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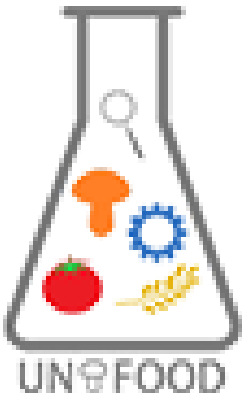
od čega 66 usmenih označenih sa U/O



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Efekat nanočestica CeO_2 obloženih polisaharidima na rast i ukupni sadržaj fenola kao parametar stresa kod dve vrste useva

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Cerijum oksid nanočestice ($nCeO_2$) se istražuju u velikoj meri zbog jedinstvene sposobnosti- izmene između Ce^{3+} u Ce^{4+} oksidacionih stanja, što im omogućava višestruku primenu, kao što su katalizatori, elektrolitički materijal u akumulatorima, za transport lekova u organizmu, u poljoprivredi (đubriva, pesticidi) itd. Uprkos ovim činjenicama, glavno ograničenje primene $nCeO_2$ je njihova sklonost taloženju, što je mnoge istraživače navelo da ih oblažu različitim polimerima. Međutim, literaturni podaci o uticaju obloženih nanočestica na metabolizam biljke su oskudni. Takođe, povećana primena $nCeO_2$ postaje rizik za životnu sredinu zbog njihove akumulacije u zemljištu, vazduhu i vodi. Toksičnost metala može dovesti do prekomerne proizvodnje reaktivnih kiseoničnih vrsta (ROS) uzrokujući abiotički stres i oštećenje važnih bioloških molekula u usevima.
U ovom istraživanju klijanci pšenice i graška su tretirani tokom tri nedelje u hidroponici sa 200 mgL^{-1} neobloženih i glukozom-, levanom- i pululanom obloženih $nCeO_2$ (G-CeO_2, L-CeO_2 and P-CeO_2). Cilj je bio ispitati uticaj oblaganja nanočestica na usvajanje Ce, rast i promenu ukupnog sadržaja fenola (TPC), kao indikatora oksidativnog stresa u usevima monokotila i dikotila. ICP-OES je korišćen za određivanje koncentracije Ce u nadzemnim delovima tretiranih useva, dok je TPC određen Folin-Ciocalteu-ovom spektrofotometrijskom metodom.
Među tretiranim usevima, usvajanje Ce je bilo različito. Povećano usvajanje Ce je zabeleženo nakon oblaganja u grašku, a smanjeno u pšenici. Visok sadržaj Ce detektovan u pšenici je uzrokovao povećano izdužavanje nadzemnog dela bez efekta na TPC. Sa druge strane, nizak sadržaj Ce izmeren u grašku nije imao uticaja na izdužavanje nadzemnog dela, kao ni na TPC.
Prikazani rezultati pokazuju razlike u usvajanju $nCeO_2$ i njihov efekat na rast biljke bez uticaja na fenolni metabolizam. Uprkos ovim činjenicama, neophodno je dalje istraživanje.

Effect of polysaccharide coated CeO_2 nanoparticles on growth and total phenolic content as a stress parameter of two crop species

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Cerium oxide nanoparticles ($nCeO_2$) have been widely investigated because of their unique property - transition between Ce^{3+} and Ce^{4+} oxidation states which allows them multiple applications, such as a catalyst, an electrolyte material in fuel cells, for drug delivery, in agriculture (fertilizer, pesticides) etc. Despite these facts, the main restriction of $nCeO_2$ application is their tendency for agglomeration, which led many researchers to coat them with different polymers. However literature data about the impact of coated nanoparticles on plant metabolism are scarce. Also, enhanced $nCeO_2$ application has become the risk for the environment due to their accumulation in soil, air and water. Metal toxicity may lead to an overproduction of reactive oxygen species (ROS) causing the abiotic stress and damage of important biological molecules in crop species.
In current research, we performed a three week treatment of wheat and pea seedlings in hydroponics with 200 mgL^{-1} uncoated and glucose-, levan- and pullulan coated $nCeO_2$ (G-CeO_2, L-CeO_2 and P-CeO_2). Our goal was to study the impact of nanoparticles coating on Ce uptake, plant growth and on changes in total phenolic content (TPC), as an indicator of oxidative stress, in monocotyledonous and dicotyledonous crop species. ICP-OES was used for determination of Ce concentration in shoots of treated crop species, while TPC was determined by Folin-Ciocalteu's spectrophotometric method.
The uptake of Ce was different among the treated crop species. Ce uptake was increased after coating in pea, but decreased in wheat. The high Ce content detected in wheat caused the increase in shoot elongation without the effect on TPC. On the other hand, low Ce content measured in pea, had no influence on shoot elongation as well as on TPC. Presented results indicate the difference in $nCeO_2$ uptake and their effect on plant growth without the impact on phenolic metabolism. Despite these results, further research is necessary.