Greener Journal of Agricultural Sciences
ISSN: 2276-7770; ICV: 6.15
Vol. 3 (3), pp. 211-214, March 2013

http://gjournals.org/GJAS

Research Article

Nutritive Potentials of *Allium Cepa* and *Diplotaxis Tenufolia* Vegetable Leaf Protein Concentrates

A.I. Adeagbo, *K.A. Bolaji and O.F. Odoje

Department of Chemistry, Emmanuel Alayande College of Education. P.M.B 1010, Oyo.

ARTICLE INFO

Article No.: *011613390*
DOI: *10.15580/GJAS.2013.3.011613390*

Submitted: *16/01/2013*
Accepted: *10/02/2013*
Published: *20/03/2013*

Corresponding Author
Bolaji, K.A.
E-mail: *khornskenny@yahoo.co.uk*

Keywords:
leaf protein, leaf concentrates,
Amino acid, Functional properties

ABSTRACT

Leaf protein concentrates were derived from two vegetable species; Allium ceppa and Diplotaxis Tenuifolia. The two samples were evaluated for their nutritional values using standard analytical techniques for proximate, amino acid and functional properties. In proximate analysis, ash, carbohydrates, proteins, fibre, fats and moisture were assayed, while amino acid was determined using method of Sparkman et al. and functional properties determined using method of coffman Gargia and Beuchat. The highest value of crude protein was recorded in Allium ceppa while Diplotaxis Tenuifolia has highest value of Nitrogen free extract. Other values of proximate analysis were present in significant proportion. The amino acid profile of the leaf protein concentrates indicated favourable nutritional balance except that tryptophan which is the limiting amino acid. The water absorption capacity, fat emulsion capacity foaming and foaming stability reveal good functional properties.

INTRODUCTION

Green leafy vegetables have been considered as one of the sources of nutrients required for growth in man and animal in most part of the countries in the world and particularly Africa. They have constituted an indispensable part of the human diet. They also occupy an important place among the food crops as these provide adequate amounts of vitamins and minerals for humans. They are rich source of carotene, ascorbic acid, riboflavin, folic acid and minerals like calcium, iron and phosphorus.

Leaf vegetables are highly beneficial for maintenance of health and prevention of diseases. They contain valuable source of food ingredients that can be utilized to build up and improve the body successfully (Haruf et al, 2006). They also maintain alkaline reserve of the body. They contain high carbohydrate, vitamin and mineral contents.

Vegetables hold an important position in well balanced diet, they are believed to occupy a modest place as a source of trace elements due to their high water content (Gibson 1994).

However, protein are of prime importance to health and are often deficient in the diets of people in developing countries especially those in vulnerable groups such as nursing mothers, expectant mothers, weanlings and pre – school children (Fasuyi and Afetor, 2005). In addition, deficiencies in protein and other consumption observed in the diet of people in some developing countries may result in serious health problems, this is due to the fact that animal proteins are very expensive and are becoming inadequate year after year.

MATERIALS AND METHODS

Preparation of Leaf Protein Concentrates

Fresh leaves of *Allium Cepa* and *Diplotaxis Tenuifolia* were bought from farm sites situated near Erelu Dam of Oyo town. The leaves of the vegetables were plucked and the stems were trimmed. Leaf protein concentrates were obtained by passing the leaves through a locally produced mincer. The pulped juice was separated from the crushed fibre by passing the mixture through cotton cloth followed by pressing with a screw press. The pulped green juice was coagulated by steaming between 80°_{C} and 90°_{C} the coagulant was then washed with water, pressed and pulverized and air – dried prior to chemical analysis.

Proximate and Amino Acid Composition

Proximate composition of the leaf protein concentrates were determined by adopting procedures of Association of Analytical Chemist (AOAC, 1990). The amino acids were determined by methods described by Sparkman et al (1958). After the dried samples have been defatted using mixture of chloroform and ethanol in ratio 2:4 respectively, hydrolysed with 5.0m HCl, evaporated in an evaporator and was analysed using Amino Acid analyser.

RESULTS AND DISCUSSION

Table 1Proximate composition of leaf protein concentrates (g/100g)

Sample	Moisture	Crude fat	Crude fibre	Crude protein	Ash	carbohydrate
Allium Spp	16.45 ± 0.071	9.20 ± 0.85	10.46 ± 1.05	44.28 ± 2.43	12.48 ± 0.24	23.58 ± 3.64
Diplotaxis Tenuifolia	23.43 ± 2.3	11.23 ± 1.33	12.73 ± 2.15	34.56 ± 2.56	14.34 ± 2.43	27.14 ± 2.34

$\pm$ mean standard derivation of Triplicate measured.

Table 1 reveals proximate composition of *Allium* Ceppa and Diplotaxis Tenuifolia vegetable leaf protein concentrates.

The moisture content value was 16.45 ± 0.071 in *Allium Ceppa* and 23.43 ± 2.3 in Diplotaxis Tenuifolia

The moisture in food determines the keeping quality and influences the rate of food absorption and digestion. It also determines the rate at which enzymatic activities takes place on food. The observed moisture content was higher than 7.6 ± 0.6 reported by Adeyeye and Omotayo (2011) for *Amaranthus hybridus* and 6.6 ± 0.6 for *Telfaira accidetalis* leaf concentrates. This indicated that the two samples have good water retention capacity and could therefore easily be spoiled if not consumed on time.

Crude fat value was 16.45 ± 0.071 in *Allium Ceppa* and 23.43 ± 2.3 in *Diplotaxis Tenuifolia* The values were higher than 5.3 ± 0.1 reported for *solanum micropium* and 6.8 ± 0.1 reported for *Cochorus Olitarium* by Falade et al (2004). Fat in food determines the amount of energy available.

The value of crude fibre was 10.46 ± 1.05 for *Allium Ceppa* and 12.73 ± 2.15 for *Diplotaxis Tenuifolia.* The values were higher than those reported by Alelor and Fasuyi (1999) for Amaranthus hybrids which was 1.6 and *Telfairia accidentalis* which was 1.7 fibre in food independently lowers the blood pressure and reduces the risk of cardiovascular diseases. Its presence in food keeps waste products moving through the intestine. Adequate in take of fibre is also essential for normal functioning of the bowel and prevention of disease. Also fibre in the diet plays a crucial role in the functioning of the gastrointestinal system.

Allium Ceppa and *Diplotaxis Tenuifolia* had a value of 44.28 ± 2.43 and 34.56 ± 2.56 respectively. The values observed for the two leaf protein concentrates were higher than 4.85 reported for sweet potato leaf protein concentrate by Akindahunsi and Salami (2005). This indicates that these leaf concentrates are good source of daily protein. Protein in food provides necessary amino acids for the synthesis of protein in muscle brain, blood and other tissues in the human body as well as hormones and enzymes.

The Ash content of food determines the extent of mineral matters likely to be found in food substrate. It also helps to determine the rate at which dietary mineral would be available. The ash content of *Allium Ceppa* is 12.48 ± 0.24 and 27.14 ± 2.34 for *Laurea taxifolia*. The two Ash content values of the two leaf protein concentrates were higher than 11.43 ± 1.16 reported for *crassocephalum crepidiodes*. The values were higher than those reported for five vegetables by Saidy and Adunbarin (1998) which are *Talium Triangulare*, (0.62)%, *Roselle* (0.46%), *Cochurus olitonus* (0.32%), *Telfaira occidentalis* (0.68%). The reported values of ash in the two samples indicated that they are good sources of mineral elements

Carbohydrate content in *Allium Ceppa* was 23.58 ± 3.64 and 27.14 ± 2.34 in *Diplotaxis Tenuifolia*. Carbohydrate in foods is the key source of energy. Carbohydrate is widely available in normal diets but the preferred sources of carbohydrate are cereals and vegetables which contain adequate fibre and other nutrients. There is no specified daily requirement for carbohydrates but about 50grams of carbohydrates should be enough to prevent breakdown of the body's store of protein and fats. This indicates that these two leaf protein concentrates are a good source of energy as complex carbohydrates containing indigestible dietary fibres plays a vital role in our health.

Table II: Amino Acid Profile (mg/100g)

Amino Acids	*Allium Ceppa*	*Diplotaxis Tenuifolia*
Lysine	5.23	6.44
Histdine	2.56	4.36
Arginine	5.51	4.87
Aspartic Acid	8.65	9.32
Threonine	2.75	4.53
Serine	3.67	4.32
Glutamic Acid	13.97	13.56
Proline	3.56	4.53
Glycine	1.86	3.24
Alanine	2.98	3.64
Cystine	1.76	3.49
Valine	5.21	4.56
Methionine	1.45	2.76
Isoleucine	4.74	4.76
Leucine	9.49	6.87
Tyrosine	4.56	5.43
Phenylalanine	3.38	6.34

The amino acid content of Alluminium Cepa an Diplotaxis Tenufolia were presented in table II. A total of six amino acids were determined each for both samples with tryptohan being the limiting amino acid.

The predominat amino acid in the two leaf protein concentrates is Aspertic acid which is 8.65/100g in Allium Cepa and 9.32 in Diplotaxis tenuifolia.

Arguine concentration Allium cepa was 5.51mg/100g and 4.87mg/100g in diplotaxis tenuifolia while lysine concentration in Allium Cepa was 5.23mg/100g and 6.44mg?100g in Diplotaxis tenufolia.

The quantity of food protein is assessed by amino acid content. The total essential amino acid composition of Allium Cepa is 28.37mg/100g while that of diplotaxis tenuifolia is 33.84mg/100g. relatively these values are closer to those reported for two legumes, known to be high in protein content. Soya bean 44.30mg/100mg and cowpea 28.10mg/100g essential amino acid content. ((Aremu et al, 2006)

Table III: Functional Properties of Leaf protein Concentrates

Example	% WAC	% OAC	% FC	% FS	% EC	% ES
Allium Ceppa	224.40 ± 1.31	298.91 ± 1.22	24.10 ± 0.23	4.20 ± 0.13	36.49 ± 0.16	2.43 ± 0.36
Laurea taxifolia	374.24 ± 2.41	2.79 ± 1.29	19.34 ± 1.23	7.23 ± 2.17	46.23 ± 1.14	23.24 ± 0.26

KEY
WAC - Water Absorption Capacity
OAC - Oil absorption Capacity
FC - Foaming Capacity
FS - Foaming stability
EC - Emulsion Capacity
ES - Emulsion Stability

TABLE III: presents the functional properties of the two sample. The water absorption capacity had a value of 224.40% in *Alliium Spp* and 374.24% in *Diplotaxis Tenuifolia*. Oil absorption capacity had a value of 298.91% in *Alliium Ceppa* and 2.79% in *Diplotaxis Tenuifolia*. The foaming capacity in *Allium Ceppa* was 24.10% while that of *Diplotaxis Tenuifolia* has a value of 19.34%.

Oil absorption capacity plays a vital role in food formulation due to the fact that fat improve the flavor and mouth feel of food (Kinsella, 1976).

Foaming stability ranges from 4.20% in *Allium Ceppa* to 7.25% in *Diplotaxis Tenuifolia*. A protein that is utilized to form stable foam will require many of the same properties as are required to form stability.

Emulsion capacity reported in this investigation for the two leaf protein concentrates are higher than 28.7% reported by Fasuyi (2006) for *Talium triangulare* and 32.7% reported for *Amaranthus cruenthus*. Emulsion capacity is an important consideration in production of pastries, coffee container and frozen deserts.

Emulsion stability values for Allium Ceppa and *Diplotaxis Tenuifolia* were 25.43% and 23.24% respectively.

CONCLUSION

Leaf protein concentrates from *Allium Ceppas* and *Diplotaxis Tenuifolia* could be used satisfactorily to supplement the protein of cereals, grains and so on. They are the main staple foods because they are nutritionally adequate. As a result of the availability and cheapness of these leaf protein, the problem of malnutrition which is still prevalent in developing countries could be alleviated.

REFERENCES

Adeyeye IA and Omotayo F O (2011). Chemical Composition and functional properties of leaf protein concentrates of amaranthus hybridus and Teliferia occidentalis. Agric and Biology Journal of North America 2011. 237 – 240.

Akindahunsi AA and Salawu S O (2005). Photochemical screening and Nutrient – Antinutrient composition of selected Tropical Green \Leaf vegetables. African Journal of Biotechnology, 4:497.

AOAC (1990). Official methods of Analysis. 14th Edition, Association of official Analytical Chemist, Washington D. C.

Aremu A O, Olaofe O and Akintayo T E (2006). A comparative study on the chemical and Amino acid composition of some Nigerian underutilized Legume flours. Pakistan Journal of Nutrition. 5(1): 34 – 35.

Ayodeji O Fasuyi and Valentine, A Aletor (2005). Varietal Composition Functional Properties of Cassava (Manihot esculenta, Cranzt). Leaf Meal and Leaf Protein Concentrates. Pakistan Journal of Nutrition 4: 43 – 49.

Fasuyi AO (2006). Nutritional properties of some Tropical Vegetable Leaf Meals; Chemical Characteization and Functional properties. African Journal of Biotechnology 5(1): 049 – 053.

Gibson R A (1994) Australian Fish – an excellent source of Both Arachidonia Acid and Three Polyunsaturated Fatty Acids. J. of lipids 18; 743 – 752.

Haruf et al, 2006.

Kinella J E (1994). Journal of Food Chemistry 78: 63 – 68.

Spackman D H Stein and Mcores (1958). Automatic Recording Apparatus for use in the Chromatography of Amino Acid. Analytical Chemistry 30: 11 – 91.