

Bioplastics, Bioacids and Biocompost from Organic Wastes



Bioplastics such as polyhydroxyalkanoates (PHA) possess many characteristics similar to plastics particularly polyethylene, polystyrene and polypropylene. They are also amenable to thermal processing and moulding, hence they could be used in place of normal plastics. In Malaysia, there is a growing demand for the production of biodegradable packaging such as plastic bags and disposable food packs. However the high market price of bioplastics is the main obstacle for their widespread use.

Award Winner



Usually wastes are regarded as unwanted or discarded products requiring proper treatment and disposal to avoid environmental pollution. However, many organic wastes can actually be used as fermentation media for microbial growth and production of useful products. By using palm oil mill effluent (POME) or kitchen wastes as raw materials for the production of bioplastics, the costs of bioplastics can be reduced – making them more competitive as alternatives to conventional plastics.



PHA product from kitchen refuse

For the first time in Malaysia, UPM researchers have produced biodegradable plastics from organic wastes and effluent. These resources were first treated anaerobically for conversion to bioacids, which were then utilised to produce biopolymers with characteristics similar to normal everyday plastics. Unlike normal plastics, which are non-biodegradable, these bioplastics biodegrade naturally to carbon dioxide and water within a few weeks upon disposal in the soil or the environment. As such they can be the environmental-friendly alternatives to petrochemical-based plastics such as polyethylene and polypropylene. With the importance of environmental preservation and the growth of green and clean consumerism, there is a big potential for the usage of bioplastics in future. Recently the bioplastic production process from wastes has been improved and integrated to include production of biocompost suitable for use as fertilizer. UPM has applied for patent for this technology, PI Number 9601322.



Clear mixture of organic acids from POME

The major findings of this R&D are:

- Production and purification of organic acids from anaerobically treated palm oil mill effluent (POME) and kitchen waste;
- L-Lactic acid production from kitchen waste by a locally isolated bacteria;
- Bioplastic production from organic acids obtained from anaerobically treated POME and kitchen wastes using fed-batch pH-stat fermentation;
- Environmental friendly method for the extraction of bioplastic from bacterial cells.

In 2003 this project was awarded an IGS grant (Industrial Grant Scheme) from The Ministry of Science, Technology and Innovation for R&D on scaling up towards commercialization within two years. UPM is now collaborating with Kasa Ganda Sdn. Bhd. in commercializing this project.

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