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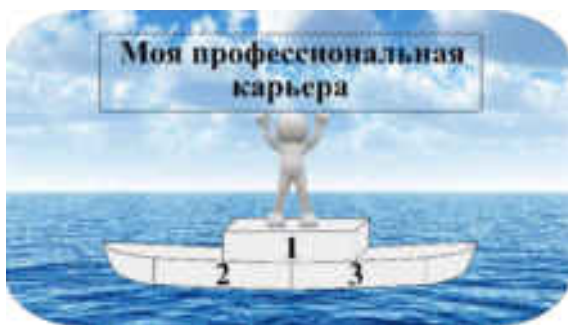


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**Международный научно-образовательный электронный журнал
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Журнал объединяет авторов на территории стран СНГ и помогает обмениваться передовыми научно-образовательными исследованиями.

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Название публикации: «TECHNOLOGY OF PRODUCING ORGANOMINERAL FERTILIZERS»

Abstract

Organomineral fertilizers represent a modern approach to sustainable agriculture by combining organic and mineral components to improve soil fertility and crop productivity. These fertilizers integrate the benefits of organic matter, such as improved soil structure and microbial activity, with the immediate nutrient availability of mineral fertilizers. This paper examines the production technologies, raw materials, processing methods, advantages, and applications of organomineral fertilizers, highlighting their role in environmentally friendly agricultural systems.

1. Introduction

The growing demand for food production has led to the extensive use of chemical fertilizers, which, although effective, have contributed to soil degradation, environmental pollution, and reduced soil biodiversity. In response to these challenges, organomineral fertilizers have emerged as a sustainable alternative that enhances soil health while maintaining high crop yields.

Organomineral fertilizers are produced by combining organic materials such as compost, manure, or peat with mineral fertilizers containing essential nutrients like nitrogen (N), phosphorus (P), and potassium (K). This combination allows for a gradual release of nutrients and improves nutrient use efficiency.

2. Concept and Principles of Organomineral Fertilizers

Organomineral fertilizers are designed to provide both immediate and long-term nutrient supply. The mineral fraction supplies readily available nutrients, while the organic fraction improves soil properties and supports microbial activity.

2.1 Role of Organic Components

Organic materials contribute to:

- Improved soil structure and aeration
- Increased water retention capacity
- Enhanced microbial activity
- Slow release of nutrients

2.2 Role of Mineral Components

Mineral fertilizers provide:

- Fast nutrient availability
- Precise nutrient composition
- High efficiency in crop uptake

The synergy between these components leads to better soil fertility and sustainable agricultural productivity.

3. Raw Materials for Production

3.1 Organic Materials

Common organic raw materials include:

- Animal manure (cow, poultry)
- Compost (plant residues, food waste)
- Peat and humus
- Agricultural by-products (straw, husks)
- Sewage sludge (treated and sanitized)

3.2 Mineral Components

Mineral inputs typically include:

- Nitrogen fertilizers (urea, ammonium nitrate)
- Phosphorus sources (superphosphate, rock phosphate)
- Potassium fertilizers (potassium chloride, potassium sulfate)

3.3 Additives and Enhancers

Additional substances may be included:

- Microelements (Zn, Fe, Mn, Cu)

- Bioactive compounds
 - Microbial inoculants
-

4. Production Technologies

The production of organomineral fertilizers involves several key technological steps to ensure uniformity, stability, and effectiveness.

4.1 Composting and Pre-Treatment

Organic materials are first processed through composting to stabilize them and eliminate pathogens.

Steps:

- Collection and sorting of raw materials
- Aerobic decomposition under controlled temperature and moisture
- Maturation of compost

This stage improves the quality and safety of organic inputs.

4.2 Mixing and Formulation

After pre-treatment, organic and mineral components are mixed in specific proportions depending on the desired nutrient composition.

Key Considerations:

- Nutrient balance (NPK ratio)
- Moisture content
- Homogeneity of mixture

Advanced mixing equipment ensures even distribution of nutrients.

4.3 Granulation Technology

Granulation is one of the most important steps in production, as it improves handling, storage, and application.

Methods:

- Drum granulation

- Disc (pan) granulation
- Extrusion granulation

Process:

- Addition of binders (e.g., lignosulfonates)
- Formation of granules under rotation
- Control of particle size

Granules enhance the slow-release properties of fertilizers.

4.4 Drying and Cooling

After granulation, the product is dried to reduce moisture content and improve shelf life.

Steps:

- Thermal drying using hot air
 - Cooling to prevent caking
 - Stabilization of granules
-

4.5 Screening and Packaging

Final processing includes:

- Screening to separate uniform granules
 - Recycling of undersized and oversized particles
 - Packaging for storage and distribution
-

5. Mechanism of Action in Soil

Organomineral fertilizers function through a combination of physical, chemical, and biological processes:

- **Nutrient Release:** Mineral nutrients are immediately available, while organic matter decomposes slowly
- **Soil Improvement:** Organic content enhances soil structure and porosity
- **Microbial Activity:** Supports beneficial microorganisms that aid nutrient cycling

- **Reduced Leaching:** Organic matter binds nutrients, preventing loss
-

6. Advantages of Organomineral Fertilizers

6.1 Improved Soil Health

Enhances soil fertility by increasing organic matter content and biological activity.

6.2 Higher Nutrient Efficiency

Reduces nutrient losses and improves plant uptake.

6.3 Environmental Protection

Minimizes pollution caused by excessive chemical fertilizer use.

6.4 Cost-Effectiveness

Utilizes waste materials, reducing production costs in the long term.

6.5 Sustainable Agriculture

Supports long-term productivity without degrading soil quality.

7. Challenges and Limitations

Despite their benefits, organomineral fertilizers face certain challenges:

- Variability in organic raw materials
 - Higher production complexity
 - Transportation and storage issues
 - Need for quality control and standardization
-

8. Applications in Agriculture

Organomineral fertilizers are widely used in:

- Crop production (cereals, vegetables, fruits)
- Horticulture
- Organic farming systems
- Soil restoration and reclamation projects

They are particularly effective in degraded soils where both nutrient supply and soil structure need improvement.

9. Future Trends and Innovations

Research is focused on improving the efficiency and sustainability of organomineral fertilizers:

- Development of bio-enhanced fertilizers with beneficial microbes
- Use of nanotechnology for controlled nutrient release
- Recycling of industrial and agricultural waste
- Smart fertilizers integrated with precision agriculture systems

10. Conclusion

The technology of producing organomineral fertilizers represents a significant advancement in sustainable agriculture. By combining organic and mineral components, these fertilizers address the limitations of conventional fertilizers and contribute to improved soil health and crop productivity.

Although challenges remain, continued innovation and technological development are expected to enhance their effectiveness and adoption worldwide. Organomineral fertilizers are a key component in achieving environmentally friendly and economically viable agricultural systems.