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MICROBIAL DEGRADATION OF FLORAL WASTE: SUSTAINABLE SOLUTIONS FOR FLORICULTURE BYPRODUCTS

Malepati S N V S Sripriya Bhargavi*, M Gayathri, S P Mirunalini, C Muthu Lakshmi Bavithra
Ph.D Scholar, Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu.
Corresponding Author Mail ID: malepati.priya24@gmail.com

ABSTRACT:

Floral waste generated after flower use presents environmental challenges, but microbial degradation offers sustainable solutions to this problem. Microbial communities in floral waste, comprising bacteria, fungi, and actinomycetes, decompose organic compounds through aerobic and anaerobic processes. Applications include composting, vermicomposting, bioremediation, and bioenergy production can be employed for this. Microbial degradation reduces greenhouse gas emissions, conserves landfill space and enhances soil fertility. Challenges include optimization, odour management and regulatory compliance. Embracing microbial degradation represents a proactive approach to achieving sustainability in floriculture, fostering a circular economy where floral waste becomes a source of nutrients, energy and ecological resilience.

INTRODUCTION:

Floral waste generated from floriculture operations presents significant environmental challenges, including potential soil and water contamination, greenhouse gas emissions and aesthetic degradation. However, microbial degradation offers a promising avenue for managing floral waste sustainably.

Microbial Diversity in Floral Waste:

Floral waste comprises a diverse array of organic materials, including stems, leaves and petals. These substrates provide a rich source of nutrients for various microorganisms, including bacteria, fungi, and actinomycetes. Microbial communities in floral waste play essential roles in decomposing complex organic compounds through enzymatic degradation, facilitating nutrient recycling and organic matter turnover.

Microbial Processes in Floral Waste Degradation:

Microbial degradation of floral waste involves multiple metabolic pathways, including aerobic and anaerobic respiration, fermentation and lignocellulose breakdown. Aerobic bacteria and fungi dominate in well-aerated environments, utilizing oxygen to decompose floral waste into simpler compounds such as carbon dioxide, water and humus. In anaerobic conditions, fermentative bacteria and methanogenic archaea contribute to degradation through fermentation and methane production.

Applications of Microbial Degradation in Floriculture:

Microbial degradation offers several practical applications for managing floral waste in floriculture operations. Composting, a controlled aerobic degradation process, transforms floral waste into nutrient-rich

compost suitable for soil amendment and plant growth enhancement. Vermicomposting, employing earthworms to accelerate decomposition, further enhances nutrient mineralization and microbial activity in floral waste.

Bioremediation, utilizing microbial consortia to remediate contaminated soil and water, offers a sustainable solution for managing floral waste-associated pollutants such as heavy metals, pesticides and organic pollutants. Additionally, microbial degradation can be harnessed for the production of bioenergy through anaerobic digestion, converting floral waste into biogas for heat and power generation.

Benefits of Microbial Degradation in Floriculture:

Microbial degradation presents numerous environmental, economic and social benefits for floriculture operations. By diverting floral waste from landfills and incineration, microbial degradation reduces greenhouse gas emissions, conserves landfill space and mitigates environmental pollution. Moreover, the production of compost and bioenergy from floral waste contributes to soil fertility, resource conservation and renewable energy generation, fostering sustainable agricultural practices and enhancing the resilience of floral ecosystems.

CHALLENGES AND FUTURE THRUST:

Despite its potential benefits, microbial degradation of floral waste faces challenges such as process optimization, odour management and regulatory compliance. Future research efforts should focus on improving degradation efficiency, exploring novel microbial strains and integrating microbial degradation technologies into integrated waste management strategies for the floriculture industry.

CONCLUSION:

Microbial degradation offers a sustainable and cost-effective solution for managing floral waste in floriculture operations, transforming organic residues into valuable resources while mitigating environmental impacts. By harnessing the power of microorganisms, floriculture can embrace a circular economy approach, where floral waste becomes a source of nutrients, energy, and ecological resilience. Embracing microbial degradation technologies represents a proactive step towards achieving sustainable and regenerative practices in the floriculture industry.