INHIBITION OF QUORUM SENSING CONTROLLED VIRULENCE FACTORS IN *ESCHERICHIA COLI* O157:H7 BY DIETARY PLANT EXTRACTS

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ABSTRACT

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Quorum sensing is a cell-to cell communication that regulates gene expression based on the cell densities in response to signal molecules called autoinducers. Pathogenic bacteria such as *Escherichia coli* O157:H7 have been found to use this system to regulate virulence genes and begin infection. In this study, screening for quorum sensing inhibitors in ethanol plant extracts was performed to find potential compounds for anti quorum sensing. At sub-lethal concentration, crude extracts of garlic, sand ginger, pandan leaves and kaffir lime leaves were found to inhibit or modulate quorum sensing-regulated violacein production by acyl-homoserine lactone (AHL) reporter strain *Chromobacterium violaceum*. All plant extracts tested in this study give significance effects in inhibiting *E. coli* O157:H7 swarming motility and able to reduce or increased biofilm formation which indicates these plants can inhibited quorum sensing dependent phenotypes. However, expression study showed that the extracts (betel leaves, garlic, sand ginger and lemongrass) induced *luxS* and *QseC* gene expression by 2 to 12-fold which indicates that the inhibitory compounds do not target AI-2 autoinducer synthase and AI-3 sensor kinase. This suggests that the inhibitors are targeting different genes in the quorum sensing regulatory system.

ABSTRAK

'Quorum sensing' ialah komunikasi di antara sel yang mengawalatur ekspresi gen berdasarkan jumlah populasi sel sebagai tindak balas terhadap isyarat molekul yang dipanggil 'autoinducers'. Bakteria pathogen seperti Escherichia coli O157:H7 didapati menggunakan sistem ini untuk mengawalatur gen virulen dan jangkitan. Projek ini melibatkan penyaringan bahan bioaktif daripada ekstrak tumbuhan sebagai anti 'quorum sensing'. Pada tahap kepekatan yang tidak merencatkan pertumbuhan bakteria, ekstrak daripada bawang putih, cekur, pandan dan daun limau purut didapati merencat atau merangsang penghasilan pigmen ungu (violacein) daripada strain Chromobacterium violaceum. Semua ekstrak tumbuhan yang dikaji didapati merencat pergerakan E. coli O157:H7 manakala hanya sepuluh ekstrak sahaja yang merencat pembentukan biofilem. Walaubagaimanapun kajian ekspresi menggunakan kuantifikasi PCR menunjukkan bahan bioaktif di dalam sireh, bawang putih, cekur dan serai meningkatkan ekpresi gen luxS dan QseC dari 2 hingga 12 kali ganda. Kontradiksi ini mencadangkan perencat bertindak pada gen lain dalam sistem 'quorum sensing'.