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Proximate Analysis of *Talinum triangulare* (Water Leaf) Leaves and its Softening Principle

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Abstract: The proximate analysis of *Talinum triangulare* was carried out in both wet and dry conditions respectively. The results revealed the presence of carbohydrates (10.87±3.99 mg/g and 12.38±2.76 mg/g), steroids (106.61±2.53 mg/100mg and 11.37±1.19 mg/100g), protein (3.52±0.32% and 18.75±2.72%), oil content (3.52% and 1.44%), b-Carotene (114.5±1.49 mg/g and 40.02±0.50 mg/g) and crude fibre (12.00% and 8.50%) in dry and wet samples respectively. The wet sample was assayed for pectinases at various temperatures. This revealed the presence of pectinases with specific activities of 38.64 units/kg protein, 55.44 units/kg protein, 61.14 units/kg protein and 62.09 units/kg protein at 35, 55, 75 and 95°C respectively. These results indicate that the leaves contain an appreciable amount of nutrients and should be included in our meal for a balanced diet. The high amount of pectinases detected lends credence to the traditional use of water leaf as a softener of other vegetables species and a possible industrial application.

Key words: *Talinum triangulare*, carbohydrates, protein, crude fibre

INTRODUCTION

Leafy vegetables are known to add taste, flavour, as well as substantial amounts of protein, fibre, minerals and vitamins to the diet (Onyenuga and Fetuga, 1975; Adeyemi, 1987). While the amounts of the nutrients constituents in the more commonly used leaf vegetable species in Nigeria have been studied to some extent (Onyenuga, 1968; Kola, 2004), the lesser known regional and local species remain virtually neglected. Lack of information on the specific nutrients in a large number of the native vegetables species with which Nigeria is richly endowed is partly responsible for their under-exploitation especially in areas beyond the traditional localities where they are found and consumed. Among the leafy vegetables in which their proximate analysis and softening principle have not been extensively studied are leaves of water leaf.

Talinum triangulare (water leaf) is an herbaceous, perennial, coalescent and glabrous plant widely grown in tropical regions as a leaf vegetable (Adewunmi *et al*., 1987). It is consumed as a vegetable and constituent of a sauce in Nigeria. In Nigeria, it is widely distributed and consumed as a leafy vegetable in the Southern ecological zones. Its leaves are used as softener of other vegetable species in vegetable soup. However, despite that the leaves are used as a natural softener of other vegetable species during vegetable soup preparation, no information has been published on this role. In order to ascertain the nutritive value of the vegetable species and thereby stimulate interest in its utilization beyond the traditional localities, this study was designed to determine the levels of the major nutrients in the leaves and its softening principle.

MATERIALS AND METHODS

The leaves of *Talinum triangulare* (water leaf) were collected from Ishiagu in Ebonyi State, Nigeria. The leaves were identified and authenticated by a taxonomist Dr. Ibiam, F.O. of the Department of Applied Biology, Ebonyi State University, Abakaliki, Nigeria. The leaves were destalked, washed and sun dried by constantly exposing the leaves to sunlight for 2-3 days and turning of the vegetable leaves to avert fungal growth. The leaves were later milled to obtain the Vegetable Leaf Meals (VLMs) using an electric blender, some of the leaves were also ground fresh using electric blender and both were stored in refrigerator in a well labeled air-light container for analysis. Proximate analysis and the softening principle were carried out on dried and wet samples of *T. triangulare* leaves.

Proximate analysis: Proximate analysis was carried out according to the procedure of Association of Official Analytical Chemist (A.O.A.C., 1990) to determine the carbohydrate, protein, oil, crude fibre, b-carotene and steroids components of the sample.

Pectinases assay: The pectinases assay was determined using Somogyi-Nelson methods (Somogyi, 1945; Miller, 1969). Pectinases may be measured by quantification of the reducing groups liberated following enzyme attack in the wet sample.

RESULTS

Table 1 shows the proximate chemical composition of *T. triangulare* leave in both dry and wet samples. It

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Table 1: Proximate chemical composition of *T. triangulare* leaves in both dry and wet samples

Name of the nutrient	Dry Sample	Wet sample
Carbohydrate (mg/g)	10.87±3.99	12.38±2.76
Steroids (mg/g)	106.61±2.53	11.37±1.19
Proteins (%)	3.52±0.32	18.75±2.72
Oil content (%)	3.52	1.42
β-Carotene (mg/g)	114.15±1.49	40.02±0.50
Crude fibre	12%	8.5%

contains considerate amount of b-carotene, (114.15± 1.49 and 40.02±0.50) which indicates high antioxidant effect of the vegetable and low levels of carbohydrate, (10.87±3.99 and 12.38±2.76), protein (3.52±0.32 and 18.75±2.72), oil content (3.52% and 1.42%) and crude fibre (12% and 8.5%) which indicates that water leaves is not a good source of these chemicals compositions. Table 2 present Specific Pectinases Activities at 95°C shows 62.09 units/kg protein as the highest and decreases down to temperature 35°C. This shows that this enzyme is thermo stable and hence its activities increases with increase in temperature. Fig. 1 presents the specific pectinase activities and temperature change.

Table 2: Specific Pectinase Activities at various temperatures

Name of Enzyme	Specific Activities
Pectinase (Units/kg proteins) at 35°C	38.36
Pectinase (Units/kg proteins) at 55°C	55.44
Pectinase (Units/kg proteins) at 75°C	61.14
Pectinase (Units/kg proteins) at 95°C	62.09

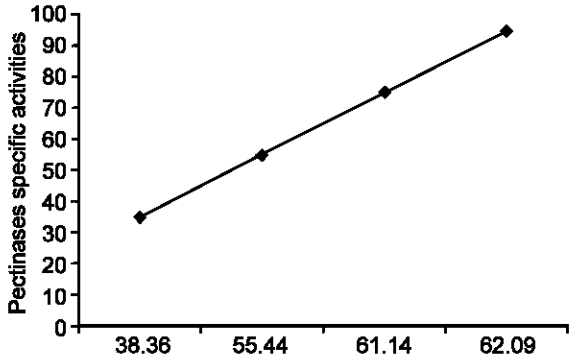

Fig. 1: Specific Pectinase activities against temperature change

DISCUSSION

Proximate compositions of *Talinum trinagulare* were carried out in both dry and wet samples. Its softening principle was equally investigated in the wet sample. Carotenoids, protein, carbohydrates, steroids, crude fibre and among others were revealed to be present in *T. Triangulare* (Table 1), this shows high level of its possible dietary value (Oleyede, 2005).

Generally the dry sample showed higher level of these nutrients than the wet sample except for protein and carbohydrates (Table 1). The reason may be that the nutrients are not volatile compounds and hence have high dried weight. These results are in correlation with the findings of Akindahunsi (2005). High level of β-Carotenoids (114.15±1.49 mg/100 g 40.02±0.50 mg/ 100 g) in Table 1, showed that the vegetable is good for the management of cardiovascular diseases and oxidative stress, since carotenoids are biologic antioxidants. Antioxidants are compounds that protect cells against the damaging effects of reaction oxygen species, such as singlet oxygen, super oxide, peroxyl radicals, hydroxyl radicals and peroxy nitrile. An imbalance between antioxidants and reactive oxygen species results in oxidative stress, leading to cellular damage (Burton and Ingold, 1984). Oxidative stresses have been linked to cancer, aging, atherosclerosis, inflammation, ischemic injury and neuro degenerative diseases (Palozza, 1998). Carotenoids may help provide protection against these diseases by contributing along with antioxidant vitamins and enzymes, to the total antioxidant defense system to the human body. Epidemiological studies have shown, that flavonoids and carotenoids intake, are inversely related to mortality from coronary heart diseases and to the incidence of heart attacks (Donald and Cristobal, 2006).

The oxidation of Low-density Lipoproteins (LDL) has been recognized to play an important role in atherosclerosis, immune system cells called macrophages recognize and engulf oxidized LDL, a process that leads to the formation of atherosclerotic plagues in the arterial wall, LDL oxidation can be induced by macrophages and can also be catalyzed by metal ions like copper. Several studies have shown that certain flavonoids can protect LDL from being oxidized (Donald and Cristobal, 2006).

The result of proximate analysis in Table 1 shows that *T. triangulare* has appreciable level of carbohydrates (12.38±2.26 mg/g and 10.87±3.99 mg/100 g), steroids (11.35±1.90 mg/100 g and 106.61±0.73 mg/100 g), proteins (1.39±0.60% and 18.75±2.72%) and crude fibre (12% and 8.5%). The result of this study indicated that *T. triangulare* is a good source of these nutrients. Low oil content and crude fibre obtained in this study confirms that *T. triangulare* is not a good source of oil and crude fibre.

Conclusion: The results of this study revealed that leaves of *T. triangulare* contain an appreciable amount of proteins, carbohydrates, steroids, carotenoids, among others and low level of oil content, etc. Since it contains substantial amount of nutrients, it can therefore be concluded that *T. triangulare* leaves can contribute significantly to the nutrient requirements and health management of man and should be recommended in our diet. Equally, its high specific activity of pectinases that enables it to be used traditionally as a softener of other vegetables species and a possible industrial application for its validity.

REFERENCES

Adeyemi, S.A.O., 1987. Contribution of Horticulture to Food Production in Nigeria by the 2000AD. Acta Horticulture, 211: 37-42.

Adewunmi, C.O., J.O. Ariwodola and P.A. Olubunmi, 1987. Crude Drug Research; Int. J. 'Crude Drug Res., 25: 7-14.

Akindahunsi, A.A., 2005. Phytochemical Screening and nutrient-anti nutrient composition of selected tropical green leaf vegetables, Afr. J. Biotechnol., 4.

AOAC, 1990. Official method of Analysis, Thirteenth Edition, Washington DC, Association of Official Analytical Chemists.

Burton, G.W. and K.U. Ingold, 1984. B-Carotene, an unusual type of Lipid antioxidant. J. Sci., 224: 569-573.

Donald, R.B. and M. Cristobal, 2006. Antioxidant activities of flavonoids, J. Agric., 52: 125-757.

Kola, F., 2004. Proximate Composition of bungu leaves and seeds. Biochemistry, 16.

Miller, G.L., 1969. Use of dinitrosalicylic acid reagent for determination of reducing sugar. Analysis Chemistry Acta., 22: 433-437.

Oleyede, O.I., 2005. Chemical profile of Unripe Pulp of Carica papaya. Pak. J. Nutr., 4: 379-381.

Onyenuga, V.A., 1968. Nigeria's Food and Feeding-Stuffs: Their Chemistry and Nutritive Value. 3rd Edn. (Revised Edition), Ibadan University Press, pp: 99.

Onyenuga, V.A. and B.L. Fetuga, 1975. First National Seminar on Fruits and vegetables, In Process And Recombination by NIHORT, Ihadan, Nigeria, 13-17 Oct., 1975. pp: 122-123.

Palozza, P., 1998. Pro-oxidant actions of Carotenoids in Biologic Systems. Nutr. Revolution, 56: 257-256.

Somogyi, N., 1945. A new reagent for the determination of Sugars. J. Biol. Chem., 160: 61-68.