition of yam tuber (in mg/100g edible portion) shows that water yam (*D. alata*) has 135 food energy calories (65.1% moisture, 2.3gm protein, 0.1 fat, 31.8 total carbohydrate, 1.5gm fibre, 0.7gm ash 28g/100g of calcium, 52mg/100g of phosphorus and 1.6mg/100g of iron). While the composition of yellow guinea yam (*D. cayenensis*) is 71 food energy calories, 80.8% moisture, 1.5gm protein, 0.1g fat, 16.4g total carbohydrate, 0.6gm fibre, 1.2 gm ash, 36mg/100g of calcium, 41mg/100g of phosphorus and 5.2mg/100g of iron. Eka (1978) reported that, in the case of white yam (*D. rotundata*), after proximate composition analysis shows 117 food energy calories, 69% moisture, 1.9gm protein, 0.1g fat, 27.0g total carbohydrate, 0.8gm fibre, 1.2 gm ash, 24.10mg/100g calcium, 38.20g phosphorus and 0.60g iron.

Analysis of amino acid composition of (*D. alata*) water yam tuber (FAO 1972) shows that the least content determined amino acid was tyrosine with 68mg/gN and 22mg/100g food, the highest being arginine 456mg/gN and 145mg/100g food. Other amino acids determined were Isoleucine 280mg/gN and 90mg/100g food, leucine 379 mg/gN and 121 mg/100g food, lysine 376 mg/gN and 120 mg/100g food, total saturated amino acids 180mg/gN and 58mg/100g food, phenylalanine 322mg/gN and 103mg/100g food, total aromatic amino acid 390mg/gN and 125mg/100g food, threonine 211mg/gN and 67mg/100g food, valine 299mg/gN and 96mg/100g food, arginine 456mg/gN and 145mg/100g food and histidine 136mg/gN and 44mg/100g food.

Eka (1986) reported that vitamin content of Water yam (*D. alata*) with tuber carotene (vitamin A) as 80µg/100g food, thiamine 150µg/100g food, riboflavin 40µg/100g food, niacin 500µg/100g food and ascorbic acid 6,000µg/100g food. Vitamin content of White yam (*D. rotundata*) indicates carotene or (vitamin A) as 20µg/100g food, thiamine 120µg/100g food, riboflavin 30µg/100g food, niacin 400µg/100g food and ascorbic acid 8,000µg/100g food.

Most recently, work published by USDA National nutrient Database (2017) on nutrient values and weights from edible portion in proximate values shows that yam contains 69.6mg/100g water and 104.40g/1 cup, cubes of 150g, 118kcal/100g and 177kcal/1 cup, cubes of 150g, energy, 1.53g/100g and 2.30g/1 cup, cubes of 150g protein, 0.17g/100g and 0.26g/1 cup, cubes of 150g fat, 27.88g/100g and 41.82g/1 cup, cubes of 150g carbohydrate by difference, 4.1g/10g and 6.2g/1 cup, cubes of 150g fibre the following minerals; Ca, Fe, Mg, P, K, Na and Zn as 17, 0.54, 21, 55, 816, 9 and 0.24 mg/100g respectively of edible portion. The results on vitamins are 17.1mg/100g vitamin C (ascorbic acid), 0.112mg/100g thiamin, 0.032mg/100g riboflavin, 0.552mg/100g niacin, 0.293mg/100g vitamin B-6, 2.3µg/100g folate DFE, 0MG/100g vitamin B-12, 7µg vitamin A- RAE, 138.1µg/100g vitamin A, 1µ, 0.35mg/100g vitamin E (alpha tocopherol), 0 vitamin D (D2 + D3), 2.3ug/100g vitamin K (phylloquinone), 0mg/100g cholesterol and 0mg/100g fatty acids total trans.

MATERIALS AND METHODS

Thirteen cultivars of Water yam (*Dioscorea alata*) Akpuke, Gbaranburu, Obeke, Okokodiaburu, Izon otumu, Tamankuro, Oweiburu hausa, Oweiburu Ekpeya, Akasousou, Engene Akpuke, Taraberiburu, Akrikuwa, Gbaranotumu, Ofofo and one *D. rotundata* (Oweiburu hausa) as control. The cultivars were collected from Odi, Okoloba, Sabagreia, Yenagoa, Okordia and Igbogene in Bayelsa State, Nigeria. They were planted and harvested in the year 2016 in the Niger Delta University Teaching and Research farm with no agro-chemical used during the cultivation and post harvest storage period. After harvest tubers were randomly collected and subjected to proximate analysis in the Central Laboratory of Niger Delta University Headed by Chief Spiff within three months. In our analysis, vitamins, caffeine, cholesterol, individual amino acids and lipids were not considered.

Data Analysis

Data collected were subjected to a software composed and developed by Seimokumo S. Angaye Junior. The methods used were Microsoft Excel quantitative data analysis tool and Visual Basic Programming Language in Integrated Development Environment.

RESULTS AND DISCUSSION

The results are presented in charts and measures of statistical values of edible portions of water cultivars in which the X- axis is the level of the trait analyzed in mg/100g expressed in percentage of moisture, ash, protein, lipid, fibre, dry matter and carbohydrate, while the rest elements are expressed in mg/100g. In the Y-axis are the names of water yam cultivars investigated. In the presentation of results, a software composed and developed by Seimokumo S. Angaye Junior was used. The methods used were Microsoft Excel quantitative data analysis tool and Visual Basic programming Language in integrated development environment.

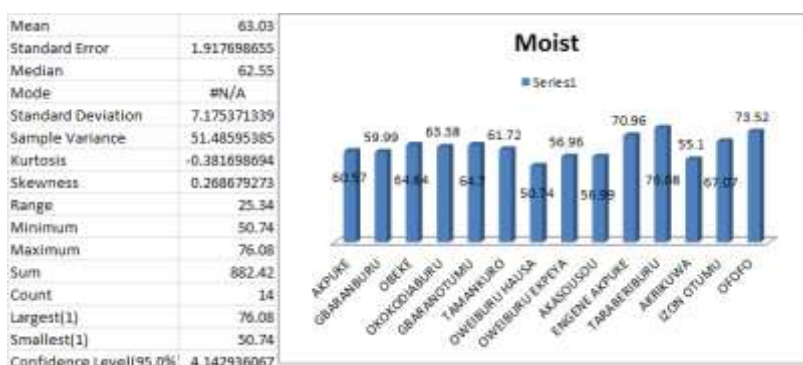
The results are presented in charts in which for the moisture content the X- axis is the level of Moisture Content in 100% while in the Y-axis is the presentation of Cultivars with their respective moisture values in relation to the total value of moisture.

Other results with analysis of element content are presented in the X-axis the total content in mg/100g and the Y-axis represents the number of water yam cultivars under investigation.

Analysis on Moisture Content in Water Yam (*Dioscorea alata*) Cultivars, 2017

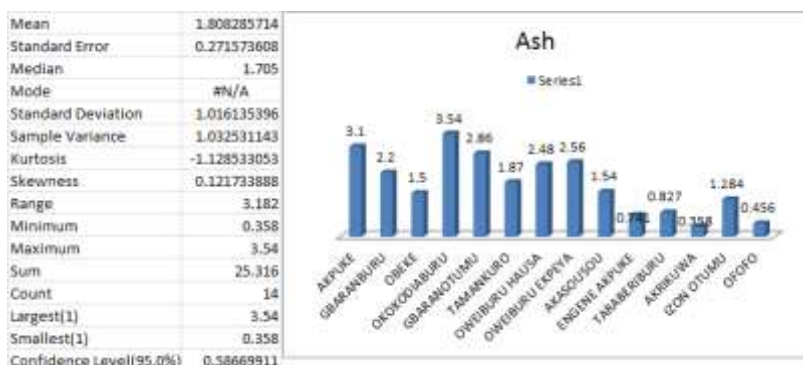
In fig. 1 the values of moisture content are presented in a chart. The chart shows that the highest value of moisture is recorded in the Water Yam cultivar Taraberi buru with 76.08% whereas Akrikkuwa Cultivar shows the least value of moisture content with 55.1% in mg/100 grams of edible portion. While the mean value of this characteristics is 63.03%, of all the Water Yam cultivars studied .

Other values of moisture content are also clearly shown on the chart according to the respective cultivars. The statistics measures of Kurtosis is -0.38 and Skewness of this characteristic is 0.27, at Confidence level (95.0%) of 4.14.



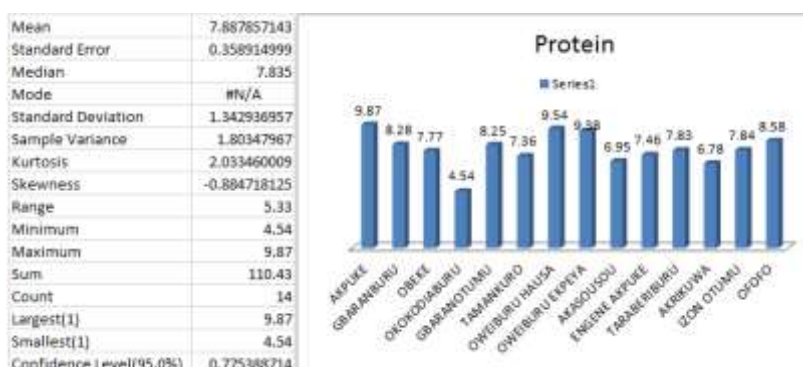
Analysis on ash content in water yam (*Dioscorea alata*) cultivars 2017.

The values of ash content in Water Yam (*Dioscorea alata*) cultivars mg/100g of edible portion are presented in Fig.2. Our results showed that Okokodiaburu had the highest value of ash with 3.54% in mg/100g and the least is presented in Akrikwa with 0.36% in mg/100g. Other values of ash content in the respective Water Yam cultivars are also presented on the chart. However, the mean value of Ash content is calculated to be 1.81% in mg/100g. Our results showed that the kurtosis of this analysis is -1.13, Skewness 0.12 at Confidence level (95.0%) of 0.59



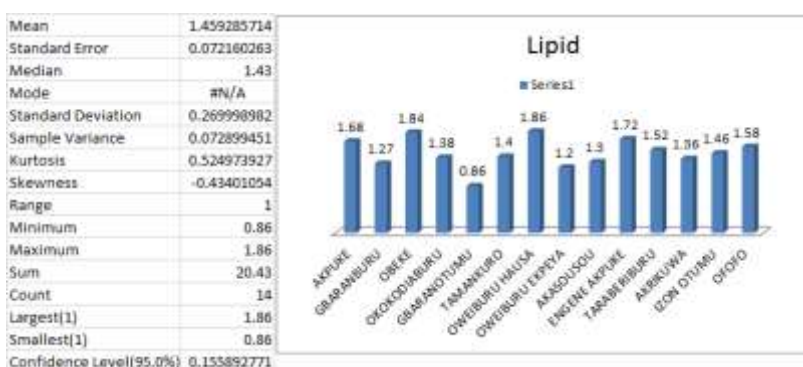
Analysis on protein content in wateryam (*Discrea alata*) cultivars: 2017

Fig.3. presents protein distribution on the various cultivars. The chart clearly showed that the highest level of protein is presented in Akpuke as 9.87% in mg/100g, Tamankuro 9.54% in mg/100g and Oweiburu 9.38% in mg/100g respectively. Whereas, Oweiburu (Hausa) the reference yam (*Dioscorea rotundata*) had the least protein content as 4.54% in mg/100g. The mean value of Protein content in the Water Yam cultivars studied is 7.89% in mg/100g. Other values of protein content analysis in the respective cultivars are all clearly presented on the chart and statistical results below. Result of Kurtosis of this trait is 2.03, and Skewness is -0.88 at Confidence level (95.0%) of 0.78.



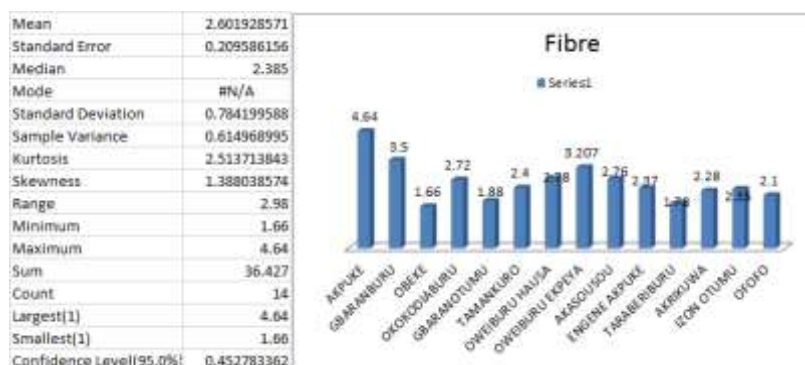
Analysis on lipid content in water yam (*Dioscorea alata*) cultivars 2017

The element analysis on lipid content is represented in fig.4 The highest value of lipid are recorded in the Owei Buru (Hausa) control as 1.86% in mg/100g of edible portion. Others close to it are Akasousou, 1.84% in mg/100g, Engene Akpuke 1.72mg/100g and Akpuke 1.68mg/100g respectively, while the least value of lipid content in Gbaran Otumu is presented as 0.86% in mg/100g. Our results also recorded the mean value of lipid content of the studied yam cultivars as 1.46 % in mg/100g . The values of kurtosis and Skewness are 0.52 and -0.43 at a Confidence level (95.0%) of 0.16. Values of Lipid content and measures statistics in other cultivars are presented below.



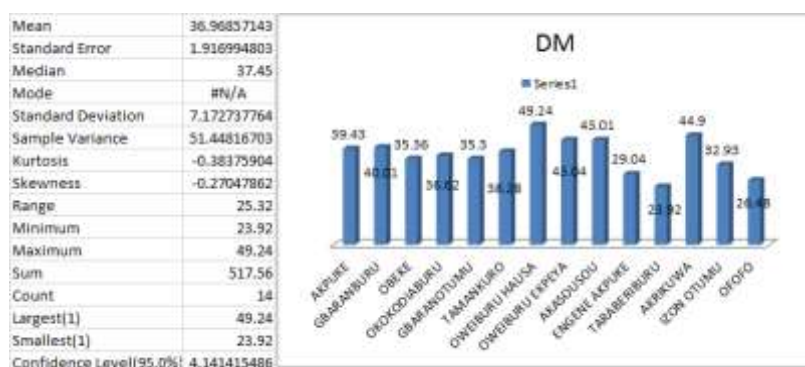
Analysis on fibre content in water yam (*Dioscorea alata*) cultivars. 2017

Results on fibre analysis are presented in Fig.5 showed that fibre content is highest in Akpukeburu as 4.64% in gm/100g of edible portion followed by Gbaranburu 3.50% in mg/100g and Oweiburu Ekpeya 3.2% in mg/100g. The least of fibre content is reflected in Akasousou as 1.66% in mg/100g The average value of fibre content in the cultivars is 2.6% in mg/100g. The kurtosis and Skewness are calculated to be 2.51 and 1.39 respectively, at Confidence Level ((95.0%) of .045. For other results on this characteristic can be sited on the chart below.

**Analysis on dry matter content in water yam (*Dioscorea alata*) cultivars 2017**

Our results on dry matter content in water yam cultivars Fig.6. shows that Tamankuro had the highest value as 49.26% in mg/100g. While, the least is recorded on Ofofo cultivar 26.48% in mg/100g. Next to Tamankuro is Akrikwa with 44.9% in mg/100g and Oweiburu Ekpeya with 43.04% in mg/100g. Our analysis also showed that the kurtosis and Skewness of dry matter content are -0.38 and -0.27 respectively at Confidence Level (95.0 %) of 4.14.with an average value of 36.97% in mg/100g on this characteristic. Dry matter values of other cultivars can be perused on the chart below.

However, Oweiburu (Hausa) had the highest value of dry matter as 49.24% in mg/100g been the control of the experiment.

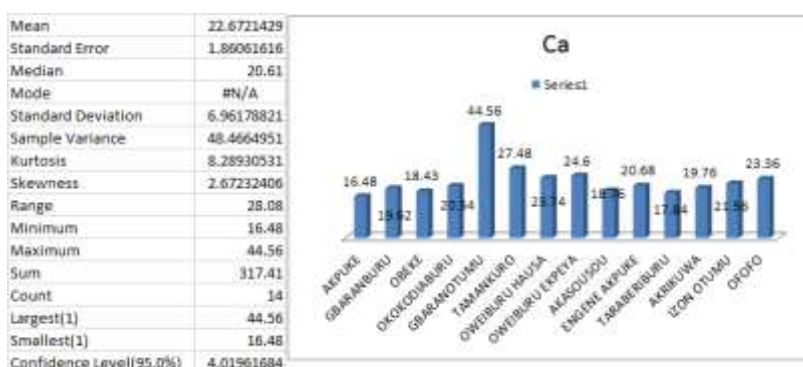


Analysis on carbohydrate content in water (*Dioscorea alata*) cultivars 2017.

Carbohydrate content in water yams are presented in Fig.7, with the highest value recorded in Akrikwa as 88.22% in mg/100g and the least in Akpuke as 80.71% in mg/100g. Other cultivars with higher values of this trait are Taraberiburu, Okokodiaburu, Engege Akpuke, Akasousou, Ofofo, Obeke, and Gbaran Otumu with the following values 88.04% in mg/100g, 87.82% in mg/100g, 87.71% in mg/100g, 87.45% in mg/100g, 87.28% in mg/100g, 87.23% in mg/100g and 87.07% in mg/100g respectively with an average value of 86.17% in mg/100g and the control Oweiburu (Hausa) had 83.3% in mg/100g. Results on this parameter of other cultivars are presented together with the kurtosis 1.38, Skewness -1.43 at Confidence Level (95.0%) of 2.29 below.

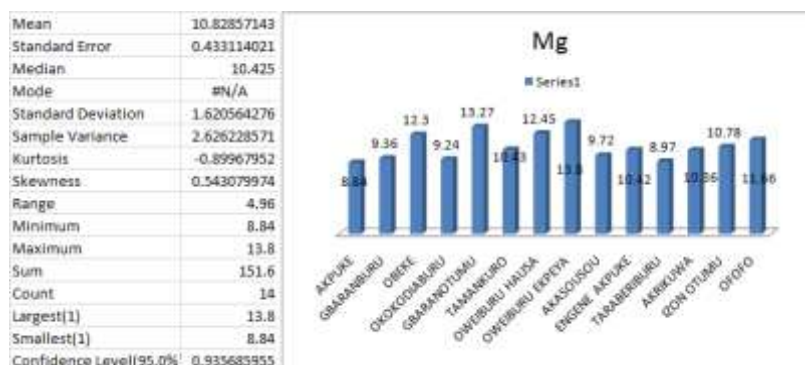
**Element analysis on calcium content in water yam (*Dioscoreaalata*) cultivars 2017**

Analysis on calcium content in water yam cultivars in Fig 8. showed that GbaranOtumu has the highest value of this element with 44.56 mg/100g and the least is recorded in Akpuke with 16.48 mg/100g and a mean value of 22.67 mg/100g of the cultivars at Kurtosis 8.29, Skewness 2.67 and at Confidence Level (95.0%) of 4.02. Other values of this characteristic in the rest cultivars and other statistical values are presented below.



Analysis on magnesium content in water yam (*Dioscoreaalata*) cultivars 2017

Determination of the values of magnesium content in water yam cultivars in Fig.9 showed that OweiburuEkpeya has the highest value of this element with 13.80mg /100g, with the least value in Akpuke 8.84mg/100g and a mean value of 10.83mg/100g with statistical values of kurtosis -0.90, Skewness 0.54 at Confidence Level (95.0%) of 0.94. In addition, the values of Magnesium (Mg) content of the rest cultivars and statistical measures are presented for siting below.

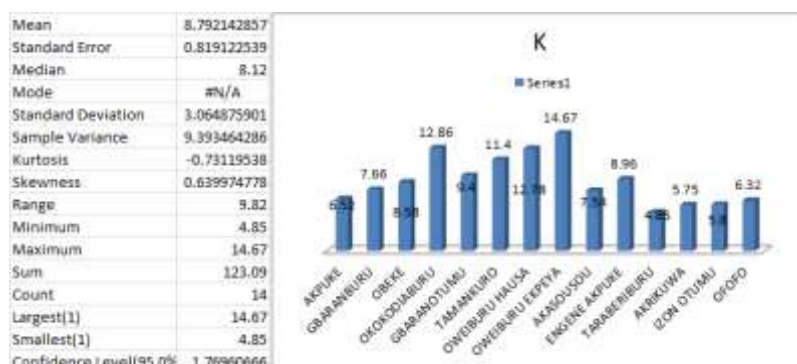
**Analysis on sodium (na) content in water yam (*Dioscoreaalata*) cultivars 2017.**

Sodium as one of the essential element was analyzed in water yam cultivars and its content is presented in Fig.10, with GbaranOtumbu cultivar that had the highest value of Sodium(Na) 27.78mg/100g and the least recorded in Taraberiburu cultivar with 8.76mg/100g and mean value of all cultivars studied as 14.07mg/100g. Records of statistical measures such as kurtosis 1.08, Skewness 0.21 at Confidence Level (95.0%) of 3.78 serves as reliable values of our results. Details of Sodium content in the rest water yam cultivars together with other statistical measures are presented below.

**Analysis on potassium (k) content in water yam (*Dioscoreaalata*) cultivars 2017**

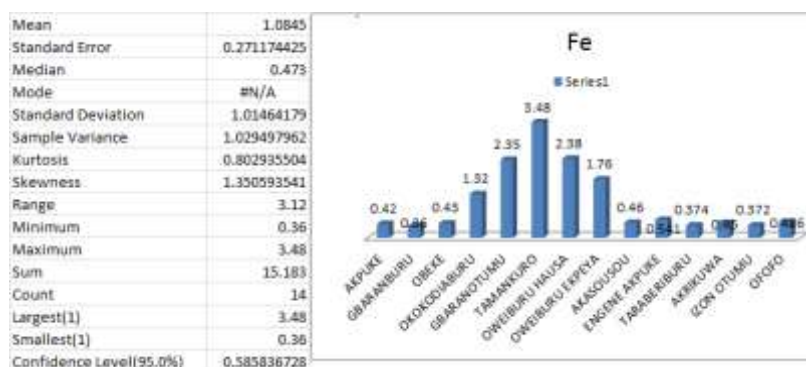
Fig. 11 represents the value of potassium content in water yam cultivars in mg/100g. Our analysis showed that OweiburuEkpeya has the highest value of potassium content with 14.67mg/100g and the least in Taraberiburu with 4.85mg/100g compared to the control Oweiburu -Hausa with 12.78mg/100g. The average value of Potassium (K) in the cultivars is 8.79mg/100g while statistical measures of Kurtosis and Skewness are -0.73 and 0.64 respectively at Confidence Level (95.0%) of 1.77.

Results of this characteristic in other cultivars and statistical measures are also presented for your perusal.



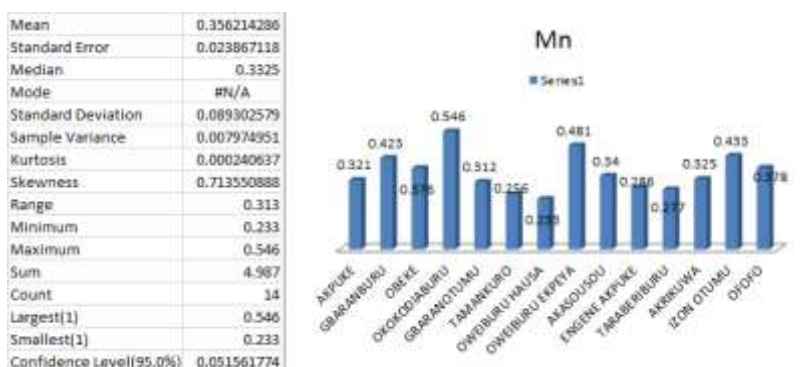
Analysis on iron (Fe) content in water yam (*Dioscoreaalata*) cultivars.

The values of iron content in mg/100g of Water yam (*D. alata*) cultivars are presented in Fig.12, with Tamakuro record as the highest of iron content 3.48mg/100g and Gbaranburu cultivar the least as 0.36 mg/100g of this trait. While the average value of iron content in all the cultivars is 1.08mg/100g with statistical measures of Kurtosis 0.80, Skewness 1.35 at Confidence Level (95.0%) of 0.86. Results of Potassium content in other cultivars and statistical measures are displayed below for sitting.



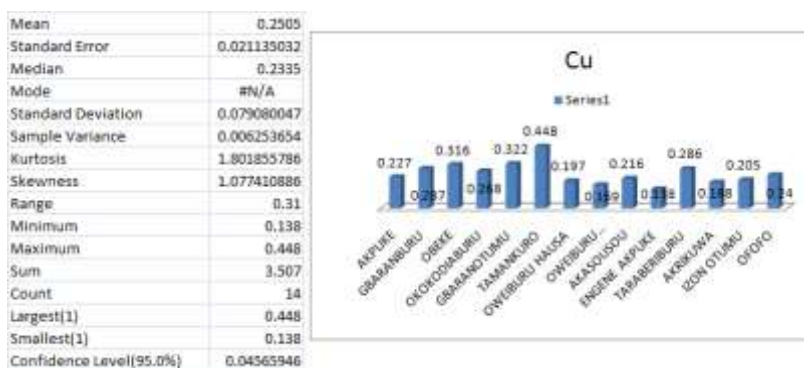
Analysis on manganese (Mn) content in water yam (*Dioscoreaalata*) cultivars 2017

Results on Manganese (Mn) content in Fig.13. of water yam (*D.alata*) cultivars showed that the value of this parameter is highest in Okokodiaburu 0.546 mg/100g and the least is recorded in Tamakuro as 0.256mg/100g while, the control Oweiburu Hausa had 0.23mg/100g whereas the average Manganese content of water yam cultivars is 0.36mg/100g with statistical measures of Kurtosis 0., Skewness 0.71 at Confidence Level (95.0%) of 0.05. cultivars are also presented on the chart. We observed that the content of this element in the studied cultivars are all relatively higher than the control-Oweiburu Hausa.



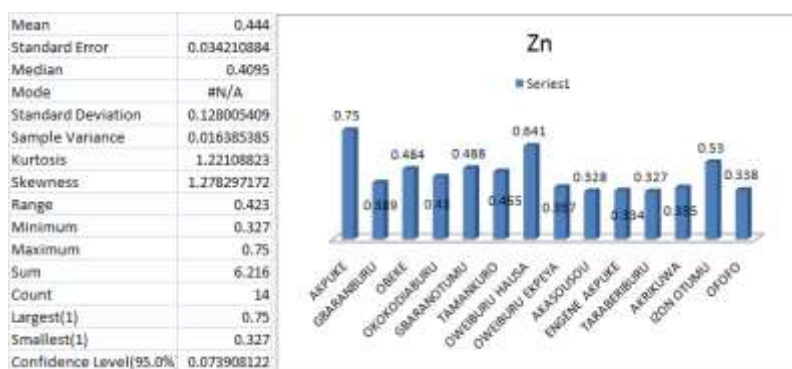
Analysis on copper (Cu) content in water yam (*Dioscoreaalata*) cultivars 2017

Our results in Copper (Cu) content in water yam (*Dioscoreaalata*) cultivars, Fig.14., showed that this value ranges from 0.45mg/100g Tamakuroburu to 0.14mg/100g EngeneAkpuke with a mean value of this characteristic as 0.25mg/100g ,haven the statistic measures of Kurtosis 1.80, Skewness 1.08 at Confidence Level (95.0%) of 0.05. We observed that the mean value of Copper (Cu) content in the cultivars studied is higher than in the control (OweiburuHaua) by 0.05mg/100g. Other values of copper in the rest cultivars and statistical measures are presented below.



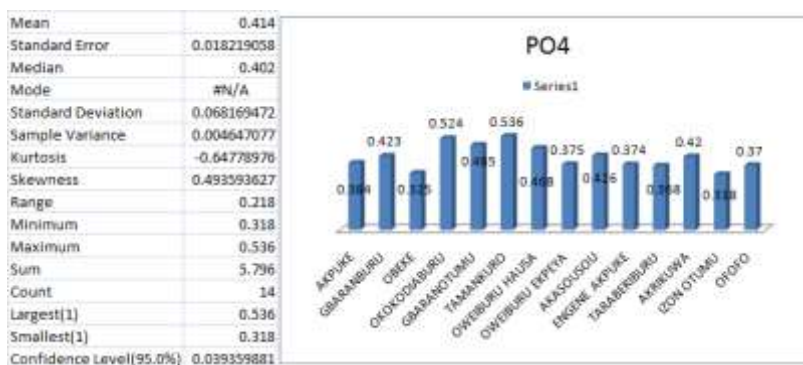
Analysis on zinc (Zn) content in water yam (*Dioscoreaalata*) cultivars 2017.

The values of Zinc content as presented in Fig.15, showed that IzonOtumu cultivar had 0.75mg/100g of Zinc element which is the highest of all the cultivars as compared to the control Oweiburu Hausa with 0.47mg/100g other yam cultivars with higher values of this characteristic are Tamankuro 0.64/100g,Taraberiburu 0.53mg/100g, EngeneAkpuke 0.49mg/100g and Akasousou 0.48mg/100g.Presented also on the chart are other values of water yam cultivars with low contents of Zinc in their edible portions of which the least is recorded in Obeke with 0.33mg/100g of Zinc. Statistical measures of Kurtosis is 1.0 4 and Skewness is 1.29 at Confidence Level (95.0%) of 0.08.



Analysis on phosphorus (P) content in water yam (*Dioscoreaalata*) cultivars, 2017

The content of phosphorus in Water Yam (*D.alata*) Cultivars as present in Fig.16, showed that Tamankuro had the highest value of phosphorus 0.54mg/100g, followed by Okokodiaburu 0, 52m/100g, IzonOtumu 0.49mg/100g, Akasousou 0.43mg/100g, and the least in GbaranOtumu 0.32mg/100g, while the control Oweiburu Hausa with 0.47mg/100g. Results of all other cultivars with statistical measures of Kurtosis -0.65 and Skewness 0.49 at Confidence Level (95.0%) Of 0.03.with a mean value of 0.41mg/100g of all the cultivars investigated are presented below.



CONCLUSIONS

1. Moisture content in water yam (*D.alata*) cultivars ranges from 76.08% to 55.10% with a mean value of 63.03%.
2. The value of Ash content varies in Water Yam (*D.alata*) cultivars from 3.54% to 0.34% and the mean result of this trait is recorded as 1.81%.
3. The protein content in the water yam (*D.alata*) cultivars investigated varies from 9.87% to 4.54%, while the mean value of this parameter is 7.89%.
4. Lipid content in water yam (*D.alata*) cultivars is from the range of 1.86% to 0.86% with an average of 1.46% of cultivars investigated.
5. Our records showed that Fibre content in the water yam (*D.alata*) cultivars studied varied from 4.64% to 1.66%. while the mean value of fibre is 2.60%.
6. Dry matter Values of water yam (*D.alata*) cultivars studied recorded this trait ranged from 44.90% to 23.92% with a mean of 36.97%.
7. Values of Carbohydrate content in water yam (*D.alata*) cultivars in our study varied from 88.22mg/100g to 80.71mg/100g, with an average value of 86.17mg/100g of all the cultivars.

8. Analysis on calcium (Ca) content in water yam (*D. alata*) cultivars showed that, the value of this element varied from 44.56mg/100g to 16.48mg/100g with a mean value of 22.67mg/100g of the investigated cultivars.
9. Determination of the values of magnesium (Mg) content in water yam (*D.alata*) cultivars showed, that the value of this element ranged from 13.80mg /100g to 8.84 mg/100g and had a mean value of 10.83mg of the evaluated number of cultivars.
10. Sodium (Na) as one of the essential elements was analyzed in water yam (*D. alata*) cultivars and its content swayed from 27.78mg/100g to 8.76mg/100g and mean value of all cultivars studied is 14.07mg/100g.
11. Potassium (K) content in water yam (*D.alata*) cultivars varied from 14.67mg/100g to 4.85mg/100g .The average value of this element in the cultivars is 8.79mg/100g of total number of cultivars investigated.
12. The values of iron (Fe) content in water yam (*D. alata*) cultivars ranged from 3.48mg/100g to 0.36 mg/100g of this trait. While the average value of iron content in all the cultivars is 1.08mg/100g.
13. Results on Manganese (Mn) content in water yam (*D.alata*) cultivars varied from 0.546 mg/100g to 0.256mg/100g whereas, the average manganese content of water yam cultivars is 0.36mg/100g, of all the cultivars evaluated.
14. Values Copper (Cu) content in water yam (*D. alata*) ranges from 0.45mg/100g to 0.14mg/100g, with a mean value of this characteristic as 0.25mg/100g of the total number of cultivars investigated.
15. Zinc (Zn) content in water yam (*D. alata*) cultivars ranged from 0.75mg/100g to 0.33mg/100g, however the average value of this element in all the investigated cultivars is 0.44mg/100g.
16. The content of Phosphorus content (P) in water yam (*D. alata*) Cultivars varied from 0.54mg/100g to 0.32mg/100g, while the mean value is 0.41mg/100g of all the cultivars evaluated.

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