Yossapol Palapol 2009: Characterization of MYB Transcription Factors and Anthocyanin Biosynthesis Genes of Mangosteen Fruit during Red Colouration. Doctor of Philosophy (Horticulture), Major Field: Horticulture, Department of Horticulture. Thesis Advisor: Professor Saichol Ketsa, Ph.D. 240 pages.

The colour of mangosteen (*Garcinia mangostana* L.) fruit changes from green to purple black after harvest as the fruit ripening advances. The relationships between anthocyanin composition and content during colour development and fruit maturity and postharvest quality were determined. Fruit at different stages of maturity (light greenish-yellow with 5% scattered pink spots to purple black) were harvested and kept at 25^{o}C (85-90% RH). Fruit from each maturity stage all developed to the final purple black stage. During the postharvest period, hue values and pericarp firmness decreased significantly, while soluble solids content increased concomitant with a decrease in titratable acidity (stage 4-6). Anthocyanin content in the outer pericarp was higher than in the inner pericarp and increased to a maximum at the final stage. Sensory evaluation and fruit quality (hue values, soluble solids and titratable acidity) of fruit harvested at the different stages did not differ once the fruit had finally developed to the purple black stage. Anthocyanins in the outer pericarp mainly consisted of five compounds, identified by HPLC/MS as cyanidin-sophoroside, cyanidin-glucoside, cyanidin-glucoside-pentoside, cyanidin-glucoside-X, cyanidin-X_2 and cyanidin-X, where X denotes an unidentified residue of *m/z* 190, a mass which did not correspond to any common sugar residue. Cyanidin-3-sophoroside and cyanidin-3-glucoside were the major compounds that increased with fruit colour development. In all plant species previously studied, the anthocyanin pathway is co-ordinatively regulated by transcription factors of the MYB-super family. Three full-length mangosteen MYB transcription factors (GmMYB1, GmMYB7 and GmMYB10) and all the anthocyanin biosynthesis genes (GmPal to GmUFGT) were characterized. Sequence analysis at the protein level of the R2R3-MYB transcription factor family showed GmMYB10 had a high degree of similarity with production of anthocyanin pigment1 (PAP1) in *Arabidopsis* and as well as sequences from other plant species related to the elevation of anthocyanin pigmentation. In transient transactivation assays, *GmMYB10*, co-expressed with *AtbHLH2*, strongly activated the *GmDFR* and *AtDFR* promoters. Transcript levels of *GmMYB10* and *GmUFGT* were highly abundant with onset of pigmentation and subsequently during red colouration. Our results suggest that *GmMYB10* plays an important role in regulating anthocyanin biosynthesis both on the tree and after harvest, while *GmUFGT* may be a key biosynthetic gene in mangosteen pigmentation. The expression patterns of *GmMYB10* and *GmUFGT* correlated with ethylene production that increased linearly until stage 5 (dark purple) and decreased thereafter. 1-Methycyclopropene (1-MCP) and low temperature storage (15^{o}C) clearly delayed red colouration with resulting down-regulation of *GmMYB10*. These results suggest that the effect of ethylene on anthocyanin biosynthesis may be via the regulation of *GmMYB10* expression.

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