

Mini Review

Silver Nanoparticles and Attainment through their Application in Soil-borne Disease Management

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Abstract

Amongst the several biotic factors that limits the production and productivity of crops, the soil borne plant diseases pose a serious threat. Intervention of nanotechnology in plant protection is a notable event in the field of agricultural sciences which could reduce the dependence of farmers on chemical pesticides and fungicides. The silver nanoparticles (AgNPs) are the most studied nanoparticles in the arena of plant disease management. They can be synthesized via physical, chemical and biological method; however, biological synthesis approach is mostly preferred due to its simplicity, less cost involvement and ecofriendly nature. AgNPs displays multiple modes of inhibitory actions against fungi as well as bacteria through various pathways. Antifungal activities of AgNPs might be due to disruption of ion transport systems including ion efflux. Antibacterial activities can be explained by the ability of free silver ions, present or released from the nanomaterials, to bind cell membrane structures, destabilizing the membrane potential and causing proton leakage. Due to their exceptional antimicrobial properties, silver nanoparticles are commonly produced in the form of nanoformulations or nanoencapsulated formulations to improve their stability and efficacy. However, for large scale production of biogenically synthesized AgNPs, there is an urgent need to develop more reliable route which are economically viable without compromising its quality. Also, more studies need to be channelized towards determination of toxicity of AgNPs along with rational strategies to minimize risk.

Key words: AgNPs, biotic factors, disease, nanoencapsulation

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