



E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(5): 660-663
Received: 01-06-2020
Accepted: 03-08-2020

B Harshith Reddy
College of Food Science and
Technology, PJTS Agricultural
University, Rudrur, Telangana,
India

P Pradeep
College of Food Science and
Technology, PJTS Agricultural
University, Rudrur, Telangana,
India

TVN Padmavathi
Department of Food Safety and
Quality Assurance, college of
Food Science and Technology,
PJTS Agricultural University,
Rudrur, Telangana, India

Development and evaluation of value-added products from Moringa leaves

B Harshith Reddy, P Pradeep and TVN Padmavathi

DOI: <https://doi.org/10.22271/phyto.2020.v9.i5j.12304>

Abstract

Moringa oleifera Lam (Moringaceae) is a plant with high nutritional and medicinal value. The leaves are rich in minerals like calcium, potassium, iron etc and vitamins like β -carotene, Ascorbic acid, proteins, flavonoids, phenolic components and other essential phytochemicals. The leaf extracts are used to treat malnutrition and also acts as potential antioxidant, anticancer, anti-inflammatory, antidiabetic and antimicrobial agent. Due to the wide range of nutritional properties, the value-added product, instant moringa idly mix is being developed. The present study was conducted to see the supplementation of moringa leaf powder to increase nutritional value and to check physiochemical properties. Instant moringa idly mix of three different proportions were prepared by adding moringa leaf powder at levels of 5%, 10%, 15% and were evaluated organoleptically and physiochemically in comparison to control samples (without addition of moringa leaf powder). Thus, the product with 10% level of moringa leaf powder supplementation was accepted obtaining sensory evaluation scores in the range of 8.0 with increased nutritive value for moringa idly.

Keywords: Moringa leaf powder, malnutrition, instant idly mix, physiochemical properties

Introduction

Moringa oleifera tree belongs to the family of Moringaceae, it is commonly called “drumstick tree”. It can be grown in any tropical and subtropical regions of the world with a temperature around 25–35 °C. Extracts from the leaves are used to treat malnutrition, augment breast milk in lactating mothers. It is used as potential antioxidant, anticancer, anti-inflammatory, antidiabetic and antimicrobial agent. The leaves and seeds also contain PUFAs are linoleic acid, linolenic acid and oleic acid; these PUFAs have the ability to control cholesterol. Research show that moringa seed oil contains around 76% PUFA, making it ideal for use as a substitute for olive oil [1]. *M. oleifera* leaves have high source of proteins, vitamin-C, calcium, β -carotene. Due to the presence of several sorts of antioxidant such as ascorbic acid, flavonoids, phenolic and carotenoids, Moringa is able to extend the period of food containing fats. [2]. Moringa leaves contain more vitamin A than carrots, more calcium than milk, more iron than spinach, more vitamin C than oranges, and more potassium than bananas, noting that the protein quality of Moringa leaves rivals that of milk and eggs [3, 4]. About 87% of the total crude protein was in the form of true protein in the leaves. In leaves, amount of all the essential amino acids were higher than the amino acid pattern of the FAO reference protein and comparable to those in soya bean [5]. By reviewing all the health benefits of moringa tree, instant moringa idly mix with various proportions of black gram, idly sooji, and moringa powder with 5%, 10%, 15% of mix is prepared and physiochemical and organoleptic characters were studied.

The main objective of study:

1. To develop value added food product by incorporating *Moringa oleifera*.
2. To evaluate physio-chemical characteristics of the product.
3. To evaluate sensory characteristics of the value-added product.
4. To study the nutritive value of developed product (instant moringa idly mix).

Materials and Methods

Raw materials such as black gram, sooji flour, were procured from local market and Bulk sample of moringa leaves procured from nearby orchids.

Corresponding Author:
B Harshith Reddy
College of Food Science and
Technology, PJTS Agricultural
University, Rudrur, Telangana,
India

Preparation of moringa leaf powder

After harvesting leaflets obtained after harvesting were sorted to eliminate damaged ones and washed. The leaves were given pre-treatment such as blanching and drying. The leaves were blanched in water for 5 minutes to inactivate the enzyme which causes browning and to preserve the nutritional value of the leaves. After blanching the leaves were dried by shade drying at (28-30 °C) for 6 days or by cabinet drying at 60 °C for 6 h.

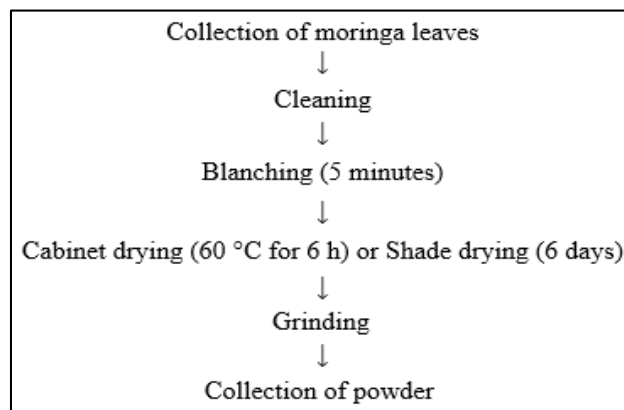


Fig 1: Preparation of moringa leaf powder

Preparation of mix

All the ingredients are taken in required proportion according to the formulation. Dry roasting of black gram and idly sooji is done separately under flame. Allow them to cool. Then grind the black gram by adding the moringa leaf powder. Add this mixture to the idly sooji and mix properly. Cool the mix properly. Packing in the air tight containers.

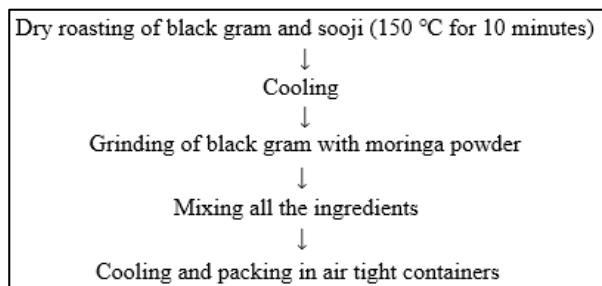


Fig 2: Preparation of instant moringa idly mix

Table 1: Formulations of instant moringa idly powder (per 100 g)

Ingredients	T ₀	T ₁	T ₂	T ₃
Black Gram	25	25	20	20
Idly Sooji	75	70	70	65
Moringa Powder	0	5	10	15

Where, T₀ is Control sample, T₁, T₂, T₃ are moringa incorporated with 5%, 10%, 15% moringa powder respectively.

Determination of Moisture content:

Moisture is done by oven drying method (AOAC, 2005) [6]. Weigh the empty Petri dish. Take 10 g of the sample and place in weighed empty Petri dish. Note the weight. (Petri dish + sample) (W₁). Pre heat the oven to 100 °C. Now place the sample in the oven at 105 °C ± 2 °C for 4 to 5 hours. Take the sample from the hot air oven and place it in desiccators for some time. Weigh the sample (dried sample + Petri dish) (W₂).

$$\text{Moisture \%} = \frac{W_1 - W_2}{W_1} \times 100$$

Determination of Protein content

Protein content was estimated by Kjeldahl (AOAC, 2016) [7]. The nitrogenous compounds of the material to be tested are converted into ammonium sulphate by boiling with con. H₂SO₄. It is subsequently decomposed by addition of excess of alkali and the liberated ammonia absorbed into a boric acid solution containing Bromocresol green indicator by steam distillation. Ammonia forms a loose compound, ammonium borate, with boric acid, which is titrated directly against standard hydrochloric acid.

$$N \text{ (g/Kg)} = \frac{(\text{mL of HCl} - \text{mL of blank}) \times \text{normality} \times 14.01}{\text{weight of sample taken}}$$

$$\text{Crude protein (\%)} = N \times 6.25$$

Determination of Ash content

Ash content was calculated by muffle furnace method (AOAC, 2000) [8]. The finely ground sample of 10 g was weighed (W₁) in pre-weighed silica crucible (W₂) and ignited till smokeless. Then it was transferred to muffle furnace and heated at 550 °C for 4 hours for complete oxidation of organic matter and resultant ash content was calculated by weighing the crucible after combustion (W₃).

$$\text{Ash content (\%)} = \frac{W_3 - W_2}{W_1} \times 100$$

Determination of Fat content

The fat content was estimated by using Soxhlet apparatus (AOAC, 2000). The powdered sample 10 g was weighed (A) accurately in thimble, weight of the flask before extraction (B) was noted and extracted with petroleum ether (60 -80 °C) in Soxhlet apparatus for 6-8 h. Weight of the flask after extraction was noted and calculated to get fat content [9].

$$\text{Fat content (\%)} = \frac{100(B-C)}{A}$$

Determination of total carotenes

Total carotenoids were determined by the (AOAC,2016) method [10]. Reagents used are Petroleum, Acetone (50%), Sodium sulphate (5%). Weight 10 g sample and ground with 10 mL petroleum ether in pestle mortar. Added 10 mL 50% acetone and shake vigorously. Added 5 mL sodium sulphate. A yellow layer will be formed. Take liquid above yellow layer with pipette and take the reading at 450 nm on spectrophotometer.

Determination of Carbohydrate

Carbohydrate is done by difference method. Carbohydrates come in simple forms such as sugars and complex forms such as starches and fiber [11].

$$\text{Carbohydrate (\%)} = 100 - (\% \text{ Moisture} + \% \text{ Ash} + \% \text{ Fat} + \% \text{ Protein})$$

Determination of Calcium

This was determined by ethylenediaminetetraacetic acid (EDTA) titrimetric method [12]. 10 mL of the digested sample was measured into a 250 mL conical flask. A pinch of potassium cyanide, a pinch of hydroxylamine hydrochloride,

5 mL of 10% potassium hydroxide were added and shaken gently until the solids dissolve. Then a pinch of indicator (Patton's & Reader's reagent) was added and the mixture titrated with the 0.01M EDTA solution until the colour changed from wine red to blue which is the end point.

Determination of bulk density

Bulk density was determined by (WHO, 2012) method [13]. Take a container of known volume and weigh the amount of sample that can be filled in it. Mildly tapped 2-3 times on the bench. Weight of the sample was noted and calculated.

$$\text{Bulk density (g/cm}^3\text{)} = \frac{\text{weight of sample}}{\text{volume of sample}}$$

Sensory analysis

The sensory evaluation for moringa idly mix was done by

preparing idly's and conducted sensory evaluation using 9 points hedonic scale. Samples were evaluated for colour, taste, appearance, and overall acceptability. It is performed by 9-member trained panel. Judgments were made through rating products on a 9 points Hedonic Scale with corresponding descriptive terms ranging from 9 'like extremely' to 1 'dislike extremely'

Results and Discussion

Instant idly mix is prepared by black gram, sooji flour and moringa leaf powder of three different formulations T₀ as Control sample, T₁ -with 5%, T₂ -with 10%, T₃ -with 15% moringa leaf powder. The formulated mixtures were tested for physical characteristics (bulk density), nutrient composition, sensory attributes.

Table 2: Physicochemical composition of formulated moringa idly mix (10g)

Parameters	Samples			
	T ₀	T ₁	T ₂	T ₃
Moisture	8.033±0.039	8.098±0.048	8.230±0.066	8.250±0.051
Protein	10.76±0.423	11.36±0.366	12.04±0.205	12.52±0.407
Fat	1.21±0.221	1.12±0.420	1.25±0.305	1.31±0.220
Ash	1.28±0.255	1.53±0.410	1.71±0.175	1.87±0.179
Carbohydrate	78.717±0.216	77.892±0.198	76.770±0.233	76.048±0.256
Crude fiber	1.32±0.11	1.46±0.23	1.63±0.15	1.74±0.12
Calcium(mg)	177±0.32	202±0.29	233±0.16	269±0.24
Total carotenoids	0	19.93±0.15	23.42±0.23	29.56±0.19
Bulk density(g/cm ³)	0.691±0.09	0.713±0.12	0.722±0.03	0.707±0.07

Values are means ± SD of three independent determinations

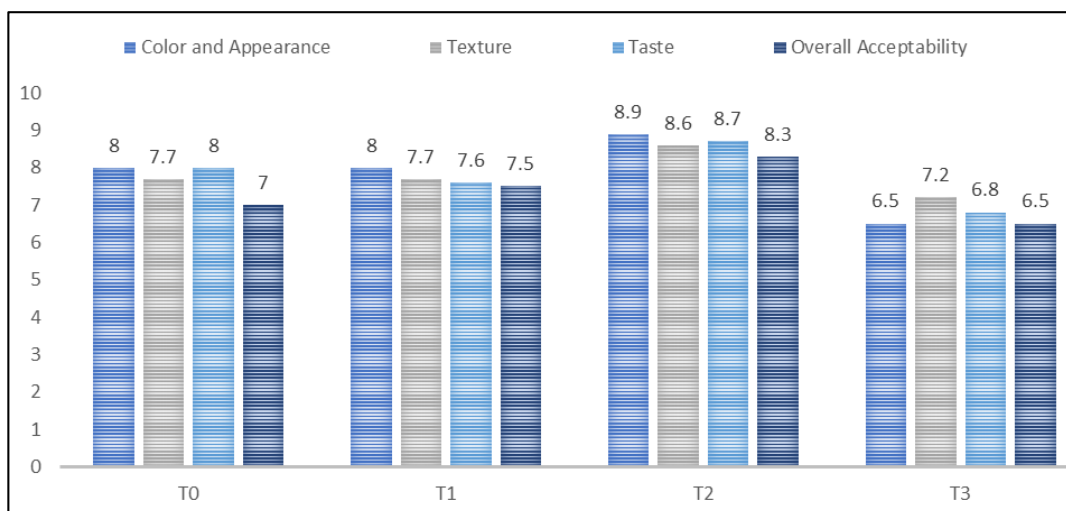


Fig 3: Sensory attributes of instant moringa idly mix

The acceptance scores were assigned for various sensory parameters- color and appearance, taste, texture and overall acceptability. T₀ as Control sample, T₁ -with 5% moringa powder, T₂ -with 10% moringa leaf powder, T₃ -with 15% moringa leaf powder. The acceptance scores are more for idly served with T₂ sample.

Conclusion

The results indicated that the sample T₂ was most accepted based on nutritional and sensory aspect. The addition of moringa powder improves the nutritional and sensory properties. Protein content of moringa leaf powder supplemented product is more when compared to the control sample. Crude fiber, carotenoids and mineral content increase with increase in the supplementation of moringa powder. The study proved that 8 -10 g serving of dried leaf powder will

satisfy a child with 11-12% of the protein, 35-40% of the calcium, required amount of the iron, and nearly all the vitamin A that the child needs in a day. The study has shown that the supplementation of moringa powder in diet reduces malnutrition and provides most of the nutrients required for the body.

References

- Gopalakrishnan L, Doriya K, Kumar DS. *Moringa oleifera*: A review on nutritive importance and its medicinal application. Food science and human wellness, 2016.
- Abdull Razis AF, Ibrahim MD, Kntayya SB. Health benefits of *Moringa oleifera*. Asian Pacific Journal of Cancer Prevention. 2014; 15(20):8571-6.

3. Fuglie LJ. New Uses of Moringa Studied in Nicaragua. ECHO Development Notes 2000, 68.
4. Fuglie LJ. The Miracle Tree: *Moringa oleifera*: Natural Nutrition for the Tropics. Church World Service, Dakar. 68 pp.; revised in 2001 and published as The Miracle Tree: The Multiple Attributes of Moringa, 1999, 172.
5. Makkar HP, Becker K. Nutrients and antiquality factors in different morphological parts of the *Moringa oleifera* tree. The Journal of Agricultural Science. 1997; 128(3):311-22.
6. AOAC. Official Methods of Analysis. 18th edn. Association of Official Analytical Chemists; Arlington, VA, USA, 2005.
7. AOAC. official methods of the association of official agricultural chemist, Washington, D.C., 20th edition, 2016.
8. AOAC. official methods of the association of official agricultural chemist, Washington, D.C., 11th edition, 2000
9. Pearson DA. The Chemical analysis of foods, 7th ed. (Edinburgh: Churchill Livingstone, 1976.
10. Welcher FJ. The Analytical uses of Ethylenediaminetetraacetic acid, New York: D. Van Nostrand Company Inc., 1958.
11. Bulk density and tapped density of powders, World Health Organization (WHO), 2012.