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Osmotic Dehydrofreezing for Protection of Rheological Properties of Agricultural Products from Freezing-Injury

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Three agricultural products, carrot, broccoli and potato tissue, were osmotically dehydrated by immersion in 50% (w/w) sucrose solution and their rheological properties were measured before and after freezing-thawing-rehydration. Although the dynamic elasticity and viscosity became smaller after freezing-thawing as compared to the fresh sample, the osmotically dehydrated sample showed much higher retention of rheological properties than the untreated sample with the exception of the potato sample. In measurement of complex impedance, the radius of the Cole-Cole arc, an index of the intactness of cell plasma membrane, showed good correlations with the rheological properties for carrot and broccoli. The amount of drip from the cell tissue was also compared among various treatments. The osmotically dehydrated sample showed much less drip than the untreated sample after freezing-thawing-rehydration. Under an optical microscope, the cell structure seemed to show less injury for the osmotically dehydrated sample than the untreated sample. These results indicate that osmotic dehydrofreezing protects the cell structure, in particular the cell plasma membrane, against freezing injury to give reduced softening after freezing-thawing.

Keywords: [osmotic dehydrofreezing](#), [agricultural products](#), [freezing injury](#)

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