**Supplemental Figure legends**

**Supplemental Figure 1**

Relationship between $CO_2$ assimilation rate measured at 1500 μmol photons $m^{-2}$ $s^{-1}$ and 380 μL $L^{-1}$ $CO_2$ concentration ($A_{380}$) and the Rubisco activase contents at several leaf temperatures in wild type (triangles) and antisense lines (circles or squares). Plants were grown at 20/15°C (a, c) or 30/25°C (b, d).

**Supplemental Figure 2**

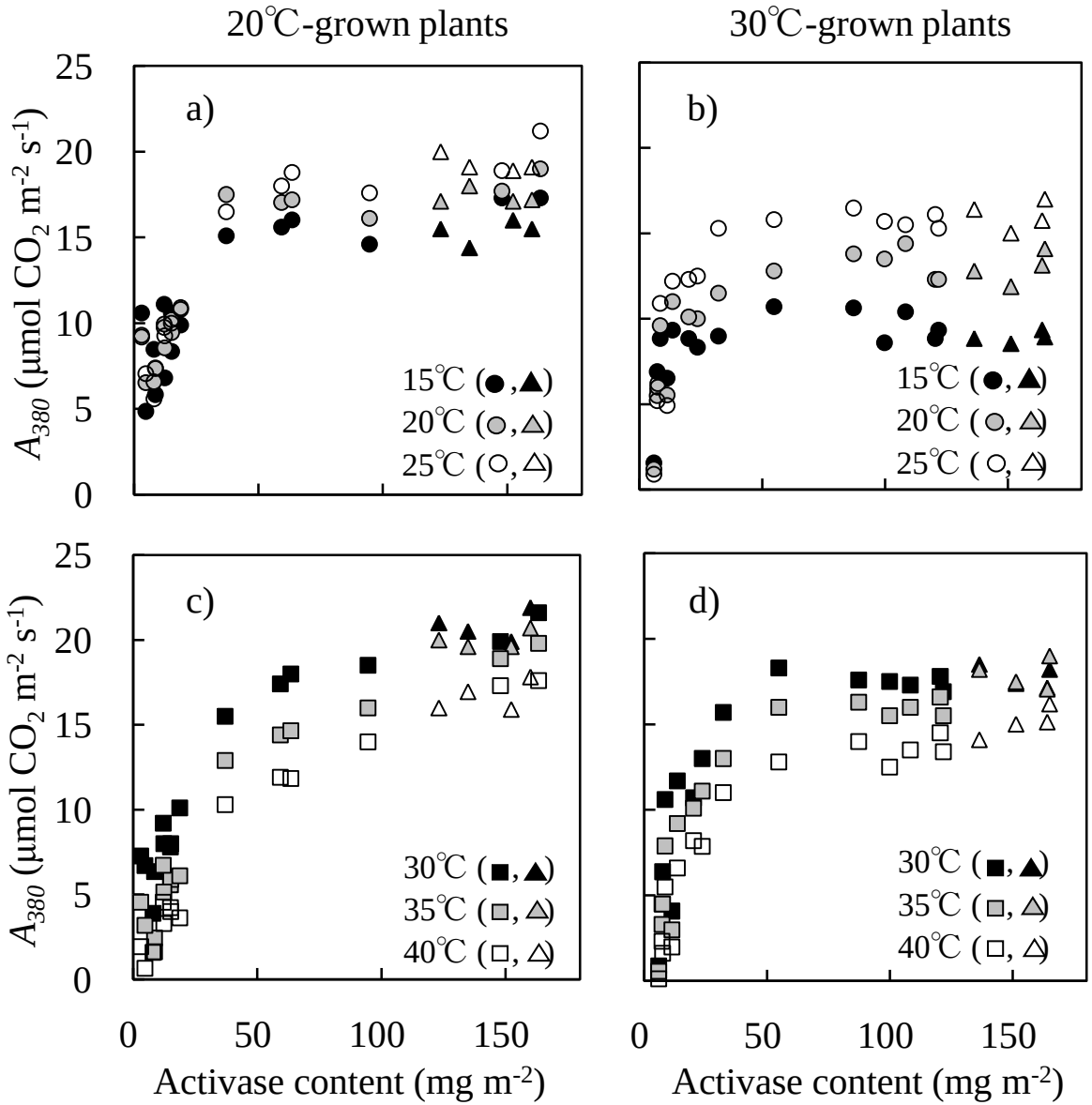
Relationship between Rubisco activation state at 1500 μmol photons $m^{-2}$ $s^{-1}$ and 380 μL $L^{-1}$ $CO_2$ concentration and Rubisco activase contents at several leaf temperatures in wild type (triangles) and antisense lines (circles or squares). Plants were grown at 20/15°C (a, c) or 30/25°C (b, d).

**Supplemental Figure 3**

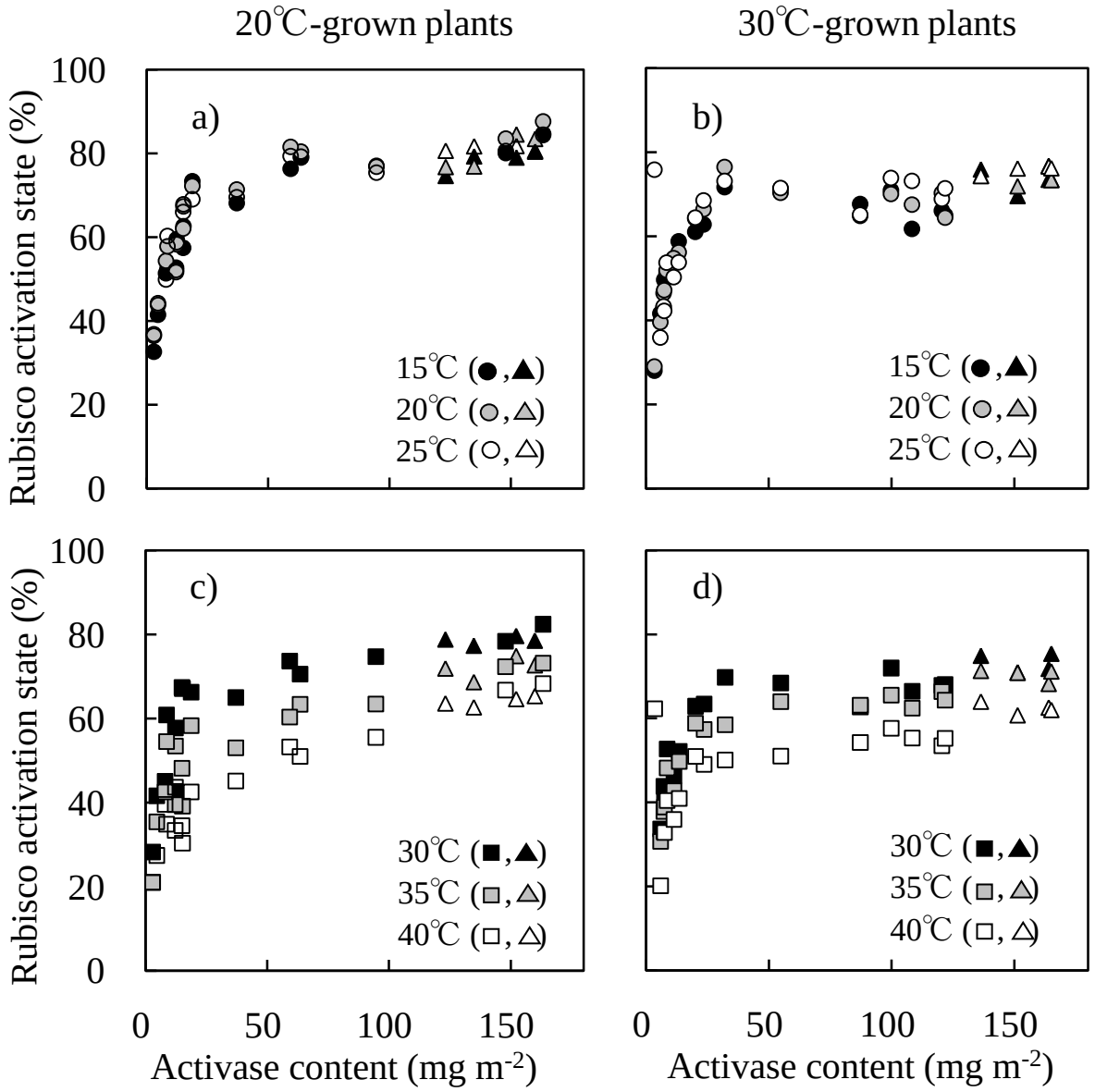
$CO_2$ assimilation rate at 1500 μmol photons $m^{-2}$ $s^{-1}$ and 380 μL $L^{-1}$ $CO_2$ concentration ($A_{380}$) and the Rubisco activation state as a function of the ratio of Activase/Rubisco contents in wild type (triangles) and antisense lines (circles). Plants were grown at 20/15°C (closed symbols) or 30/25°C (open symbols). $A_{380}$ and Rubisco activation state was shown at leaf temperatures of 25°C (a, c) and 40°C (b, d).

**Supplemental Figure 4**

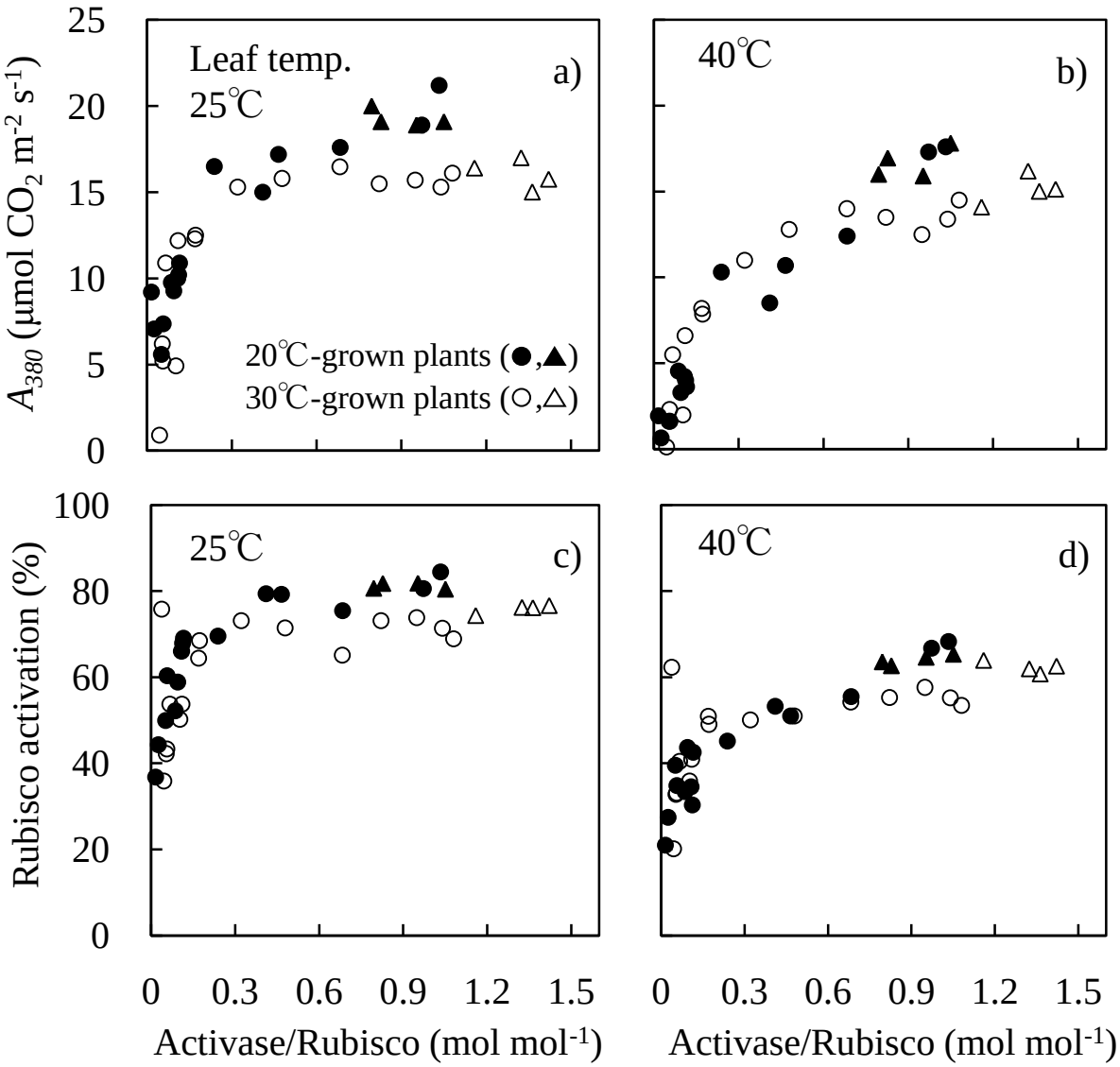
$CO_2$ response of $CO_2$ assimilation rate ($A$) measured at 25 & 40°C and 1500 μmol photons $m^{-2}$ $s^{-1}$ in wild type (a), plants with intermediate Rubisco activase contents (b) and plants with low Rubisco activase contents (c) grown at 20/15°C. The explanation of plant classification is given in Table 1. $A$ at 25°C is shown as closed circles, whereas $A$ at 40°C is shown as open circles. Rubisco-limited $A$ ($A_c$: solid line) was estimated from Eqn 1 in Materials & Methods, whereas RuBP regeneration-limited $A$ ($A_r$: dotted line) was estimated from Eqn 2 in Materials & Methods. Electron transport rate from chlorophyll fluorescence ($J_f$) as a function of chloroplast $CO_2$ concentration ($C_c$) at 25 & 40°C in wild type (d), plants with intermediate Rubisco activase contents (e) and plants with low Rubisco activase contents (f) in plants grown at 20/15°C. $J_f$ at 25°C is shown as closed symbols, whereas $J_f$ at 40°C is shown as an open symbol. Arrows show measurements made at 380 μL $L^{-1}$ $CO_2$ concentration. Data represent means ±SE, n = 4.



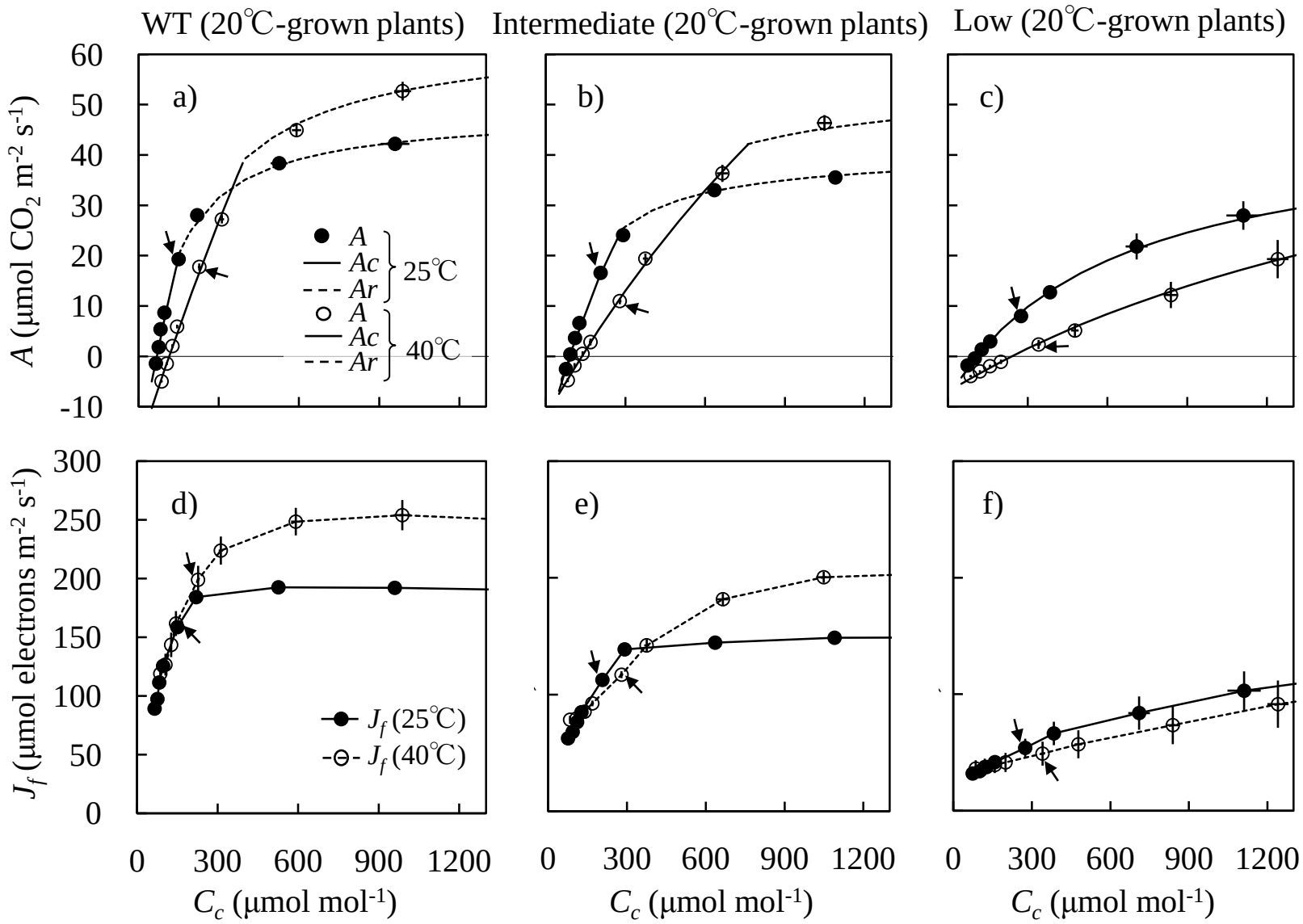

(Supplemental Figure 1) Relationship between $CO_2$ assimilation rate measured at 1500 μmol photons $m^{-2}$ $s^{-1}$ and 380 μL $L^{-1}$ $CO_2$ concentration ($A_{380}$) and the Rubisco activase contents at several leaf temperatures in wild type (triangles) and antisense lines (circles or squares). Plants were grown at 20/15° C (a, c) or 30/25° C (b, d).




(Supplemental Figure 2) Relationship between Rubisco activation state at 1500 µmol photons $m^{-2}$ $s^{-1}$ and 380 µL $L^{-1}$ $CO_2$ concentration and Rubisco activase contents at several leaf temperatures in wild type (triangles) and antisense lines (circles or squares). Plants were grown at 20/15° C (a, c) or 30/25° C (b, d).




(Supplemental Figure 3) $CO_2$ assimilation rate at 1500 μmol photons $m^{-2}$ $s^{-1}$ and 380 μL $L^{-1}$ $CO_2$ concentration ($A_{380}$) and the Rubisco activation state as a function of the ratio of Activase/Rubisco contents in wild type (triangles) and antisense lines (circles). Plants were grown at 20/15° C (closed symbols) or 30/25° C (open symbols). $A_{380}$ and Rubisco activation state was shown at leaf temperatures of 25° C (a, c) and 40° C (b, d).




(Supplemental Figure 4) $CO_2$ response of $CO_2$ assimilation rate ($A$) measured at 25 & 40° C and 1500 μmol photons $m^{-2}$ $s^{-1}$ in wild type (a), plants with intermediate Rubisco activase contents (b) and plants with low Rubisco activase contents (c) grown at 20/15° C. The explanation of plant classification is given in Table 1. $A$ at 25° C is shown as closed circles, whereas $A$ at 40° C is shown as open circles. Rubisco-limited $A$ ($A_c$: solid line) was estimated from Eqn 1 in Materials & Methods, whereas RuBP regeneration-limited $A$ ($A_r$: dotted line) was estimated from Eqn 2 in Materials & Methods. Electron transport rate from chlorophyll fluorescence ($J_f$) as a function of chloroplast $CO_2$ concentration ($C_c$) at 25 & 40° C in wild type (d), plants with intermediate Rubisco activase contents (e) and plants with low Rubisco activase contents (f) in plants grown at 20/15° C. $J_f$ at 25° C is shown as closed symbols, whereas $J_f$ at 40° C is shown as open symbol. Arrows show measurements made at 380 μL $L^{-1}$ $CO_2$ concentration. Data represent means ± SE, n = 4.