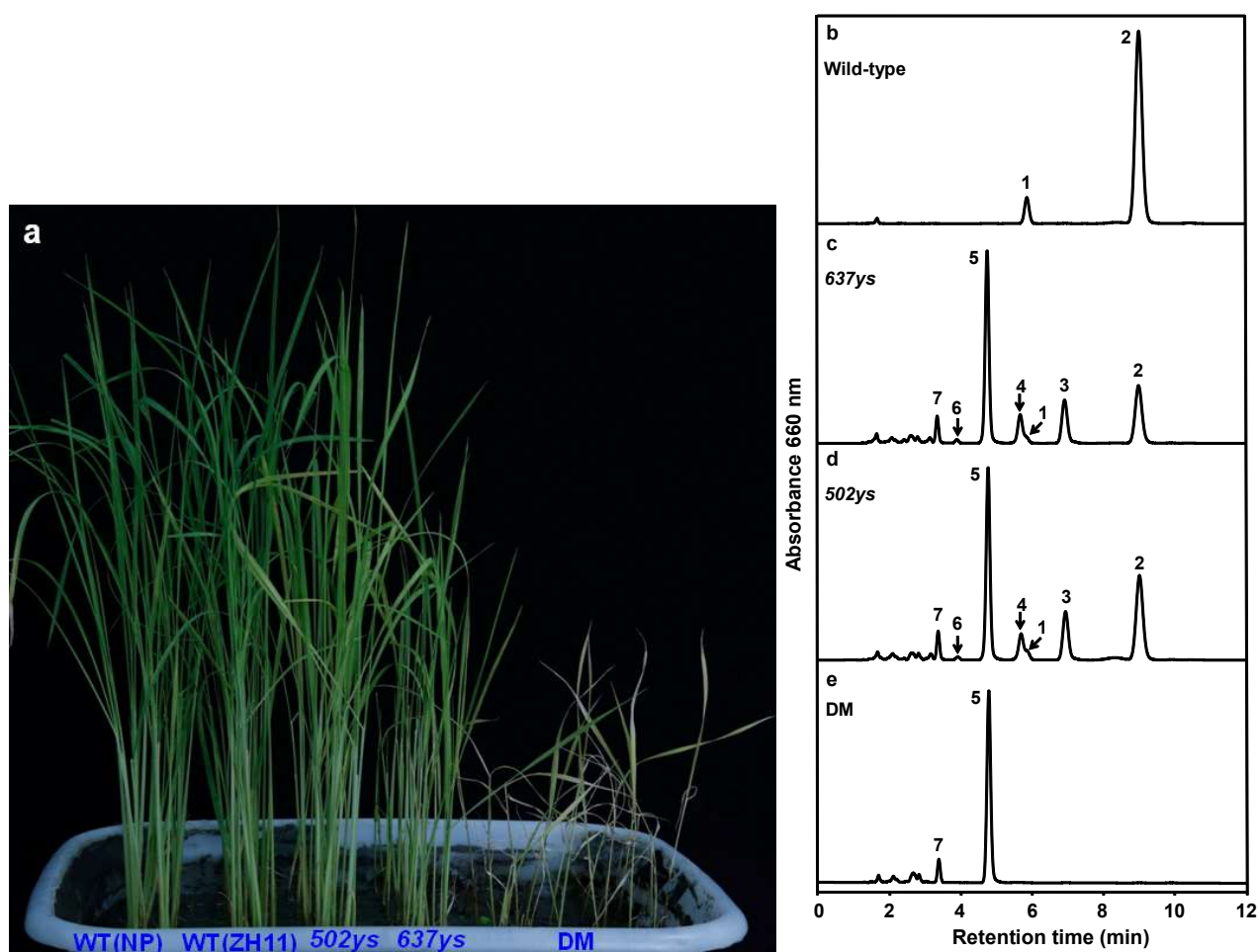




**Additional file 11: Figure S7.** Phenotypic comparison and Chl composition analysis of the wild-type ZH11 and Nipponbare (NP), the 637ys mutant, the 502ys mutant and the 637ys 502ys double mutant (DM) at the three-leaf stage grown in a growth chamber under low light at constant 23 °C. **(a)** Phenotypic comparison. **(b), (c), (d)** and **(e)** The elution profiles of Chls in wild type, 637ys, 502ys and DM, respectively. Peaks 2, 3, 4, and 5 represent Chl<sub>phy a</sub>, Chl<sub>THGG a</sub>, Chl<sub>DHGG a</sub>, and Chl<sub>GG a</sub>, respectively. Peaks 1, 6 and 7 represent Chl<sub>phy b</sub>, Chl<sub>DHGG b</sub>, and Chl<sub>GG b</sub>, respectively. The absorption spectra of elution profiles in acetone are the same as those in **Figure S1c** and **d**.