

Cactus Pear Mucilage as a Natural Food Packaging Alternative

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Abstract

With increased consumer demands for food products displaying improved quality and safety, together with environmental concerns over the use of non-biodegradable, plastic packaging in the food industry, the investigation of non-conventional natural polymers, such as cactus pear mucilage (CPM) used in the development of natural food packaging has been considered. Film forming solutions were prepared at 5% (w/w) using freeze-dried CPM from both 'Algerian' and 'Morado' cultivars together with glycerol as a plasticiser at 60% (w/w, based on the weight of the CPM used in the film forming solution). The influence calcium chloride (CaCl_2) had on the physical properties of the various films was also determined by preparing a CaCl_2 stock solution at 30% (w/w). Scanning electron microscopy (SEM) imaging showed variations between 'Algerian' and 'Morado' CPM films, with CaCl_2 treatment showing to improve the homogeneity of the CPM films. Using a Brookfield Texture Analyser, the various films mechanical properties showed considerable variation between 'Algerian' and 'Morado' CPM film strength and elasticity. Film tensile strength (TS) showed to be enhanced by the addition of CaCl_2 , with 'Morado' films TS increasing from 0.31 to 1.01 MPa with calcium treatment. 'Algerian' films showed to be less sensitive to CaCl_2 , reporting an increase from 0.26 to 0.37 MPa. Similarly, 'Morado' films showed a clear increased sensitivity to calcium treatment for the puncture force (PF) tests, reporting increases from 1.82 to 5.43 (N) by calcium treatment, with 'Algerian' + CaCl_2 only reporting a PF of 2.38 (N). Other than film strength, film elasticity was also considered, evaluated in terms of film elongation a break percentage (%E) and distance to puncture (DTP). Although a phenomenon of increased film strength linked to decreased film elasticity was observed, all CPM films showed excellent elasticity. 'Morado' CPM showed to produce films displaying overall superior films strength and elasticity and is recommend for further investigation as a viable natural packaging.

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Brandon van Rooyen has industry experience as a product developer and innovative thinker, applying knowledge to further research in food biochemistry.