TITLE: EFFECTS OF ZINC OXIDE NANOPARTICLES AND SILICA NANOPARTICLES INCORPORATED WITH SILVER AGAINST TOXIGENIC FUNGI FILAMENTOUS

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ABSTRACT:
Fusarium graminearum and *Aspergillus flavus* are widely distributed pathogens and responsible for raw and processed grains deterioration which can cause plant pathologies leading to seed/grain loss of germination, discoloration and reduction of nutritional values. Especially, when exposed to optimal environment conditions as high temperature and humidity, they can produce mycotoxins in food. Several strategies are used to eliminate toxigenic fungi in grains, however, they are still great public health problem. Therefore, the development of new antifungal agents that can assist in the current control strategies is essential. Nanomaterials have received special attention due to their interesting physical and chemical properties. Nanotechnology has benefited the area of food safety due to development of novel antifungal agents, especially for reduction of synthetic fungicides and in addition, it has been used to absorb mycotoxins. They exhibit increased barrier properties of novel packaging with distinct benefits used for food. This study aimed to investigate the effects of zinc oxide nanoparticles (ZnNPs) and silica nanoparticles (SiNPs) incorporated with silver (Ag) against toxigenic fungi. The nanomaterials were duly synthesized and characterized and antifungal potential against *F. graminearum* and *A. flavus* was evaluated by the agar diffusion and dilution methods. By diffusion method, the zones of inhibition observed around the ZnNPs were of 20 mm and 10 mm for *F. graminearum* and *A. flavus*, respectively. On the other hand, SiNPs-Ag display 12 mm and 10 mm to the same fungi. Furthermore, they also reduced significantly the fungal growth by dilution method, which SiNPs-Ag showed best efficiency. None nano-silica, oxide zinc and the control groups reduced the fungal growth. It is important to highlight that zinc compounds have advantages in relation other antifungal compounds, especially by non-toxic for the organism in appropriate amounts and showed effectiveness, safety and stability on antifungal activity at low concentrations. Data suggest that ZnNPs and SiNPs incorporated with metal ions could be further studied as an effective fungicide in order to investigate whether nanoparticles interfere to the fungi metabolism thus inhibiting their mycotoxins production.

Keywords: antifungal, *Aspergillus flavus*, *Fusarium graminearum*, nanoparticles, zinc

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