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Nutrient analysis and development of products in drumstick leaves

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Abstract

Moringa oleifera native to India grows in the tropical and subtropical regions of the world. The local language name is Drumstick tree or Murungai tree. This miracle tree had prominent health properties, it is widely cultivated because of its nutritional values. The leaves of this tree are used to treat malnutrition also helps for secretions of breast milk in lactating mothers. The use of moringa leaves as a cure for type II diabetic as well as for cancer because of its photochemical and antioxidants presence. Overall sensory quality indicated that the snacks had acceptable textural attributes and improved nutritional profile. It is possible to develop a ready-to-eat convenience food product with good functional and nutritional properties using pre-treated moringa leaf. Moringa is rich in nutrition owing to the presence of a variety of essential phytochemicals present in its leaves, pods and seeds. In fact, moringa is said to provide 7 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach. Moringa improves body metabolism. The nutrient benefits in Moringa provide a gentle nudge over time to improve the body's metabolic processes because of critical nutrients. The Moringa plant provides the nutrient benefits that so many diets lack. Moringa leaves have many health benefits. For instance, the moringa leaf can boost your immunity, strengthen your bones, treat erectile dysfunction, treat Alzheimer's disease, decrease liver damage, prevent constipation, relieve menstrual pain, and boost libido.

Keywords: Drumstick leaves, photochemical, antioxidants, sensory quality, malnutrition, Vitamin C.

Introduction

Drumstick leaves (*Moringa oleifera*) are extremely nutritious and this plant has tremendous potential for greater use in the human diet. Moringa is very rich in healthy antioxidants and bioactive plant compounds. The leaves are excellent source of many vitamins and minerals. The nutrient benefits in Moringa provide a gentle nudge over time to improve the body's metabolic processes because of critical nutrients. Dried powdered Moringa leaves are sold as dietary supplements. So far, scientists have only investigated a fraction of the many reputed health benefits. Many experts feel that *M. oleifera* boosts the widest array of vital nutrients of any botanical crops. Drumstick leaves has a prominent role in consumption due to the presence of many nutrients. *M. oleifera* is a rich source of potassium, calcium, phosphorous, iron, vitamin A, D and C, essential amino acids as well-known antioxidants such as betacarotene and flavonoids. Moringa can lower cholesterol levels in the blood which should lead to reduced risk of heart disease. Moringa leaves contains 45.38 g of carbohydrate, 25.42 g of protein, 2.91 g of fat and 23.33 mg of vitamin C.

The leaves of *M. oleifera* are a good source of a natural antioxidant due to the presence of various compounds such as ascorbic acid, flavonoids, phenolic and carotenoids. The antioxidants are capable of performing a number of functions including acting as free radical scavengers, enzyme inhibitors, reduce damage caused by free radical activity and oxidation, have significant role in preventing stress that might cause several degenerative diseases.

Moringa leaves show great potential for benefiting people especially those who suffer from poverty and malnutrition. Further scientific studies are needed to examine these uses and their benefits, and to determine the techniques that will produce the greatest benefits. Moringa trees have been used to combat malnutrition, especially among infants and nursing mothers. One rounded tablespoon (8 g) of leaf powder will satisfy about 14% of the protein, 40% of the calcium, 23% of the iron and nearly all the vitamin A needs for a child aged 1-3. Six rounded spoonful of leaf powder will satisfy nearly all of a woman's daily iron and calcium needs during pregnancy and breast-feeding.

Methodology

The methodology pertaining to the study entitled "Physical properties, sensory characteristics

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and nutritional quality of products developed using drumstick leaves". Drumstick leaves were harvested in Aastampatti at Salem district. The following standardized procedure were used to determine the nutrient content and antioxidant substance presence in the selected moringa leaves powder.

Collection of samples

The leaves were collected from the fresh and disease free moringa tree. After cleaning the leaves were allowed to shade drying. The dried leaves were grinded and stored in a air tight container.

Product development using moringa leaves.

- Moringa tea
- Moringa soup
- Moringa chocolate

Moringa tea

Moringa tea was prepared as green tea. The researcher interested to prepare two variations as V1T1 and V2T2. The moringa leaves powder for V1T1 and V2T2 were 14g and 21g respectively. The tea was enriched with one teaspoon of honey for both Variations of 100ml moringa tea.

Moringa soup

Soup prepared from moringa leaves paste for two different variations. V1S1 contains 50gms of moringa leaves paste were as V2S2 holds 30gms. Procedure for the soup preparations was formal method.

Moringa chocolate

Moringa chocolate was prepared using moringa powder, for which it requires cocoa powder, milk made and moringa powder. This product also prepared in two different variations such as V1C1 and V2C2 of 40 Gms and 60 Gms respectively.

Methods

Estimation of Moisture

The moisture content of the sample was estimated by the hot air oven method. The sample was dried and the moisture content was expressed in percentage.

Estimation of Protein

Protein was analyzed by the amount of nitrogen available by. The amount of nitrogen available in the sample by micro kjeldhal method. The nitrogen value multiplied by the factor 6.25 gives the crude protein content of the sample in per cent.

Estimation of fat

The fat content of the sample was estimated by the method described by Cohen. The lipid in the sample was extracted with petroleum ether (60-80°C) in Soxhlet apparatus for two hours. The fat content was expressed as percentage.

Estimation of crude fiber

The crude fiber content was determined by acid and Subsequent alkali hydrolysis method. The crude fiber was expressed in percentage.

Estimation of vitamin C

Vitamin C was estimated by using reduction with 2,6-Dichloroindophenol solution to a colorless dye. The result was expressed in milligram.

Organoleptic evaluation

The developed product were evaluated by the un trained panel members using the hedonic scale score card method.

Statistical analysis

To verify the significant values of the studied parameters Mean values (M) of three time analysed samples of standard deviation (SD) were defined. The difference between variations were tested by paired t test using SPSS version software. The p value of <0.05 were considered to be significant.

Results and discussion

The result of the study that the moringa powder of 100g contains 45.38 g of carbohydrates, protein of 25.42 g fat were 2.91 g and vitamin C were 23.33 mg. The nutrient present in 100 g of moringa powder holds sufficient recommended nutrients in it.

Table 1: Nutritive value of moringa leaves powder

S. no	Test parameters	Test method	Unit	Result
1	Carbohydrate	IS: 656	g/ 100g	45.38
2	Protein	IS: 7219	g/ 100g	25.42
3	Fat	IS: 7874	g/ 100g	2.91
4	Vitamin c	FSSAI Manual- Fruits & Vegetables	mg/100g	23.33

Sensory evaluation

Sensory evaluation test for moringa tea reveals that among the two variations, variation one V1T1 scores good enough in all the aspects of the redoing rating scale given by the un trained

panel members. Like that in moringa soup variation V2s2 score higher acceptance by the panelist. The score card value was given highest for V2C2 where as V1C1 gives less taste in moringa chocolate.

Table 3: Health Benefits of Moringa Soup

Protect the healthy eyes	Prevent the growth of cancer cells
Keep the healthy bone	Prevent anemia in pregnant women
Stimulate the nervous systems	Control the blood sugar level in diabetes
Help to prevent heart disease	Prevent constipation
Boost your immune system	Help to treat asthma
Control the blood pressure Prevent hair loss	Increase breast milk secretion

Organoleptic evaluation score card for Moringa tea

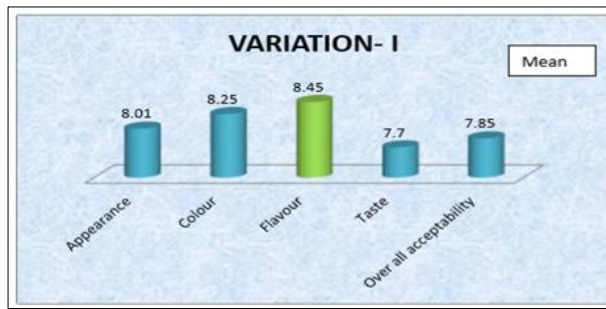


Fig 1: variation 1

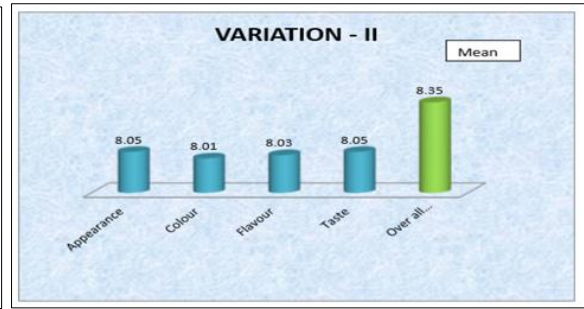


Fig 2: variation 2

Organoleptic evaluation score card for Moringa soup

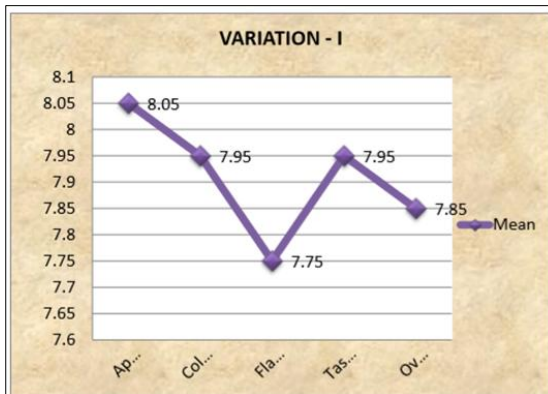


Fig 3: variation 1

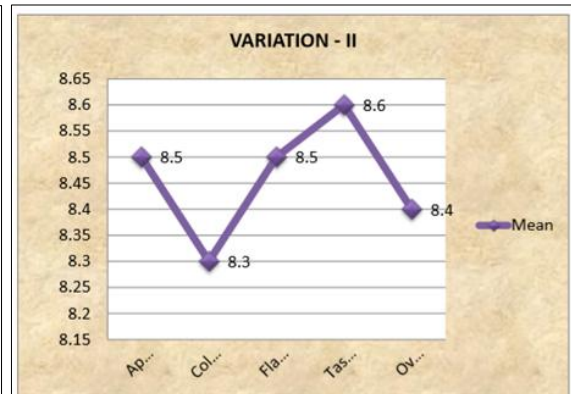


Fig 4: variation 2

Organoleptic evaluation score card for Moringa chocolates

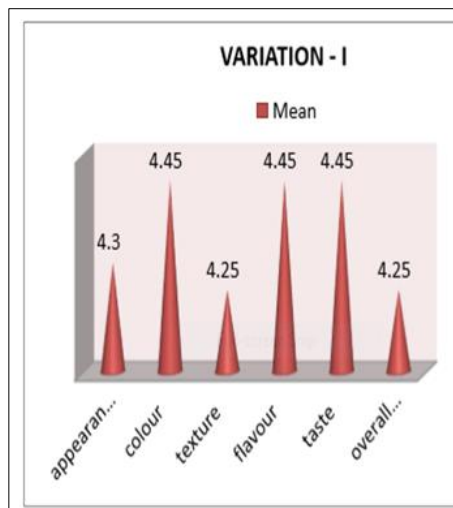


Fig 5: variation 1

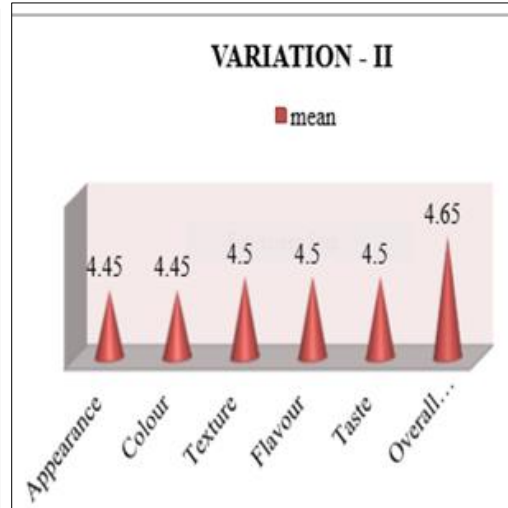


Fig 6: variation 2

Table 2: Statistical Difference among variations of the developed products

Moringa Tea				
Variations	Mean	S.D	F value	P value
Variation -I	7.85	0.93	0.001	0.03
Variation -II	8.35	0.87		
Moringa Soup				
Variation -I	7.85	0.67	0.622	0.01
Variation -II	8.40	0.680		
Moringa Chocolate				
Variation -I	4.30	0.57	0.027	0.251
Variation -II	4.50	0.51		

The statistical result of the different variations of three newly developed products mean values are significantly different in various products. The p value of moringa tea and moringa soup were significantly difference, but the p value of moringa chocolate signifies there was no significant difference between the two variations.

Conclusion

Awareness regarding the consumption of moringa leaves as food and nutraceutical keep spreading all around world. New trend in nutrition to update product development in various food substances. The research study was conducted to develop healthy food products in drumstick stick leaves. Drumstick leaves contains all the macro and micro nutrients in it. It is essential that the nutrients of this wonder leaves are exploited for a variety of purposes. Products developed from this moringa leaves are rich sources of nutrients. Hence the researcher concluded that consumption of this leaves from different products will enhance the reduction of mal nutrition.

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