



Extracellular biosynthesis of silver nanoparticles from *Bacillus* sp. SZT1 to control the bacterial leaf blight of rice

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Abstract:

Rice (*Oryza sativa* L.) is among the major cereal crops for its economic and nutritional value, constituting the basis of food for various people around the globe. Amongst the serious biotic factors deteriorating the crop yield, the most destructive pathogen of rice is *Xanthomonas oryzae* pv. *oryzae* (Xoo), which causes bacterial leaf blight (BLB) disease. This study involved the targeted use of biogenic silver nanoparticles (AgNPs) to control BLB to cope with the disadvantages of chemical disease control. The AgNPs were biologically synthesized from natively isolated *Bacillus* strain SZT1, which was identified through 16S rRNA gene sequence analysis. The synthesis of AgNPs in bacterial culture supernatant was confirmed through UV-Vis spectrophotometry with absorption peak at 418.99 nm. The Fourier-transform infrared spectroscopy (FTIR) spectra of biogenic AgNPs confirmed that the existence of AgNPs is stabilized with proteins and alcoholic groups. Moreover, scanning electron microscopy (SEM) and X-ray diffraction (XRD) data revealed that the AgNPs have variable shapes and an average particle size of 22.96 nm. The SZT1-AgNPs showed the maximum antibacterial activity (24.21 ± 1.01 mm) for the pathogenic strain Xoo on culture medium. In pot experiment, SZT1-AgNPs were found to be an effective weapon against bacterial leaf blight and also significantly increased the plant biomass with decreased cellular concentration of reactive oxygen species (ROS) and increased concentration of cellular antioxidant enzyme activity. In conclusion, biogenic AgNPs synthesized extracellularly from *Bacillus* strain SZT1 were found effective antibacterial agents for pathogen of BLB disease.

Biography:

Muhammad Shahid currently works at the Department of Bioinformatics and Biotechnology, Government Col-



lege University Faisalabad, Pakistan. Muhammad does research in plant-microbiome interaction, green nanotechnology and environmental biotechnology

Recent Publications:

1. Muhammad Shahid, et al; Microbe-based Antiangiogenesis Therapies for Cancer Management; 2020
2. Muhammad Shahid, et al; Application of a Dye-Decolorizing *Pseudomonas aeruginosa* Strain ZM130 for Remediation of Textile Wastewaters in Aerobic/Anaerobic Sequential Batch Bioreactor and Soil Columns; 2020
3. Muhammad Shahid, et al; First report of diazotrophic *Brevundimonas* spp. as growth enhancer and root colonizer of potato; 2020
4. Muhammad Shahid, et al; Genome wide association analysis for stripe rust resistance in spring wheat (*Triticum aestivum* L.) germplasm; 2020
5. Muhammad Shahid, et al; Biogenic copper nanoparticles synthesized by using a copper-resistant strain *Shigella flexneri* SNT22 reduced the translocation of cadmium from soil to wheat plants; 2020

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