Title of thesis: Extending The Shelf-Life of Sliced Fruits by Developing Edible Packaging With Apple Pomace Extract

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Sliced fruits such as pears and apples offer convenience and freshness to consumers, but their shelf-life is limited due to processes like cutting and peeling, leading to issues like surface colour, browning, texture loss, and off-flavours. Edible packaging, an alternative to conventional methods such as Modified Atmosphere Packaging, has been explored to extend the shelf-life of sliced fruits by regulating transpiration and physiological disorders. Various edible polymers and additives, including apple pomace, have been utilised in the manufacture of edible coatings to extend shelf-life.

This study aimed to extend the shelf-life of sliced 'Idared, apples and 'conference' pears using an edible coating made from apple pomace extract, addressing the disposal challenge of apple pomace. Two different edible coating solutions were prepared using apple pomace extract, one containing citric acid, sodium alginate, and glycerol and the other using ascorbic acid instead of citric acid. Additionally, the effect of the apple pomace extract was compared to a control sample and three other edible coating solutions containing different combinations of citric acid, ascorbic acid, glycerol, and sodium alginate.

Quality assessment parameters including browning, colour parameters (L*,a*.b*), % weight loss , and texture were evaluated during the five-day storage period at 40C±1 to investigate the impact of different edible coating solutions. During the 5-day storage at 40C±1, all sliced apple samples showed a decrease in lightness (L*) values, with the control solution exhibiting the highest decrease. However, all five edible coating solutions maintained consistent lightness values. The b* and a* values increased during storage, with the control sample showing the highest increase in yellowness and redness. Solutions with apple pomace extract exhibited the least increase, indicating better colour stability. The browning index increased in all samples, but significantly less in the edible coating solutions compared to the control. Apple pomace

extract, citric acid, and ascorbic acid contributed to reduced browning. However, none of the solutions fully prevented browning in the sliced apples.

In the sliced pear samples, the lightness L* value remained consistent during the storage period and no significant difference was observed between the edible coatings and the control. The edible coating solutions reduced yellowness (b*) and redness (a*) compared to the control, with solution 5 showing the least b* value. The browning index increased less in coatings than in the control.

Texture analysis revealed that, in sliced pear samples there was a decrease in hardness of sliced pear samples during the 5-day storage, attributed to moisture loss and enzymatic pectin hydrolysis. Solution 5 (1% sodium alginate, 1.5% glycerol, 0.5% ascorbic acid, 5% apple pomace extract) had the least hardness indicating that solution 4 (1% sodium alginate, 1.5% glycerol, 0.5% ascorbic acid, 5% apple pomace extract), has better preservation of firmness. Adhesiveness and springiness increased in all coated pear samples over the 5-day storage, but the differences were not significant among the edible coating solutions and when the edible coating solutions were compared to the control.

For the sliced apple samples, the control samples showed increasing hardness, possibly due to the wound-healing process of wounded apples and the crosslinking of calcium ions with pectin in the cell wall. Coated samples, on the other hand, showed decreased hardness, and there were no significant differences in the samples in which apple pomace extract was used when compared to the edible coating solutions containing sodium alginate, glycerol, and antioxidants. Increased adhesiveness and stringiness were observed, attributed to pectin breakdown in the cell wall, a process accelerated during storage and fruit ripening.

Overall, the study suggests that apple pomace extract has the potential as an edible coating to extend the shelf-life of sliced fruits, even when used with antioxidants and plasticizers. However, further investigation and research are needed on the full optimization of the apple pomace extract as an edible coating.