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BIOPLASTIC PRODUCING MICROORGANISMS FROM RAW AGRICULTURAL RESIDUES

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Abstract

The increase in environmental problems has led to new searches that can be an alternative to petroleum-based plastics. At this point, bioplastics are good biodegradable alternatives. However, the cost of bioplastic can be higher than the cost of petrochemical-based plastics. For low cost production of bioplastics, agricultural waste/s are good alternatives as raw material. In this study barley straw and pumpkin residues were used as carbon sources for the isolation of bioplastic producing bacteria. A total of 23 bioplastic producing isolates were found but, only 2 of them produced bioplastic from both barley straw and pumpkin residues. These isolates were identified as *Bacillus aryabhathi* and *Bacillus filamentosus*. The bioplastic yields were as effective as commercial carbon sources. *Bacillus aryabhathi* accumulated 151.5 and 129.8 mg/L bioplastics, while *Bacillus filamentosus* accumulated 188.4 mg/L and 123.3 mg/L bioplastics when barley straw and pumpkin residues were used as carbon sources, respectively. The produced bioplastics were characterized by UV–Vis, IR, ¹H NMR, and ¹³C NMR spectroscopies, which concluded the structure of the polymer as PHB. These isolates can be used for industrial bioplastic production from agricultural residues, cost reduction, and waste removal and might contribute to a green economy in the future.

Key words: agricultural wastes, barley straw, bioplastic, FTIR, NMR, pumpkin

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