

# COLONIZATION OF MARINE BACTERIA ON VARIOUS TYPES OF PLASTIC POLYMERS: EARLY EFFORTS TO PROCESS PLASTIC WASTE IN THE MARINE

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## ABSTRACT

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Global annual production of fossil fuel-based plastics has increased exponentially from around 2 million in 1950 to around 438 million tons in 2017, and most of the plastic waste produced has polluted the environment, especially marine ecosystems. In the sea, the plastisphere has become a new marine ecosystem for biofilm-forming microorganisms which will influence the biodegradation process of plastic in the sea. Colonization of plastic surfaces by biofilm-forming bacteria is an initial requirement for the plastic biodegradation process by microbes to take place. Therefore, this research was carried out to determine the colonization of marine bacteria on plastic polymers and isolate bacteria that have the potential to become bioremediation agents for plastic waste. Based on TPC calculations on the natural plastisphere consortium, it shows that the number of colonies was found to be greater in PS>LD>HD samples with values respectively  $1.09 \times 10^7$ ,  $9.40 \times 10^3$ , and  $8.59 \times 10^5$  CFU/ml. Three bacterial isolates were successfully isolated from the plastisphere, namely SB1, SB2, and DB3, showing the ability to colonize PS, LD, and HD polymers based on their ability to form biofilms. Apart from that, testing for the production of esterase and protease enzymes in the three isolates showed positive results. Based on molecular identification using 16S rRNA isolates SB1, SB2, and DB3 were identified as *Pseudomonas aeruginosa*, *Staphylococcus saprophyticus*, and *Enterococcus gallinarum* respectively.

Key words: marine bacterial colonization, biofilm, plastic biodegradation

Kata Kunci: *marine bacterial colonization, biofilm, plastic biodegradation*