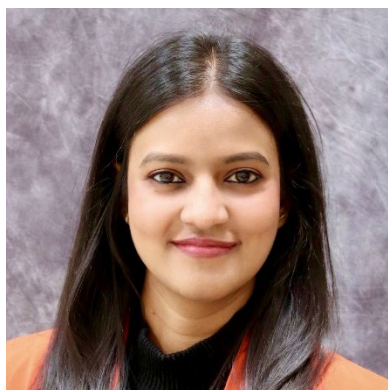


WSU Plant Pathology Seminar

April 14, 2025

Type VI Secretion System: A Bacterial Arsenal Against Fungi, Bacteria, and the Soil Microbiome



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Abstract: Bacterial secretion systems are essential molecular machineries that facilitate the transport of proteins and toxins across membranes, enabling bacterial survival, competition, and pathogenesis. Among 11 known secretion systems (Type I to Type XI), the Type VI Secretion System (T6SS) stands out as a contractile nanoweapon structurally resembling an inverted bacteriophage tail. Functioning as a contact-dependent speargun, T6SS allows bacteria to inject toxic effectors into competing bacteria. Recent studies have demonstrated the diverse roles of T6SS beyond its originally recognized antibacterial function. Long *et al.* (2023) highlighted the antifungal activity, showing that soil bacteria such as *Pseudomonas fluorescens* and *Lysobacter enzymogenes* utilize intercellular contact via T6SS to inhibit filamentous fungal pathogens in an antibiotics-independent manner, offering a potential biocontrol strategy against plant diseases. Chen *et al.* (2023) revealed a novel role in nutrient acquisition, demonstrating T6SS-mediated secretion of the iron-chelating siderophore pyoverdine in *Pseudomonas taiwanensis*, providing a competitive advantage in iron-limited environments. Furthermore, Wang *et al.* (2024) examined its ecological impact on plant-associated microbial communities, showing that *Agrobacterium tumefaciens* utilizes T6SS to influence crown gall formation and shape the gall microbiome, thereby affecting plant-pathogen interactions and microbial ecology. These findings underscore the ecological and biotechnological significance of T6SS as a multifaceted tool for microbial competition, plant-microbe interactions, and pathogen control. The ability of T6SS to target diverse organisms highlights its potential applications in agricultural biocontrol, microbiome engineering, and antibiotic-independent pathogen management. As ongoing research unravels its molecular mechanisms and evolutionary adaptations, T6SS emerges as a promising avenue for innovative approaches in microbiology and biotechnology.

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Short biography of Sheersa Manna

Manna earned her Bachelor's degree in Agricultural Science in 2019 and her Master's degree in Plant Pathology in 2021 from College of Agriculture, Nagpur, Maharashtra, India (PDKV). During her graduate studies, she conducted research on *Xanthomonas citri* pv. *malvacearum*, the causal agent of bacterial leaf blight in cotton, in the Molecular Plant Pathology Laboratory under the Division of Crop Protection at ICAR- Central Institute for Cotton Research, Nagpur. She also worked at ICAR- Indian Agricultural Research Institute, New Delhi, focusing on the transmission of Tospoviruses by thrips. In Fall 2022, Manna joined Dr. Youfu Zhao's research group at Washington State University as a Ph.D. student. Her current research focuses on bacterial canker in sweet cherries caused by *Pseudomonas syringae* pv. *syringae* and *Pseudomonas amygdali* pv. *morsprunorum*. Beyond her academic pursuits, Sheersa enjoys exploring new cuisines, taking scenic drives, and hosting lively gatherings.

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