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The effect of hydroxyapatite nanoparticles on rice (Oryza sativa L.) callus

The effect of hydroxyapatite (HAp) nanoparticles on plant growth has been studied in recent years due to the chemical composition of the material which consists of calcium and phosphate. However, little has been done with regards to the effect of nanoparticles on callus. In this study, the effects of HAp on callus induction and morphology were investigated. The production of embryogenesis callus was carried out under two conditions: culturing on inducing medium containing different concentrations of HAp nanoparticles and incubating in suspension of 50 µg/ml HAp nanoparticles on a shaker at 120 rpm for 15, 30 and 60 minutes prior to culturing on inducing medium. Calli from all treatments were harvested after 3 weeks. Callus growth was examined. Size, fresh and dry weight of callus were measured. The morphology of calli and callus cells were investigated under an optical microscope. The results showed that HAp nanoparticles were not toxic to rice calli and did not suppress growth of all the calli tested. The study of morphology showed that calli were yellow or cream in color and compact. More embryogenic calli were observed in HAp pretreated groups as characterized by their nodular and compact structure. Calli on solid medium containing HAp nanoparticles showed less embryogenic structure at the same concentration. In addition, tracheary elements were observed in all HAp exposed calli although more of such cells were found in calli pre-exposed to suspensions of HAp nanoparticles. The results suggest the potential of HAp to be used as effective embryogenesis inducing supplement in tissue culture medium.

Author: POONPOKLANG, Apakorn (School of Biology, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand)

Presenter: POONPOKLANG, Apakorn (School of Biology, Institute of Science, Suranaree University of Technology, Nakhon Ratchasima 30000, Thailand)

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