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Nanomechanical Property of Podoviruses for Biocontrol Agents of Bacterial Wilt Disease

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ABSTRACT

Bacteriophages (phages) are viruses that are capable of eradicating bacteria. Despite already being commercialized, phage usage for preventing and controlling crop bacterial pathogen in agriculture is still low compared to other antagonistic biocontrol agents. One of the major contributing causes is its variable efficacy originated from poor understanding of how phages survive under environmental duress i.e. phage stability. An emerging platforms to investigate the phage stability is atomic force microscopy (AFM). In this study, we applied AFM-based imaging technique and nano-indentation to extract nanomechanical property namely stiffness of two podoviruses. Both phages isolated from soil samples in Thailand are capable of lysing *Ralstonia solanacearum* causing bacterial wilt disease in chili and tomato. The stiffness of the podoviruses was examined under variation of two external factors of pH and ionic strength. The specific range of the stiffness of the podoviruses were shown to be associated with the highly retained phage infectivity quantified by plaque-based assay during storage period. This work offers a complementary understanding of phage stability which can be correlated to how phages stabilize under fluctuating conditions. Improving multidisciplinary knowledge will pave for a way for effective utilization of phage in biocontrol for agriculture.

Keyword: Bacteriophage/ Podovirus/ Nanomechanical property/ Phage stiffness/ Atomic force microscope

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