CHAPTER 5

CONCLUSIONS

5.1 Anatomical comparison between normal and chilling injured longan fruit pericarps cv. Daw and Biew Kiew

The anatomy of normal longan fruit pericarp cv. Daw and Biew Kiew is similar in ultrastructure but different in pericarp thickness. The pericarp thickness in cv. Daw and Biew Kiew averaged 575 and 552 μm. The pericarp surface was covered by a thin discontinuous cuticle, many natural crackings, few stomata and some groups of trichomes. It consisted of three layers; exocarp, mesocarp, and endocarp that differed by cell type, shape and arrangement. The chilling injury symptoms of longan fruit pericarp were similar in both cultivars as evidenced by browning of vascular strands and water soaking of the pericarp. The mesocarp cells were the first to turn brown, followed by the endocarp, then the discoloration spread over the whole pericarp, finally darkening the pericarp surface. The SEM observation was shown damage of the cuticle, trichomes and cell wall of mesocarp cells. The ultrastructure of cells in mesocarp appeared degradation of cell membrane and cell wall when observed with TEM and also showed lacking of stain between the cells. Likewise, the single layer cells in the endocarp showed the separation of the middle lamella and cell membrane damage when observed with TEM.

5.2 Physico-chemical changes and PPO activity between normal and chilling injured longan fruit pericarps

Longan fruit cv. Daw and Biew Kiew during storage at 5°C showed visible signs of chilling injury as a score 2 after 6 days and severe injury after 14 and 10 days, respectively. Electrolyte leakage and PPO activity of the inner and outer pericarps increased with a peak on days 10 and 12 of storage. The L^* values gradually decreased until the discoloration spread over the whole pericarp and finally darkening the pericarp surface. These results showed the relationships between the structure of pericarp, which included damaged cell membrane and cell wall of

mesocarp cells, moisture loss and PPO activity with chilling injury development. Results also, agreed with the fact that the natural opening of longan pericarp facilitates rapid moisture loss that also caused surface browning after harvest and during storage. The surface damage of longan pericarp also helped the chilled air to penetrate through the pericarp during low temperature storage. These openings, plus the damaged cuticle and trichomes could be enhanced by dehydration, while a water deficit was an essential prerequisite for chilling injury induced solute leakage.

5.3 Identify the main classes of phenolic compounds and other components of normal and chilling injured longan fruit pericarps

The phenolic compounds in longan fruit pericarp were identified as ellagic acid conjugates, quercetin and kaempferol glycosides and 2 groups of unknown compounds. After partial purification of unknown compounds with P2 chromatography, followed by TLC and HPLC and then analysis with FTIR spectroscopy, they were similar to hydroxycinnamates. The changes of identified phenolics such as quercetin and kaempferol glycosides exhibited a decrease in cv. Biew Kiew faster than cv. Daw during chilling injury.

5.4 Quantification of other components of normal and chilling injured longan fruit pericarps cv. Daw and Biew Kiew

The cell wall components of fresh longan fruit pericarp cv. Daw consisted of TDF 7.26 g, pectin 0.89 g and lignin 0.019 g /100g DW and was similar to cv. Biew Kiew consisted of TDF 7.28 g, pectin 0.85 g and lignin 0.022 g/100g DW. TDF slightly increased and pectin decreased in cv. Biew Kiew, but not in cv. Daw and lignin slightly increased with severity of chilling injury. TDF, pectin and lignin contents did not show any clearly distinguishable differences between chilling injury and cell wall components in longan fruit pericarp of both cultivars.