BOTRYTIS CINEREA INHIBITION BY PHOTOACTIVATED ZNO NANOPARTICLES

Bernadeta Žudytė[1], Vilmantas Pupkis[2], Vilma Kisnierienė[2], Živilė Lukšienė[1]

[1] Institute of Photonics and Nanotechnology, Vilnius University, Lithuania
[2]Department of Neurobiology and Biophysics, Vilnius University, Lithuania

bernadetazud@gmail.com

Botrytis cinerea is the gray mold pathogen, which causes diseases for pre- and post-harvest fruits [1]. It is the most important postharvest decay pathogen [2] and the second most economically significant plant pathogen [3]. In order to control *B. cinerea*, it is necessary to find effective antifungal method.

In recent years, a rapid development of nanotechnology opens up whole universe of new possibilities for agriculture. ZnO nanoparticles have high specific toxicity against bacteria and only minimal effects were observed on human cells. The aim of this study was to evaluate the antifungal efficiency of ZnO nanoparticles in suspension after photoactivation with visible light against harmful fungi *B. cinerea* in vitro.

The absorption spectrum of ZnO nanoparticles suspension (1×10^{-3} M) is presented in Fig. 1. It is obvious, that absorption maximum at 375 nm. No other peaks were observed in the spectrum, what confirms the high purity of ZnO nanoparticles.

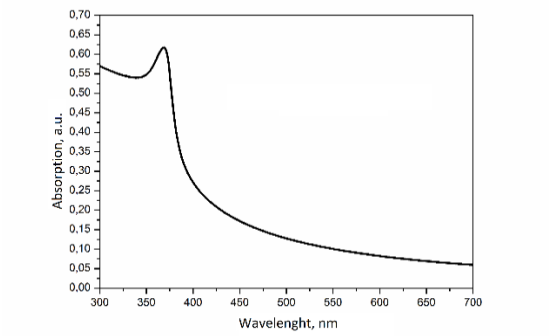

Fig. 1 Absorption spectrum of 1×10^{-3} M ZnO nanoparticles

Radial growth of *B. cinerea* was examinated in control and treated samples in vitro. As seen in Fig. 2 photoactivated ZnO nanoparticles significantly (~80 %) inhibited the radial growth of *B. cinerea* compared to the control.

Membrane potential (MP) is useful parameter to measure because it reflects physiological status of the cell and integrity of plasma membrane. Cells in treated group exhibited less negative MP (-24.8±1.4 mV) compared to MP of untreated cells (-35.5±1.5 mV). These results are in agreement with other studies, which showed that photoactivated ZnO nanoparticles increases permeability of plasma membrane.

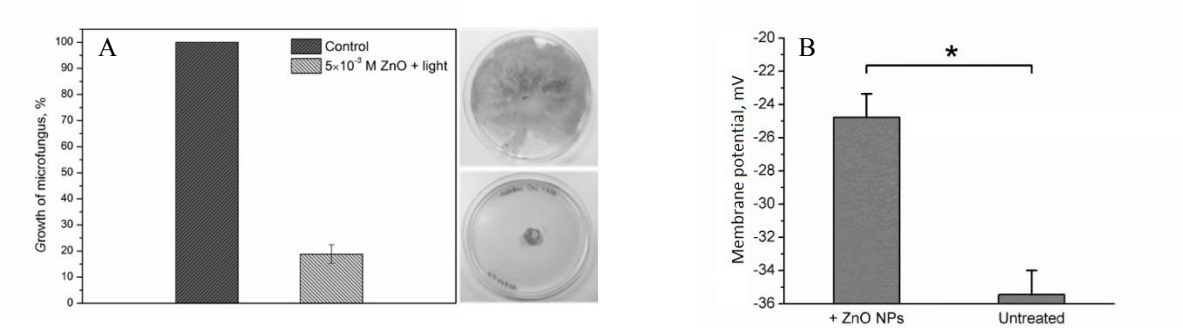

Fig. 2 A – *B. cinerea* growth inhibition by 5×10^{-3} M photoactivated ZnO nanoparticles; B - Effect of ZnO nanoparticles on *B. cinerea* cell membrane potential

Obtained results confirms the idea, that photoactivated ZnO nanoparticles can be used as effective antifungal treatment against *B. cinerea.*

[1] Stockwell, V. O., Shaffer, B. T., Jones, L. A., & Pscheidt, J. W. (2018, July). Fungicide resistance profiles of Botrytis cinerea isolated from berry crops in Oregon. In International Congress of Plant Pathology Abstracts and Proceedings.
[2] Romanazzi, G., & Feliziani, E. (2014). Botrytis cinerea (Gray Mold). In Postharvest decay (pp. 131-146).
[3] Dean, R., Van Kan, J. A., Pretorius, Z. A., Hammond□Kosack, K. E., Di Pietro, A., Spanu, P. D., ... & Foster, G. D. (2012). The Top 10 fungal pathogens in molecular plant pathology. Molecular plant pathology, 13(4), 414-430.