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The influence of Cu and Co nanoparticles on *Mentha piperita* growth and rootage *in vitro*

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The clonal reproduction method allows to receive in a short time a considerable quantity of plants genetically homogeneous and cleared from viruses [1, 2]. Though at the big achievements in this area, there are certain difficulties in definition of components and their concentration in a nutrient medium. From literary sources it is known about positive influence of metals nanoparticles on development of plants in an open ground.

The aim of this work was analysis of Cu and Co nanoparticles influence on growth and rootage of mint explants of kinds Ukrainian peppery and selection depending on concentration and nanoparticles sizes at clonal reproduction *in vitro* [3,4].

As object of research was used mint of kinds Ukrainian peppery and selection from the collection of research station of medicinal plants of Agroecology and Nature Management Institute, NAAS, which were introduced into the culture *in vitro* 16.07.2014. The work was spent in aseptic conditions according to standard methods [5, 6]. Explants were cultivated in cultural room at temperature 25-27^{0}C, at relative humidity 65-70 % and at lighting 2,5-3 thousand luxes with 16 hours photoperiod.

Cu and Co nanoparticles were received by joint sedimentation from a steam phase of metal and alkaline metal halogenide (NaCl) [7, 8]. Then on the basis of

nanoparticles data were received stable colloidal solutions simultaneously with two and more aminogroups [9, 10]. Concentration of given colloidal solutions both for Cu nanoparticles and for Cu nanoparticles composed 0,4mg/l, 0,8mg/l and 1,2mg/l. Average diameter of Cu and Co nanoparticles was 2-2,5 nm.

At a following stage Co and Cu nanoparticles influence was investigated depending on their concentration and size. For this purpose spears were grafted and placed on modified nutrient medium of Murasige and Skuga (pH 5,6-5,8) which contained 0,75 mg/l 6-BAP, 0,1 mg/l gibberellin acid and both Co and Cu nanoparticles in concentration specified above. The analysis of results was spent for 12, 18 and 27 days. The spears height of both mint kinds in research banks was higher than control, but the maximum gain was observed in tests of selection kind on nutrient medium with Cu nanoparticles (with concentration 0,4mg/l) – 41 % for 18 days, on nutrient medium with Cu nanoparticles (with concentration 1,2 mg/l) - 72,4 % for 18 days, and nutrient medium with Co nanoparticles (with concentration 1,2 mg/l) – 81,8 % for 18 days. The mint peppery kind on nutrient medium with Cu nanoparticles considerably conceded to selection mint kind. On nutrient medium with Co nanoparticles (with concentration 0,8 mg/l) peppery mint has shown the best result – 126 %. Also differed and mint peppery rootage on nutrient medium with Cu nanoparticles: on 21 day rootage was absent. The selection mint kind the same nutrient medium has shown the best result of all experiment by quantity and length of roots – 9 roots at length more than 80 mm.

Thus, it is possible to draw a conclusion, that Co and Cu nanoparticles positively influence on mint development *in vitro,* but results depend on a kind of mint and concentration of Co and Cu nanoparticles. The use of Co and Cu nanoparticles in nutrient mediums at clonal reproduction can accelerate plant transition in helium mediums on a ground.

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