AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 03, Issue: 03 (March, 2026)
Available online at http://www.agrimagazine.in
©Agri Magazine, ISSN: 3048-8656

Characteristics and Uses of Moringa Seed Cake

Kamaleshwaran, R[1], *Durgadevi, R[2], Jeyasania[2], Meena[2], Janet Sweety Celsia[2] and Priyadharshini[2]

[1]Guest faculty, School of Agriculture and Animal Sciences, Department of Soil Science and Agricultural Chemistry, The Gandhigram Rural Institute (DTBU), Gandhigram, Dindigul – 624302, India

[2]UG Scholar, School of Agriculture and Animal Sciences, The Gandhigram Rural Institute (DTBU), Gandhigram, Dindigul – 624302, India

*Corresponding Author's email: rajkumarjanani16@gmail.com

Moringa seed cake is a valuable agro-industrial by-product obtained after the extraction of oil from the seeds of *Moringa oleifera*, a fast-growing, drought-tolerant tree widely cultivated in tropical and subtropical regions. While moringa is traditionally recognized for its nutritious leaves and pods, the seeds and their derivatives have gained increasing attention in recent years due to their significant economic, agricultural, and environmental potential. The seed cake, often considered a waste material, is now being re-evaluated as a multifunctional resource with wide-ranging applications.

The cake is characterized by a high protein content, along with essential minerals and biologically active compounds. Notably, moringa seed cake contains natural cationic proteins that possess strong coagulating and flocculating properties, making it useful in water purification and wastewater treatment. This unique characteristic distinguishes it from many other oilseed cakes and highlights its role in low-cost, eco-friendly water treatment solutions, particularly in rural and resource-limited areas.

In agriculture, moringa seed cake is increasingly used as an organic fertilizer and soil amendment, as it improves soil fertility, enhances microbial activity, and supports sustainable crop production. After appropriate detoxification or processing, it also shows promise as a protein-rich ingredient in livestock and aquaculture feed, contributing to improved feed efficiency and nutritional balance. Furthermore, its potential applications in bioproduct development, nutraceuticals, and industrial uses are being actively explored.

Characteristic of Moringa Seed Cake

1. Physical Characteristics:

Moringa seed cake is generally:

- Brown to light yellowish in colour
- Fine to coarse textured, depending on grinding and extraction method
- Low in moisture content, which enhances its shelf life and reduces microbial spoilage
- Mild to slightly pungent odor, typical of oilseed cakes

The low moisture level makes it suitable for storage and handling when kept under dry conditions.

2. Chemical and Nutritional Characteristics

a. High Protein Content:

One of the most important characteristics of moringa seed cake is its exceptionally high protein content, especially in defatted cake. Protein levels commonly range between 25–60%, making it comparable to or even superior to many conventional oilseed cakes.

The proteins include essential amino acids, contributing to its nutritional and functional value.

b. Low Residual Fat:

After oil extraction, the seed cake contains very low residual oil, generally less than 1–2%, which improves its stability and reduces the risk of rancidity. This low fat content also enhances its suitability for agricultural and environmental applications.

c. Fiber and Carbohydrates:

Moringa seed cake contains moderate amounts of crude fiber and carbohydrates, which support its role as a soil amendment and organic fertilizer. Fiber content also influences its digestibility when considered for animal feed applications.

d. Mineral (Ash) Content:

The cake is a good source of essential minerals such as Calcium, Potassium, Phosphorus and Magnesium.The ash content typically ranges from 6–10%, reflecting its mineral richness and importance in soil fertility improvement.

3. Bioactive and Functional Characteristics:

a. Natural Coagulant Properties:

A unique and widely studied characteristic of moringa seed cake is the presence of cationic (positively charged) proteins. These proteins act as natural coagulants, capable of binding suspended particles in water and causing them to settle. This property enables its use in:

- Drinking water purification
- Wastewater treatment
- Reduction of turbidity and microbial load

This eco-friendly property distinguishes moringa seed cake from most other oilseed cakes.

b. Antioxidant and Antimicrobial Properties:

Moringa seed cake retains phenolic compounds, flavonoids, and other phytochemicals that contribute to antioxidant activity. These compounds help inhibit microbial growth and support its use in organic agriculture and environmental management.

4. Agronomic Characteristics:

When applied to soil, moringa seed cake functions as:

- An organic fertilizer, supplying nutrients gradually
- A soil conditioner, improving soil structure and aeration
- A biostimulant, enhancing microbial activity and nutrient availability

Its slow nutrient release reduces leaching losses and supports sustainable crop production.

Value Addition And Uses Of Moringa Seed Cake

1. Organic Fertilizer and Soil Amendment:

Moringa seed cake is widely used as an organic manure due to its high nutrient and mineral content.

Uses:

- Improves soil fertility and structure
- Enhances microbial activity in soil
- Provides slow-release nutrients to crops

Crops: vegetables, fruit trees, plantation crops, and medicinal plants.

2. Natural Coagulant for Water Purification:

One of the most important uses of moringa seed cake is in water treatment.

Uses:

- Clarification of drinking water
- Reduction of turbidity and suspended solids
- Treatment of household and rural water sources
- It serves as an eco-friendly alternative to chemical coagulants such as alum.

3. Livestock and Poultry Feed (After Processing):

After detoxification, moringa seed cake can be used as a protein supplement in animal feed.

Uses:

- Improves growth and productivity
- Reduces dependence on costly protein feeds
- Suitable for cattle, goats, poultry, and fish (in limited proportions)

4. Bio-Pesticide and Nematicide:

Moringa seed cake exhibits antimicrobial and nematicidal properties.

Uses:

- Suppresses soil-borne pests and pathogens
- Controls root-knot nematodes
- Used in organic and natural farming systems

5. Compost Enrichment Material:

Moringa seed cake is used to enrich compost and vermicompost.

Uses:

- Increases nutrient value of compost
- Accelerates decomposition
- Improves compost quality

6. Industrial and Research Applications:

Moringa seed cake is used in:

- Protein extraction for industrial binders
- Biopolymer and enzyme research
- Pharmaceutical and nutraceutical studies

7. Environmental Management:

Its biodegradable and non-toxic nature makes it useful in:

- Wastewater treatment
- Eco-restoration practices
- Sustainable waste recycling systems

References

1. Okuda T, Ali EN. Application of *Moringa oleifera* plant in water treatment. In: Water and wastewater treatment technologies. Singapore: Springer Singapore; 2018. p. 63-79.
2. Tushar Ravikiran Ramteke, Larens Kuril and Om Prakash Suryawanshi,2024. Quality evaluation of moringa (*Moringa oleifera*) seed and defatted cake. *International Journal of Advanced Biochemistry Research*, 8(6): 226-231.