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Nutritional composition of sun and shade dried form of drumstick leaves (*Moringa oleifera*)

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Abstract

Green leafy vegetable consumption has been associated with decreased risk of persistent metabolic diseases. The present study examined the nutrient composition of sun dried and shade dried of drumstick leaves (*Moringa oleifera*). It belongs to the family Moringaceae. Fresh drumstick leaves were obtained from Horticulture Department, UAS, GKVK, Bengaluru. The leaves were cleaned by washing with water to remove dirt and other contaminants. The sun dried and shade dried leaves of drumstick were analyzed by using standard method AOAC. From the results, the shade dried leaves were rich in moisture, fat, protein, ash and crude fiber. The result suggests that drumstick leaves (*Moringa oleifera*) has a high potential health benefits for diabetes, cardiovascular disease and obesity.

Keywords: *Moringa oleifera*, sun dried, shade dried, nutrient composition

Introduction

In nature, there are many underutilized greens of promising nutritive value, which can nourish the ever increasing human population. They have remained underutilized due to lack of awareness and popularization of technologies for utilization. Plant leaves are one of the most important sources of medicines. The medicinal plants are rich in secondary metabolites (which are potential sources of drugs) and essential oils of therapeutic importance. The important advantages claimed for therapeutic uses of medicinal plants in various ailments are their safety besides being economical, effective and their easy availability. A high intake of fruit and vegetables is well known to have positive effects on human health and has been correlated to a decreased risk of most chronic diseases such as cardiovascular disease, diabetes and several forms of cancer (Sheela., 2004) [4].

Moringa oleifera an aboriginal of India sub-continent is a member of the Moringaceae family of perennial angiosperm plants, which includes 13 other species. The plant is grown best in dry sandy or loamy soil that is slightly alkaline. Although it is adaptable to various soil conditions from varying PH of 4.5 to 8.0. It is not able to tolerate water logging, freezing or frosts conditions. Leafy vegetables occupy an important position in the India diet. India produce about 12% of the total world's production of vegetables but it is not enough to meet this country's requirement (Singh *et al.*, 2014) [6].

Moringa is known by various vernacular names tree and horseradish tree (English) Saragvo (Gujarathi), Soanjna (Hindi), Sajna (Bengali), nugge (kannada), sigru (Malayalam), shevga (Marathi), shobhanyana (Sanskrit), munaga (Telugu), murungai (Tamil), sajana (oriya), surafana (Punjabi). Sajiwan or swejan (nepali), sojina (Assamese), Murunga (Sinhalese) (Bukar *et al.*, 2010) [3].

Moringa oleifera is one of the most helpful tropical trees and is generally grown at back side of the home. It is good sources of vitamins and minerals. It is significant source of B vitamins, vitamin C, provitamin A as beta carotene, vitamin K, dietary fiber, protein, potassium, manganese and magnesium and also rich source of many bioactive compounds *viz.*, terpenoids, alkaloids, p – cymene, eugenol, chavicol, flavonoids, saponins, allylcatechol, cadinene carvacrol, estragol, caryophyllene, chavibetol, cineole *etc* (Singh *et al.*, 2012) [7].

It is recognized for its food and nutritional value, with forage, medicinal, and seasoning properties, being used in culinary, fuel, and cosmetics industries and in water treatment for human consumption. Hence this work was undertaken to determine the nutrient composition of drumstick leaves and the objective of the study was to identify the nutrient composition of sun and shade dried leaves powder of drumstick leaves.

Material and Methods

Collection and preparation of plant material: The samples were procured from Horticulture department, UAS, GKVK, Bengaluru, Karnataka, India.

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The green leafy vegetables were sorted to remove spoilt, low quality vegetables from the bulk. They were picked and remove from the stalk, trimmed, washed and shredded. Washing was done with water to remove dirt and other contaminants and divided into two parts.

Shade drying: In this drying method the air dried leaves were spread on filter papers and kept in the room which was well ventilated. Natural current of air was used for 2 days.

Sun drying: In sun drying method the leaves were washed and kept for air drying and then put on the filter paper. Filter paper along with tray were placed at a where adequate amount of sunlight for 10 hours.

Proximate Analysis: The sample was analyzed for proximate composition of Moisture, ash, protein, fat, crude fiber, carbohydrate and energy content of the sun dried and shade dried form of leaves were determined using AOAC (2005) [1] method.

Results and Discussion

Vegetables play a significant role in human nutrition, apart from the fact that the most of our recommended daily needs of minerals and vitamins are met and they also supply certain constituents in which other food materials are deficient. The wide variations in color, taste and texture of various vegetables have added an interesting touch to meals. The cultivation and consumption of green leafy vegetables cuts across different races because of their nutritional and health benefits. They have been shown to reduce the risk of degenerative diseases such as cancer, diabetes and cardiovascular disease.

The nutrient composition of the sun dried and shade dried drumstick leaves powder showed in Table 1 and Figure 1.

Table 1: Nutrient composition of the sun dried and shade dried drumstick leaves powder.

Nutrients	Sun dried	Shade dried
Moisture (g)	6.30	6.14
Protein (g)	19.86	21.55
Fat (g)	2.79	3.35
Crude fiber (g)	10.17	11.10
Ash (g)	7.60	8.10
Carbohydrates (g)	53.28	49.75

Moisture (g)

The moisture content of drumstick leaves in sun dried (6.14 g) and shade dried (6.30 g) respectively. The highest moisture content is found in shade dried and lowest was found in sun

dried. The reduction in the moisture content was due to the effect of dehydrated process. As the drying temperature and drying time increased, there was a reduction in moisture value.

Protein

The protein content of drumstick leaves in sun dried (19.86 g) and shade dried (21.55 g) respectively. The highest protein content is found in shade dried and lowest was found in sun dried. The protein value of moringa observed in this study confirms the advantage as a rich source of vegetable protein over some vegetables such as raw Amaranthus (6.1%) and *Moringa oleifera* (4.2%) as reported Adepoju *et al.*, 2006 [2]. The plant foods, when rightly combined with other foods can be of high biological value and adequately meet the protein needs of malnourished children and adults.

Fat

The fat content of drumstick leaves in sun dried (2.79 g) and shade dried (3.35 g) respectively. The highest fat content is found in shade dried and lowest was found in sun dried. The results were on par with the study conducted by Satwase *et al.* (2010) [5]. Due to the general low level of crude fat in vegetable leaves and its high level of total unsaturated fatty acid, their consumption in large amounts would be beneficial to individual suffering from overweight or obesity and this would constitute a good dietary habits.

Crude fiber

The crude fiber content of drumstick leaves in sun dried (10.17 g) and shade dried (11.10 g) respectively. The highest crude fiber content is found in shade dried and lowest was found in sun dried. This value is high as compared to the fiber value of other vegetables such as kale (3.00%). Basella Alba a type of spinach variety had an appreciable level of crude fiber. Leafy vegetables are particularly rich in dietary fiber and these fiber contents together with the low carbohydrate contents found in this spinach are good in the management of diabetes mellitus. Fiber also adds bulk to the food and prevents the intake of excess starchy food and may therefore guard against metabolic conditions such as hyper cholesterolemia and diabetes mellitus. Fiber can also help to keep blood sugar levels under control (Tanya *et al.*, 1997) [8].

Ash

The ash content of drumstick leaves in sun dried (7.60 g) and shade dried (8.10 g) respectively. The highest ash content is found in shade dried and lowest was found in sun dried. The results were on par with the study conducted by Satwase *et al.* (2010) [5].

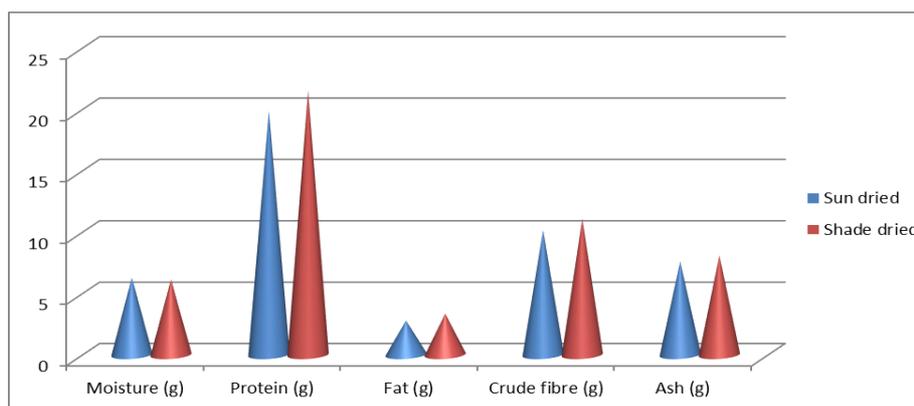


Fig 1: Nutrient composition of the sun dried and shade dried drumstick leaves powder.

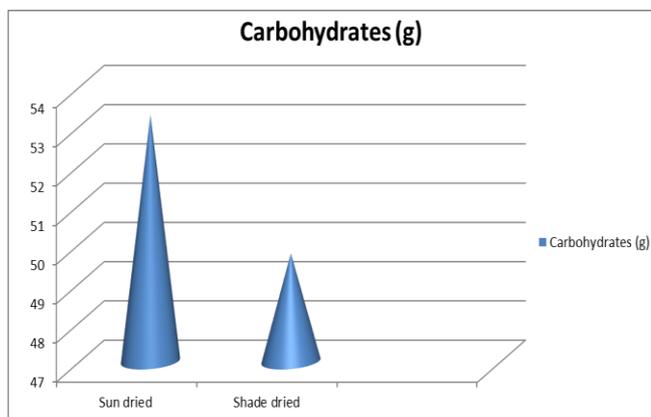


Fig 2: Carbohydrate content of sun dried and shade dried drumstick leaves powder.

Carbohydrate

Figure 2 depicts the carbohydrate content of sun dried and shade dried drumstick leaves powder. The carbohydrate content of drumstick leaves in sun dried (53.28 g) and shade dried (49.75 g) respectively. The highest carbohydrate content is found in sun dried and lowest was found in shade dried. The present results were on par with the study conducted by Satwase *et al.* (2010)^[5].

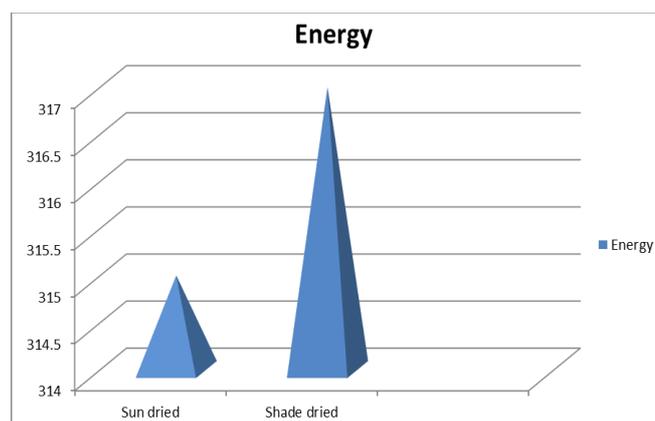


Fig 3: Energy content of sun dried and shade dried drumstick leaves powder.

Energy

Figure 3 depicts the energy content of sun dried and shade dried drumstick leaves powder. The energy content of drumstick leaves in sun dried (315 Kcal) and shade dried (317 kcal) respectively. The highest energy content is found in shade dried and lowest was found in sun dried. The present results were on par with the study conducted by Satwase *et al.* (2010)^[5].

Conclusion

From the results of this study, it is clear that drumstick leaves (*Moringa oleifera*), though a lesser known leafy vegetables, has enormous nutritional potentials and thus can favorably be used as a substitute for most of the commonly used vegetables. The drumstick leaves is nutritious food that provide sufficient amount of nutrients for normal body function, maintenance and reproduction. In sun dried leaves fat content was found to be lesser and it is found to be an excellent choice of leafy vegetable for people with diabetes and obesity. Drumstick leaves has been recognized as a good source of vegetable fiber both in shade dried powder, which helps to reduce high cholesterol levels thus helping in

prevention of atherosclerosis. It can also help in keeping blood glucose levels under control and is an excellent vegetable for people with diabetes. The protein content of drumstick leaves in shade dried powder confers form has the advantage as a rich source of vegetable protein over other lesser known vegetables. It could be recommended for the children with malnutrition. The result obtained serve as a nutritional data base for local consumers, as well as for further research purposes. Combination with other foodstuffs is recommended satisfactorily to meet nutritional needs satisfactorily. Drumstick leaves (*Moringa oleifera*), has high potential as a leafy vegetable in the preparation of different south Indian dishes and treatment of various diseases due to its nutritional potentials.

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