ANTI-BACTERIAL AND ANTI-QUORUM SENSING ACTIVITIES FROM BACTERIA ASSOCIATED WITH SEAWEED IN PULAU BIDONG

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ABSTRACT

Bacteria associated with seaweeds are highly diverse and rich sources of bioactive compounds. The antagonistic properties of seaweed-associated microbes from Pulau Bidong have not been explored and also very limited studies on bacteria associated with seaweed in Malaysia. Six seaweed species in Pulau Bidong were screened for antibacterial and anti-quorum sensing activities. A total of 26 bacterial strains were isolated from six species of seaweed (*Caulerpa serrulata*, *Caulerpa peltata*, *Caulerpa racemosa*, *Lobophora variegata* and *Hypnea pannosa*). It was observed that more bacteria were isolated from the surface of seaweed, epiphytic compared isolate endophytic bacteria. The agar well diffusion method was used to screen for antibacterial activity against pathogenic bacteria *Vibrio alginolyticus*. Of the 26 bacterial strains, 9 strains exhibited antibacterial activity. The results showed that among all the 9 strains, LV Epi 4 had the highest antibacterial activity against *Vibrio alginolyticus* (ATCC17749). Followed by CS Epi 1, CP Epi 3, LV Epi 2 and LV Epi 1. Meanwhile the enrichment of AHL degrader and AHL degradation assay were used to screen for anti-quorum sensing by using *Chromobacterium violaceum* (CV026) as the reporter strain. Among the six seaweed species, only brown seaweed *Lobophora variegata* showed bacteria successfully AHL degrader. This bacteria namely B4 and tested for their AHL degradation activity. Three bacterial strains (LV Epi 2, LV Epi 4 and CS Epi 2) from the high antibacterial activity were also tested for AHL degradation assay. Among the AHL bacterial degrader tested, LV Epi 2 strain showed the strongest degradation activity. Positive anti-bacterial and anti-quorum sensing activities were identified by 16S rRNA gene sequence was identified as *Stenotrophomas pavanii* (B4), *Kocuria haloterans* (LV Epi 4 and CP Epi 1), *Vibrio alginolyticus* (LV Epi 2 and CP Epi 2) and *Exiguobacterium indicum* (CS Epi 1). These bacteria associated with seaweed were revealed to be excellent sources of natural antibacterial and anti-quorum sensing compounds.

ABSTRAK

Bakteria yang bersatu dengan rumpai laut adalah mempunyai jenis yang pelbagai dan kaya dengan sebatian bio-aktif. Ciri-ciri antagonistik antara mikrob dan rumpai laut dari Pulau Bidong belum diterokai dan juga sangat terhad kajian mengenai bakteria yang bersatu dengan rumpai laut di Malaysia. Enam spesies rumpai laut di Pulau Bidong telah diasingkan untuk aktiviti anti-bakteria dan anti-kuorum penderiaan. Sebanyak 26 jenis bakteria telah diasingkan daripada enam species rumpai laut (*Caulerpa serrulata*, *Caulerpa peltata*, *Caulerpa racemosa*, *Lobophora variegata* and *Hypnea pannosa*). Berdasarkan pemerhatian bahawa lebih banyak bakteria telah diasingkan daripada permukaan rumpai laut, epifit berbanding bakteria endofitik diasingkan. Kaedah disfusi agar dinding digunakan untuk menyaring aktiviti antibakteria menghalang bakteria patogenik *Vibrio alginolyticus*. Daripada 26 strain bakteria, 9 strain menunjukkan aktivti anti-bakteria. Hasil kajian menunjukkan bahawa di kalangan kesemua 9 strain, LV Epi 4 mempunyai aktiviti anti-bakteria yang paling tinggi terhadap *Vibrio alginolyticus*. Diikuti oleh CS Epi 1, CP Epi 3, LV Epi 2 and LV Epi 1. Sementera itu, pengayaan AHL pedegradasi dan AHL degradasi assay digunakan untuk anti-kuorum penderiaan menggunakan *Chromobacterium violaceum* (CV026) sebagai strain report. Antara enam spesies rumpai laut, hanya rumpai laut perang *Lobophora variegata* menunjukkan bakteria berjaya sebagai pedegradasi AHL. Bakteria ini dinamakan sebagai B4 dan diuji untuk aktiviti AHL degradasi mereka. Tiga bakteria strain (LV Epi 2, LV Epi 2, LV Epi 4 dan CS Epi 2) daripada aktiviti anti-bakteria yang tertinggi juga telah diuji untuk AHL degradasi assay. Antara bakteria pedegradasi AHL yang diuji, LV Epi 2 menunjukkan aktiviti anti-kuorum penderiaan yang paling kuat. Aktiviti positif anti-bakteria dan anti-kuorum telah dikenal pasti oleh 16S rRNA jujukan gen iaitu *Stenotrophomas pavanii* (B4), *Kocuria haloterans* (LV Epi 4 dan CP Epi 1), *Vibrio alginolyticus* (LV Epi 2 dan CP Epi 2) dan *Exiguobacterium indicum* (CS Epi 2). Bakteria yang bersatu dengan rumpai laut telah didedahkan sebagai sumber anti-bakteria dan anti-kuorum penderiaan semulajadi yang sangat baik.