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Microencapsulation of anti-pathogenic bacterial symbionts to fight against AWS coral disease of Karimunjawa Archipelago, Indonesia

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Backgrounds: Coral reefs are experiencing a recent period of severe decline due to emerging coral diseases. Acropora White Syndrome (AWS) has been reported worldwide with increasing dramatically in the number of host species and geographic ranges. This disease is now recognized as one of the major causes of reef degradation and coral mortality in Indonesian waters. Our primary objectives of this research were to screen anti-pathogenic property of coral symbionts against the causative agents of AWS and to develop microsphere of anti-pathogenic AWS bacterial consortia.

Methods: This study was started by conducting isolation and purification of bacteria associated with corals, postulate Koch's experiments in the laboratory and fields, screening of anti-bacterial coral symbionts via soft agar overlay and agar diffused method. The experiment was finished by conducting polyphasic identification and anti-pathogenic bacterial microencapsulation.

Results: A culture collection of 174 bacteria associated with branching coral Acropora was established by plating on Zobell's 2214E. The screening results showed that 8 isolates (4.59%) were able to inhibit the growth of the bacteria associated with the AWS isolates. The DNA sequence analyses demonstrated that these bacterial isolates affiliated with Firmicutes. The AU2 and AU5 isolates showed high 16S rDNA sequence identity to Bacillus sp. and Virgibacillus sp, respectively. Different types of wall materials affected significantly on the survival and antipathogenic level. Among all wall material used, maltodextrin rendered microcapsule with the highest microencapsulation efficiency. The freeze-drying method of microencapsulation process was more effective than that of by the spray-drying method.

Conclusion: The results of the research are expected to be used as 'embryonic' marine industry for 'biocontrol agents' pellets on a large scale in the future regarding enhancing management, conservation and protection of coral reef ecosystems.

Recent Publications

1. Agus Sabdono, Ocky Karna Radjasa (2018) Early assessment of the organochlorine pesticides pollution of coral reefs ecosystem along Jepara Coastal Waters, Java Sea. International Journal of Conservation Science 9(4):761-770.
2. A Sabdono, D P Wijayanti and Sarjito (2017) Antipathogenic activity of bacteria associated with Acroporid corals against black band disease of Karimunjawa, Indonesia. Research Journal of Microbiology 12(2):154-160.
3. D P Wijayanti, M Hidaka, F Layla, Munasik and A Sabdono (2016) An initial assessment of coral disease prevalence on tourism areas of pasir putih beach, Java sea. Journal of Fisheries and Aquatic Science 11: 232-237.
4. Agus Sabdono, Paiga Hanurin Sawonua, Ary Giri Dwi Kartika, Jasmine MasyithaAmelia, Ocky Karna Radjasa (2015) Coral diseases in Panjang Island, Java Sea: diversity of anti–pathogenic bacterial coral symbionts. Procedia Chemistry 14:15-21.

Biography

Agus Sabdono is a Professor of Marine Biotechnology at Diponeogoro University, Indonesia. He graduated from University of Kentucky, Lexington, USA and obtained his PhD from Department of Sains and Mathematics, Gadjah Mada University, Indonesia in 2001. His research interests covering Environmental Biotechnology, Marine Pollution and Coral Diseases. Currently, he is also serving as the Dean of Fisheries and Marine Science Faculty, Diponegoro University in Semarang.

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