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Copper nanoparticles effect on proline accumulation in wheat seedlings under ultraviolet radiation

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The increase of ultraviolet radiation (UV) intensity, as a result of ozone depletion, and its destructive influence on plant organism today is the important issue in the agricultural sector. Under the influence of various stressors the plants synthesize and accumulate protective compounds, one of which is an amino acid osmolyte – the proline. The proline regulates homeostasis inside plant cells under drought, salt stress, etc. Wheat is a leader among world food crops and the study of plant protective compounds synthesized under the stress condition is an important subject of research. Nanoparticles of biogenic metals are intensively studied in the world and positioned as a positive influence factors on plant growth and development. Therefore the aim of our work was to find out the changes of proline content in seedlings of different wheat varieties received a pre-sowing treatment of the Cu nanoparticles and exposure of UV radiation.

Varieties of winter wheat (*Triticum aestivum* L.) seedlings – *Myronivs'ka 808* and spring wheat (*T. dicoccum* Schuebl.) seedlings – *Holikovs'ka* with different yields and resistance to stress factors were used as a plant material. Pre-sowing seed treatment carried out with a colloidal solution of non-ionic Cu nanoparticles. Five-day seedlings of wheat were exposed to UV-B irradiation. Proline content was determined spectrophotometrically during 7 days.

As a result of our research, the studied wheat seedlings showed the increase of proline content in response to the effect of both UV-B and Cu nanoparticles. The indicators of proline content increase relative to control under the UV-B influence were 28, 3% (Holikovs'ka), 19, 3% (Myronivs'ka 808), and with Cu nanoparticles treatment – 14, 2% and 10, 7% respectively. However, the response formation in the studied varieties was different: the maximum of proline content in the Myronivs'ka 808 variety seedlings was observed at the 2nd day of UV-B effect and at the 3rd day of Cu nanoparticles treatment and the maximum of proline content in the Holikovs'ka variety seedlings – at the 5th day of both experiment versions.

Thus, the total effect of Cu nanoparticles and UV-B irradiation increased the stress condition of wheat plants at the germination stage. Intensity and period of the plant organism response formation depends on the varietal characteristics.