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# NUTRIENT COMPOSITION OF FIVE "DRAW" LEAFY VEGETABLES OF ADAMAWA STATE, NIGERIA

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## ABSTRACT

The Nutrient Composition of five "draw" plant leaves namely *Sesamum indicum, Adansonia digitata, Corchorus olitorius, Hibiscus esculentus* and *Corchorus esthuens* was investigated. The moisture contents are comparatively high with quantities not more than 794.0 ±5.41mgg$^{-1}$ while the ash levels are low (14.4 ± 0.38 - 29.9 ± 0.67 mgg $^{-1}$) but enough to supplement the required vegetable ash index (3%) for the body. The crude protein contents are significantly low 58.8 ± 0.06 - 127.5 ± 1.05 mgg $^{-1}$ but sufficient enough as complementary to the starch-based food of the population of the area. The ascorbic acid contents are highest for *A. digitata* (856.8 ± 4.08 mgg $^{-1}$) and *C. olitorius* (571.2 ± 3.01 mgg $^{-1}$), and could serve as a source of vitamin C for the body. The presence of high calcium content in *H. esculentus* seems to suggest why the sample possesses higher "drawability".

**Keywords:** "Draw-leaves", Nutrition, Vegetables, Nutrient composition

## INTRODUCTION

Several leafy vegetables used in the cooking of soups abound in Northern Nigeria. Such leaves amongst others include *Sesamum indicum, Adansonia digitata, Corchorus olitorius, Hibiscus esculentus* and *Corchorus esthuens.* One of the most distinct organoleptic attributes of these edible leafy vegetables which make them suitable for use in soups is their elasticities or rheological properties otherwise referred to in this work as "drawability".

Some researchers like Sopade *et al*, (1993), Olorunda and Tung (1977), Sopade and Kassum, (1992) have carried out works on the rheological characterization of some Nigerian foods, however, the nutritional data on these "draw" elastic leafy vegetables are lacking. Consequently this study was geared towards contributing to the nutritional data bank of some of these edible leaves mostly grown in the wild.

The use of large quantities of leaves for soup making is a good dietary habit because vegetables supply much needed

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minerals and vitamins (such as ascorbic acid and carotene). This goes to a large extent in supplementing their starch-based food complements (Tudges and Hauge, 1953). Furthermore, Carlowitz (1985) reiterated the nutritional importance of vegetables to the human diet because the human body require certain essential nutrients such as vitamin C which may be found in green vegetables. Flags (1968) reported that the nutritional values of some wild plants greatly determine their acceptance by man. People generally require fruits, seeds and vegetables, that are rich in protein, vitamin, carbohydrate, fibres, minerals and fats for their physiological functions. Jenson (1978), stated that fruits are similar in composition to vegetables, all of which contain a high percentage of water covering 85%, while fats and protein are in varying proportions. Festenstain (1976) pointed out that freshly made sample of leaf protein usually contains 5 - 10% of carbohydrate. Pivie and Butler (1977) reported that leaf protein contains useful amounts of fat-soluble vitamins E and K, while the ash content varies from 3 - 8%; while the true protein ranges from 6 - 7%. They therefore suggested that when leaf protein is to be used as human food, it should naturally contain about 3% ash and 1% acid soluble ash.

Most of the vegetable especially in Northern Nigeria are still grown in the wild. Regretably, people generally tend to be selective even under strict situation of famine and drought. This, thus limits traditional base of food plants used as food. Consequently, the need therefore arises to assess the nutritional content of the few vegetables that are being used for food. Thus realising how the people of Adamawa State cherish "draw" (elastic) soups prepared from the "draw leaves; this study focusses on the nutritional compositions of some of these "draw leaves", as a contribution towards a national data bank.

## MATERIALS AND METHODS

Sample analyses: Samples of draw leaves from five plants were collected from the Jimeta, Girei and Yola environs of Adamawa State. The analyses were carried out in the laboratory of the Department of Chemistry, Federal University of Technology, Yola. The samples were washed with distilled water and dried in an oven at 50°C for 24 hours, passed through a 60 mm mesh and stored in polythene bags. The ash, fat and carbohydrate contents were determined using the Official Methods of Analysis (A.O.A.C, 1984). The crude protein was anlaysed by the Kjeldahl digestion method, while the modified Tillmann's Method (Paul and Pearson, 1987) was used for the determination of ascorbic acid. The mineral elements (Ca, P, Mg) were determined using the Atomic Absorption Spectrophotometer (AAS), while Sodium (Na) and Potassium (K) were determined by the method of flame photometry (Rockland *et al*, 1979).

## RESULTS AND DISCUSSION

Table 1 shows the nutrient compositions of the five leaf samples. It can be seen that the moisture contents of the samples are relatively high and comparatively close in values. The highest values of 794.0 ±5.41 mgg $^{-1}$ is recorded for *C. olitorius*. The results obtained are comparable to Jenson (1978) which reported that fruits and vegetables contain a high percentage of water covering about 85%. The ash contents are in the range of 14.4 ± 0.38 - 29.9 ± 0.67 mgg $^{-1}$ with the highest value for *H. esculentus* (29.9 ± 0.67 mgg $^{-1}$) while the lowest (14.4 ± 0.38 mgg $^{-1}$) is for *A. digitata*. The value of 29.9 ± 0.67 mgg $^{-1}$ for *H. esculentus* is a factor of one and a half higher than the values of the other samples and is comparable to the findings of Pivie and Butler (1977) that when leaves are to be used as human food, they should contain about 3% ash. This means that the results obtained for *H. esculentus* (29.9 ± 0.67 mgg $^{-1}$) and *C. esthuens* (25.5 ± 0.38 mgg $^{-1}$) make them more suitable for consumption. The other leaf samples could only serve as complementary to human diet as their ash values are below 3%.

The fat contents range 3.1 ± 0.01 - 33.2 ± 0.05 mgg $^{-1}$ and is highest for *A. digitata*. This value 33.2 ± 0.05 mgg $^{-1}$ is a factor of two to eleven higher than the other leaves. Generally the fat contents are low. The crude protein contents are in the range 58.8 ± 0.06 - 127.5 ±1.05 mgg $^{-1}$ and the highest value is recorded for *S. indicum*. This value is a factor of one to two higher than the other samples. These values obtained, when compared with the values 6 - 7% of food protein also obtained by Pivie and Butler

TABLE 1: NUTRIENT COMPOSITION OF "DRAW" LEAVES

| Parametar determined | SAMPLE/CONCENTRATION (mgg $^{-1}$) | | | | |
|---|---|---|---|---|---|
| | *S. indicum.* | *A. digitata* | *C. olitorius* | *H. esculentus* | *C. esthuens* |
| Moisture content | 731.4 ±5.0 | 751.3 ±2.76 | 794.0 ±5.41 | 781.3 ±4.07 | 781.3 ±4.07 |
| Ash | 22.7±0.19 | 14.4 ± 0.38 | 19.9 ± 0.57 | 29.9 ±0.67 | 25.5±0.38 |
| Fat | 3.1 ±0.01 | 33.2 ±0.05 | 20.1±0.03 | 16.5±0.55 | 13.1±0.01 |
| Crude Protein | 127.5±1.05 | 58.8 ±0.06 | 73.1 ±0.06 | 62.5 ±0.03 | 90.0 ±0.08 |
| Carbohydrate | 110.3±2.01 | 142.3±2.08 | 92.9 ±1.09 | 109.8±1.07 | 90.1 ±0.99 |
| Ascorbic Acid | 95.2 ±1.67 | 856.8 ±4.08 | 571.2 ±3.01 | 238.0±1.09 | 238.0 ±1.09 |
| Ca | 14.0 ±0.09 | 34.5 ±1.69 | 24.5 ±0.99 | 54.0 ±1.80 | 14.0 ±0.09 |
| Mg | 1.2 ±0.01 | 0.9 ±0.01 | 1.8 ±0.06 | 2.7 ±0.16 | 0.6 ±0.01 |
| Na | 5.7 ±0.68 | 7.6 ±0.1.25 | 6.4 ±1.06 | 10.0 ±0.91 | 6.8 ±1.61 |
| K | 8.8 ±0.99 | 12.8 ±1.02 | 1.9 ±1.60 | 7.6 ±0.98 | 6.9 ±1.06 |
| P | 17.6 ±1.25 | 14.4 ±1.51 | 16.4 ±1.60 | 16.0 ±1.50 | 18.4 ±1.07 |

(1977) are low but notwithstanding the low indexes of the samples, the leafy vegetables can still be sources of vegetable protein for those populations whose main food values are starch-based. The carbohydrate levels are generally close in values 90.1 ± 0.99 - 142.3 ± 2.08 mgg $^{-1}$ with the value for *A. digitata* 142.3 ± 2.08 mgg $^{-1}$ as the highest. Similarly, the ascorbic acid contents are comparatively highest for *A. digitata* (856.8 ± 4.08 mgg $^{-1}$) and is significantly higher by a factor of one and a half than the others. The presence of a higher ascorbic acid content (571.2 ±3.01 mgg $^{-1}$ and 856.8 ± 4.08 mgg $^{-1}$) in *C. olitorius* and *A. digitata* respectively make these two samples more suitable as sources of vitamin C for human consumption. Also it can be asserted that the ascorbic acid contents (95.2 ±1.67 and 238.0 ± 1.09 mgg $^{-1}$) for the other samples can still be supplementry as other sources of vitamin C. This fact is supported by the report of Grubben (1977) that green vegetables are valuable suppliers of ascorbic acid.

The calcium values are in the range of 14.0 ±0.09 - 54.0 ±1.80 mgg $^{-1}$. The results showed that *H. esculentus* has the highest value which is a factor of two to three higher than the other samples and this shows why the sample exhibits more rheological characteristic ("drawability") than the other leaves.

The concentration of magnesium and sodium are in the range 0.6 ±0.01 - 2.7 ±0.16 mgg $^{-1}$ and 5.7 ±0.68 - 10.0 ±0.91 mgg $^{-1}$ respectively. The highest values for both elements (2.7 ± 0.16 mgg $^{-1}$ and 10.0 ±0.91 mgg $^{-1}$) are recorded for *H. esculentus* and this also contributed to its elastic ("drawability") characteristic. The potassium and phosphorus contents are low (1.9 ±1.60 - 12.8 ±1.02 mgg $^{-1}$ and 14.4 ±1.51 - 18.4 ±1.07 mgg respectively). These results are comparatively very low to the normal value of 480 mg or 20% of the Daily Value (DV) of K and P for human nutrition (Pennington *et al*, 1995).

## CONCLUSION

The moisture contents of the samples are relatively high. Nutrient analysis indicate an adequate level of ash for *H. esculentus* and *C. esthuens* while the crude protein levels of the leaves are low (58.8 ± 0.06 - 127.5 ±1.05 mgg $^{-1}$). The high level of calcium in *H. esculentus* is an indication of the "drawability" characteristics of the vegetable. It is suggested that as sources of nutrients to the human body, the five "draw" leaf samples are highly recommended.

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## REFERENCES

Anonymous 1984. Preparing Vegetables for eating: Home Economic Series. No. 16. A.B.U. Zaria. pp 1 - 3.

.O.A.C. 1984. Official Methods of Analysis. Fifth edn. Association of Official AnalyticalChemists, Arlington, Virginia, pp 236 - 248.

arlowitz P.G. 1985. ICRAF multi purpose tree and shrub information system 5. pp 312 - 338.

lags J.T. 1968. Food nutrient Requirements and evaluation: A research symposium. MISC pub. No. 1147. pp 21 - 23.

estentain, G.N. 1976.Carbohydrates associated with leaf protein. J. Sci. Ed. Agric., 2: 849.

rubben, G.H. 1977. Tropical Vegetable and their Genetic Resources. IBPGR. Rome. AGPE, IBPGR/77/23. P 29.

enson, N.F. 1978. Wild Plant Fruit Production: A Research Symposium on Wild Food Plants. No. 32: 1 - 5.

lorunde, A.O. and Tung, M.A. 1977. Rheology of Fresh and frozen okra dispersions. J. Food Tech. 12: 593 - 598.

ul, G. and Pearson, W.N. 1987. The vitamins. Vo. 7, 2nd Edn. pp. 31 - 32.

Pennington, J.A.T., Schoen, S.A., Salmon G.D., Young, B., Johnson, R.D. and Marts, R. 1995. Composition of Core Foods of the U.S. Food Supply. J. Food Composition and Analysis. 91 - 128.

Pivie, N.W. and Butler, J.B. 1977. A simple Unit leaves Proceeding Nut. Soc. 36. 136.

Rockland, L.B., Wolf, W.R, Hahn, M. and Young R. 1979. Estimation of Zinc and Copper in Raw and cooked legumes. A inter laboratory study of Atomic Absorption and x-ray fluorescence spectroscopy. J. Food. Sci.14. 171 - 1713.

Spade, A.A. and Kassum, A. 1992 Rheological Chracterization of Akamu, a Semi-liquid food from Maize, Millet and Sorghum. J. Cereal Sci. 15. 193 - 202.

Sopade A.P., Kassum A.L. and Adamu, J.M. 1995. Rehological characterization of Nigerian traditional soups. Int. J. Food Sci. and Tech. 28. 647 - 653.

Tudges, K.A. and Hauge, S. M. 1953. Carotene Factors affecting Destruction in Alfalfa. J. Agric. Edn Chemistry. 1001.