Potential Identification and Application of the Rhizophora apiculata and Sonneratia alba as a Bio Antifouling Agent for Antifoulant Paints

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Biofouling is a biological attachment on structures submerged in sea water that causing severe economic lost. The use of antifoulant paint containing TBT (Tributyltin) has been banned because its notorious environmental impact especially on non-target marine organisms. It is urgent to find environmentally acceptable bio antifouling source, such as mangrove plants, Rhizophora apiculata and Sonneratia alba. The purposes of this research are 1) to identify the active compounds in each plant extract and 2) to determine the activity of those extracts on microfouling and macrofouling organisms. The plants materials were Rhizophora apiculata and Sonneratia alba. Novel method was apllied to extract active compounds, namely using multilevel maceration method, with three solvents (n-hexane, isopropyl alcohol, methanol). The content of secondary metabolites was analyzed through phytochemical, FTIR, and GCMS analysis. Each extract was tested for its inhibitory effect on Pseudomonas aeruginosa and macro fouler Littorina scutulata. Finally, the plant extract was used as formula of paint on various concentrations. The results obtained 1) all extracts contained antifouling compounds. 2) In microfouling testing, methanol extracts had the highest inhibitory zone values, 11.55 mm (Rhizophora apiculata) and 11.67 mm (Sonneratia alba). 3) Rhizophora apiculata (n-hexane) and Sonneratia alba (methanol and n-hexane) have the highest inhibitory power against macrofouler attachment. In field test, Paint with 50% extract of Sonneratia alba (Methanol) has the highest inhibitory power on Barnacle attachment. The duration of paint mixture storage does not have a significant effect on paint quality.

Awards Won:
Fourth Award of $500
Sigma Xi, The Scientific Research Honor Society: Second Physical Science Award of $1,000