Biological Activity of Gold Nanoparticles Towards Filamentous Pathogenic Fungi of Grain and Food Products

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Fungi are responsible for deteriorations in plant parts, grain and food products during and after harvest. Nanoparticles (NPs) have received special attention by their physical and chemical properties applications on developing new products with antimicrobial activity. In this study, the antifungal activity of gold (Au) nanoparticles were investigated towards three food pathogenic fungi: *Fusarium verticillioides*, *Penicillium citrinum* and *Aspergillus flavus* cultured on PDA at 25°C. After, the Au-NPs were synthesized and characterized by standard spectroscopic methods, antifungal tests were performed by the agar dilution method at different concentrations: 0.05, 0.1 and 0.2 mg L\(^{-1}\) and the efficacy of treatment was evaluated during 8 days by measuring the diameter of fungal colonies. Scanning electron microscopy (SEM) analysis was used to evaluate the morphological changes in Au-NPs treated fungi. With the increasing concentration of Au-NPs, it was observed a reduction of the fungal colony growth diameter. *F. verticillioides* and *A. flavus* demonstrated better sensitivity when compared to *P. Citrinum* after the 8 days of incubation, however, all strains showed significant difference (p<0.05) under the Au-NPs treatment. SEM analysis revealed that fungi hyphae that received treatment showed damage as: deformations, broken and unusual bulges that were not observed in fungi that grew on the no treated medium. We found that even the highest concentration of Au-NPs applied was not able to completely inhibit the fungi growth. However these fungi hyphae have suffered modifications that alter the structure of growth, which could influence the production of toxins by these fungi.