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Othman, R.[a] , Hatta, F.A.M.[b] , Latif, N.H.M.[c] , Wan Sulaiman, W.S.H.[c] , Ramya, R.[d] , Ali, Q.A.M.[b] , Johari, N.N.[a] , Bakar, A.E.A.[c]

Algal-based Degradation of Microplastic: Prospects for Combating Microplastic Pollution
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[a] Herbarium Unit, Department of Landscape Architecture, Kulliyyah of Architecture and Environmental Design, International Islamic University Malaysia, Kuala Lumpur, Malaysia
[b] Institute of Islam Hadhari, The National University of Malaysia, Bangi, Malaysia
[c] International Institute for Halal Research and Training, International Islamic University Malaysia, Kuala Lumpur, Malaysia
[d] Institute of the Malay World and Civilization, The National University of Malaysia, Bangi, Malaysia

Abstract
Microalgae or microphytes are microscopic microorganisms that can be found in both freshwater and seawater. They can be described as a diverse group of unicellular and predominantly photosynthetic organisms. Eukaryotic or prokaryotic cyanobacteria (blue-green algae) can be classified as microalgae. The phycoremediation process uses microalgae to bioremediate (bioconcentrate, biotransform, sequester, assimilate, and biosorption) contaminants like heavy metals, phosphates, nitrates and the most recent microplastics from polluted waters in an eco-friendly manner without generating additional toxic compounds. It is a reliable alternative method for addressing microplastic pollution in a responsible, cost-effective, and practical manner when compared to conventional treatment methods. It also has the added benefit of lowering the carbon footprint. Several initiatives have been undertaken in the fields of immobilisation, pre-treatment techniques, genetic engineering, and other technologies to fully harness the potential of microalgae in phycoremediation and the production of value-added products (such as bioenergy and biofuel generation). Additionally, to address the ever-growing problem of water pollution in the world, particularly microplastic pollution, phycoremediation strategies must examine and develop hyperaccumulator algae species from pre-existing algal species. This integrated structure is a prime example of how to achieve numerous goals while implementing sustainable growth policies that address environmental, social, and industrial concerns, protecting natural resource, and simultaneously enhancing the quality of life for the world's growing population. Consequently, an in-depth research is necessary to analyse or produce hyperaccumulator algae species that could easily and efficiently tackle the issue of microplastic pollution. © The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2024.

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Biodegradation mechanism; Cyanobacteria; Microalgae; Phycotechnology; Plastics

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Correspondence Address
Othman R.; Herbarium Unit, Malaysia; email: rashidi@iium.edu.my

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