International Journal of Advances in Scientific Research
ISSN: 2395-3616 (Online)
Journal DOI: 10.7439/ijasr **Research Article**

A comparative study of nutrients and mineral composition of *Carallia brachiata* (Lour.) Merill

Priya D. Patil* and N. S. Chavan

Department of Botany, Shivaji University, Kolhapur-416 004, India

***Correspondence Info:**
Priya D. Patil
Department of Botany,
Shivaji University, Kolhapur-416 004, India
E-mail: ppriya.patil@rediffmail.com

Abstract

The proximate composition and mineral constituents of *Carallia brachiata* leaf and fruit powder were evaluated for their nutritional values and mineral compositions by using standard techniques. In proximate analysis, ash, carbohydrate, proteins, fiber, fat, moisture, total energy content (dry basis) was assayed while mineral analysis were carried out by using atomic absorption spectrophotometer. The species showed variable results in proximate analysis of both the parts; however, the fruit of *C. brachiata* have revealed higher percentage of carbohydrate (65.74%) and energy values (310.25Kcal/100g). The leaf showed higher percentage of proteins (13.59%) and crude fibers (18.87%). From the results is clear that both the parts of *C. brachiata* are rich in micronutrients like Cu, Zn & Fe. The proximate and nutrient analysis of the species can help us to determine the health benefits achieved from their use in marginal communities.

Keywords: *Carallia brachiata*, carbohydrate, proteins, micronutrient, nutritional value

1. Introduction

Carallia brachiata (Lour.) Merill (Family-Rhizophoraceae) is commonly known as karalli. It is a large evergreen ornamental tree. It has many medicinal uses. Bark of *Carallia brachiata* is traditionally used in wound healing, treating itch, oral ulcer, inflammation of throat and stomatitis[1]. The ethyl acetate and methanol extracts of bark exhibited anti-inflammatory and wound healing activities[2]. The leaves and bark are used medicinally against itch and septic poisoning. The fruit extracts have medicinal importance to treat ulcers[2]. The occurrence of trees is reported in semi- evergreen forest and also along the coastal areas in mangrove habitat[3]. The subcanopy tree is geographically distributed in Indo-Malasia and Australia[4]. In developing countries, numerous types of edible wild plants are exploited as sources of food; to provide an adequate level of nutrition to the inhabitants, where poverty and climate change are causing havoc to the rural people. In this context, this analysis was carried out to evaluate the nutritional value and mineral composition of *Carallia brachiata* with hope that it would be incorporated into food basket of the country. The aim of analysis is the preliminary assessment of nutritional value and mineral composition of the plant-based diets. Attention has been drawn to this undervalued natural resource specifically, to make a bigger contribution against malnutrition.

2. Material and Methods

2.1 Collection of Material: Fruits as well as leaves were collected from coastal area of Ratnagiri district.

2.2 Sample Preparation: The leaves and fruits were air-dried and ground to a fine powder. Powder is stored in air-tight containers prior to further analysis.

2.3 Proximate analysis: The moisture and ash content was determined by gravimetric method. The crude fiber was calculated by acid-base digestion. Crude protein was determined by Macro-Kjeldahl method. Crude fat content was determined gravimetrically following Soxhlet extraction with ether according to Official "Association of Official Analytical Chemists" (AOAC) method[5]. Available carbohydrate was estimated "by difference" using the formula, TCH (%) =100-% (CP+A+CF+M). The energy value were estimated by calculation method using following formula, Energy value (g/100g) = [4x crude protein] + [4 x carbohydrate] + [9 x crude fat].

2.4 Mineral Analysis: Acid digestion was carried out by the method followed by Toth[6]. The mineral elements like Cu, Zn, Co, Fe, Ca, Mg, Mn etc. were analyzed by Atomic Absorption Spectrophotometer (AAS).

3. Results and Discussion

3.1 Proximate composition: The results of proximate composition of leaf and fruit powder of *C. brachiata* are shown in Table 1. The ash content, which is an index of mineral contents; it is found in the leaf powder of *C. brachiata* 4.87% Dry Weight (DW) was more than the fruit (3.42%). It is apparent that leaves of *C. brachiata* are good source of crude fibers, while fruits are good source of carbohydrates. The crude protein content of both leaf and fruit was 13.59% and 10.9% respectively. Plants foods that provide more than 12% of their calorific value from protein are a good source of protein. The crude lipid contents of leaf and fruit of *C. brachiata* were less than the range (8.3-27% DW)[7].

Table 1: Proximate analysis of leaf and fruit of *C. brachiata*

Sr. No.	Proximate composition	Leaf	Fruit
1.	Moisture (%)	1.47±0.01	6.73±0.01
2.	Ash (%)	014.87±0.01	3.42±0.02
3.	Crude protein (%)	13.59±0.025	10.9±0.1
4.	Crude lipid (%)	1.41±0.01	0.41±0.015
5.	Crude fiber (%)	18.87±0.01	12.82±0.025
6.	Carbohydrate (%)	59.79±0.015	65.74±0.015
7.	Total energy (Kcal/100g)	306.21±0.015	310.25±0.017

*The values presented in table are the average of the triplicate

The estimated carbohydrate content in fruit of *C. brachiata* (65.74%) was found to be higher than that of leaves (59.79%). The crude fiber content in leaves was found 18.87%, which was more than the fruit fiber content (12.82%). The fiber RDA values for children, adults, pregnant and breast-feeding mothers are 19-25%, 21-38%, 28% and 29% respectively. The total energy content of leaf was estimated to be 306.21±0.015 Kcal/100g (DW) and for fruit it is 310.25±0.017 Kcal/100g (DW), which is an indication that it could be an important source of dietary calorie. Calorific content of *C. brachiata* could be attributed to high carbohydrate and protein contents.

3.2 Mineral composition

Fig. 1 and 2 represent the results of mineral compositions of *C. brachiata* leaf and fruit. Nutritional significance of elements in both leaf as well as fruit has adequate level of all the essential minerals. There is a range of minerals needed regularly by our bodies. Iron is needed by our blood and helps produce the red colouring. Iron is higher in the leaf of *C. brachiata* (117.84 mg/100g) than the fruit (54.66 mg/100g). This deficiency is very common around the world and women, children and old people are much more likely to suffer from iron deficiency. Iron is essential trace element for haemoglobin formation, normal functioning of central nervous system and in the oxidation of carbohydrates, proteins and fats[8]. Calcium is found nearly same amount in both the parts of *C. brachiata*. Calcium is very important for bones and teeth but also affects many other things within our bodies. Zinc has now been recognized as very important especially for the growth of children. Zinc is used in our bodies in chemicals called enzymes that control how our bodies work. Zinc is found to be higher in fruits as well as in leaves of *C. brachiata*. Several coastal seeds and nuts are important sources of zinc and that are often eaten by children along seashores in all tropical countries as a good source of zinc.

Sodium is important for fluid distribution, blood pressure, cellular work and electrical activity. Potassium is essential for the ability of skeletal and smooth muscles to contract. Because of this, an adequate intake of potassium is important for regular digestive and muscular functioning. In *C. brachiata* sodium and potassium were found to be higher in fruits than the leaves (Table 2).

Table 2: Mineral composition of *C. brachiata*

Sr. No.	Mineral Composition	Leaf (mg/100g)	Fruit (mg/100g)
1.	Copper (Cu)	0.32	0.64
2.	Iron (Fe)	117.84	54.66
3.	Magnessium (Mg)	8.44	8.92
4.	Mangnese (Mn)	21.58	15.82
5.	Calcium (Ca)	19.9	19.5
6.	Zinc (Zn)	4.48	5.42
7.	Sodium (Na)	160	240
8.	Potassium (K)	160	460

Fig. 1: Mineral composition of leaf of *C. brachiata*

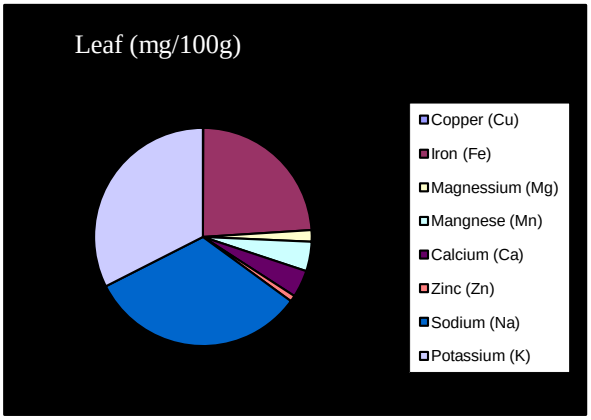
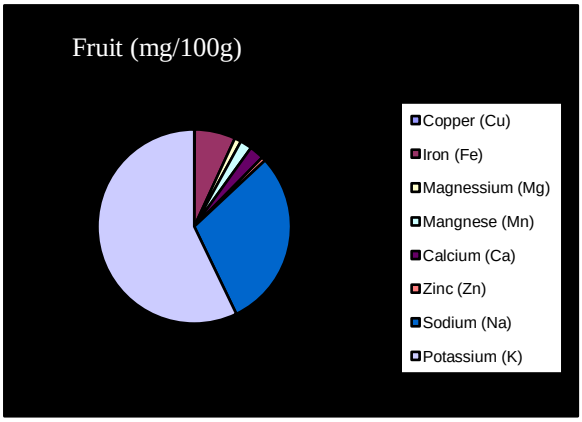


Fig. 2: Mineral composition of fruit of *C. brachiata*



According to Food and Agricultural Organization (FAO), food balance data, it has been calculated that about 20% of the world's population could be at risk of deficiency of essential minerals. In the leaves and fruits of *C. brachiata*, the range of copper is less than 5mg, which is recommended by World Health Organization (WHO).

4. Conclusion

The results of the proximate and mineral assessment showed that fruit is good source of potassium, moisture and carbohydrate whereas leaf is good source of zinc, fiber, lipid and ash. The results suggest that the plant fruits if consumed in sufficient amount could contribute greatly towards meeting human nutritional requirement for normal growth. Fruits of *C. brachiata* are recommended for continues used for nutritional purposes, considering the amount and diversity of nutrients it contains. Biochemical analysis alone cannot be the exclusive criteria for judging the nutritional significance of plant parts. Thus, it becomes necessary to consider other aspects like antinutritional/toxicological factors. Also, the awareness about their use and rational sustainable harvesting from the area is the need of the present scenario for meeting demand as ethnic food with nutritional security in rural areas.

Acknowledgment

Authors are wishing to thanks Head, Department of Botany, Shivaji University, Kolhapur for providing necessary laboratory facilities. Authors are also grateful to U.G.C., New Delhi for providing financial assistance.

References

[1] Nadkarni, K. M. and Nadkarni A. K. Indian Materia Medica. 3rd ed. Vol 1 Mumbai: Popular Prakashan Pvt. Ltd. 1995; pp 30- 40.

[2] Krishnaveni B, Neeharika V, Srikanth A. V. and Madhava Reddy B. Antiinflammatory activity of *Carallia brachiata* bark. *International Journal of Pharmaceutical Sciences and Nanotechnology;* 2009; 1: 375-378.

[3] Krishnaveni B, Neeharika V, Venkatesh S, Padmavathy R and Madhava Reddy B. Wound healing activity of *Carallia brachiata* bark. *Indian Journal of Pharmaceutical Sciences* 2009; 71: 576-578.

[4] Chavan N. S. New area record of some mangrove species and associates from the coast of Maharashtra, India. *Seshaiyana* 2013; 21(2): 2-3.

[5] Sasidharan, N. Biodiversity documentation of Kerala - Flowering Plants. Kerala Forest Research Institute. 2004; Pp 169- 170.

[6] AOAC (1990) Official Methods of Analysis. Association of Official Analytical Chemists, Washington DC., U.S.A.

[7] Toth, S. J.; Prince A. L.; Wallace A. and Mikkenisen, D. S. Rapid Quantitative determination of eight mineral elements in plant tissue by systematic procedure involving use of a flame photometer. *Soil Sci.* 1948; 66: 459-466.

[8] Isong, E. and Idiong, V. Nutrient content of the edible leaves of seven wild plants from Nigerian plant food. *Human Nutr.* 1997; 51: 79-84.

[9] Adeyeye, E. I. and M.K.O. Otokiti. Proximate composition and some nutritionally valuable minerals of two varieties of Capsicum annum. (Bell and Cherry peppers). *Discovery and Innovation* 1999; 11: 75-81.