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Application of duckweed as an organic amendment for food production.

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Intensive swine farming generates nutrient-rich wastewater that, if mismanaged, poses environmental risks but also offers opportunities for resource recovery. Duckweed, noted for its rapid growth and high nutrient-uptake capacity, offers a promising solution for wastewater treatment and holds untapped potential for agricultural valorisation. This study investigated duckweed cultivated on both swine wastewater and mineral fertilizer to produce a nutrient-rich biomass for application as an organic amendment, thereby enhancing sustainable food production. Agronomic evaluations were conducted to assess the potential of duckweed as an organic amendment in comparison to mineral fertilizer and raw manure. Duckweed biomass, both dried and fresh, was tested in a 52-day pot experiment with spinach (*Spinacia oleracea*) and lettuce (*Lactuca sativa*). Additionally, wheat (*Triticum aestivum*) was grown for 168 days under laboratory conditions. The findings indicate that duckweed-based amendments, when combined with raw manure, enhanced the growth and biomass accumulation of spinach, lettuce and wheat, outperforming the mineral fertilizer treatment. The fertilizing potential of the produced biomass, in both dried and fresh forms, was demonstrated to be comparable to the use of raw manure and other inorganic fertilizers. The integrated use of duckweed with raw manure further enhances soil nutrient cycling through synergistic effects on mineralization, reinforcing the approach of combining organic nutrient sources to optimize crop performance and soil health. Duckweed-based amendments reduce nutrient losses, slowly releasing nutrients, and enabling wastewater bioremediation and production of nutrient-rich biomass that supports sustainable crop production and soil regeneration.

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References

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