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Physiological responses of plants to non-ionic colloidal solution of metal nanoparticles

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Bio-protective role of colloidal solutions of metal nanoparticles (Ag, Cu, Fe, Zn, Mn) under oxidative stress conditions of wheat germ seedlings due to the by reducing reduction the level of TBA-active compounds level in photosynthetic tissues (15%) and accumulation of photosynthetic pigments was shown. The Positive positive effect on aerial growth of above-ground parts (up to 7% increase) and root system (up 6% increase) of germ growth processes seedlings depending on the combination of metal nanoparticles and the treatment method of processing was observed.

Since The lack of studies of the functional activity of metal nanoparticles has not been studied enough, especially considering regarding the mechanisms of their absorption and action in the plant's organism, the activity of colloidal solutions of metal-containing nanoparticles (Ag, Fe, Mn, Cu, Zn) at the cellular and organismal level by a standard *Allium cepa* (L.) test system was investigated using *Allium cepa* (L.) test system.

The results of our investigations had proved that addition of colloidal solutions of Mn nanoparticles had with Mn contributed to the onion root biomass increased of onion root biomass by 30% in comparison with the to the control group, and while solution with of Fe and Cu nanoparticles containing Fe and Cu, on the contrary, had oppressed their growing growth of onion roots by 46 and 77%, correspondingly.

By the tolerance index at the level of the entire organism the Pphysiological reaction of plants to the treatment with Mn nanoparticles can be evalueted characterized as positive, that while to reaction to Zn and Ag nanoparticles is – as neutral, and that to Fe and Cu nanoparticles is as negative by index of tolerance at the level of the entire organism. The Ffunctional activity of studied solutions of metal-containing nanoparticles by cytological effect on root meristem cells of *Allium cepa* (L.) had decreases decreased in the following order: Cu ≥ Zn> Ag ≥ Fe > Mn by cytological effect on root meristem cells of *Allium cepa* (L.).

Thus, it was shown that the functional activity of nanoparticles is inversely

proportional to their sizes , it and depends on the concentration and square their surface area instead of mass or volume. Generally the nanosystem which includes studied nanoparticles of metal has the essential impact on the functional activity of plants. In the future, this problem requires further, more detailed, investigations. , using integrated approach and various test systems on different trophic levels.