

The Effect of Different Metal Nanoparticles on Growth and Survival of Pseudomonas syringae Bacteria

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Abstract : The Pseudomonas syringae species complex includes many plant pathogenic strains with highly specific interactions with varied host species and cultivars. The rapid spread of these bacteria over the last ten years has become a cause for concern. Nanoparticles have previously shown promise in microbiological action. We have therefore investigated in vitro and in vivo the effects of different types and sizes of nanoparticles in order to provide quantitative information about their effect on the bacteria. The effects of several different nanoparticles against several bacteria strains were investigated. The effect of NP on bacterial growth was studied by measuring the optical density, biochemical and nutritional tests, and transmission electron microscopy (TEM) to determine the shape and size of NP. Our results indicate that their effects varied, with either a negative or a positive impact on both bacterial and plant growth. Additionally, the methods of exposure to nanoparticles have a crucial role in accumulation, translocation, growth response and bacterial growth. The results of our studies on the behaviour and effects of nanoparticles in model plants showed. Cerium oxide (CeO₂) and silver (Ag) NP showed significant antibacterial activity against several pathogenic bacteria. It was found that titanium nanoparticles (TiO₂) can have either a negative or a positive impact, according to concentration and size. It is also thought that environmental conditions can have a major influence on bacterial growth. Studies were therefore also carried out under some environmental stress conditions to test bacterial survival and to assess bacterial virulence. All results will be presented including information about the effects of different nanoparticles on Pseudomonas syringae bacteria.

Keywords : plant microbiome, nanoparticles, 16S rRNA gene sequencing, bacterial survival

Conference Title : ICM 2018 : International Conference on Microbiome

Conference Location : Amsterdam, Netherlands

Conference Dates : December 03-04, 2018