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Changes in the content of amino acids and protein in different hidromakrofits under the influence of metal nanoparticles

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It was conducted the estimation of protein content and amino acid composition under the influence of metal nanoparticles (Mn, Cu, Zn, Ag) for seven species of hidromakrofits: *Limnobium laevigatum* (Humb.& Bonpl.Ex Willd.), *Pistia stratiotes* L., *Salvinia natans* L., *Elodea canadensis* Michx., *Najas guadelupensis* (Spreng.) Magnus, *Vallisneria spiralis* L. and *Riccia fluitans* L. Exposition of plants was realised at a rate of 1 g of plant per 100 ml of the mixture of uterine colloidal solutions of metal nanoparticles (Mn – 0,75 mg/l, Cu – 0,37 mg/l, Zn – 0,44 mg/l, Ag + Ag2O – 0,75 mg/l) diluted 200 times within 7 days. Protein content was determined by biuret method, and for amino acids – by method of tandem mass-spectrometry using a mass spectrometer AB Sciex 2000 with Autosampler Ultimate 3000 (Dionex). Among the seven studied species in five it was registered decreasing of protein content. It remained stable only in *P.stratiotes* (52 μg/ml) and, conversely, increased in *V.spiralis* (46 μg/ml to 51 μg/ml). The content of the studied amino acids in *N.guadelupensis* decreased by 46% (from 112.05 μmol/g to 60.15 μmol/g), in *R. fluitans* – by 44% (from 104.06 μmol/g to 58.25 μmol/g), *in S. natans* – by 23% (from 90.08 μmol/g to 69.59 μmol/g), in *E. sanadensis* – by 10% (from 143.92 μmol/g to 129.4 μmol/g), and in *P. stratiotes* as well as in *L. laevigatum* – by 8% (from 210.65 μmol /g to 193.77 μmol/g and with 155.0 μmol/g to 142.60 μmol/g), but in *V. spiralis*, on the contrary, increased by 7% (from 91.31 μmol/g to 97.59 μmol/g).

It was analyzed the changes in the composition and in the contents of amino acids for each type of plant. In *P. stratiotes* content of 5 amino acids was reduced – 5-oksoprolin, arginine, aspartic acid, leucine and serine; remained constant content of glycine, histidine, proline; and content of 6 amino acids: alanine, citrulline, glutamic acid, methionine, ornithine, and phenylalanine – increased. In *L. laevigatum* content of 9 amino acids decreased, among them the most – of arginine, aspartic acid, methionine and glutamic acid; remained constant content of glycine and tyrosine; content of 5-oxyproline, alanine, citrulline, leucine, histidine and serine – increased. In *V. spiralis* content of 8 amino acids increased, the most significant – of aspartic acid and valine. At the same time, in *V. spiralis* content of 8 amino acids decreased, but others, especially ornithine, alanine and glutamic acid. It is suggested that the studied plants, which belongs to different families, have different mechanisms of protection, according to which the amino acid composition of plants varies.