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# *Abstract Book*

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# I-CReST 2025:158-125 – Time-dependent Polyethylene Terephthalate (PET) Biodegradation by *Aspergillus niger* and *Aspergillus oryzae* under Solid State Fermentation

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## ABSTRACT

Polyethylene terephthalate (PET) is a major plastic pollutant, contributing significantly to global environmental issues such as landfilling and microplastic due to its non-biodegradable nature. This study investigates the potential of fungal-mediated PET bottles biodegradation under solid-state fermentation (SSF) as a sustainable and eco-friendly waste management approach. This study evaluates the effects of fermentation time on the weight loss of PET after treatment with *Aspergillus niger* and *Aspergillus oryzae* separately. In this study, xylanase activity was measured over a 10-week treatment period to assess the enzyme's role in the hydrolysis and subsequent weight reduction of PET. The alterations in chemical structures and surface structure of the PET caused by the xylanase-mediated degradation were also analysed. The procedures begin with solid state fermentation using PET samples derived from mineral water bottle wastes as substrates. The fermentation was carried out separately by utilizing *Aspergillus niger* and *Aspergillus oryzae* as inoculum for 10 weeks. Sucrose and yeast extract were added as carbon and nitrogen sources to enhance the microbial activity. The procedures were continued with analysing xylanase activity throughout the fermentation period. The results showed that *Aspergillus oryzae* exhibited both highest xylanase activity of 467.8 U/ml and maximum PET weight loss of 1.91% at week 4. Meanwhile, *Aspergillus niger* showed peak xylanase activity at week 2 with 641.9 U/ml of xylanase activity, with its maximum weight loss 0.76% was observed at week 6. These results demonstrates that *Aspergillus oryzae* are more efficient for short term PET biodegradation compared to *Aspergillus niger*. This research suggests SSF as a convenient low-cost substrates, energy-efficient and low operational requirement plastic degradation method and contributing to advancements in microbial biotechnology and environmental sustainability.

**Keywords:** Polyethylene terephthalate; Solid state fermentation; Aspergillus niger; Aspergillus oryzae; Xylanase