# COMPARATIVE EVALUATION OF THE NUTRIENT COMPOSITION OF AQUEOUS LEAF EXTRACTS OF *Corchorus olitorius*, *Myrianthus arboreus* AND *Annona muricata*

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**ABSTRACT**
Background: Wild okro, browse plant and sour sop leaves are underutilized important leaves used mainly for medicinal purpose in eastern Nigeria. These leaves could be incorporated into the human diet. There is lack of scientific data on the nutrient content of these leaves.
**Objective:** This study examined the nutrient composition of *Corchorus olitorius*, *Myrianthus arboreus* and *Annona muricata* aqueous leaf extracts.
**Materials and methods:** The leaves were plucked out from the stem, washed with clean tap water, allowed to drain and shade dried at room temperature. The shade dried leaves were systematically processed into extracts. The samples were chemically analysed to determine the nutrient content using standard methods. The results were presented as means and standard deviation.
**Results:** Compared to the other two leaves, *Corchorus olitorius* had the highest protein (2.77±0.04), crude fibre (0.57±0.03), fat (1.03±0.09) and least carbohydrate (37.88±0.46) content. *Myrianthus arboreus* had the highest moisture (56.82±0.17), ash (1.70±0.04) and least protein (1.99±0.01) and crude fibre (0.22±0.03) content while *Annona muricata* had the highest carbohydrate (40.26±0.68) and least fat (0.49±0.04) contents. The vitamin screening of the three leaves revealed that *Corchorus olitorius* had the highest content of vitamins C ( 22.80±0.27) and A (1625.67±23.12) while *Annona muricata* had the highest vitamin $B_3$ (18.05±0.27) content. *Corchorus olitorius* had the highest content of the minerals analyzed followed by *Myrianthus arboreus* and *Annona muricata.*
**Conclusion:** The study revealed that *Corchorus olitorius*, *Myrianthus arboreus* and *Annona muricata* leaves are good sources of nutrients which can make significant impact in the nutrient intakes of the populace.
**Key words:** Leaves, proximate composition, minerals, vitamins.

## INTRODUCTION

Vegetables are one of the most natural foods that contain different nutrients known for their health benefits. There is a wide variety of indigenous vegetables in Africa, which are good sources of nutrients (1). Vegetables, especially leafy vegetables serve as sources of iron (non-heme). In addition to the iron contained in vegetables, the high levels of vitamin C found in many vegetables will increase the efficiency of dietary iron absorption *(2)*.

Many indigenous plants leaves are used for food and medicinal purposes in Nigeria (3). *Corchorus olitorius* belongs to the family *Tiliaceae* (4). According to (Zakaria *et al.,*) (5), *C. olitorius* is used in folklore medicine for the treatment of gonorrhea, cystisis, pains, fever and tumours. *C. olitorius* leaves are also useful for the prevention and treatment of anaemia (6). *Myrianthus arboreus* belongs to the family *Cecropiaceae.* Extracts of the leaves are used to treat dysentery, diarrhea and vomiting (7). Within the continents of Africa, such as Nigeria, the leaf serves as an analgesic given to young children against fever, applied as an enema to treat pain in the back and loins, chopped leaves are eaten raw for heart problems, pregnancy complications, dysmenorrhea, incipient hernia and a plaster made of beaten leaves is applied to boils (7). Sap from the leaf is applied topically to manage toothache, to the chest for bronchitis or to the throat for sore throat. *Annona muricata* belongs to the family *Annonaceae*. The bark, leaf and roots are considered sedative, antispasmodic (smooth muscle relaxant), hypotensive, hypoglycaemic and they are used for various disorders (8). Much of the recent research on *Annona muricata* has been on a novel set of pytochemicals (*Annonaceous acetogenins*) that are found in the leaves, stems and seeds which are cytotoxic against various cancer cells (9). The leaf extract also serves as a hypoglycaemic agent as well as an antihyperlipidaemic agent (10). The aim of this study is to determine the nutrient composition of *Corchorus olitorius*, *Myrianthus arboreus* and *Annona muricata* leaf extracts.

## MATERIALS AND METHODS

### Collection of samples

Fresh leaves of *Corchorus olitorius* (wild okro), *Myrianthus arboreus* (browse plant) and *Annona muricata* (sour sop) were collected from a farm in Obollo-Etiti in Udenu L.G.A, Enugu State. The leaves were identified in the Harbarium Centre of the Department of Plant Science and Biotechnology, University of Nigeria, Nsukka.

### Preparation of samples

The leaves were plucked out from the stem, washed with clean tap water, allowed to drain and shade dried at room temperature. The shade dried leaves were ground

using Warburg laboratory blender. Two hundred grammes (200 g) each of the shade dried crushed leaves were soaked separately in 400 ml distilled water for 24 hours. The mixtures were filtered with muslin cloth in a funnel. The extracts were retained and used for the nutrient analysis.

**Chemical analysis**

The moisture, ash and crude fibre contents of the leaf extracts were determined by method of AOAC (11). The protein and lipid contents were determined using method of AOAC (11) documented in Pearson (12). Carbohydrate was determined by difference. The provitamin A determined using the method adopted from International vitamin A Consultative Group (IVACG). The vitamins C and $B_3$ were determined using AOAC method (13). The minerals iron (Fe) and zinc (Zn) was determined by AOAC methods (11). Calcium (Ca) was determined using method of AOAC (14).

**Statistical analysis**

All statistical analyses were carried out using IBM SPSS Statistics version 21. All values obtained were expressed as means and standard deviation.

**RESULTS**

Table 1 shows proximate composition of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaf extracts. The moisture contents of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaf extracts were 56.44, 56.82 and 55.41%, respectively. On the other hand, protein, crude fibre, fat, ash, and carbohydrate contents of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaf extracts were 2.77, 1.99, 2.36%; 0.57, 0.22, 0.51%; 1.03, 0.52, 0.49%; 1.30, 1.70, 0.65%; 37.88, 38.76 and 40.26%, respectively.

**Table 1 Proximate composition of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaf extracts (%)**

| Samples | Moisture | Protein | Crude fibre | Fats | Ash | Carbohydrate |
|---|---|---|---|---|---|---|
| Co | 56.44±0.42 | 2.77±0.04 | 0.57±0.03 | 1.03±0.06 | 1.30±0.09 | 37.88±0.46 |
| Ma | 56.82±0.17 | 1.99±0.01 | 0.22±0.03 | 0.52±0.02 | 1.70±0.04 | 38.76±0.16 |
| Am | 55.41±0.04 | 2.36±0.06 | 0.51±0.04 | 0.49±0.04 | 0.65±0.05 | 40.26±0.68 |

Mean ±standard deviation of three determinations.

Key: Co = Corchorus olitorius

Ma = Myrianthus arboreus

Am = Annona muricata

Table 2 presents the vitamin composition of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaves extracts. The vitamin contents of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* were 22.80, 19.20, 20.60 mg for vitamin C; 1625.67, 577.67, 650.93 IU for beta carotene; 13.98, 12.09 and 18.05 mg for vitamin $B_3$ respectively.

**Table 2 Vitamin compositions of *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaf extracts**

| Samples | Vitamin C (mg) | Beta carotene (IU) | Vitamin $B_3$ (mg) |
|---|---|---|---|
| Co | 22.80±0.27 | 1625.67±23.12 | 13.98±0.08 |
| Ma | 19.20±0.11 | 577.67±15.70 | 12.09±0.16 |
| Am | 20.60±0.00 | 650.93±2.52 | 18.05±0.27 |

Mean ±standard deviation of three determinations.

Key:

Co = *Corchorus olitorius*

Ma = *Myrianthus arboreus*

Am = *Annona muricata*

## DISCUSSION

The moisture content of the leaves was within the expected range. This could possibly be due to loss of moisture during the shade drying periods. Fresh vegetables are known to contain more water than either sun or shade dried vegetables. The current observations are lower than 90% reported for *Jatropha curcas* leaves (15). High moisture content of vegetables predisposes them to perishability and susceptibility to microflora spoilage during storage. However, the low moisture content of the leaves would hinder the growth of microorganisms and the storage life would be high.

The protein contents of *C. olitorius*, *M. arboreus* and *A. muricata* leaves extracts as displayed in table 1 were lower relative to those reported by Agbaire and Emoyan (16) whose crude protein values ranged from 6.16 to 6.72% for some local vegetables from Delta State, Nigeria. This might be because some protein fractions may still be embedded in the leaf samples. Incorporating these leaves in diet can furnish it with appreciable amount of protein which provides enormous benefits such as building and repairing of body tissues, maintenance of fluid balance, formation of hormones and enzymes and contribution to immune functions (15).

The low-fat content of the three extracts was expected because plant leaves are generally low in fat and this makes them good for health. A diet providing 1- 2% of its caloric of energy as fat is said to be sufficient for human beings as excess fat consumption is implicated in certain diseases such as obesity and cardiovascular disorders (17). The fat values obtained in this study were low compared to reported values (4.20- 4.80%) in some local vegetables from Delta State, Nigeria (16).

Ash content is a measure of nutritionally important minerals present in a food. The ash content of the three extracts compare favorably with the reported values (1.52- 2.00%) in some local vegetables from Delta State, Nigeria (16) and lower than 8.00% and 8.00% reported by Akindahunsi and Salawu (18) in *Occimum graticimum* and *Hibiscus esculentus* leaves respectively.

The low carbohydrate values for the three extracts were expected as they are leaves. It had some nutritional benefits. Two of the nutritional benefits of dark green leafy vegetable are their low calorie and low glycemic index. These features of vegetables promote their consumption to maintain a healthy weight (19). The carbohydrate values in this work were comparable with 37.58% and 41.36% reported by Abu, Ozoagudike and Akaneme (20) for *Occimum graticimum* and *G.latifolium* leaves, respectively.

The result of this work revealed that the extracts contained vitamins C, $B_3$ and beta- carotene in high amounts. Nwamarah, Otitoju and Otitoju (15) reported lower values for vitamins C (0.93 mg) and $B_3$ (10.00 mg) in *Jatropha curcas.* These vitamins are antioxidant vitamins and protect the cells or tissues of the diabetics against degenerative changes associated with the syndrome (21).

The high contents of iron, magnesium and zinc in the three extracts confirmed that they are good sources of these minerals. Onwordi, Ogungbade and Wusu (22) reported lower values for Fe, Zn and Mg in some leafy vegetables consumed in Lagos State, Nigeria. Magnesium is a cofactor of several enzymes involved in phosphorylation reactions in carbohydrate metabolism and diminished levels of magnesium may reduce tyrosine kinase activity at insulin receptors (23). Zinc has been found to affect the components of the insulin intracellular pathway (24). Calcium values were low and suggest strongly that these leaves are not good sources of calcium. Onwordi, Ogungbade and Wusu (22) found higher values for calcium in their study. It is known that these inorganic mineral elements play important roles in the maintenance of normal glucose-tolerance and in the release of insulin from beta cells of islets of Langerhans, thus possessing beneficial effect in the treatment of diabetes mellitus (24).

### Conclusion

This study showed that *Corchorus olitorius, Myrianthus arboreus* and *Annona muricata* leaves contained vital nutrients which could contribute to the required nutrient intakes from our diets. Interestingly, the leaves were low in protein, fat and carbohydrates. This shows that they could be eaten in large quantities as desired, especially for obese people who are on weight management diets.

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