Available online at www.elixirpublishers.com (Elixir International Journal)

Applied Chemistry

Elixir Appl. Chem. 70 (2014) 24140-24141

ISSN: 2229-712X

Comparative evaluation of the toxicant levels of some edible green vegetable in ikot ekpene

Abasiekong B. O[1], Ukpong I. J[1,*] and Abasiekong R. S[2]

[1]Department of Science Technology, Akwa Ibom State Polytechnic, Ikot Osurua, Nigeria.

[2]Department of Anatomy, Madonna University, Elele, Nigeria.

ARTICLE INFO

Article history:

Received: 19 February 2014;

Received in revised form:

25 April 2014;

Accepted: 8 May 2014;

Keywords

Comparative,

Evaluation,

Toxicants and Vegetable.

ABSTRACT

Oxalate (soluble and total), phytic acid, hydrogen cyanide (HCN) and tannin content of *Lasienthera* Africana (Editan), *Heinsia Crinata* (Atama) and *piper quineensis* (Adusa) were analyzed. The moisture content was first determined and results showed the highest level for *lasienthera* Africana as (7.52%) and the least (5.14%) for *Heinsia Crinata*. Standard analytical method was used to estimate the levels of the toxicants in the three vegetables. The result of the analysis showed that *Heinsia Crinata*, had the maximum total oxalate content of (10.40mg/10g) while *piper quineensis* had the minimum level of (2.50mg/100g). The highest value of phytic acid (743.00mg/100g) was found in *piper quineensis* and the minimum value (484.00mg/100g) was found in *Lasintherra* Africana. The maximum level of HCN (0.43mg/100g) was found in *Heinsia Crinata* and the minimum value (0.17mg/100g) obtained for *piper quineensis*. While Tannin recorded least (50.20mg/100g) for *piper quineensis* and maximum (63.40mg/100g) for *Lasienthera* Africana. When these result were compared with their respective, lethal does, and the values obtained for other edible leaves the leaves were found to be fit for consumption with respect to their toxicant contents.

Introduction

Consumers generally have expectation of the food supply, including that it may be nutritious, wholesome, pure and safe. It is also expected that it be plentiful, offer wide choices and be a reasonable value. In recent years consumer's emphasis is increasingly placed on food safety and such food that may not contribute to chronic diseases such as cancer or heart disease. This could be suggested to be due to some potential adverse environmental impact of agriculture. As pesticides residues and irradiation were major uses debated upon worldwide in the 1980s till date the use of the chemical are still in constant use.

In fact recent scientific evidence suggests that some types of diet can help prevent chronic diseases, but it is important to note that all foods have some degree of risk and that no food is absolutely "safe".

The important consideration becomes the size of the risk and how the size of the risk can be reduced without eliminating the food source. Therefore the goal of food safety is to reduce the size of risks to the lowest reasonable level without severe disruption of the food supply. Therefore the major objective of eating is to maintain or even improve health. Foods, food component, or diets which detract from health represent diet hazard. It is for this reason many health organization both within an outside of governments have advocated changes in the diet to promote better health and reduce risks. For this reason, vegetable is one of most highly recommended. Potter and Hitchhikes (2006).

Vegetables are plant such as cabbages, potatoes, and onions which can be cooked and eaten. It may be classified morphologically according to the particular part of the plant that is harvested as food. Such as Entire plant, Leafy parts, Root, Tubers, Bulbs and Fruit parts. For the purpose this research some vegetable commonly found in Akwa Ibom State and generally (traditionally) used for major soups will be considered and investigated for their toxicants level.

Toxicants in food are those substances causing signs of toxicity in animals or symptoms of toxicity in humans. They may be added deliberately or introduced unintentionally as a consequence of human activities. They affect metabolic processes n the body. Some of them are oxalic acid, phytic acid, hydrocyanic acid and tannin. Bassir (1969) Oxalic acid may combine with calcium, iron, sodium, magnesium, or potassium to form less soluble salt called oxalate and its regular consumption may result in such mineral deficiency most notably of calcium Nelson, 2005.

Tannins are made up of complex phenolic polymers which are classified into two structural groups, hydrolysable and condensed tannins identified in cassava tubes, in the green pulp of many banana varieties in yam species, wine tea, sorghum, bean etc. Onwuka (2004) and Suzuki (2005).

The role of tannins in the inhibition of trypsin, chymotrypsin, amylase and lipase activities have been confirmed Eddy and Udo (2005). It binds and precipitate proteins. Suzuki (2005).

Phytate is a salt of divalent cation e.g (Ca, Mg) with phytic acid. It is also the principal storage form of phosphorus in many plant tissues especially bran and seeds. Thus phosphorus in this form is generally not bioavailable to non-ruminant animals, because they lack the digestive enzyme, phytase required to separate phosphorus from phytate molecule. However ruminant readily utilize phytate because of the phytase produced by rumen micro-organisms. Noonan and Savage (1999). Also the journal of environmental nutrient (2004, vol. 27, 104) state phytic acid as a strong chelator of important minerals such as Calcium, Magnesium, Iron and Zinc and can contribute to these mineral deficiencies in developing countries.

Tele:

E-mail addresses: Itoks2020@yahoo.com

The result of the analysis is as present in the table below

Samples		Moisture %	Total oxalate	Soluble oxalate	HCN	Phytic acid	Tannin
Lasenthera African(Editan)		7.52 ± 0.03	9.97± 0.026	2.03 ± 0.25	0.37 ± 0.021	485.7 ± 3.78	63.40±0.05
Heinsia crinata (Atama)		5.14 ± 0.01	10.40+ 0.026	3.23 ± 0.017	0. 43 +0.017	699 ± 2.645	52.30±0.02
Piper quineensis (Adusa)		6.58 ± 0.017	2.50 ± 0.037	1.20 ± 0.026	0.17 ± 0.02	743 ± 1.73	50.20±0.03

Mean± SD

Yet phytic acid is considered a phyto-nutrient, providing an antioxidant effect.

Hydrocyanic acid is derived from a poisonous cyanagenic glycoside found predominantly in cassava. Nelson and Con (2000). Cyanide is one of the most potent, rapid acting poisons known. It inhibits the oxidative processes of cells causing them to die very quickly. Because the body rapidly detoxifies cyanide, an adult human can withstand 50-60 ppm for an hour without serious consequences Suzuki (2005). Hydrocyanic aid is known to inhibit cytochrome oxidase (respiratory enzymes) Akpayang et al (1995).

It inhibit cellular oxidation by combining with catalytic ion of cytochrom oxidase leading to elimination of the active unit concerned with transfer of electrons to molecular oxygen Detmetz et al (1982). It can also inhibit the activity of vitamin K dependent carboxylase of the liver (Ene-Obong, 2001).

Material and methods

The samples of vegetable namely lasienthera Africana (Editan), Heinsia Crinata (Atama) and piper quineensis (Odusa) were randomly purchased from different traders in the early morning while they were still very fresh at Urua Otor (Ikot Ekpene major food market) Ikot Ekpene, Akwa Ibom State. The plunking was done conventionally as done in home when preparing for cooking which involves the use of some part of the stem together with the leaves. The research was conducted at the Chemistry Lab. of Akwa-Ibom State Polytechnic Ikot Osurua and in the soil Science Laboratory of the University of Uyo all in Akwa Ibom State. The methods involved in the analysis were as described by following methods.

(i) Moisture content – AOAC (1975)
(ii) Estimation of Oxalic acid – Dye (1956)
(iii) Estimation of Hydrocyanic acid AOAC (1975)
(iv) Estimation of Phytic acid – James (1984)
(v) Estimation of Tannin – Burn (1971)

Result and discussion

From the table, moisture is highest for Lasienthera Africana, followed by Piper quineensis and least for Heinsia Crinata. The order of occurrence of both total oxalate and soluble oxalate are the same. Both highest for Heinsia crinata followed by lasienthera Africana and least for piper quineensis. But the presence of total oxalate is much higher than soluble oxalate in all the samples indicating the presence of some level of soluble oxalate in all examples. In same pattern, HCN is highest for Hensica Crinta followed by Lasienthera finally phytic acid is highest in piper guineensis followed by Hensia crinta and least in Lasienthera Africana.

The values obtain for HCN, which is 0.43, 0.37 and 0.17mg/100g are all lower than the lethal close for HCN 35mg/100g as recorded by Oke (1969). The values of both total (2.50-10.40mg/100g) and soluble oxalate (1.20-322mg/100g) were found to be higher for total oxalate and lower for soluble oxalate than the lethal does range 2.00-5. 00mg/100g as stated by Eddy and Udoh (2005). Therefore the extensive cooking may lower this level. The phytic acid level in the three vegetables range from 484 – 743mg/100g. is lower than lethal dose and therefore it is safe when consumed.

The tannin content which rises from 50.20 – 63.40mg/100g. These values are within range obtained by other researchers for some other edible vegetables, as reported by Eddy and Udoh (2005), Akpan and Ntia (2002) and Giami et al (2001).

Conclusion: The result of this research when compared with lethal dose and values obtained, it can be concluded that the three leaves does not contain dangerous level. In addition to the processing processes, the leaves are safe for consumption. However the excessive cooking processing may affect or lower their nutritional values, especially the vitamins and minerals. But the presences of the antinutrient in these leaves are therefore not enough to cause any major deficiency of their mineral constituent.

References

Akpanyony, E. O; Udoh, A.P and Akpan, E. J. (1995): Chemical composition of edible leaves of pterocerpus mildbraechi plant foods for human nutrition; 48, 209-215.

AOAC, (1975): Official method of Analysis, William Stowits Ed. Nith Ed. Washington D.C.

Bossis, (1969):Toxic substance in Nigerian foods. I vest Africa J. Bio. Appl. Chem., 12 (1), 3-6.

Burn, R. E. (1971): Method of estimation of Tannins in the grain sorghum. Agronomy journal 163,511-579.

Detmetz, M. Soute, B. Henker, H. and vermere, C (1982): Inc-bition activity in winged beans and possible role of Tannins. J. Agric and food chem. 25, 533-536.

Dye, W. B. (1956): Studes on Halogenton. Glomeratus weed. 4, 55-60.

Eddy, N. O and C. L Udoh (2005): Effect of cooking and frying on the nutritional value of beans prce. Of the nutria soc. Nig. 109 – 112.

Enobong, H. N. (2001): Eating Right, A nutritional guide University of Calabar press, Calabar Nigeria 269.

James, C. S. (1984): Analytical chemistry of food, Blackie Academic and professional. London.

Nelson, D. L. and Cox, M. M. (2005) "Lehnirger's Principle of Biochem., 4th ed. W/+ freeman, V.Y.

Noonam, S. C and Sange G. P. (1999). Food group Division of Animal and food science. Lincoln University Canterbury, new Zealand.

Norman N. Potter and Joseph H. Hotchkies (2006): food safety, Risk and Hazard in food science 5th ed. Pp 532-535.

Oke, O. L. (1969): The Role of hydrocygenic acid in Nutrition, World Rev. Diet 9.227-230.

Onwuka (2004) "Food Analysis and instrumentation" food Toxicant. The Journal of Environmental Nutrition .vol 27 issue 4.

Suzuki, (2004) " Food Analysis and instrumentation" food of host range variation of influence viruses" In biological and Pharmaceutical Bulletin Vol 28,pp 399-408.