World Academy of Science, Engineering and Technology
International Journal of Biological and Ecological Engineering
Vol:18, No:11, 2024

# Systematic Discovery of Bacterial Toxins Against Plants Pathogens Fungi

**Authors :** Yaara Oppenheimer-Shaanan, Nimrod Nachmias, Marina Campos Rocha, Neta Schlezinger, Noam Dotan, Asaf Levy

**Abstract :** Fusarium oxysporum, a fungus that attacks a broad range of plants and can cause infections in humans, operates across different kingdoms. This pathogen encounters varied conditions, such as temperature, pH, and nutrient availability, in plant and human hosts. The Fusarium oxysporum species complex, pervasive in soils globally, can affect numerous plants, including key crops like tomatoes and bananas. Controlling Fusarium infections can involve biocontrol agents that hinder the growth of harmful strains. Our research developed a computational method to identify toxin domains within a vast number of microbial genomes, leading to the discovery of nine distinct toxins capable of killing bacteria and fungi, including Fusarium. These toxins appear to function as enzymes, causing significant damage to cellular structures, membranes and DNA. We explored biological control using bacteria that produce polymorphic toxins, finding that certain bacteria, non-pathogenic to plants, offer a safe biological alternative for Fusarium management, as they did not harm macrophage cells or C. elegans. Additionally, we elucidated the 3D structures of two toxins with their protective immunity proteins, revealing their function as unique DNases. These potent toxins are likely instrumental in microbial competition within plant ecosystems and could serve as biocontrol agents to mitigate Fusarium wilt and related diseases.

**Keywords :** microbial toxins, antifungal, Fusarium oxysporum, bacterial-fungal intreactions
**Conference Title :** ICPPPMB 2024 : International Conference on Plant Pathology and Plant-Microbe Biology
**Conference Location :** Bangkok, Thailand
**Conference Dates :** November 25-26, 2024