Abstract No: 2023_22

Synthesis and evaluation of micronutrients incorporated hydrogel seed coating on seed germination and seedling growth

K. B. C. D. Dhanapala[1], G. Senevirathne[2], M. Gimhani[2], S. Chathurika[3] and L. Weerasinghe[1]*

[1] *Department of Chemistry, Faculty of Applied Sciences, University of Sri Jayewardenepura*

[2] *Sri Lanka Institute of Nanotechnology, Mahenwattha, Pitipana, Homagama, Sri Lanka*

[3] *Department of Urban Bioresources, Faculty of Urban and Aquatic Bioresources, University of Sri Jayewardenepura*

**Corresponding author: laksiri@sjp.ac.lk*

Hydrogels based on modified ultra-short peptide sequences are considered as effective low molecular weight hydrogelators. Among these, fluorenylmethyloxycarbonyl (Fmoc) dipeptide-based hydrogels exhibit a higher swelling capacity and some other unique properties such as extended stability, low toxicity, and high biocompatibility. In this study, the effect of micronutrient incorporated Phe (Fmoc)-Gly dipeptide-based hydrogel seed coating for germination and seedling growth of maize seeds was investigated. Phe (Fmoc)-Gly dipeptide was synthesized using the solid-phase peptide synthesis and characterized using ^{1}H NMR spectroscopy. The hydrogelation of Phe (Fmoc)-Gly was conducted using pH trigger method and the gel was obtained with 0.2% concentration of the dipeptide at pH 4. The formulation of micronutrients incorporated hydrogel seed coating based on Phe (Fmoc)-Gly was developed using 4% - carboxymethylcellulose and 5% calcium chloride as the cross-linker. After the application of seed coating, the germination and seedling growth study were carried out using coated seeds and non-coated control for 07 days. The germination percentage of non-coated control and coated seeds were not significantly different throughout the tested germination period. The increase of mean fresh weight and the mean dry weight of seedlings of coating treatments compared to the non-coated controls also observed to be not significant. To the best of our knowledge, this is the first study describing the development of a micronutrient incorporated Phe(Fmoc)-Gly dipeptide-based hydrogel to investigate the effect on seed germination and seedling growth.

Key words:
dipeptides. hydrogel, coating, germination, seedlings, growth

Abstract No: 2023_07

Encapsulation of chlorhexidine in zincite form of porous zinc oxide nanoparticles for intraoral applications

R. M. G. Rajapakse[1]*, Ushani Karunarathne[1], Ruwan D. Jayasinghe[2], and P. V. Kalani S. Hettiarachchi[2]

[1] *Department of Chemistry, Faculty of Science, University of Peradeniya*

[2] *Department of Oral Medicine and Periodontology, Faculty of Dental Sciences, University of Peradeniya*

**Corresponding author: rmgr@pdn.ac.lk*

Chlorhexidine (CHX) is widely used in pharmaceutical formulations due to its low toxicity and antimicrobial properties. Most of the oral treatment methods for CHX are ineffective since CHX has a poor thermodynamic stability. In order to increase the thermodynamic stability and controlled release, CHX is encapsulated in synthesized thermodynamically stable and nontoxic zincite form of porous zinc oxide nanoparticles (ZnONPs) and characterized both zinc oxide (ZnO) and CHX encapsulated ZnONPs. The X-ray diffractometry and particle size analysis show that the synthesized ZnO particles in the nano-range between 10 nm to 100 nm. The FT-IR spectrum of the CHX encapsulated ZnONPs show the characteristic transmission band for OH stretching at 3454.56 cm^{-1} which clearly confirms the interaction between the amine ($-NH_2$) groups in CHX and the hydroxyl (-OH) groups in ZnO has resulted in the binding of CHX to the ZnONPs. This is further