Bioformulation for low-density polyethylene (LDPE) degradation

Plastic materials are strong, light-weight, and durable and thus are widely used in food, clothing, shelter, transportation, construction, medical, and recreation industries. However, because of its xenobiotic origin and recalcitrant nature, its biodegradation is problematic and therefore, it accumulates at a rate of 25 million tons per year. Low-density polyethylene (LDPE) is inert plastic materials with high molecular weight, complex three-dimensional structure, and hydrophobic nature. It is characterized by good toughness, resistance to chemicals, flexibility, and clarity. Despite of their wide applicability, the main limitation to their use is the fact that polyethylene adversely affects the environment. Earlier reports have shown that no signs of deterioration could be observed in polyethylene sheet incubated in moist soil for 12 years, and only partial degradation was observed in a polyethylene film buried in soil for 32 years. Thus, to deal with this environmental menace, biodegradation appears to be the best choice, as the other two approaches, land filling and incineration, have their own limitations.

The consortium was developed on the basis of screening of individual strains to utilize polyethylene as a primary carbon source. Furthermore, individual bacterial strains have been characterized by their 16s rDNA sequencing and their sequences have been submitted to the NCBI database.

This invention relates to a formulation of bacterial consortium for degradation of low density polyethylene, developed by selective adaptability and enrichment under in-situ conditions, comprising, *Pseudomonas aeruginosa* strain PS1 (EU741797), *P. putida* strain PW1 (EU741798), *P. aeruginosa* strain C1 (EU753182). 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 LDPE biodegradation.

Advantages:

1. A formulation of bacterial consortium for degradation of low 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.