Bioformulation For High-Density Polyethylene (Hdpe) Degradation

High-density Polyethylene (HDPE) is rigid, hard, and has a greater tensile strength than the other polyethylene polymers. Because of their high durability, they accumulate in the environment at the rate of 25 million tons per year. It has been observed that a PE sheet incubated in moist soil for 12 years shows no signs of deterioration and only partial degradation could be seen after 32 years. The resistance of polyethylene to biodegradation stems from its high molecular weight, three-dimensional structure, hydrophobic nature and lack of functional groups recognizable by existing microbial enzyme systems. Major strategies to facilitate PE disintegration and subsequent biodegradation, were focused on the direct incorporation of carbonyl groups within the backbone or on their in-situ generation by pro-oxidant additives like polyunsaturated compounds, transition metal ions and dithiocarbamates. These functional groups act as initiators of thermal and photo-oxidation of the hydrocarbon polymer chains (, thereby increasing the surface hydrophilicity and facilitating biodegradation by microorganisms.

This invention relates to a formulation of bacterial consortium for degradation of high density polyethylene, developed by selective adaptability and enrichment under in-situ conditions, comprising, *Microbacteriurn* sp. strain MK3 (DQ 318884), *Pseudomonas putida* strain MK 4 (DQ 318885), *Bacterium Te68R* strain PN12 (DQ 423487). The individual bacteria were isolated, purified, characterized and conserved individually in five steps. Further, consortium development was also carried out in four different steps. Therefore, the specific combination of these three individual bacteria in defined quantity has tremendous utility for HDPE biodegradation.

Advantages:

1. A formulation of bacterial consortium for degradation of high density polyethylene, developed by selective adaptability and enrichment under *in situ* conditions.
2. It does not alter the functioning or any other property of bacterial preparation.
3. It can be used safely under any condition even for *in vitro* experiments without any risk or health hazards.
4. It can be formulated by using non pathogenic indigenous microorganisms.