

Title

Microbial methane production using plastics as substrate

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Area of research and domain of research

Microbiology & Greenhouse gas reduction using plastics

Objective of the research

The aim of this proposal is to reduce the level of environmental pollutants using microbes. Certain microorganisms such as *Pseudomonas alcaligenes* are capable of degrading plastics and their metabolic profile can be used to reduce plastic accumulation. Isolation of these bacteria and their genes and introduction of these genes to methane producing bacteria using suitable vector will result in the production of methane using plastics as substrate. The key challenge of the research will be the identification of genes responsible for the catabolism of plastic polymer and transferring the genes into methanogens (methane producing bacteria)

Background description

The purpose of this research is to simultaneously reduce both the plastics and greenhouse gas. Methane production and utilisation and reduction of plastic both can directly or indirectly reduce greenhouse gas emissions – the major problem of environment nowadays.

Although there are research going on to utilizing the metabolic activity of plastic degrading bacteria, there is still more way to go and the idea of using its capacity for methane production is not reported yet.

Expected results

Successful isolation of genes responsible for plastic degradation from plastic degrading bacteria and introduction of the genes into methanogens can result in production of methane using plastics as substrate. Large scale implementation of the process can significantly reduce pollutants and improve the health and functioning of various ecosystem.

Reference

Urbanek, A. K., Rymowicz, W., & Mirończuk, A. M. (2018). Degradation of plastics and plastic-degrading bacteria in cold marine habitats. *Applied microbiology and biotechnology*, 102, 7669-7678.

Asiandu, A. P., Wahyudi, A., & Sari, S. W. (2021). A review: plastics waste biodegradation using plastics-degrading bacteria. *Journal of Environmental Treatment Techniques*, 9(1), 148-157.