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The Future of Green Nanobiotechnology for Wheat Blast Control

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Abstract

Wheat is one of the most important staple crops globally. Being a destructive fungal disease, Wheat Blast caused by the pathogen *Magnaporthe oryzae* pathotype *Triticum* (*MoT*) has become a significant agricultural concern in South Asia, particularly in Bangladesh and parts of India. As of 2024, wheat blast continues to seriously threaten wheat production in South Asia. It first appeared in Bangladesh in 2016 and has since spread across South Asia. The disease can wipe out entire wheat fields under favorable conditions, which include high temperatures and humidity. Controlling blast pathogens raises the production cost and harms the environment. Therefore, biological based crop protection strategies must be considered to combat this pathogen. Smart innovations like nanobiotechnology are strongly required for agricultural growth to face global food security challenges and climate change. Historically, various endophytic bacteria have been explored as possible antagonists against various plant infections. Microbe-based NPs are advantageous over chemical and physical approaches because they are less poisonous and environmentally friendly. However, there is little evidence of the inhibitory effect of green synthesis of nanoparticles on the wheat blast pathogen. This article focuses on microbiology and nanobiotechnology to prevent further outbreaks and mitigate the economic impact on wheat farmers across the region. The article will also address various biosynthesized metal nanoparticles that can enhance the resistance against wheat blast pathogens.

Key Words: *Wheat Blast, Nanobiotechnology, Endophytic bacteria, Nanoparticles*