

Exploring the Prevalence of Quorum Sensing Systems in Thermophiles

Abstract:

Quorum sensing (QS) is a well-known mechanism of cell-to-cell communication among mesophilic bacteria. QS regulates myriad processes such as bioluminescence, biofilm formation, flagellar motility, virulence and antibiotic resistance through signaling molecules (acyl homoserine lactones, AI-1; oligopeptides, peptide based system and furanosyl borate diester, AI-2). Despite extensive research in mesophiles, the phenomenon of QS in thermophiles is largely unknown. We have successfully investigated the prevalence of QS in thermophiles using genomes/proteomes of 106 thermophilic eubacteria and 21 thermophilic archaea for major QS systems. AI-1 system and complete peptide based two component systems for QS was also not found in any thermophile. However the traces for the presence of response regulators for peptide based system were found in some of them. BLAST analysis revealed the presence of LuxS (AI-2 synthase) and autoinducer-2 receptors (LuxP, LsrB and RbsB) in 17 thermophilic bacteria from phyla Deinococcus- Thermus and Firmicutes. 18 thermophilic bacteria belonging to phyla Deinococcus- Thermus, Proteobacteria and Firmicutes have only LuxS that might function as AI-2 synthesizing protein whereas, 16 are having only LsrB and/or RbsB which may function as AI-2 receptor in biofilms. We concluded that the thermophiles in which known QS systems were absent may use some unknown mechanisms as the mode of communication. The information about quorum sensing mechanisms can be used to develop quenchers against slime producing thermophilic contaminants in paper-mills, pipelines and dairy industry. I have submitted my PhD in the Department of Microbiology, Panjab University, Chandigarh, India in July 2019. I have 3 publications in reputed journals. I am looking forward to get post-doctorate in the field of microbiology.

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