WSU Plant Pathology Seminar

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Defying Transpirational Flow: Movement and Spread of Xylella fastidiosa in the Xylem

Sudeep Poudel

Ph.D. Student
Department of Plant Pathology Washington State University

Abstract: *Xylella fastidiosa* (*Xf*) is a non-flagellated, xylem-limited bacterium, disrupting transpirational stream and causing economically important plant diseases. Unlike other vascular pathogens, *Xf* must establish itself in xylem vessels while mitigating against transpirational flow, which can exceed 20,000 µm/min at peak transpiration. *Xf* employs twitching motility driven by Type IV pili, for upstream migration in xylem vessels, enabling colonization far from the initial infection site. The type IV pilus-associated proteins encoded by the genes *pilQ* and *pilB* are essential for this motility, and mutations in these genes significantly impair motility (Meng *et al*., 2005). In addition, Type I pili, encoded by the *fimA* gene, plays a key role in cell adhesion and biofilm formation. Mutant studies showed that cells expressing only Type I pili require a significantly higher detachment force (204 ± 22 pN) compared to wild type (147 ± 11 pN) and cells with only Type IV pili (119 ± 8 pN), emphasizing their role in bacterial attachment and

biofilm stability (Leonardo *et al*., 2007). *Xf* also exhibits lateral movement to evade early plant defenses, such as tyloses formation and starch depletion, which are triggered by ionic imbalances and host transcriptional changes (Newman *et al*., 2002; Cardinale *et al*., 2018; Leonardo *et al*., 2024). A deeper understanding of *Xf*'s motility and defense evasion mechanisms is critical for developing effective control strategies against *Xf*-associated diseases.

References

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Biography of Sudeep Poudel

Sudeep Poudel is a Ph.D. student in Dr. Frank Zhao's lab at Washington State University, Prosser, IAREC. He holds a B.S. in Agriculture and an M.S. in Plant Pathology from Tribhuvan University, Nepal. With research experience in *Ralstonia solanacearum* and plant growth-promoting rhizobacteria, Sudeep is currently focused on the epidemiology of *Erwinia amylovora*, the bacterium responsible for fire blight in apples.