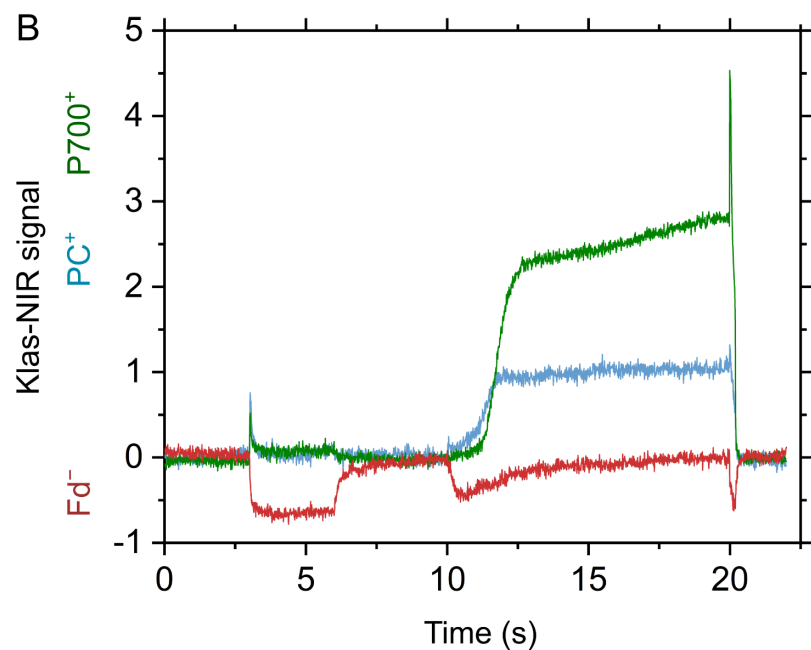
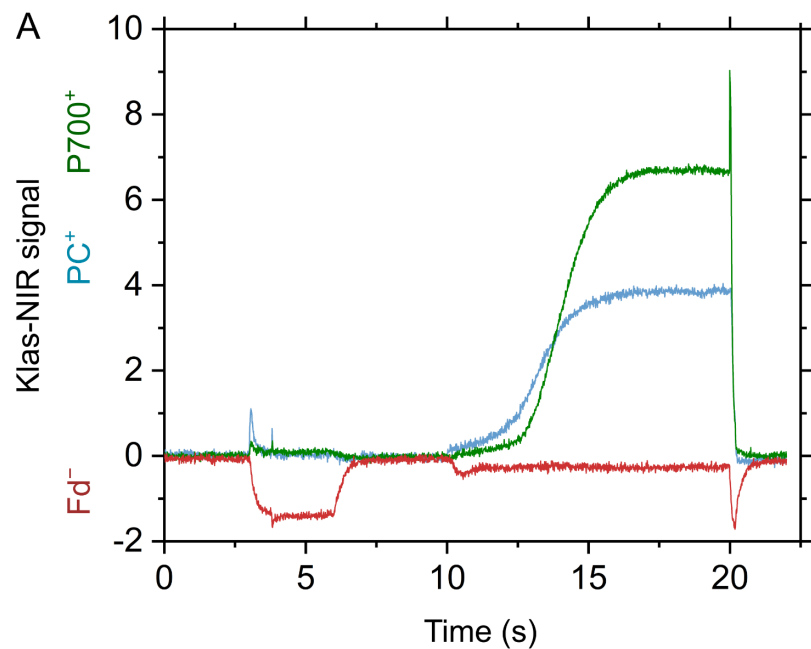
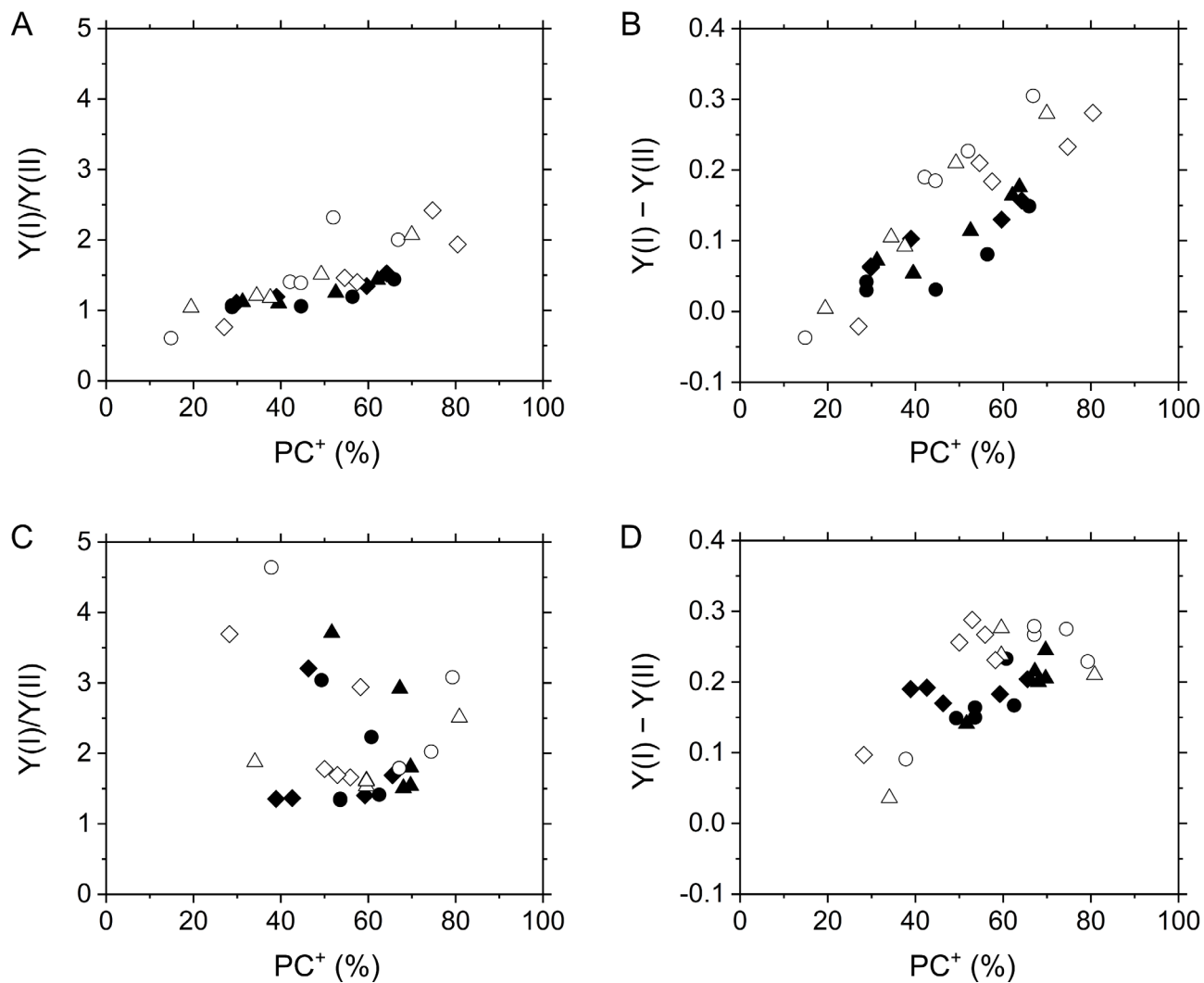


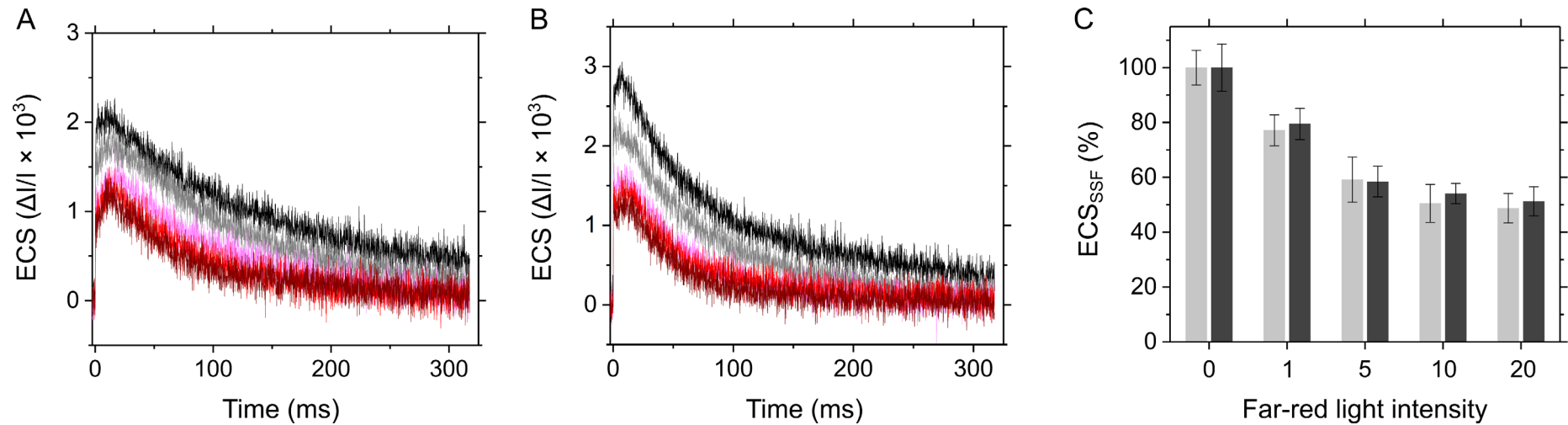
**Supplemental Fig. S1.** Inferred reduction level of plastoquinone (PQ) pool ( $1 - qL$ ; A, C) and non-photochemical quenching (NPQ; B, D) at various intercellular CO<sub>2</sub> partial pressures (Ci) in the C<sub>3</sub> plant mustard (A, B) and the C<sub>4</sub> plant maize (C, D). Experiments were conducted independently three times as shown in different symbols (biological replicates) at 21 kPa (closed symbols) and 1 kPa O<sub>2</sub> (open symbols).



**Supplemental Fig. S2.** Responses of the redox states of P700<sup>+</sup> (green), plastocyanin (PC<sup>+</sup>, blue), and ferredoxin (Fd<sup>-</sup>, red) to the illumination with red actinic light (3–6 s, 450  $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ ) and far-red light (10–20 s) in the C<sub>3</sub> plant mustard (A) and the C<sub>4</sub> plant maize (B). Saturation flashes (10,000  $\mu\text{mol photons m}^{-2} \text{s}^{-1}$ ) were applied at 4 (30 ms) and 20 s (200 ms) respectively. The signal to Fd<sup>-</sup> has negative values.



**Supplemental Fig. S3.** Relationships of the gap between effective quantum yield of PSI, Y(I), and of PSII, Y(II) with plastocyanin (PC) oxidation at various intercellular CO<sub>2</sub> partial pressures in the *C<sub>3</sub>* plant mustard (A, B) and the *C<sub>4</sub>* plant maize (C, D). Experiments were conducted independently three times as shown in different symbols (biological replicates) at 21 kPa (closed symbols) and 1 kPa O<sub>2</sub> (open symbols).



**Supplemental Fig. S4.** Electrochromic shift induced by a 5  $\mu$ s-short saturation flash (ECS<sub>SSF</sub>) during far-red light illumination in the C<sub>3</sub> plant sunflower (A) and the C<sub>4</sub> plant maize (B) grown in a field condition. Far-red light was provided at various intensities (0, black; 1, grey; 5, pink; 10, red; and the maximum 20, wine red; the values defined by the Walz software). (C) The flash-induced ECS changes normalized by the values without far-red light illumination as 100%. The data of sunflower (light grey) and maize (dark grey) are shown as the mean with the standard deviation ( $n = 3$ , biological replicates).