

Insect-based organic waste recycling technology: Potential and bottlenecks for large-scale application in the bioeconomy

Mini-review Published: 08 May 2025

Volume 45, pages 2489–2512 (2025) [Cite this article](#)



**International Journal of Tropical
Insect Science**

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Abstract

Organic waste in the agriculture and food value chains contribute between 8–10% to global greenhouse gas emissions, limits progress towards accomplishing global food security and aggravates environmental impacts of intensive agriculture. In particular, in urban areas, organic waste is produced at a rate of one billion tons per year and it is projected to reach 1.7 billion tons by 2050. Innovative ways of recycling organic waste are therefore urgently required. Insect-based waste recycling presents a novel pathway to organic waste management in line with bioeconomy principles. Insects can convert different types of waste biomass into useful products such as nutritious animal feeds, biofuel, and organic fertilizer. To attain the full benefits of insects in waste recycling, they must be reared in a controlled environment at an industrial scale. However, many research gaps need to be addressed to achieve this development. This paper presents a comprehensive literature review on various insect-based waste recycling techniques, including industrialization, bioproducts, challenges as well as opportunities of insect-

based waste recycling, while highlighting the research gaps. In conclusion, the increasing interest of investors, municipalities and development stakeholders in insect-based waste recycling technologies has exposed various technological and knowledge gaps which must be closed to fully unlock its potential to contribute to the bioeconomy transformation of the organic waste sector.

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Data availability

The data for this study are available from the corresponding author on reasonable request.

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