



# A Review on Food Product Development with a Flower of *Moringa oleifera*

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**Abstract:** *Moringa oleifera* Lam. is generally known as a “Healing tree” of life. The plant is native to the Sub-Himalayan Valley of India. Each part of *Moringa oleifera* is a “powerhouse” of prominent nutrients. *M. oleifera* Lam. is a nutriment part of the extraordinarily nutritious flower. The flowers have a larger amount of vitamin C and protein with many bioactive compounds. *M. oleifera* flower (MOF) is high in calcium, potassium, zinc, magnesium, phosphorus. Vitamin C, D, and E, in addition, present 16 amino acids. The flower has 31% Amino acids. It contains linolenic acid, lenoleic, palmitic and oleic acids which reduce hypercholesterolemia (high cholesterol) in addition, phytochemicals are present and it acts as an antioxidant. In dried MOFP The protein content of 25.16%, Carbohydrate content of 53.67%, Fiber content of 7.55%, Ash 6.01% are present. The flowers are used to prepare various products developed with *M. oleifera* flower Powder (MOFP) in the fortification. It is used for therapeutic aspects such as malnourishment and abdominal diseases. Concluding by the overall study reviews are increasing the nutritive profile in the various food product development.

**Keywords:** Food product development, Fortification with MOFP, MOFP bar, Food biodiversity, healing properties, Nutritious.

## I. INTRODUCTION

*Moringa oleifera* Lam. is generally known as a “Healing tree” of life. It has tremendous medicinal properties and belongs to the monogeneric family Moringaceae consisting of *Moringa oleifera* and *M. concanensis*. It is a plant native to the Sub-Himalayan valley of India, Bangladesh and Afghanistan, Cambodia, and many North Asian and South African countries. *M. Oleifera* Lam. is also known as Shubhanjana (very auspicious tree), Tiksha-gandha (strong and pungent order), Aksheeva (relieves intoxication), and the petals of the flower are known as Shigru Pushpa (*Moringa* flower) (Shigru means strong and piercing qualities) as Drushti pathya (diet for eye diseases) Sanskrit names in Ayurveda [1].

All parts of *M. oleifera* have several medicinal parts like fresh leaves, seeds, pods, and flowers. The flowers are being used in functional food and they don't have side effects. This functional food is used for medicinal purposes or food fortification. The flower acts as a stimulant, tonic, diuretic and enhances the flow of bile [2]. Traditionally, the plant has various properties such as Antiseptic, Antineoplastic, immunomodulatory, spasmolytic, Antioxidative [3], Antihypertensive, Hypoglycemic, Antidiarrheal, Antimalarial, Antipyretic, Anti-inflammatory, weight-reducing agent, Antimicrobial, Antiparasitic, Antidepressants, and Anti asthmatic, Antidiuretic. This *M. oleifera* flower (MOF) is rich in essential micronutrients such as calcium, potassium, selenium, iron, magnesium. The flower has the highest amount of vitamin C (77.502 to 224.672 mg/100g) [4]. Vitamin-A, vitamin B12, and folic acid MOF also act as Antioxidants. The macronutrients are a rich source of protein and dietary fiber with a good amount of 16 amino acids [5]. The MOF is conveniently available in the market. The MOF grows once a year in late spring and early summer in the plant of *Moringa oleifera* Lam. [6].

Presently, the research of MOF is mostly focused on the bioactive compound and phytochemical properties are increasing in food production and food fortification. The flower extract or components like isolation of protein is used in incorporated recipes and used in weaning food like bars, fermented food items, laddoos, tea, cake, bread, cookies, Biscuits, chikki, tikki, vermicelli, chilla, chapattis, Porridge, Crackers, pasta, spaghetti, Khakhra, non-veg in chicken meat nuggets. It is rich in dietary fibers and antioxidant [7] for therapeutic aspects and treats the disorders like malnourishment, abdominal disorders such as colon cancer, anorexia, constipation, and worm infestation, it improves the clarity of vision, increase the production of breast milk, nourishing, arthritis, high blood pressure and cleanse the bladder [1,8].

## II. NUTRITIVE PROFILE OF *MORINGA OLEIFERA* FLOWER

Each part of moringa is a “Powerhouse” of prominent nutrients. The petals of the MOF are high in minerals such as iron, calcium, zinc, magnesium, manganese, selenium, potassium, phosphorus, and copper and in vitamins like Vitamin A (beta-carotene and carotenoids), Vitamin B3, B6, B9, B12, Vitamin C, Vitamin D, and E. In addition, 16 amino acids and phytochemicals such as flavonoids, terpenoids, saponins, tannins, anthraquinones, sterols, and alkaloids are present. It reduces blood sugar levels along with Antineoplastic agents like glucoside, isothiocyanates, glucosinolates compounds, and glycerol-1-9-octadecanoate. The flower's content is high fibrous to prevent various digestive disorders and colon cancer. In dried MOFP, the protein content of 25.16%, carbohydrate content of 53.67%, fiber content of 7.55%, Ash 6.01% are present. The result obtains that the crude protein content is comparatively similar with legumes such as cowpea, pigeon pea, and Bambara groundnut. The level of crude protein content has specific nutritive significance as it is used in infant protein and enhances the immune system against diseases. Many studies show that the flowers are contain 31%, the leaves contain 44%, and pods contain 30% of amino acids. The flowers and immature pods have similar content of linolenic, linoleic, palmitic, and oleic acids [9].

The linolenic, linoleic, palmitic, and oleic acids are types of PUFAs. PUFAs control cholesterol. Studies show 76% of PUFA is found in moringa seed oil making it similar to olive oil [9].

Table 1: Essential amino acids in *M. Oleifera flower* (milligram per gram of dry weight basis) [10].

Amino acid	Flower
Aspartate	12.3±0.9
Glutamate	17.0±2.2
Serine	7.5±0.4
Histidine	3.1±0.4
Glycine	6.5±0.3
Threonine	5.4±0.2
Alanine	8.1±0.5
Proline	6.6±0.5
Tyrosine	0.4±0.1
Arginine	20.1±1.2
Valine	6.4±0.6
Methionine	1.0±0.2
Isoleucine	5.2±0.5
Leucine	5.6±0.5

Phenylalanine	3.8±0.5
Lysine	4.6±0.5
Total	116.7±3.2
Essentials	38.6±1.5

Table 2: Proximate analysis of *Moringa oleifera* flower powder [7].

Proximate analysis of MOFP	Values (%)
Protein (g)	25.16
Fat (g)	1.7
Carbohydrates (g)	53.67
Fiber (g)	7.55
Ash	6.01
Moisture	5.8

### III. MOF PRODUCTS & HEALTH BENEFITS

*Moringa oleifera* plant is known for its high nutrient properties and hence widely cultivated and extensively used in food in Africa, Asia, the Philippines, South Africa, and North Asia. *Moringa oleifera* consists of safe and healthy proteins, amino acids, and bioactive compounds. In addition, it is a good source of vitamins and minerals like phosphorus, calcium, iron, etc.

Although, each part of the *Moringa oleifera* plant is highly nutrient and having health beneficial constituents, especially its edible flowers are beneficial in the treatment of many diseases like treatment of tumor, herbal tonic for functional infertility and sexual weakness of both males and females, etc. However, there are very few reports available on the use of *Moringa oleifera* flowers in food products to improve human welfare.

Another study shows that the inclusion of *Moringa oleifera* flower powder could enhance the organoleptic properties of cereal such as maize and millet in proximate composition. They concluded that blend 6 (70:10:20) was generally acceptable blends in ratio maize, millet, and *Moringa oleifera* flower powder (MOFP). They also stated that Blend 6 formulate including the highest quality of good color, texture, taste, and flavor can be a substitute for the weaning foods to pick up the nutritional intake of children and help to restrain protein malnutrition [7].

A recent report demonstrated that *Moringa oleifera* is an inexpensive and cost-effective alternative to meat to those needy people who cannot pay for meat to overcome their energy requirements. The study concluded that snacks are fortified with protein isolate extracted from moringa addition of protein content and also help to fight against malnourishment [8].

Another report concluded that *Moringa oleifera* flower powder (MOFP) contains protein, calcium, iron, vitamin C, and fiber and suggested including dry MOFP into the meal at the household level to improve the nutritional status of the people [6].

Another research paper reveals that the MOFP is a source of dietary fiber and also contains high antioxidant incipients such as ferric reducing antioxidant power and free radical scavengers. The addition of *Moringa oleifera* flower (MOF) extract in chicken meat nuggets enhanced the odor score, lipid stability, and shelf-life period up to 20 days in the refrigerator. So that it enhanced the cooking process and dietetic fiber content immune the sustainability of the animal protein product. Hence fore, the MOF not only offering health benefits but also a safe, natural, and valuable antioxidant to the meat

food industry [5].

#### IV. CONCLUSION

There are not many studies on this MOF. The people perhaps aren't aware of the flower. They know only about the Leaves, seeds, And Pods. MOF has highly nutritive values. This is a small trial to include moringa flowers for good nutrient value. Also, the properties of MOFP used in incorporated recipes help to increase a good amount of properties. Much MOFP research will continue to find the many components and bioactive compounds. Eating MOFP powder in food products is good for those suffering from Malnourishment, Anemia, High BP, Diabetes, and various Diseases.

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