

## Description of Additional Supplementary Files

**File name:** Supplementary Data 1

**Description:** Effect of grapefruit bagged with four light-transmitting bags on the TSS content, TA content and CCI of grapefruits during ripening.

**File name:** Supplementary Data 2

**Description:** Effects of different light treatments on content of carotenoid, including  $\beta$ -carotene, phytofluene,  $\zeta$ -carotene, lycopene, and 9-cis-violaxanthin content during grapefruit ripening.

**File name:** Supplementary Data 3

**Description:** The number of upregulated and downregulated genes between samples during grapefruit ripening.

**File name:** Supplementary Data 4

**Description:** Data for weighted gene co-expression network analysis of grapefruit during ripening under different light-transmittance treatments.

**File name:** Supplementary Data 5

**Description:** Expression data of structural genes and transcriptional factors correlated with carotenoid metabolism during grapefruit ripening.

**File name:** Supplementary Data 6

**Description:** Expression data of differentially expressed transcription factors in response to RL during grapefruit ripening (from 184 DAB to 220 DAB).

**File name:** Supplementary Data 7

**Description:** The co-expression relationship of TFs and structural genes related to carotenoid metabolism in 'blue' module and 'turquoise' module.

**File name:** Supplementary Data 8

**Description:** Gene ID for transcription factors and structural genes in the Supplementary Data 7.

**File name:** Supplementary Data 9

**Description:** Expression data of 22 important candidate genes involved in the carotenoid metabolism using qRT-PCR and RNA-seq.

**File name:** Supplementary Data 10

**Description:** Primer sequences used for real-time quantitative PCR.