

ABSTRACT

Angelica Paulina Laurence. 24020220120001. **Potential of Thermotolerant Bacteria from Gonoharjo Hot Spring as Degraders of Polyethylene Terephthalate (PET) Plastic.** Supervised by Anto Budiharjo and Wijanarka.

The increase in the amount of PET plastic waste in the environment is a major problem that can have adverse effects on the economic, health, and surrounding ecosystem sectors. Plastic waste is generally recycled using conventional methods, such as mechanical and chemical methods have many drawbacks and can be toxic to the environment. One potential solution is using PETase bacteria (EC 3.1.1.101) as plastic degraders. PET-degrading bacteria use plastic polymers as the main carbon source and convert them into monomers such as ethylene glycol and terephthalic acid. This study aimed to investigate the potential of 12 bacteria isolated from Gonoharjo hot springs in degrading PET plastic. The ability of the bacteria to degrade PET was tested using MSM media supplemented with PET film and incubated for 7 days. The calculation of the percentage of plastic weight loss was carried out to identify the most potential bacterial isolate in degrading PET. The degradation test results of 12 bacterial isolates (NA 3, NA 4, NA 9, NA 12, NA 13, NA 20, NA 22, TA 13, TA 15, TA 16, TA 18, and TA 20) showed that isolate TA 13 was the most potential in degrading PET film with a weight loss percentage of 0.11%. SEM analysis showed morphological changes with the formation of cracks on the PET film tested with the TA 13 isolate. FTIR analysis indicated a decrease in transmittance value at a wavelength of 1713 cm^{-1} from 22,15 to 21 and an increase in absorbance value from 0,655 to 0,678, also changes in vibration indicating the occurrence of ester bond hydrolysis and the formation of carbonyl groups. The calculation of the carbonyl index (CI) showed a decrease from 0,95 to 0,94 which was a result of the biodegradation of PET film.

Keywords: Bacteria, Biodegradation, MSM, PETase, Polyethylene Terephthalate, Waste