Development of Minimally Processed Banana Blossom (*Musa acuminata* colla)

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Introduction

Minimally processing of fruits and vegetables is a rapidly developing segment of the food industry. The manufacturing steps of minimally processed products involve washing, sorting, peeling, slicing, blanching and packaging in films. The wound responses are the major problem of fresh cut development which cause the enzymatic browning (Wickramarachchi and Ranamukaarachchi, 2005) leading to the reduction of visual and organoleptic quality. Control of wound responses are the key to produce minimally processed product of good quality (Janisiewicz *et al.*, 1999). Blanching is an important treatment, which primarily aims at inactivating the enzymes that cause undesirable changes (Kaur and Kapoor, 2000). The increase in cut damaged surfaces and availability of cell nutrients (Delaquis *et al.*, 2003) and increased handling (Darmabandu *et al.*, 2007) of the products provide greater opportunity for contamination by pathogenic organisms. Minimally proceed vegetables are rare in the Sri Lankan market. Therefore, the major objective of this research is to develop a minimally processed vegetable from a consumption constricted local banana blossom.

Methodology

Fresh mature banana blossoms were purchased from the Badulla market and stored in a refrigerator until the processing initiated. The processing of banana blossoms involved removal of outer 2-3 outer bracts, washing by distilled water (8 °C) followed by 100 ppm chlorinated water (8 °C) for 5 minutes and sterile water (8 °C) for 5 minutes. Then the banana blossom was cut into small pieces which are of 5 mm to 10 mm in thickness using a sharp stainless steel knife. Cut pieces were separately subjected to pre-treatments: T1 = distilled water (Control), T2 = 1g/l citric acid solution, T3=1g/l ascorbic acid solution, T4 = 1g/l sodium meta bisulfate (SMS) solution, T5 = 1g/l calcium chloride solution. All the treatments were given for five minutes under 8 °C. The pre-treated samples were drained and packed in low density poly ethylene (LDPE) pouches (150 gauge). Packages were stored in a refrigerator at 8 °C. The extension of browning was noted (none-1, slightly - 2, moderate - 3, high – 4 and very high - 5) until seven days of storage. The selected best treatments were carried out in increasing concentrations C1-1g/l, C2-2g/l, C3-3g/l, C4-4g/l, and C5-5g/l. For the best treatments the extensions of browning and aerobic & anaerobic microbial load were determined under the 1$^{st.}$ 3rd, 5th and 7th days of storage. The experiment was repeated three times. The sensory evaluation was carried out for uncooked and cooked samples separately by involving 20 untrained panelists. The tested sensory attributes for cooked samples were taste, aroma, mouth feel, appearance and overall acceptability and it was a texture, color and appearance for uncooked samples. The five point hedonic scale was used to record the sensory attributes in both cases (like extremely – 5, like moderately – 4, neither like nor dislike –3, dislike moderately -2, dislike extremely – 1). Data were analyzed by Minitab statistical package version 14.

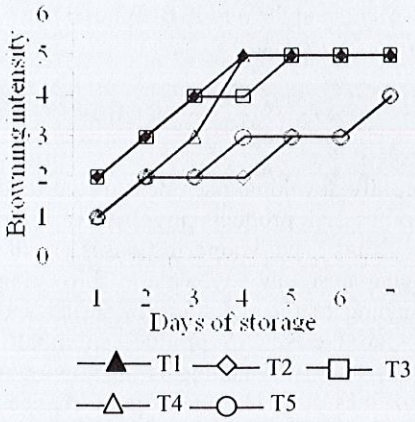


Figure 1: Browning intensity of minimally processed banana blossom against the four treatments and control under low temperature storage (8 °C)

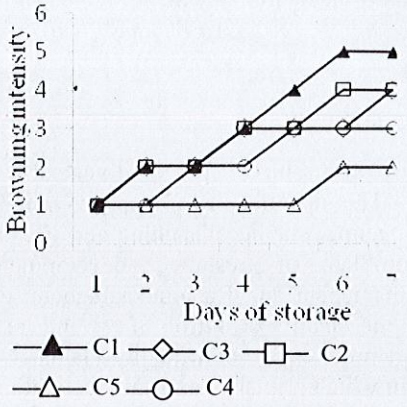


Figure 2a: Browning intensity of minimally processed banana blossom against the different concentrations of citric acid under the low temperature storage (8 °C)

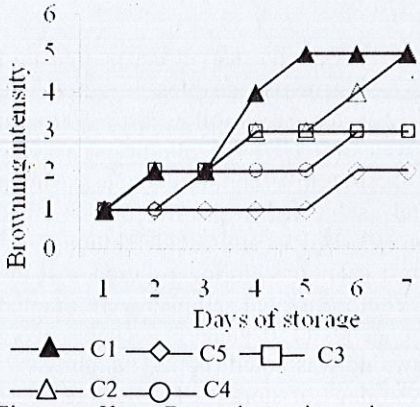


Figure 2b: Browning intensity of minimally processed banana blossom against the different concentrations of calcium chloride under low temperature storage (8 °C)

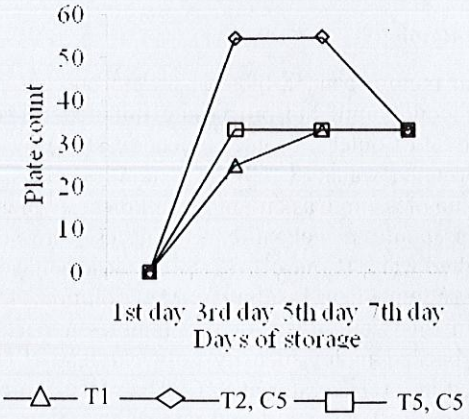
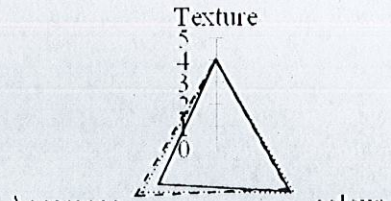


Figure 3: Anaerobic bacteria colony count of minimally processed banana blossom under the treatment of citric acid (5g/l) and calcium chloride (5g/l) under low temperature storage (8 °C)

Results and discussion

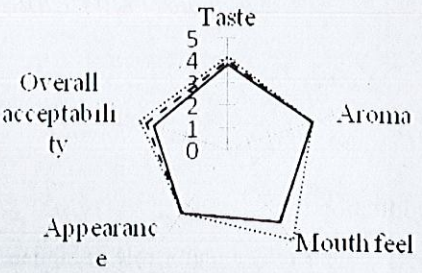
The cut surface discoloration is minimum with the citric acid and calcium chloride treatments (Figure 1). The effectiveness of browning prevention is higher with the increment of the concentrations of the both chemicals such as citric acid and calcium chloride. The similar results observed in all 3 trials (Figure 2a and 2b). According to the microbial determination, the aerobic colony count is an uncountable number. However, the number of anaerobic bacteria colonies is same under both treatments during the day

7 of storage (Figure 3). The Figure 4 and 5 show the sensory profile for the cooked and uncooked samples, respectively. In both sensory tests the sensory attributes were a significantly difference ($p<0.05$).



----- Citric acid ..... $CaCl_2$
——— Control

Figure 4: Sensory profile diagram for uncooked minimally processed banana blossom



----- Citric acid ..... $CaCl_2$
——— Control

Figure 5: Sensory profile diagram for cooked minimally processed banana blossom

Conclusions

Citric acid and $CaCl_2$ were the best treatments which control the browning in fresh cut banana blossoms. According to the sensory evaluation both citric acid and $CaCl_2$ treated uncooked samples were accepted by the sensory panel. Out from the cooked samples $CaCl_2$ treated sample was the best.

References

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