Biodegradability of Low Density Polyethylene (LDPE) by Fungi Isolated from Urban Dump Sites in Sri Lanka

Proceedings of the 6th International Conference on Multidisciplinary Approaches (iCMA) 2019 | Faculty of Graduate Studies, University of Sri Jayewardenepura

Posted: 5 Dec 2019

GD Ramanayake
Faculty of Graduate Studies, University of Sri Jayewardenepura

D Udayanga
Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura

AHL Nilmini
Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura

LJS Undugoda
Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura

NNRN Nugara
Department of Biosystems Technology, Faculty of Technology, University of Sri Jayewardenepura

PM Manage
Centre for Water Quality and Algae Research, Department of Zoology, University of Sri Jayewardenepura

Date Written: December 3, 2019

Abstract

Low-density polyethylene (LDPE) is one of the most common types of plastic produced and consumed globally. Due to the slower biodegradability, LDPE is highly accumulated in the environment and create adverse effects on the balance of natural ecosystems. Exploring microbes with the potential of speeding up the biodegradation of LDPE waste is considered to be an innovative, emerging and eco-friendly trend in solid waste management. Therefore, the present study was focused on the isolation of LDPE degrading fungal species from urban waste dumping sites located at Meethotamulla, Karadiyana and Kaduwela in Colombo, Sri Lanka. Soil samples with partially degraded polyethylene debris were collected and fungi showing different morphological characteristics were isolated on Potato Dextrose Agar (PDA) medium following the standard spread plate method. Ten and twenty discs of 7 days old fungal strains were introduced into 50 mL of Potato Dextrose Broth (PDB) and mineral salt media contained pre-

sterilized 1 g of LDPE pellets respectively and incubated at 28 ℃ for 30 days. Controls were maintained appropriately, without inoculating the fungus. Biodegradability of LDPE was evaluated by the percentage loss of weight of LDPE pellets after 30 days of incubation. Ten morphologically different fungi were isolated in the present study. Remarkable degradation of LDPE was exhibited by two fungal isolates, tentatively identified as *Aspergillus* sp., SJP-GF082 and *Penicillium* sp., SJP-GF037, in both media while control remained the same. After 30 days of incubation, *Aspergillus* sp. SJP-GF082 and *Penicillium* sp. SJP-GF037 showed the percentage weight loss of 3.0%, 9.7% in the Mineral salt medium and 3.5%, 3.4% in PDB respectively. Therefore, the two fungal isolates: *Aspergillus* sp. SJP-GF082 and *Penicillium* sp. SJP-GF037 isolated and identified in the present study, have the potential to degrade LDPE, which is generally resistant to natural degradation processes. Hence, the isolated strains can be used to develop an eco-friendly alternative treatment method to degrade LDPE, and further studies are in progress.

Keywords: biodegradation, LDPE, fungi, *Aspergillus* sp., *Penicillium* sp.