

## Analysis of nutritional and mineral contents of different parts of medicinal plant

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### Abstract

The Protein and carbohydrate analysis were carried out on the fresh materials of leaf, stem, fruit and tuber of *Momordica cymbalaria*. Carbohydrates are more than the proteins in all the parts studied. Among the leaf, stem, fruit and tuber, fruits contain maximum amount of carbohydrates. As far as proteins are concerned tubers contain maximum amount. The mineral analysis were carried out on the dry materials of leaf and tuber of *M. cymbalaria*. Mineral content of Copper, Zinc, Chromium and Cadmium were estimated.

**Keywords:** *Momordica cymbalaria*, nutritional value, mineral content (Cu, Zn, Cr, Cd), Cucurbitaceae

### 1. Introduction

The world production of vegetables is not sufficient to feed the ever increasing population and today, less than 30 species provide 90% of the world's food requirements (Bhagmal, 1990) [2]. Hence exploitation of wild germ plasm is essential to identify new varieties of vegetables. Survey of rural areas help a lot in identifying the less known vegetables used by the local population. Several reports are available on the phytochemistry and tissue culture of these species due to their commercial cultivation. But reports on *Momordica cymbalaria* are very few due to its restricted distribution in very remote areas. *Momordica cymbalaria* belongs to the family Cucurbitaceae. The plant has also been named *Luffa tuberosa* (Roxb.) or *Momordica tuberosa* (Roxb). The plant grows as a weed in the fields of Tamil Nadu, Andhra Pradesh and Karnataka. The fruits of this species are used as vegetable by the local people. The juice of the leaves are used for whooping cough tubers were reported to have antiovaratory activity (Koneri *et al.*, 2006) [4]. The paste of tubers is used for applying boils, ulcers and snake bite (Togunashi *et al.*, 1977) [9]. Parvathy and Kumar (2002) [6] estimated the major nutrients of the fruits which contain higher amounts of Calcium, Potassium, Sodium, Vitamin C and crude fiber of *M. charantia*.

### 2. Materials and methods

#### 2.1 Source of plant material

Fresh plants with tubers of *Momordica cymbalaria* were collected from Tamil Nadu (Temperature (30±200C).

#### 2.2 Protein analysis

The concentration of protein was determined by the method of Lowery *et al.*, (1951) [5] with bovine serum albumin (BSA) as standard. This method is based on the colour reaction of protein with copper iron in alkali and reduction of phosphomolybdic and phosphotungstic reagent by tryptophan and tyrosine present in protein.

#### Reagents

- **Solution A:** 2% Na<sub>2</sub>CO<sub>3</sub> in 0.1 N NaOH

- **Solution B:** 0.5% CuSO<sub>4</sub>. 5H<sub>2</sub>O in water
- **Solution C:** 1% Potassium sodium tartarate in water.
- **Reagent D:** Alkaline copper solution prepared just before mixture of (a:b:c: in 10:0.1:0.1 v/v/v) Folin phenol reagent commercial solution diluted 1:3.

#### Method

1 gram of fresh leaf, stem, fruit and tuber were ground and homogenized in 5 ml of this phosphate buffer (pH 8.6), centrifuged and supernatant was taken for estimation. An aliquot of 1 ml was taken in a centrifuge tube and 1ml TCA (Trichloro acetic acid, 10% aqueous solution) was added. The tube was kept at 40c in the dark for 1 hr and centrifuged at 12,000 rpm for 15 min. The supernatant was removed taking care to blot off the last drop. The pellet was dissolved in 1ml of 0.1N NaOH and left for 30 minutes for complete solubility. To this tube 5 ml of reagent D was added, mixed well and allowed to stand for 10 min. Then 0.5 ml of folin phenol reagent was added and vortexed. The solution was allowed to stand for 30 min in the dark and the absorbance was read at 660 nm against appropriate blank. The protein concentration of plants was determined by extra plotting the OD value on the standard graph prepared using BSA as standard.

#### 2.3 Carbohydrate analysis by Anthrone method

##### Principle

Carbohydrates are first hydrolysed into simple sugars using dilute hydrochloric acid. In hot acidic medium glucose is dehydrated to hydroxyl methyl furfural. This compound forms with anthrone a green coloured product with an absorption maximum at 630 nm.

##### Reagents

- **2.5N-HCl**
- **Anthrone Reagent:** Dissolve 200 mg anthrone in 100 ml of ice cold 95% H<sub>2</sub>SO<sub>4</sub>. Prepare fresh before use.
- **Standard Glucose:** Stock - Dissolve 100 mg in 100 ml water. Working standard - 10 ml of stock diluted to 100 ml with distilled water. Store refrigerated after adding a few drops of toluene.

**Procedure**

Weigh 100 mg of leaf, stem, fruit and tuber into a boiling tube. Hydrolyze by keeping it in a boiling water bath for three hours with 5mL of 2.5 N-HCl and cool to room temperature. Make up the volume to 100 ml and centrifuge. Collect the supernatant and take 0.5 and 1 ml aliquots for analysis. Prepare the standards by taking 0, 0.2, 0.4, 0.6, 0.8 and 1 ml of the working standard. '0' serves as blank. Make up the volume to 1 ml in all the tubes including the sample tubes by adding distilled water. Then add 4ml of anthrone reagent. Heat for 8 min in a boiling water bath. Cool rapidly and read the green to dark green colour at 630 nm. Draw a standard graph by plotting concentration of the standard on the A'-axis versus absorbance on the Y-axis. From the graph calculate the amount of carbohydrate present in the sample tube.

**2.4 Mineral analysis of the plant**

**i) Samples Collection and Processing**

Samples of dry leaves and tubers of *Momordica cymbalaria* were washed in fresh running water to eliminate external contamination. After washing the samples were placed on plotting paper to remove excess moisture. Then they were chopped into small pieces and air dried. The dried materials were grind with pestle and motor and about 1 gm of the dried materials was weighed.

**ii) Sample Digestion**

The samples were digested in microwave system (Milestone Model 1200) with an exhaust module (EM – 45 / A) using 10 ml of HNO<sub>3</sub> (69%) for 10 minutes, 1 ml of HClO<sub>4</sub> (70%) for 5 min and 10 ml of H<sub>2</sub>O<sub>2</sub> (30%) for 10 min at 250 W power setting. The digested solutions were made up to 25 ml with double distilled water and stored in well cleaned polythene vials in refrigerator till the time of analysis.

**iii) Sample Analysis**

The digested samples were analysed for metals, namely Chromium, Zinc, Cadmium, Copper in double beam atomic absorption spectrophotometer (Perkin Elmer model Analysis 800). Atomic absorption spectrometry standards for all the metals manufactured by SRL India were used for calibration studies. High purity acids and all quarterly double distilled water were used for analysis.

**3. Results and Discussion**

Protein and carbohydrate were analysed into leaf, stem, fruit and tuber of *Momordica cymbalaria* and the results are given in (Table 1, Fig 1). From the values it is evident that the carbohydrates are more than the proteins in all the parts studied. Among the leaf, stem, fruit and tuber, Fruits contain maximum amount of carbohydrates (12.6 mg/gfw) followed by tuber (12.1 mg/gfw) leaf (11.0 mg/gfw) and stem (10.5 mg/gfw). As far as proteins are concerned tubers contain maximum (2.17 mg/gfw) followed by and stem contain minimum (1.97mg/gfw). Nutritional analyses of leaf, stem, fruit and tubers indicate that leaves are rich in carbohydrates

(11mg/gm FW). But proteins are more in tubers (2.17mg/gm FW) than other parts. Copper, Zinc, Chromium and Cadmium were estimated into fruit and tuber of *Momordica cymbalaria* and the results are presented in the (Table 2, Fig 2). From the values it is evident that the content one of Copper is more in the tuber than the leaf (86.2 ppm). In contrast to this Zinc is more in the leaves (33.5ppm) than in the tubers. Cadmium is very less (0.075 ppm) in leaves and more in the tubers whereas Chromium is more in leaves (6.0ppm) and less in (1.0ppm) in tubers. Parvathy and Kumar (2002) [6] estimated the major nutrients of the fruits which contain higher amounts of Calcium, Potassium, Sodium, Vitamin C and crude fiber than *Momordica charantia*. *Telfairia occidentalis* contain zinc (6.80 mg/100g) and copper (2.24 mg/100g). The fruits and seeds of *Momordica charantia* contain Zn, Cr, Cu and Cd where the concentration of Zn is more in seeds and fruits. (Sahito *et al.*, 2002) [7]. Sekara *et al.*, (2005) [8] reported highest Zn accumulation in the leaves of field pumpkin. Leaves and meals of *Telfairia occidentalis* and *Citrullus vulgaris* contain very low level of trace elements such as Fe, Zn, Cu (Yusuf *et al.*, 2006) [10]. Hashmi *et al.*, (2007) [3] studied the content of trace elements such as Fe, Cu, Mn, Zn and Cr in the vegetables. Pumpkin and tori contain 0.8 mg/g and 0.4 mg/g of Chromium. The seed flour of *Citrullus colocynthis* and *Cucumeropsis edulin* contain Zn and Cu (Akpambang *et al.*, 2008) [1].

**4. Conclusion**

Fresh leaf, stem, fruit and tuber of *Momordica cymbalaria* presence of proteins and carbohydrates. Several species of plants are very much restricted in their distribution and are used by the people of that area for various purposes. The usage of such rare species is due to the presence of nutritional value. Hence it becomes necessary to explore such type of plants and their chemical properties. Mineral content of Copper, Zinc, Chromium and Cadmium were estimated. The plant parts of leaf and tuber of *Momordica cymbalaria* contain elements such as Copper, Zinc, Chromium and Cadmium. Many trace elements are essential to human health and their presence in excess may result in toxicity to human life.

**Table 1:** Nutritional analysis of leaf, stem, fruit and tuber of *Momordica cymbalaria*

S. No	Nutrient	<i>Momordica cymbalaria</i> (Fresh weight mg/gm)			
		Leaf	Stem	Fruit	Tuber
1	Carbohydrate	11.0 ± 0.02	10.5 ± 0.01	12.6 ± 0.05	12.1 ± 0.08
2	Protein	2.12 ± 0.10	1.97 ± 0.21	2.15 ± 0.15	2.17 ± 1.02

**Table 2:** Mineral analysis of leaf and tuber of *Momordica cymbalaria*

S. No		<i>Momordica cymbalaria</i> (Dryweightug/g)	
		Leaf	Tuber
1.	Copper	1.57 ± 0.10	86.2 ± 1.09
2.	Zinc	33.5 ± 0.13	20.6 ± 1.97
3.	Cadmium	0.075 ± 0.09	0.20 ± 1.32
4.	Chromium	6.0 ± 0.08	1.0 ± 0.98

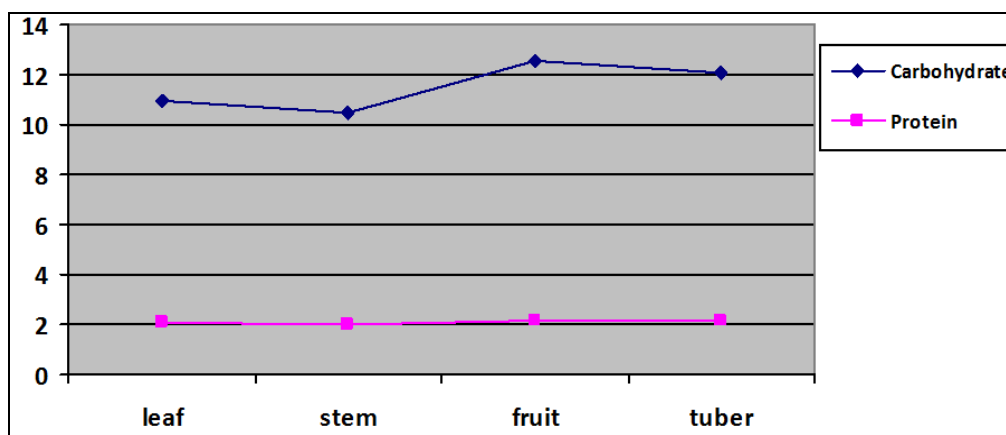


Fig 1: Nutritional analysis of leaf, stem, fruit and tuber of *Momordica cymbalaria* \

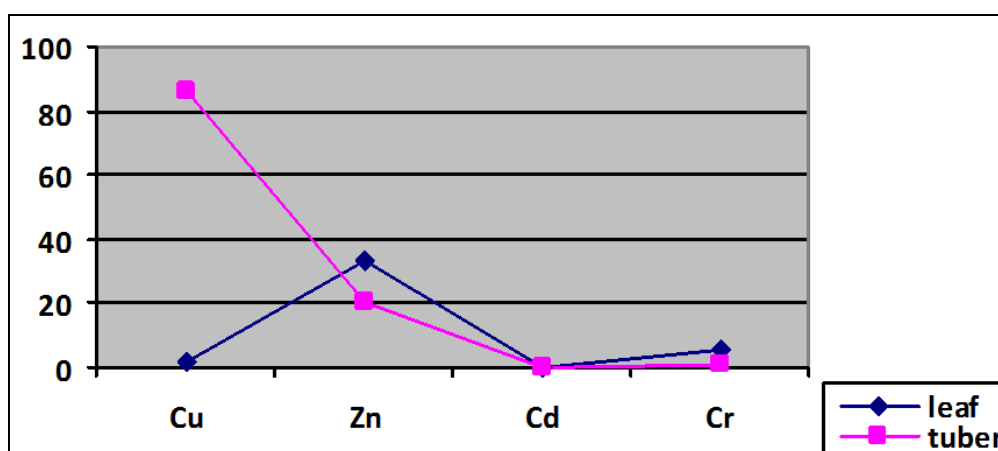


Fig 2: Mineral analysis of leaf, tuber of *Momordica cymbalaria*

5. References

1. Akpambag VOE, Amoo IA, Izuagie AA. Comparative compositional analysis on two varieties of melon (*Colocynthis citrullus* and *Cucumeropsis edulis*) and a variety of almond (*Prunus amygdalus*). *Research Journal of Agriculture and Biological sciences*. 2008; 4:639-642.
2. Bhagmal. Underutilized plants treasure house unexplored. *Ind Farming* 1990; 40:19.
3. Hashmi DR, Ismail S, Shaikh GH. Assessment of the level of trace metals in commonly edible vegetables locally available in the markets of Karachi city. *Pakistan Journal Bot.* 2007; 39:747-751.
4. Koneri R, Balaraman R, Saraswathi SD. Antiovolatory and abortifacient potential of roots of *Momordica cymbalaria* Fenzlin rats. *Indian J. Pharmacol.* 2006; 38:111-114.
5. Lowry OH, Rosebrough NJ, Farr AL, Randall RJ. Protein measurement with the Folin phenol reagent. *J. Biol. Chem.* 1951; 193(1):265-75.
6. Parvathy S, Kumar VJF. Studies on chemical composition and utilisation of the wild edible vegetable athalakkai (*Momordica tuberosa*). *Plant foods for Human Nutrition* 2002; 57:215-222.
7. Sahito S, Kazi TG, Jakhrani MA, Kazi GH, Shar GQ, Memon MA. Elemental investigation of *Momordica charantia* and *Syzygium jambolana* using atomic absorption spectrophotometer *The Nucleus* 2002; 39:49-54.
8. Sekara A, Poniedzialek M, Ciura J, Jedrszczyk E. Zinc and Copper accumulation and distribution in the tissues of nine crops: Implication for phytoremediation 2005. *Polish Journal of environmental studies*. 2005; 14:829-835.
9. Togunashi VS, Venkataram, BS, Yoganarasimhan SN. Discussion on the origin and identification of Kuduhunchi a either to unknown Ayurvedic Drug, introduced by Rajanarahari. *J. Res. Ind. Med. Yoga and Homoeo.* 1977; 12:118-112.
10. Yusuf AA, Adewuyi S, Lasisi AA. Physio - chemical composition of leaves, meals and oils of Fluted Pumpkin (*Telfairia occidentalis*) and Melon (*Citrullus vulgaris*). *Agricultural Journal.* 2006; (1):32-38.