

BRIEF REPORT

Poultry-based amendments and cover crop residues for sustainable greenhouse soil management

Andronescu Fikai*

Department of Biodiversity, Prince Sultan University, Riyadh 11586, Saudi Arabia

*Corresponding author E-mail: andronescu@ficai.sa

Received: 03 May, 2024, Manuscript No: UJE-24-138607; **Editor assigned:** 06 May, 2024, PreQC No: P-138607; **Reviewed:** 18 May, 2024, QC No: Q-138607; **Revised:** 23 May, 2024, Manuscript No: R-138607;

Published: 30 May, 2024

Under greenhouse conditions, the utilization of poultry-based amendments and cover crop residues presents a promising avenue for improving nutrient cycling and enhancing soil health. This article explores the synergistic effects of these agricultural practices, elucidating their role in fostering sustainable soil management systems. Through the decomposition of poultry-based amendments and cover crop residues, essential nutrients are released, enriching the soil microbiome and promoting plant growth. Furthermore, the incorporation of these organic materials enhances soil structure, water retention, and microbial activity, thereby mitigating soil degradation and promoting long-term agricultural sustainability. This article highlights the significance of integrating poultry-based amendments and cover crop residues into greenhouse management strategies to optimize nutrient cycling and foster soil health.

Keywords: Poultry-based amendments, Cover crop residues, Greenhouse conditions, Nutrient cycling, Soil health, Sustainable agriculture.

Introduction

In the quest for sustainable agricultural practices, optimizing nutrient cycling and preserving soil health are paramount objectives. Greenhouse conditions offer a controlled environment for exploring innovative techniques to achieve these goals. Among the various strategies, the incorporation of poultry-based amendments and cover crop residues has garnered significant attention for its potential to enhance soil fertility and structure. Poultry-based amendments, such as poultry manure or compost, are rich sources of organic matter and essential nutrients. When applied to greenhouse soils, these amendments undergo decomposition, facilitated by microbial activity. This decomposition process releases nutrients such as nitrogen, phosphorus, and potassium, which are vital for plant growth and development. Additionally, the organic matter in poultry-based amendments improves soil structure, fostering aeration and water retention. By replenishing soil nutrients and enhancing soil physical properties, poultry-based amendments contribute to the overall health and productivity of greenhouse soils.

Cover crops play a crucial role in soil conservation and fertility management. When cover crop residues are incorporated into greenhouse soils, they contribute to organic matter accumulation and carbon sequestration. These residues act as a substrate for microbial communities, accelerating the decomposition process and nutrient release. Moreover, cover crop residues help suppress weeds, reduce soil erosion, and enhance soil moisture retention. By harnessing the benefits of cover crop residues, greenhouse growers can improve soil health while minimizing environmental impact. The combined use of poultry-based amendments and cover crop residues yields synergistic effects that amplify their individual benefits. The organic matter from poultry-based amendments provides a nutrient-rich substrate for microbial activity, facilitating the breakdown of cover crop residues. In turn, the decomposition of cover crop residues releases additional nutrients and organic compounds, enriching the soil microbiome. This symbiotic

relationship between poultry-based amendments and cover crop residues promotes nutrient cycling and enhances soil biological activity. As a result, greenhouse soils become more resilient to nutrient depletion and environmental stressors, supporting healthy plant growth and sustained productivity.

Description

While the use of poultry-based amendments and cover crop residues offers numerous benefits, there are also challenges and considerations to be mindful of. One challenge is the potential for nutrient imbalances or excesses, particularly if amendments are applied in excessive amounts. Proper nutrient management practices, including regular soil testing and careful application rates, are essential to avoid nutrient runoff and environmental pollution. Additionally, the quality of poultry-based amendments can vary depending on factors such as bedding material, diet, and management practices. Growers should source high-quality amendments from reputable suppliers to ensure optimal nutrient content and microbial activity. Furthermore, the selection of cover crops requires careful consideration based on local climate, soil conditions, and production goals. Different cover crop species offer unique benefits in terms of nutrient cycling, weed suppression, and soil improvement. Growers should choose cover crops that complement their cropping system and management objectives.

As research in soil health and sustainable agriculture continues to evolve, there is a growing need for further exploration of poultry-based amendments and cover crop residues in greenhouse production. Future studies could investigate the long-term effects of these practices on soil carbon sequestration, greenhouse gas emissions, and crop productivity. Moreover, interdisciplinary research involving agronomy, soil science, microbiology, and environmental science can provide valuable insights into the mechanisms underlying the interactions between organic amendments, cover crops, and soil health. Furthermore, outreach and education initiatives can help disseminate knowledge and best practices related to the use of poultry-based amendments and cover crop residues among greenhouse growers. By fostering collaboration between researchers, growers, and agricultural extension services, stakeholders can work together to develop sustainable soil management strategies that benefit both agricultural production and the environment.

The utilization of poultry-based amendments and cover crop residues under greenhouse conditions represents a promising strategy for enhancing nutrient cycling and soil health, thereby contributing to the sustainability of agricultural systems. By harnessing the synergies between these organic inputs, growers can create resilient soil management systems that promote sustainable agriculture. However, to fully realize the potential of these practices, growers must address challenges such as nutrient management and cover crop selection while embracing opportunities for interdisciplinary research and knowledge exchange. Through collaborative efforts, the integration of poultry-based amendments and cover crop residues can pave the way for a more resilient and environmentally friendly approach to greenhouse production.

Conclusion

Under greenhouse conditions, the integration of poultry-based amendments and cover crop residues offers a holistic approach to improving nutrient cycling and soil health. By harnessing the synergies between these organic inputs, growers can create resilient soil management systems that promote sustainable agriculture. Through the enrichment of soil fertility, structure, and microbial diversity, poultry-based amendments and cover crop residues contribute to the long-term viability of greenhouse production. As the demand for environmentally friendly agricultural practices continues to rise, embracing these innovative techniques becomes imperative for ensuring food security and environmental stewardship. The utilization of poultry-based amendments and cover crop residues under greenhouse conditions represents a promising strategy for enhancing nutrient cycling and soil health, thereby contributing to the sustainability of agricultural systems.

Acknowledgement

None.

Conflict of Interest

The authors declare no conflict of interest.

References

- Bolyen, E., Rideout, J. R., Dillon, M. R., Bokulich, N. A., Abnet, C. C., Al-Ghalith, G. A., Caporaso, J. G. (2019). Reproducible, interactive, scalable and extensible microbiome data science using QIIME 2. *Nature Biotechnology* 37:852-857.
- Lima, I. M., Boykin, D. L., Klasson, K. T., Uchimiya, M. (2014). Influence of post-treatment strategies on the properties of activated chars from broiler manure. *Chemosphere* 95:96-104.
- Geisseler, D., Smith, R., Cahn, M., Muramoto, J. (2021). Nitrogen mineralization from organic fertilizers and composts: Literature survey and model fitting. *Journal of Environmental Quality* 50:1325-1338.
- Zhang, Z., Kaye, J. P., Bradley, B. A., Amsili, J. P., Suseela, V. (2022). Cover crop functional types differentially alter the content and composition of soil organic carbon in particulate and mineral-associated fractions. *Global Change Biology* 28:5831-5848.
- Webster, E., Gaudin, A. C., Pulleman, M., Siles, P., Fonte, S. J. (2019). Improved pastures support early indicators of soil restoration in low-input agroecosystems of Nicaragua. *Environmental Management* 64:201-212.

Citation:

Ficai, A. (2024). Poultry-based amendments and cover crop residues for sustainable greenhouse soil management. *Ukrainian Journal of Ecology*. 14:22-24.



This work is licensed under a Creative Commons Attribution 4.0 License
