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NANOTECHNOLOGIES FOR THE HIGHER PLANTS CULTIVATION IN SPACEFLIGHT

Abstract

The modern development of biotechnology makes it feasible to receive materials with new improved properties for plants growing. Our studies have shown that the use of nanotechnology in plant cultivation can increase yield and product quality. It is well known that for the successful work and life of astronauts in spaceflights optimal life support system including plants is necessary. A priority should be given not only to a choice of species of plants able to grow in cosmos, but also optimization of cultivation conditions, including modifications of nutrient mediums, illumination and temperature. We developed a culture medium in which basic salts, such as iron, zinc and copper, were added as electro-neutral nanoparticles instead of metal salts. Such a replacement is appropriate due to the unique properties of nanoparticles: metal nanoparticles are less toxic than ionic forms of metals; produce prolonged effects, acting as a depot of elements; nanoparticles introduced in biotic doses stimulate metabolic processes; the action of nanoparticles is multifunctional. Venice tomato is used for growing on a nutrient medium with nanoparticles of iron, zinc and copper in various concentrations instead salts. It's estimation, tomatoes growing on a nutrient medium with metal nanoparticles showed better morphometric and physiological characteristics than controls: seedlings and plants were compact with a developed and active root system and the best fruit yield.