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Increasing Plant Resistance to Drought in the Root Inhabited Zone Using Iron Oxide Nanoparticles and Carbon Nanostructures Based on Water-Soluble Fullerene Derivatives

Gayane G. Panova [1*], Olga A. Shilova[2], Konstantin N. Semenov[3], Anna M. Artemyeva[4], Tatyana Bankina[5], Olga R. Udalova[1], Dmitry V. Rusakov[1], Anna S. Zhuravleva[1], Yuri V. Khomyakov[1], Tamara V. Khamova[2], Anton M. Nikolaev[2], Anastasia S. Kovalenko[2], Vitaly E. Vertebny[1], Vladimir V. Sharoyko[3,5], Elena V. Kanash[1]

[1] Agrophysical Research Institute, Saint-Petersburg, Russia

[2] Branch of Petersburg Nuclear Physics Institute named by B. P. Konstantinov of NRC «Kurchatov Institute» - Institute of Silicate Chemistry, Saint-Petersburg, Russia

[3] Pavlov First St. Petersburg State Medical University, St. Petersburg, Russia

[4] N.I. Vavilov All-Russian Institute of Plant Genetic Resources, St. Petersburg, Russia

[5] Saint-Petersburg State University, St. Petersburg, Russia

ABSTRACT

The creation of highly effective in low concentrations environmentally friendly biocompatible means with a complex positive effect on plants remains relevant due to the lack of saturation of the market with such compounds. In a series of laboratory, vegetation experiments under controlled conditions and field experiments with phytotest objects (spring barley, wheat, Chinese cabbage and other), we have shown the increase of plants resistance to oxidative stress caused by moisture deficiency in the root-inhabited environment after their treatment at the seed stage or during the vegetative period of development with created by us suspensions based on iron oxide nanoparticles or solutions of water-soluble derivatives of fullerene C_{60} in previously established most effective concentrations [1, 2]. The treated plants with tested substances solutions showed activation of metabolism, processes of their exchange of matter and energy with the environment, increased transport of the main macro- and microelements to the above-ground part, stabilization of the work of plants antioxidant systems, which together contributed to maintaining their productivity indicators and the quality of the formed plant production at the level of those in the control plants grown in favorable conditions.

Keywords: biocompatible means, iron oxide nanoparticles, derivatives of fullerene C_{60}, drought, root inhabited zone, plant resistance

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[*]Corresponding Author:

Gayane G. Panova, Department of Plant Lighphysiology and Agroecosystem Bioproductivity, Agrophysical Research Institute, Grazhdansky pr. 14, Saint-Petersburg, 195220. Russia.
Email: gpanova@agrophys.ru