

Nutritional Properties of the Leaf, Seed and Pericarp of the fruit of four cucurbitaceae Species from South- East Nigeria.

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Abstract: The proximate composition of the leaf, seed and pericarp of the following cucurbits: *Cucurbita ficifolia*, *Mormodica charantia*, *Luffa cylindrica* and *Trichosanthes cucumerina* were investigated. The carbohydrate content ranges from (70.17-97.46%), crude protein(0.23-0.50%), crude fiber (12.00-29.50%), ash(0.03-0.90%), moisture(0.09-1.00%), fat(0.006%). The investigation indicates that the leaf, seed and fruit pericarp of the cucurbits are of nutritive value.

Keywords: Proximate analysis, seed, leaf and pericarp of the fruit, cucurbit

I. Introduction

The Gourd family(cucurbitaceae) includes hundreds of species of vines, bearing coiled climbing tendrils and some of the most unusual fruit in the world (Heiser, 1979). The four plants investigated belong to this group. *Momordica charantia* (bitter lemon) is a tropical and subtropic vine of the family cucurbitaceae widely grown in India, South Asia, China, Africa and the Caribbeans. Bitter Lemon has the ability to control diabetes. *Momordica charantia* can be used to expel intestinal gas, tumors, wound treatment, rheumatism, malaria, vaginal discharge and seeds are used to induce abortion (Sofowora, 2006; Taylor, 2006).

Trichosanthes cucumerina(L) belongs to the family cucurbitaceae. It is an herbaceous annual climber with perennial root stock. They have tendril bearing vines that will sprawl if not supported. The young unripe fruit are eaten as vegetables, while matured ripened ones are blended after extractor the seed used to prepare stew and soups (Hson-Mou and Paul-Ru-Hay,1986). The roots which are tuberous and white in colour are usually dug, washed peeled and cut into pieces and dried in the sun use as herbal remedies. They are anthelmintic (Burkill, 1985).

Cucurbita ficifolia (Malabar gourd) belongs to cucurbitaceae family. It is an edible squash gourd grown for its edible seeds, fruits and green (Bisogrin, 2002).The immature fruit is eaten while the matured fruit is sweet and used to make confectionary and beverages and sometimes alcoholic. It is used effectively to treat diabetes due to its high D-chiro-Inositol content(Xia and Wang, 2006).

Luffa cylindrica(smooth luffa) belongs to the family cucurbitaceae. It is use as sponge for washing and scrubbing utensils as well as the human body. The young fruits is eaten fresh or cooked as a vegetable. The fruit pulp is used as emollient in Nigeria (Oyetayo et al., 2007).

Nutrition is the science of food, the nutrients and other substances therein, there action, interaction and balance is related to health and diseases (Clamp, 2007).The determination of plants proximate and nutrient content of edible fruit and vegetables plays a crucial role in assessing their nutritional significance. As various medicinal plant species are also used as food along with their medicinal benefits, evaluating their nutritional significance can help to understand the worth these plant species (Pandey et al.,2006).The proximate composition of parts of plants has been determined by some workers (Aletor et al., 2012; Osuagwu, 2008) and found to be highly nutritive. The phytochemical screening of these cucurbits has been carried out and are found to contain alkaloids, flavonoids, phenols, saponins and tannins (Edeoga et al., 2010). These phytochemicals are of medicinal value. These plants evaluated are designated weeds but have their application in traditional medicine.

This research work investigates the proximate content of the leaves, seeds and fruit pericarp of the cucurbits which are designated as weeds but has their application in traditional medicine in order to determine their nutritional values.

II. Materials and Method

Collection of Plant Materials

The mature plant and fruits of the four species of *Mormodica charantia*, *Luffa cylindrica*, *Cucurbita ficifolia* and *Trichosantes cucumerina* were collected from different locations within the environs of Michael Okpara University Of Agriculture Umudike, in Abia State. The four plant species were identified by the taxonomy unit of the Department of Plant Science and Biotechnology, Michael Okpara University of Agriculture Umudike, Umuahia, Abia State, Nigeria. The leaves, seeds and fruit pericarps of the plants were used for the investigation. They were oven dried using Selecta model 150-900C oven. The dried plant materials were ground using Thomas

Willey milling machine into fine powder and store in a clean sample bottle and kept in the laboratory at room temperature. The proximate compositions of the samples were carried using the AOAC (1990) methods.

Proximate Analysis

The procedure for the determination of the proximate composition of the samples was those of the Association of Official Analytical Chemists (1990). The proximate analysis (moisture, fiber, ash, fats, proteins and carbohydrate) of all the samples were determined. The crude fiber and ash content was determined using the Weende described by AOAC (1990). The fat content of the samples was determined using the ether extraction method by reflux soxhlet method described by AOAC (1990). The crude protein content was determined using the kjeldahl method described by AOAC (1990). The moisture content of each sample was determined using AOAC (1990) method. The carbohydrate content was estimated using Miller and Tobin (1980) method. The total carbohydrate was estimated from the balance after accounting for ash, crude fiber, protein and fats as follows:
 $\% \text{ carbohydrate} = 100 - (\% \text{ crude protein} + \% \text{ crude fiber} + \% \text{ ash} + \% \text{ fat})$.

III. Result

The percentage proximate content of the leaves, fruit pericarp and seeds *Momordica charantia*, *Trichosanthes cucumerina*, *Cucurbita ficifolia* and *Luffa cylindrica* is shown in tables 1-3.

The percentage carbohydrate content of the seeds of the plant ranged from 70.54-87.2, crude protein 0.23-0.36, crude fiber 12.00-29.00, ash 0.03-0.48, moisture 0.09-0.73, fat, 0.006 (Table 1). The highest percentage of carbohydrate were found in *T.cucumerina* seeds (87.24) followed by *M. charantia* (82.16) and the lowest in *L.cylindrica* (70.54). *T.cucumerina* had the highest amount of crude protein and the least protein content was found in *C.ficifolia*. Crude fiber content was highest in *L.cylindrica* (29.00%) and the least in *T.cucumerina*. Ash was highest in *C.ficifolia* (0.48%), followed by *T.cucumerina* and least in *M.charantia* (0.03%), while the seeds of *L.cylindrica* had the highest moisture content (0.73%) and the least was in *C.ficifolia* (0.09%). The fat content of the plants was equal (0.006%) (Table 1).

Table 1: Percentage carbohydrate, crude protein, crude fiber, ash, moisture content and fat content of the seeds of *Cucurbita ficifolia*, *Mormodica charantia*, *Luffa cylindrica* and *Trichosanthes cucumerina*.

Seed	Crude protein	Crude fiber	Carbohydrate	Ash	Moisture	Fat
C.ficifolia	0.23	19.50	79.78	0.48	0.09	0.006
M.charantia	0.30	17.50	82.16	0.03	0.38	0.006
T.cucumerina	0.31	12.00	87.24	0.44	0.20	0.006
L.cylindrica	0.36	29.00	70.54	0.15	0.73	0.006

The percentage carbohydrate content of the leaves of the plant species ranged from 86.09-97.46, crude protein (0.31-0.50), crude fiber (12.00-13.50), ash (0.09-0.44) moisture (0.19-0.43) and fat 0.006 (Table 2). *L.cylindrica* had the highest carbohydrate content (97.46%), while the least carbohydrate content was in *M.charantia* (86.09%). The highest amount of crude protein was found in the leaves of *T.cucumerina* (0.50%), followed by *C.ficifolia* (0.40%) and the least was those of *L.cylindrica* (0.30%). *M.charantia* had the highest amount of crude fiber (13.50%) and those of the leaves of the other plants have the same amount of crude fiber (12.00%). *C.ficifolia* leaves had the highest ash content (0.44%) followed by *L.cylindrica* and the least was in *M.charantia*. The moisture content of the leaves of *T.cucumerina* was highest and the leaves of *L.cylindrica* had the least moisture content. The leaves of all the plant species had equal amount of fat (Table 2).

Table 2: Percentage carbohydrate, crude protein, crude fiber, ash, moisture and fat content of the leaves of *C.ficifolia*, *M.charantia*, *L.cylindrica* and *T.cucumerina*

Leaf	Crude Protein	Crude Fiber	Carbohydrate	Ash	Moisture	Fat
C.ficifolia	0.40	12.00	87.15	0.44	0.20	0.006
M.charantia	0.31	13.50	86.09	0.09	0.36	0.006
T.cucumerina	0.50	12.00	89.21	0.20	0.43	0.006
L.cylindrica	0.30	12.00	97.46	0.23	0.19	0.006

The carbohydrate content of the fruit pericarp of the plant samples ranged from 70.05-83.68%, crude protein 0.25-0.40%, crude fiber 16.00-29.50%, ash 0.06-0.90%, moisture content 0.34-1.00% and fat content was 0.006% in all the plant species (Table 3). This indicates that plant parts had low fat content. The highest carbohydrate content occurred in the fruit pericarp of *M.charantia* (83.68%), followed by that of *L.cylindrica* (71.84%), while the least amount was in *T.cucumerina* (70.05%). *C.ficifolia* had the highest crude protein content (0.40%) and the pericarp of *M.charantia* and *L.cylindrica* had the least crude protein (0.25%). The crude fiber content of *T.cucumerina* pericarp was highest (29.50%) and the least crude fiber content was in *M.charantia* (16.00%). The highest ash content of the pericarp of fruits was found in *L.cylindrica* (0.90%), followed by *C.ficifolia* (0.42%) and the least was in *M.charantia* (0.06%). The highest pericarp moisture content of *C.ficifolia* (1.00%), and the least amount was in *L.cylindrica* (0.34%). The fat content of the pericarp of the fruits of the plant species investigated was the same (0.006) (Table 3).

Table 3: Percentage carbohydrate, crude protein, crude fiber, ash, fat and moisture content of the fruit pericarp of *C.ficifolia*, *M.charantia*, *L.cylindrica* and *T.cucumerina*.

Pericarp of the fruit	Crude protein	Crude fiber	Carbohydrate%	Ash%	Moisture%	Fat %
<i>C.ficifolia</i>	0.40	29.00	70.17	0.42	1.00	0.006
<i>M.charantia</i>	0.25	16.00	83.68	0.06	0.38	0.006
<i>T.cucumerina</i>	0.30	29.50	70.05	0.15	0.74	0.006
<i>L.cylindrica</i>	0.25	27.00	71.84	0.90	0.34	0.006

IV. Discussion

This study reveals that *C.ficifolia*, *M.charantia*, *T.cucumerina* and *L.cylindrica* contain appreciable amount of nutrients which can contribute to the nutrients and energy requirement of man. The plants contain protein which range from (0.25-0.50). The recommended dietary allowance (RDA) for protein is 56g for individual weighing 70kg and 46g for adult weighing 50kg; children may consume 2kg/day (Jones *et al.*, 1985). Abortifacient protein with ribosome-inhibiting properties has been isolated from several cucurbits (Ng *et al.*, 1991). The abortifacient protein include momorcharin from (*Momordica charantia*), Luffaculin (from *Luffa operculata*) and luffin-a and luffin-b (isolated from seeds of *Luffa cylindrica*), trichosathin (*Trichosathin kirilowii*), and beta-trichosathin (*Trichosanthes cucumerina*) have been reported to exhibit antitumor, ribosome inactivating and immunomodulatory properties. (Ng *et al.*, 1991). Trichosathin manifest anti-human immunodeficiency virus activity (McGarth *et al.*, 1989).

The Crude fiber of these plant ranges from (12-29.50%) which is low. Crude fiber in food or plant is an indication of the level of non-digestible carbohydrate and lignin. Crude fiber enhances digestibility, lowering blood cholesterol and blood sugar. It is known to reduce the risk of disease such as obesity, diabetes, breast cancer and gastro intestinal disorder (Saldanha, 1995).

The carbohydrate content of these cucurbits ranges from (70.17-97.46%). These plants are good sources of carbohydrate for the body metabolic activities when compared with the recommended dietary allowance (RDA) of 130g (Pamela *et al.*, 2005). The ash ranges of these plants are (0.03-0.48%). Ash is the inorganic residue remaining after water and organic matter have been removed by heating which provides a measure of total amount of minerals within the food. Minerals are not destroyed by heating and they have a low volatility as compared to other food components (Mishra *et al.*, 2012). Moisture content of these plant ranges from (0.04-1.00). The result shows that their shelf life of this fresh plant is high. Moisture content is among the most vital and mostly used measurement in the processing, preservation and storage of food (Onwuka, 2005).

The crude fat content obtained in these four cucurbits were low and equal (0.006%). Lipid provides very good source of energy and aids in transport of fat soluble vitamins (Pamela *et al.*, 2005).

The result obtained in this study show and that *C.ficifolia*, *M.charantia*, *T.cucumerina* and *L.cylindrica* contains appreciable amount of nutrients which can contribute to the nutrient and energy requirement of man.

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