

## Aberystwyth University

### *Drought priming effects on alleviating the photosynthetic limitations of wheat cultivars (*Triticum aestivum* L.) with contrasting tolerance to abiotic stresses*

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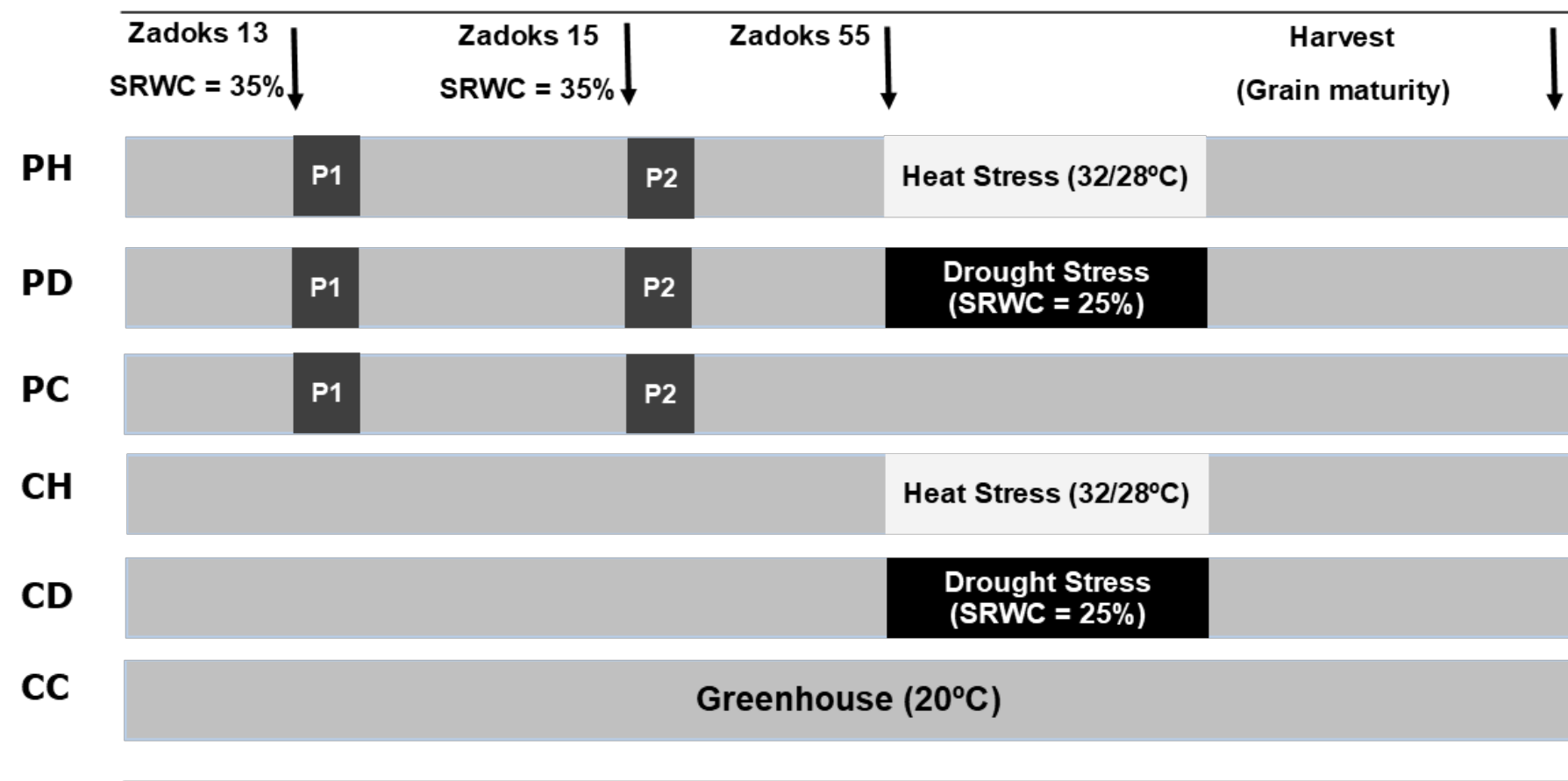


Figure 1: Design scheme of the experiment. Illustration of the six treatments showing 1st priming (P1), 2nd priming (P2) and heat and drought stress at anthesis: no priming + no stress (CC); no priming + drought stress (CD); no priming + heat stress (CH); priming + no stress (PC); priming + drought stress (PD); priming + heat stress (PH).

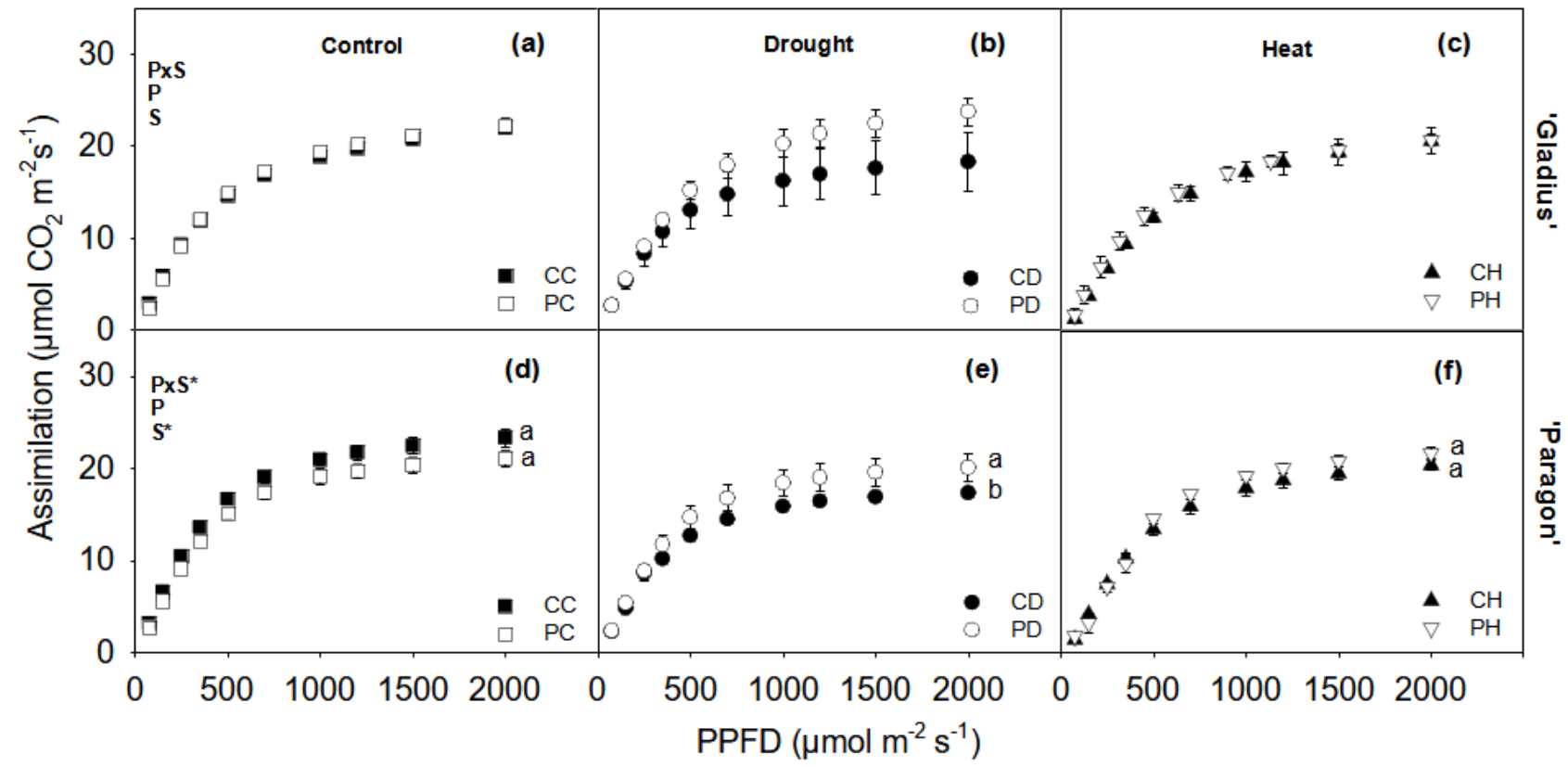


Figure 2: Measured light response curves of 'Gladius' (a, b and c) and 'Paragon' (d, e and f) in the end of the stress treatments at anthesis where the panels are non-stressed control (a and d), drought stressed (b and e) and heat stressed (c and f) plants. Treatments presented are: no priming + no stress (CC); no priming + drought stress (CD); no priming + heat stress (CH); priming + no stress (PC); priming + drought stress (PD); priming + heat stress (PH). Different lower letters indicate significant difference at  $P < 0.05$  within each cultivar for fitted values of  $A_{max}$ , with interaction between priming and stress, the absence of letters indicates no interaction between factors. Data represents mean values  $\pm$  SEM,  $n = 3$ .

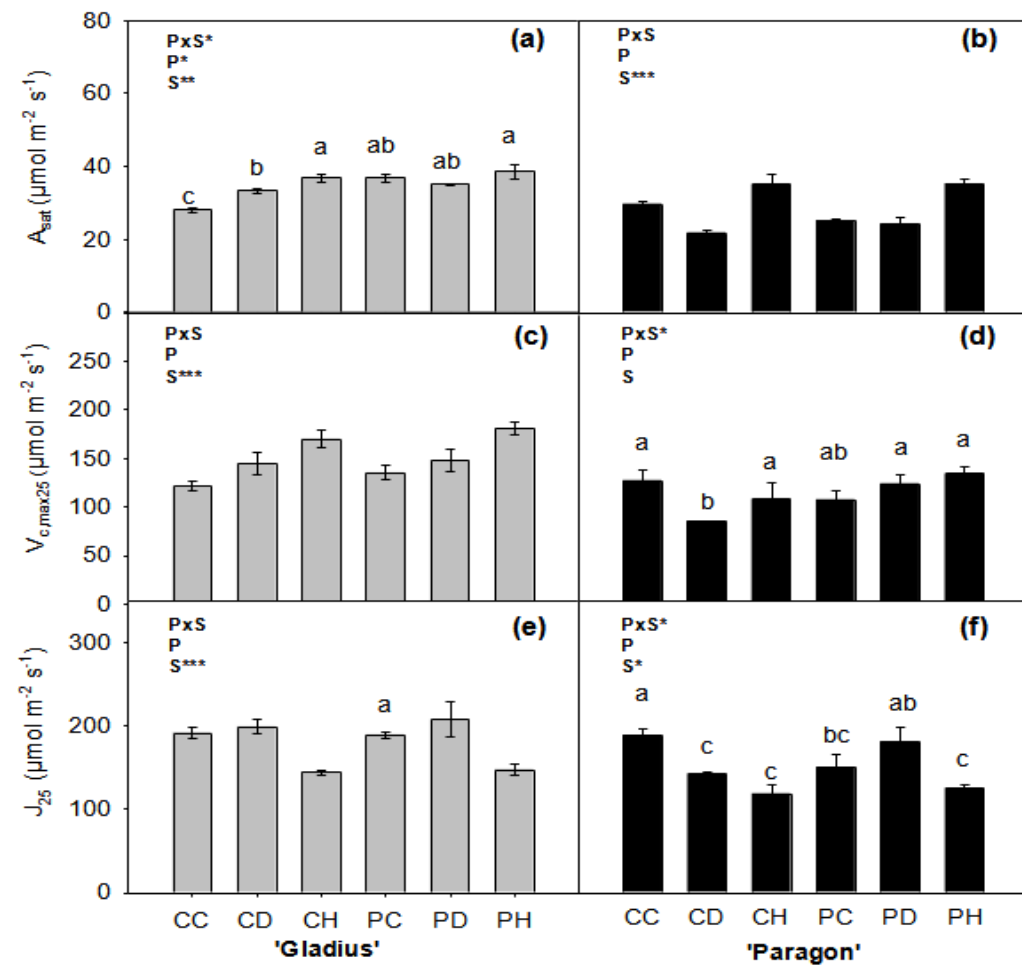


Figure 3. Parameters derived from  $A/C_i$  curves for 'Gladius' (a, c, e, f) and 'Paragon' (b, d, f, h): saturated net photosynthetic rate ( $A_{sat}$ ) (a and b); maximum carboxylation of Rubisco ( $V_{c,max25}$ ) (c and d) and electron transport demand for RuBP regeneration ( $J_{25}$ ) (e and f). Heat stressed treatments were measured at 32°C after seven days of stress at heat treatment; all other treatments were measured at the normal growth temperature 20°C. Treatments presented are: no priming + no stress (CC); no priming + drought stress (CD); no priming + heat stress (CH); priming + no stress (PC); priming + drought stress (PD); priming + heat stress (PH).  $A_{sat}$  is given at actual leaf temperature while  $V_{c,max25}$ ,  $J_{25}$  and  $TPU_{25}$  are given at standardized 25°C. Different lower letters indicate significant difference at  $P < 0.05$  within each cultivar for parameters with interaction between priming and stress, the absence of letters indicates no interaction between factors. Data represents mean values  $\pm$  SEM,  $n = 3$ .

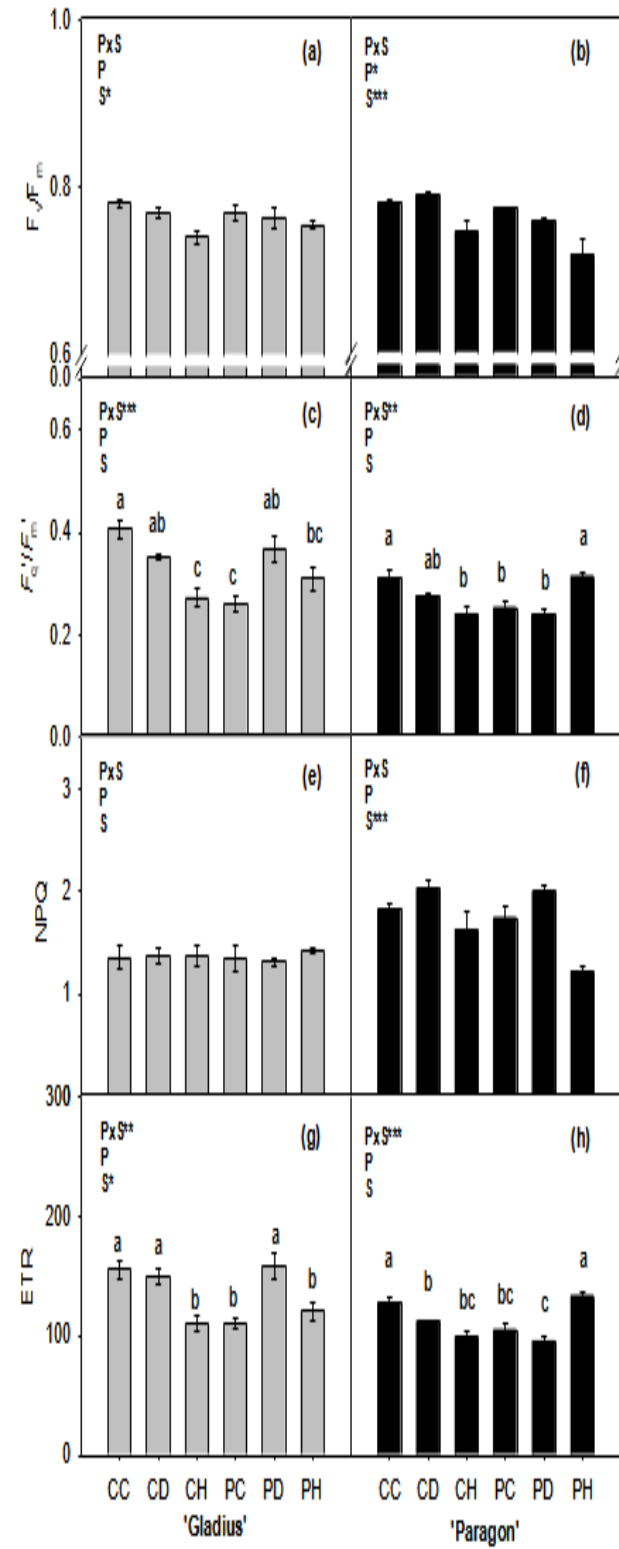


Figure 4: Chlorophyll fluorescence parameters measured at a PPFD of  $900 \mu\text{mol m}^{-2}\text{s}^{-1}$  of 'Gladius' (a, c, e, g) and 'Paragon' (b, d, f, h).  $F_v/F_m$  in dark adapted leaves (a and b), quantum efficiency of PSII ( $F_q/F_m$ ) (c and d), non-photochemical quenching (NPQ) (e and f) and electron transport rate (ETR) based on absorbed light (g and h). Treatments presented are: no priming + no stress (CC); no priming + drought stress (CD); no priming + heat stress (CH); priming + no stress (PC); priming + drought stress (PD); priming + heat stress (PH). Different lower letters indicate significant difference at  $P < 0.05$  within each cultivar for parameters with interaction between priming and stress, the absence of letters indicates no interaction between factors. Data represents mean values  $\pm$  SEM,  $n = 3$ .

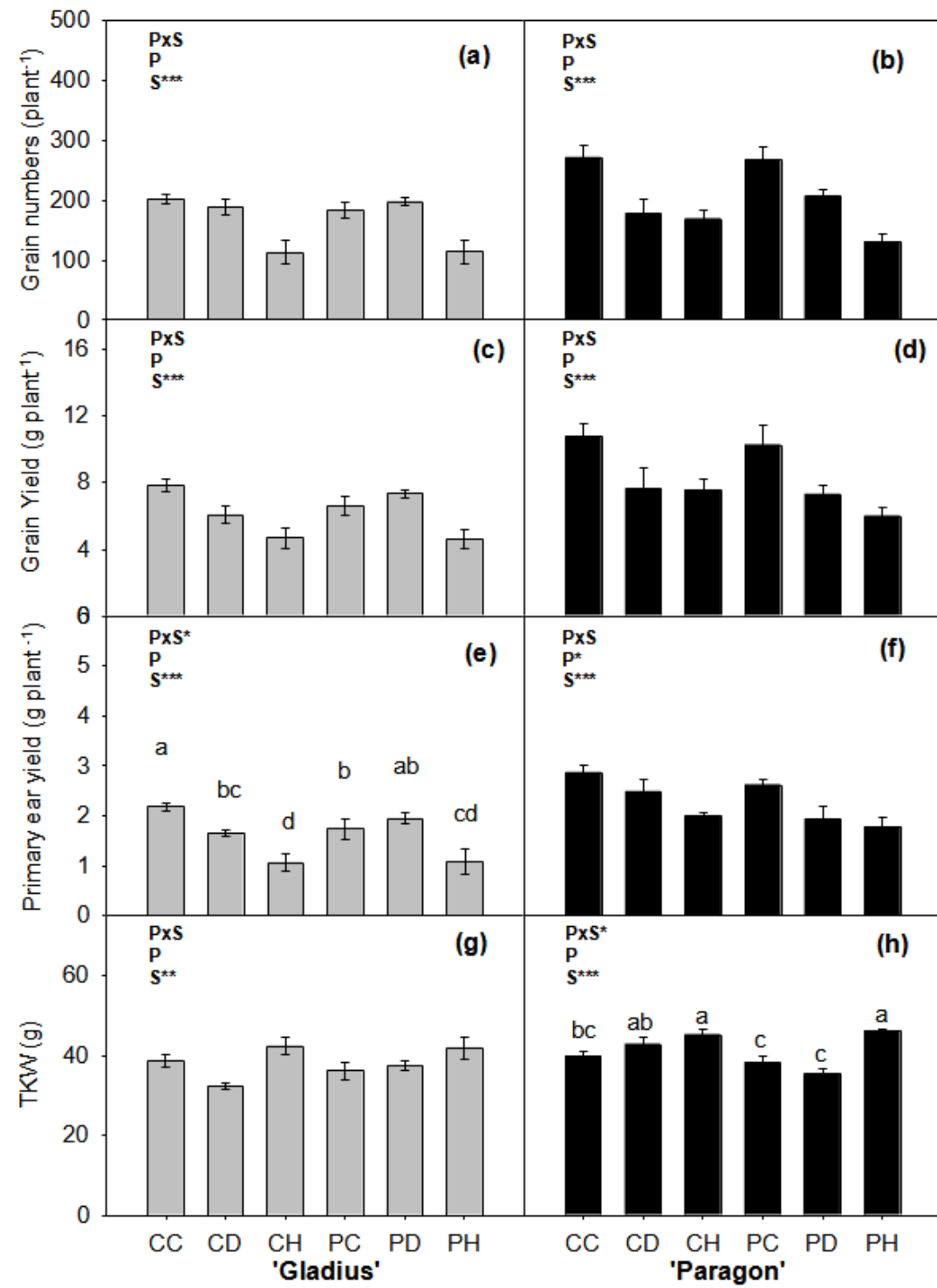


Figure 5. Effects of drought priming during vegetative growth stages on grain yield parameters of 'Gladius' (a, c, e, g) and 'Paragon' (b, d, f, h): total grain yield (a and b), total grain number (c and d), yield of primary ear (e and f) and thousand-kernel weight (TKW) (g and h) of wheat plants exposed to heat or drought stress during anthesis. Treatments presented are: no priming + no stress (CC); no priming + drought stress (CD); no priming + heat stress (CH); priming + no stress (PC); priming + drought stress (PD); priming + heat stress (PH). Different lower letters indicate significant difference at  $P < 0.05$  within each cultivar for parameters, with interaction between priming and stress, the absence of letters indicates no interaction between factors. Data represents mean values  $\pm$  SEM,  $n = 4$ .