

# EFFICACY OF ZnO NANOPARTICLE IN INHIBITING *PENICILLIUM CRUSTOSUM* AND *PENICILLIUM EXPANSUM* PRODUCERS OF PATULIN TOXIN

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(Received 17 November 2019, Revised 19 January 2020, Accepted 8 February 2020)

**ABSTRACT :** *Penicillium* fungal were isolated from different sources of the local environment, then the isolations were diagnosed in appearance using approved sources and the ability of the isolates to produce patulin toxin were detected using the technique of thin layer chromatographs (TLC) phenotypic and microscopic diagnostic were confirmed at the molecular level of the species and the anastomosis Group (AG) identification was determined, which it returns using its polymerase chain Reaction (PCR) technology. For the fungi, *P. crustosum* and *P. expansum* has been successfully used the same prefixes in determining the sequence of nitrogen bases of the two fungi that were deposited in the Database (Gen bank) of the International Information (IUCN). The results showed that the ZnO nanoparticles has a complete inhibiting effect (100%) at concentration of 5 mg/ml for both fungi, while the concentrations (0.5, 1, 1.25, 1.5, 1.75, 2, 2, 5, 5) mg/ml showed a gradual decrease in the growth diagonales with increasing concentrations, the results also showed that the effect of ZnO nanoparticle was inhibiting to the growth of the two fungi and not killing them by restoring. The fungi ability to grow when they were transferred from the PDA medium containing the nanomaterial to the PDA-with out of the nanomaterial.

**Key words :** Nanotechnology, zinc oxide, mycotxins, patulin toxin

## INTRODUCTION

Food contamination with fungi and their toxins is one of the problems that threatens many developing countries in terms of health and economic, especially those countries that lack good food storage conditions (Makum *et al*, 2010) because they affect public health and cause chronic pathological effects in addition to severe effects in the event of exposure to these toxins in high doses, especially in the kidneys and liver. Mycotxin are known as a differentiated and complex chemical compounds, mostly phenolic compounds, some of which are alkaloids, few of them are described as toxic acids (Sume, 2014). *Penicillium* is one of the largest fungal species, where it contains more 400 species described worldwide (Visagie *et al*, 2014) often lives on restored fruits, vegetables and pastries, in addition to its presence in the air and soil (Samson *et al*, 2010). Perhaps the reason for the widespread of this fungus due to its ability to form and multiple proliferative events that are characterized by its tolerance to in appropriate environmental conditions (Faris and Wardlaw, 2010) may cause economic effects on human life where the fungus of penicillium effects fruits, especially apples, which stimulate some strains of the fungus to secrete fungal toxins found in samples of apple infected with mold, especially the patulin toxin

produced by the fungus *P. expansum* (Jakason *et al*, 2003) so far more than 150 of these known toxins have been discovered, including patulin toxin (Kasa, 2010) patulin is a poly unsaturated lacton, whose chemical formula  $C_7H_6O_4$  has a molecular weight of 154.1 g/mol and its melting point (114-112) for this reason it does not broken by cooking temperature and has been estimated mainly in apples contaminated with *P. expansum* (Codex, 2003; Murillo Arbizu *et al*, 2009) as it was that this toxin had pathological effects on the organisms system, especially the immune, nervous and digestive system (Puel *et al*, 2012). Nanotechnology is an innovative modern science that has enormous potential in revolutionizing various fields including agriculture (Coles and Frewer, 2013). The use of nanotechnology in the agriculture sector is relatively recent compared to that used in other fields (Garcia *et al*, 2010), where it has a tremendous ability to improve crop productivity (Gruere *et al*, 2011) and to increase food production and quality (Biswal *et al*, 2012; Sonkaria *et al*, 2012) where this technique was used in the fight against many pathogens responsible for the occurrence of plant diseases, the compound of zinc oxide nanoparticles is one of the most important compounds that have antifungal properties and harmful microbiology that causes diseases of the plant in addition to being a chemically non-toxic