CHAPTER 7

CONCLUSIONS

7.1 Overall conclusions

The anatomy of longan fruit pericarp cv. “Biew Kiew” and “Daw” is similar in ultrastructure but different in pericarp thickness. The pericarp surface was covered by a thin discontinuous cuticle, 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 effect of SO_2 treatment, high storage temperature, and the senescent 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 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.

SO_2 treatment and the suitable storage condition improved the overall longan fruits quality, especially on inner and outer peel tissue and aril color than no SO_2 treatment. Treatment maintained peel color with no subsequent loss of color during storage, while no SO_2 treatment showed more scarlet, became darkened, and less

intensely red. Under high storage temperature, the outer peel color was less intensely color, more purple-red, became darkened, and showed blue-yellowish. Inner peel color appeared less intensely color, became darkened, and showed blue-yellowish. Additionally, color was extremely changes as affected by storage durations factor, the peel color in both inner and outer became dark brown color when the storage duration increased. SO_2 treatments resulted more yellow, and bright appearances in aril tissue. The aril color was changed to yellowing and cloudy fruit when stored at 7±2 degree C. After SO_2 treatment, pH value of peel tissue significantly decreased. However, pH value of aril tissue was significantly increased.

These results showed the positive correlation between the structure of pericarp, which included damaged cell membrane and cell wall of mesocarp cells, weight loss, increasing of electrolyte leakage and PPO activity with SO_2 treatment, unsuitable storage temperature. The cell membrane damaged resulted wound on the longan pericarp, inducing weight loss, and moisture and gas exchangeable. The high membrane integrity was accelerated the separation of polyphenol substrates which were localized in the vacuole, from the PPO which was localized in the cytoplasm and various organelles. The contact of polyphenol substrates and PPO enzyme showed the dark or browning color. Moreover, browning symptom was associated with loss of membrane integrity that could occur during tissue deterioration and senescence.

There were large variations in the content of the two phenolic compounds amount the varieties and treatments. The experiment found only ellagic acid content in the peel and aril tissue, while gallic acid was not detected in both tissues. Ellagic

acid content in aril tissue was significantly decreased after SO_2 treatment, while the content was not different in peel tissues. Those compound in both peel and aril tissues had a reverse correlation along the storage duration, it disappeared after stored for 6 weeks for peel tissue, and only 2 weeks for aril tissue. The cool storage condition (2 ± 2 degree C) could maintain the high content of ellagic acid in both peel and aril tissue, while the content of ellagic acid decreased significantly under high storage temperature, especially in aril tissue.

The SO_2 treatment may retain the high fruit quality, preserved in PPO activity, declining of membrane integrity and could maintain the content of phenolic compounds in the fruit tissues. However, the sulphite residues could detected immediately after SO_2 treatment in all part of longan fruits, especially on peel tissue, but the residues were decreased along the storage durations.

The data obtained from this study suggested that the optimum of SO_2 concentration and cold storage temperature could prolong the post-harvest quality, extend shelf life of longan fruits, and maintain the content of polyphenolic compounds inside the longan fruits.

7.2 Future works

1. The lower SO_2 concentration and treating duration should be studied on the postharvest quality of longan fruits
2. The mechanism of SO_2 treatment affecting on polyphenolic compounds reduction should be investigated

3. The application of SO_2 treatment on other agricultural products should be investigated, especially on perishable products.
4. According to sulphite residue contamination, the other compounds should be studied to replace SO_2 treatment is interesting.