

Effect of Elevated Temperature on Quorum Sensing Signal Molecule (N-Acyl Homoserine Lactone) Production of *Pectobacterium carotovorum* subsp. *carotovorum* in Tomato

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ABSTRACT

Gram negative plant pathogenic bacteria regulate specific gene expression in a population density dependant manner by sensing level of *Acyl-Homoserine Lactone* (HSL) molecules which they produce and liberate to the environment, called Quorum Sensing (QS). The production of virulence factors (extracellular enzyme *viz.* cellulase, pectinase) in *Pectobacterium carotovorum* subsp *carotovorum* (*Pcc*) is under strong regulation of QS. The QS signal molecule, *N*-(3-oxohexanoyl)-*L*-Homoserine Lactone (OHHL) was found as the central regulatory system for the virulence factor production in *Pcc* and is also under strict regulation of external environmental temperature. Under seven different incubation temperatures (24° C, 26°C, 28°C, 30°C, 33°C, 35°C and 37°C) in laboratory condition, highest amount of OHHL (804 violacein unit) and 3-unsubstituted *Hexanoyl Homoserine Lactone* (HHL) and highest (79 %) Disease Severity Index (DSI) was measured at 33°C. The OHHL production kinetics showed accumulation of highest concentration of OHHL at the exponential phase of the growth but diminution in the concentration occurred during stationary phase onwards to death phase. Instability of HSLs was increased at high temperature (35° C and 37°C) exposure and OHHL was not at detectable range. The effect of temperature on virulence factor production is the concomitant effect of HSL concentration which justifies less disease severity index in cross inoculated tomato fruits incubated at 35° and 37°C. The non-detection of the OHHL in the elevated temperature may because of degradation as these signal molecules which are quite sensitive and prone to get degraded under different physical factors like temperature. This result provides the rationale behind the highest disease severity up to certain elevated temperature and leaves opportunities for investigation on mutation, co-evolution of superior plant pathogen with more stable HSL signals mediated pathogenesis under Global warming context.

Keywords: Quorum sensing, *Acyl-Homoserine Lactone* (HSL), Elevated temperature, soft rot.
