

Antimicrobial protection for alginate beads of an additional Chitosan layer in Andean potato encapsulation-dehydration

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Alginate beads employed in plant cryopreservation encapsulation techniques readily interchange solutes and water with the surrounding media. Their transfer properties are often critical for its function, either for its stability and preservation or textural modulation, or for the cryoprotectant access to encapsulated specimens and their water interchanges with environment during dehydration-rehydration. A modification in the classical encapsulation procedure involves adding an additional external chitosan layer. The antimicrobial protection conferred by chitosan can be of great interest, as often cultivation and growth after cryopreservation can be impaired by microbial contamination. Microbial proliferation is often a surface affair and calcium alginate beads can constitute a suitable model for studying the interface microbial growth and be helpful to test the action of chitosan towards microorganisms. The aim of this work was to study the effect of a chitosan layer against microbial-derived contamination on alginate beads in the encapsulation-dehydration (ED) technique. Chitosan-coated beads were incubated with *E. coli*, *B. cereus* and *A. niger* and a protocol for ED with a chitosan layer was developed for Andean potato landraces. The microorganism kinetics was tested on a microplate assay. Chitosan significantly inhibited gram positive and gram negative model strains during a time longer than that usually employed in an ED protocol (over ten hours). ESEM micrographs showed the beads external layer evolution during dehydration. Calcium alginate beads with alginate chitosan layer were used to conserve three Andean potato varieties. A dehydration time of three hours was enough to reach good recovery results. Different re-growth light conditions were tested; the best results were obtained under an initial darkness period followed by a diffusive light step. The results obtained suggest a promising utility of chitosan as an antimicrobial for encapsulation-dehydration protocols for the cryoconservation of other Andean potato varieties.

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