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**Advances in Applied Science Research, 2013, 4(1):178-181**

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**ISSN: 0976-8610**
**CODEN (USA): AASRFC**

# Nutritional composition of wild edible ceropegia tubers

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**ABSTRACT**

*A nutritive value of two members of Asclepiadaceae has been investigated. In the study botanical characteristic of some wild edible plants, consumed abundantly in the region, such as Ceropegia hirsuta, Ceropegia bulbosa, were performed in order to determine nutritive values of these plants. In the study, dry matter, ash, protein, nitrogen, Cu, Mn, Fe, Zn and Vit C contents in the dried plant samples were evaluated. Nutritive values of these plants were compared with the other conventional vegetables. As a result mineral contents and nutritional values of the plants evaluated in the present study were richer than that of the conventional vegetable crops. The results revealed that the tubers were contains moisture with in range of (75.82-78.24%fw), dry matter (21.76-24.18% fw),crude protein (4.62-4.82g/100g dw),ash (10.2- 10.6%dw),crude fat(0.1-0.11%dw),crude fiber (8.7-9.1%dw) reducing sugar (1.727-1.948g/100g dw), total sugar (1.840-2.138g/100g dw) and Starch (14.23-15.46g/100g dw). The tubers also have a high energy value (256.14-286.14kcal/100g dw). Mineral ranges (mg/100g dw)were:K(400-440), Na(10.42-12.32), P(150-155), Ca(428-437.2), Mg(148.36-152.48), Cu(0.83-0.89), Fe(45.6-49.04), Mn(3.31-3.33) and Zn(1.22-1.5). Comparing the tubers contents with recommanded dietary allowances (RDA), the results indicated that tubers of asclepiadaceae member could be a good supplement for some nutrients such as fiber, protein and carbohydrates.*

**Key Words**: Proximate analysis, Mineral analysis, *Ceropegia bulbosa, Ceropegia hirsuta*, tuber.

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## INTRODUCTION

In developing nations, numerous types of edible wild plants are exploited as source of food to provide supplementary nutrition to the inhabitants. Recent studies on agro pastoral societies in Africa indicate that these plants resources play a significant role in nutrition, food security and income generation (Edmonds and Chweya, 1995). Furthermore, according to a food and agricultural organization (FAO) report, at least one billion people are thought to use wild food in their diet (Burlingame, 2000). In India, Malaysia and Thailand, about 150 wild plants species have been identified as sources of emergency food (Nesamvuni *et al.*, 2001). In most of reports, it was emphasized has nutritionally these unconventional plants foods could be comparable to, or even sometimes superior to, the introduced cultivars. It is therefore worthwhile to note that the incorporation of edible wild and semi cultivated plants resources could be beneficial to nutritionally marginal population or to certain vulnerable groups within populations, especially in developing countries where poverty and climatic changes are causing havoc to the rural populace.

Proximate and nutrient analysis of wild edible plants plays a crucial role in assessing their nutritional significance (Pandey *et al.*, 2006). The considerable use of wild edible tuberous species by the local people in their diet motivated us to carry out the present proximate and nutrients analysis. In spite of their importance as a food source, to the best of our knowledge, there are no published studies on the nutritional composition of wild edible tubers and

information on the nutritional composition of these varieties is scarce. The present study was therefore initiated to evaluate the nutritive value of *Ceropegia bulbosa* var. *bulbosa* and *Ceropegia hirsuta*. The detail of each species is given in table 1. Besides their usage as food item; these wild tuberous plants are also exploited for their medicinal properties. Most of these species are utilized against various diseases by the local communities through their indigenous knowledge.

Most of rural people dependent on the surrounding forests for their day to day needs.These wild edible tuberous species were subjected to proximate and micronutrient analysis. In proximate analysis ash, protein, fat, fiber, moisture and energy were analyzed while in essential nutrients analysis: K, Na, P, Ca, Mg, Cu, Fe, Mn and Zn were scrutinized.

## MATERIALS AND METHODS

**Sample preparation:**
Selected wild edible tuberous plants were collected from various localities of Satara (Maharashtra) viz. *Ceropegia bulbosa, Ceropegia hirsuta.* Efforts made to collect these plants in flowering and fruiting conditions for the correct botanical identification. Healthy and disease free edible plant parts selected and dried them under shade so as to prevent the decomposition of chemical compounds present in them. All the dried material powdered in blander for further study.

**Proximate Composition:**
Dry matter and moisture of the material were determined by following the method by AOAC (1990).Ash value was determined by following the method of AOAC (1990). Carbohydrates were estimated according to the method described by Nelson (1944). The Crude fat and crude fiber content was determined by following the method of Sadasivam and Manikam (1992). Total nitrogen was estimated according to the method of Hawk *et al*. (1948). The quantity of protein was calculated as 6.25×N (AOAC, 1990).

**Mineral Content:**
The acid digestion method of Toth *et al*. (1948) has been followed for the analysis of inorganic constituent.

## RESULTS AND DISCUSSION

### I. Proximate nutrient composition:

**Table: 1 proximate nutrient composition of wild edible tuberous plants.**

| Sr. No. | Parameters | Plant Name (Tuber) | |
|---|---|---|---|
| | | *C. bulbosa* | *C. hirsuta* |
| 1 | Moisture (%FW) | 78.24 ±1.9 | 75.82 ±1.4 |
| 2 | Dry Matter (%FW) | 21.76 ±2.1 | 24.18 ±1.12 |
| 3 | Ash (%DW) | 10.2 ±1.32 | 10.6 ±0.9 |
| 4 | Crude fiber (%DW) | 8.7 ±0.81 | 9.1 ±0.02 |
| 5 | Crude fat (%DW) | 0.1 ±0.01 | 0.11 ±0.01 |
| 6 | Crude protein (g/100g DW) | 4.62 ±0.81 | 4.82 ±1.02 |
| 7 | Reducing sugar (g/100g DW) | 1.948 ±0.32 | 1.727 ±0.00 |
| 8 | Total sugar (g/100g DW) | 2.138 ±0.12 | 1.840 ±0.27 |
| 9 | Starch (g/100g DW) | 14.23 ±3.12 | 15.46 ±3.10 |
| 10 | Energy (Kcal/100g DW) | 286.40 ±18.08 | 256.14 ±20.25 |

*The data are mean value ± Standard deviation (SD) of three replicates.*

In these experiments moisture, dry matter, ash, crude fiber, crude fat, crude protein, reducing sugar, total sugar, starch and energy content of tubers were analyzed. The results are shown in table 1.Moisture level is highest in tuber of *Ceropegia bulbosa* (78.24±1.9%) and lowest in *Ceropegia hirsuta* (75.82±1.41%). For most of the studies the fiber and protein content are considered as the main determinants of food type and less is known about elemental composition of various wild edible species (Anonymous, 1970-1988).The dry matter content highest in tubers of *Ceropegia hirsuta* (24.18±1.12%) and lowest in *Ceropegia bulbosa* (21.76±2.1%).The ash value of wild edible tuberous plants were recorded in table 1. and it is higher in tubers of *Ceropegia hirsuta* (10.6±0.9%) and is lowest in *Ceropegia bulbosa* (10.2±1.32%) of dry weight The high value of ash observed in all the species of tubers is indicated that good sources of minerals when compared to values obtained for cereals and tubers (FAO, 1968). Due to generally low level of crude fat in the tubers, their consumption in large amounts is a good dietary habit and may be recommended to individuals suffering from overweight or obesity. The daily energy requirement of 2500 to 3000 Kcal has been reported for adults (WHO/FAO, 1985). The energy value of tubers was estimated within range of 256.14-286.40 kcal/1000g dw, which is an indication that it could be an important source of dietary calories.

**II.Mineral Analysis:**

**Table: 2 Mineral compositions of wild edible tuberous plants**

| Sr. No. | Elements | Plant Name (Tuber) | |
|---|---|---|---|
| | | *C. bulbosa* | *C. hirsuta* |
| 1 | N (g/100g DW) | 0.74 ±0.001 | 0.66 ±0.00 |
| 2 | K (mg/100g DW) | 400.23 ±2.5 | 440.07 ±10.2 |
| 3 | Ca (mg/100g DW) | 437.2 ±4.5 | 428.0 ±3.2 |
| 4 | Mg (mg/100g DW) | 148.36 ±2.0 | 152.48 ±0.8 |
| 5 | Na (mg/100g DW) | 12.32 ±0.9 | 10.42 ±0.8 |
| 6 | Fe (mg/100g DW) | 49.04 ±2.6 | 45.6 ±2.0 |
| 7 | Mn (mg/100g DW) | 3.31 ±0.9 | 3.33 ±0.8 |
| 8 | Zn (mg/100g DW) | 1.5 ±0.8 | 1.22 ±0.6 |
| 9 | Cu (mg/100g DW) | 0.83 ±0.04 | 0.89 ±0.02 |
| 10 | P (mg/100g DW) | 155.0 ±0.20 | 150.4 ±0.35 |

**The data are mean value ± Standard deviation (SD) of three replicates.**

The results of the minerals estimation of the wild edible tubers are presented in table 2. This study shows that copper was the least abundant in all wild edible tubers. The species analyzed in this study contained remarkably high amount of calcium (›500mg/100g dry weight). The richest source of zinc was found in *C.bulbosa* (1.5±0.8). Both plants analyzed were excellent source of magnesium ranging from 148.36±2.0 (*C.bulbosa*) to 152.48±0.8 (*C.hirsuta*). The manganese content of tubers was slightly different from 3.31±0.1 (*C.bulbosa*) to 3.33±0.8 (*C.hirsuta*). These tubers shows less than adequate level of K, Na and P. Iron in an important trace element for hemoglobin formation, normal functioning of the central nervous system and in the oxidation of carbohydrates, protein and fats (Adeyeye and Otikiti, 1999). The results clearly indicate that all three tubers are low in iron content as compared to other green leafy vegetables i.e.110-325 mg/100g as reported by (Ifon and Bassir 1979 and Ladan *et al.*, 1996) but are within range of 4.3-119 mg/100g found in some Nigerian leafy vegetables (Sena *et al*., 1998).

Traditionally wild edible species have been meeting the protein, carbohydrate, fat, vitamins and mineral requirement of the local residents to a greater extent (Sundriyal, 1999). It is reported that the wild edible species form a good source of minerals for the local residents at different parts of the globe (Akpanyung, Udoh and Akpan, 1995; Bokary and Parez 1995; Duke and Atchley, 1986). The results of this study potentially indicate that the plants studied are well endowed with essential nutrients required for human consumption. Nutrient rich foods are vital for proper growth both in adults and children. If we take into account the recommended dietary allowances (RDA) for minerals: calcium 1000mg/day, phosphorus 800mg/day, copper 900 µg/day, zinc 10mg/day, magnesium 400mg/day,

manganese 7mg/day, and iron 8mg/day for adults(Food and Nutrition Board, Institute of medicine, National Academies,2005). These tubers can provide 10% of the RDA.

## CONCLUSION

Wild edible tubers analyzed have contained more crude fiber, crude protein and carbohydrates. These tubers were also found to be fairly good sources of dietary minerals. These results suggest that these less familiar wild tubers should not be ignored. Rather they can be used as a good alternative source of food to alleviate hunger and malnutrition.

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