



# Green Synthesis of Silver Nanoparticles by Water Soluble Fraction of the Extracellular Polysaccharides/Matrix of the Cyanobacterium Nostoc Commune and its Application as a Potent Fungal Surface Sterilizing Agent of Seed Crops

Fatthy Mohamed Morsy<sup>1</sup> , Nivien Allam Nafady<sup>1</sup> , Mohamed Hemida Abd-Alla<sup>1,\*</sup>, Deia Abd Elhady<sup>2</sup>

## Abstract:

Studying of nanoparticle structures is gaining momentum because of their great potential in improving several fields of science such as agriculture. The water soluble fraction of the extracellular polysaccharides (EPS)/matrix of the highly EPS producing cyanobacterium Nostoc commune have been used as a potent reducing and capping agent for green synthesis of silver nanoparticles. The size of these nanoparticles with the EPS coat was found to be in the range of 15–54 nm as analyzed using transmission electron micrographs. Interestingly, after washing the EPS coated silver nanoparticles by ethanol, the size of nanoparticles reduced to less than 15 nm due to the formation of silver oxide nanoparticles and removal of the EPS coat. Silver nanoparticles showed antibacterial properties against Escherichia coli. The minimum inhibitory concentration (MIC) was 0.012 mg/ml while the minimum bactericidal concentration (MBC) was 0.016 mg/ml. The slight difference between the MIC and MBC suggests that such silver nanoparticles act as a potent bactericidal agent against E. coli. Presoaking seeds of crop plants (Sorghum and broad bean) in five-fold MBC of silver nanoparticles (0.08 mg/ml) did not adversely affect the germination of Vicia faba L. and Sorghum bicolor plants. Concomitantly, such fivefold MBC concentration of silver nanoparticles was powerful sterilizing agent for seeds and grains against seed/grain-borne microorganisms. The results showed gradual depletion of the total colony forming units (CFU) in seeds and grains sterilized with silver nanoparticles than those sterilized with chlorine. These results suggest that the water soluble fraction of the extracellular polysaccharides (EPS)/matrix of Nostoc commune can be used as a potent reducing and capping agent for green synthesis of silver nanoparticles and that silver nanoparticles can be used as a potent surface sterilizer.

## Keywords:

Silver Nanoparticles, Nostoc Commune, Green Synthesis, Sterilizing Agent

## Published In:

Universal Journal of Microbiology Research 2(2): 36-43, 2014 <http://www.hrpub.org> ,