

Title Optimization of edible coating composition to retard strawberry fruit senescence
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Abstract

The ability of polysaccharide-based (starch, carrageenan and chitosan) coatings to extend the shelf-life of strawberry fruit (*Fragaria ananassa*) were studied, mainly for industrial applications. The coatings and strawberries were characterized in terms of their physical properties (superficial properties, wettability, oxygen permeability) in order to optimize coating composition. The optimized coatings were then applied to the fruit both in the laboratory and in the field and their effects on relevant quality parameters assessed. The superficial tension of the strawberry was 28.94 mN/m, and its polar and dispersive components were 5.95 and 22.99 mN/m, respectively. The critical superficial tension of the strawberry, obtained from a Zisman plot, was 18.84 mN/m. For each polysaccharide-based coating the best wettability was obtained for compositions: 2% starch and 2% sorbitol; 0.3% carrageenan, 0.75% glycerol and 0.02% Tween 80; 1% chitosan and 0.1% Tween 80. The oxygen permeability of carrageenan films was approximately 40% of that obtained with starch films. The addition of calcium to the starch film-forming solution produced an increase in the film thickness; nevertheless no significant differences in oxygen permeability were obtained between films with and without calcium. The effects of application of these coatings to fresh strawberries were assessed by determining color change, firmness, weight loss, soluble solids and microbiological growth over 6 days. No significant colour differences were found, and the minimum firmness loss was obtained in strawberries coated with carrageenan and calcium chloride. The minimum loss of mass was obtained for fruit with chitosan and carrageenan coatings both with calcium chloride. The addition of 1% di-hydrated calcium chloride to the coatings reduced the microbial growth rate on the fruit. The minimum rate of microbial growth was obtained for strawberries coated with chitosan and calcium chloride. The industrial application of calcium-enriched carrageenan coating on fresh strawberries resulted in a decrease in firmness loss when compared to non-coated fruit.