

## Nanochemistry and biotechnology

### The effect of nonionic colloidal solutions of metal nanoparticles on pro-/antioxidant system of winter wheat seedlings under infection

Belava V.N., Yakovlieva G.M., Panyuta O.O., Volkogon M.V., Lopatko S.K.

*Educational and Scientific Centre «Institute of Biology», Taras Shevchenko National University of Kyiv, 64, Vladymyrska str., Kyiv, 01601, Ukraine  
E-mail: mvolkogon@gmail.com*

Number of studies performed recently show the positive effect of biogenic metal nanoparticles on the growth and development of plants through the promotion of plant's adaptive responses to adverse environmental conditions. Copper and silver, known for their fungicide and antimicrobial properties were used in form of non-ionic colloidal solutions of metals nanoparticles as seeds treatment. The study performed had covered the effect of nanoparticles on pro-/antioxidant system of winter wheat seedlings infected with the eyespot causal agent. Varieties different by their resistance level to eyespot pathogen *Pseudocercospora herpotrichoides* (Fron) *Deighton* were used: Myronivska 808 – highly susceptible, Roazon – relatively resistant (shown the highest level of resistance in the world) and Renan – hybrid variety obtained through the breeding of first two varieties (parental lines). The content of lipid peroxidation (LPO) products was determined using the thiobarbituric acid reactive substances (TBARS) quantitative reaction [1].

It was shown that seeds treatment with nonionic colloidal solutions of nanoparticles of biogenic metals Cu and Ag, separately and under the infection had stressed the plants. Observed dynamics of TBARS contents was analogous to the one determined at pathogenesis, but at the different extent. Susceptible variety had shown significant (100%) increase in TBARS contents, with the other varieties showing much smaller range (up to 40%) of fluctuations comparing to the control.

Tellingly, the fluctuations of TBARS content in seedlings of resistant variety Roazon under infection and use of nanoparticles were relatively smaller comparing to the quantities determined in seedlings of other varieties. The maximum intensity of LPO was observed in seedlings of Myronivska 808 variety under infection and use of Ag nanoparticles, and seedlings of the Renan variety under infection and use of Cu nanoparticles.

1. Zhyrov V., Merzlyak M., Kuznetsov L. Peroxidation of membrane lipids of cold-resistant plants under the damage caused by the low temperatures // *Plant Physiol.*-1982.-**29**, N 6.-P. 1045–1053.