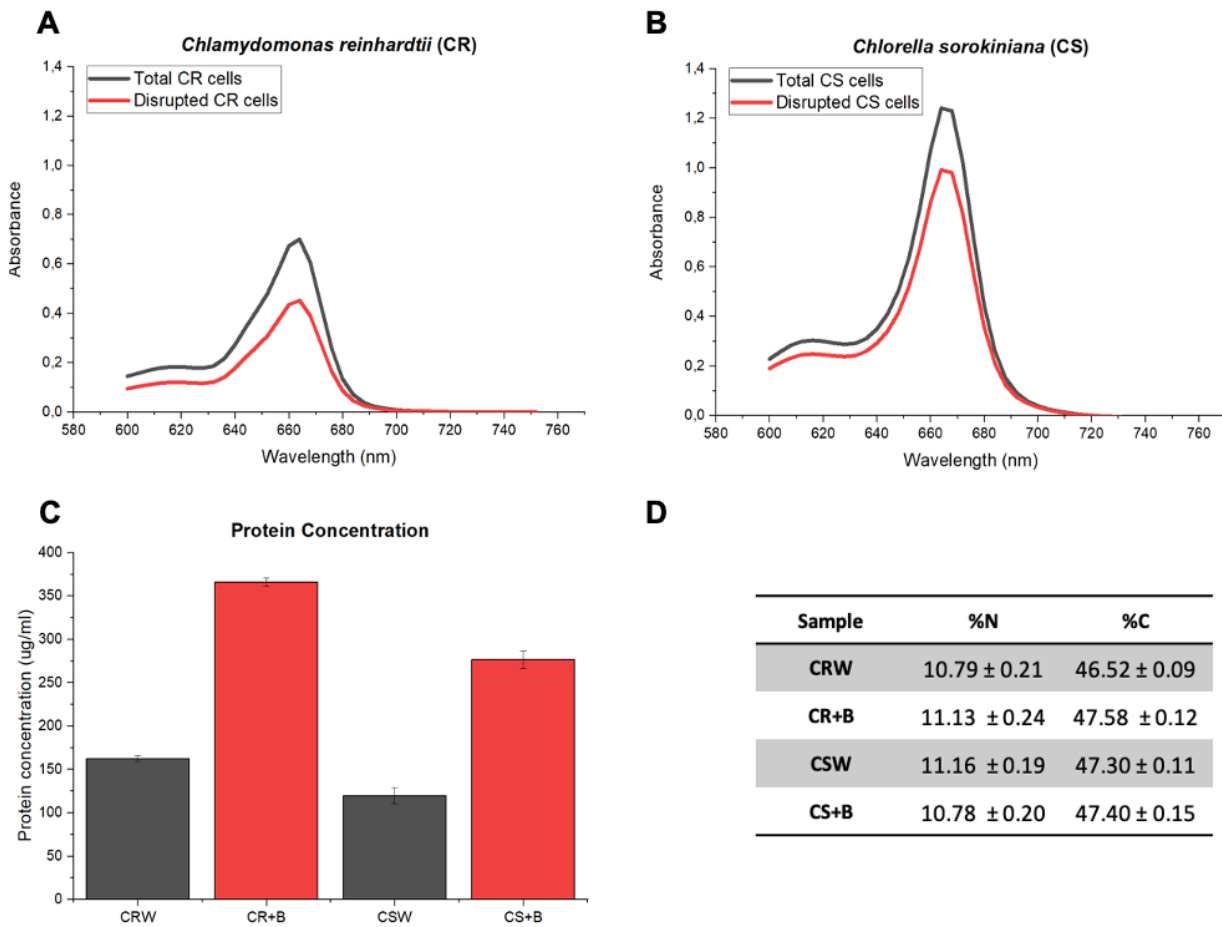


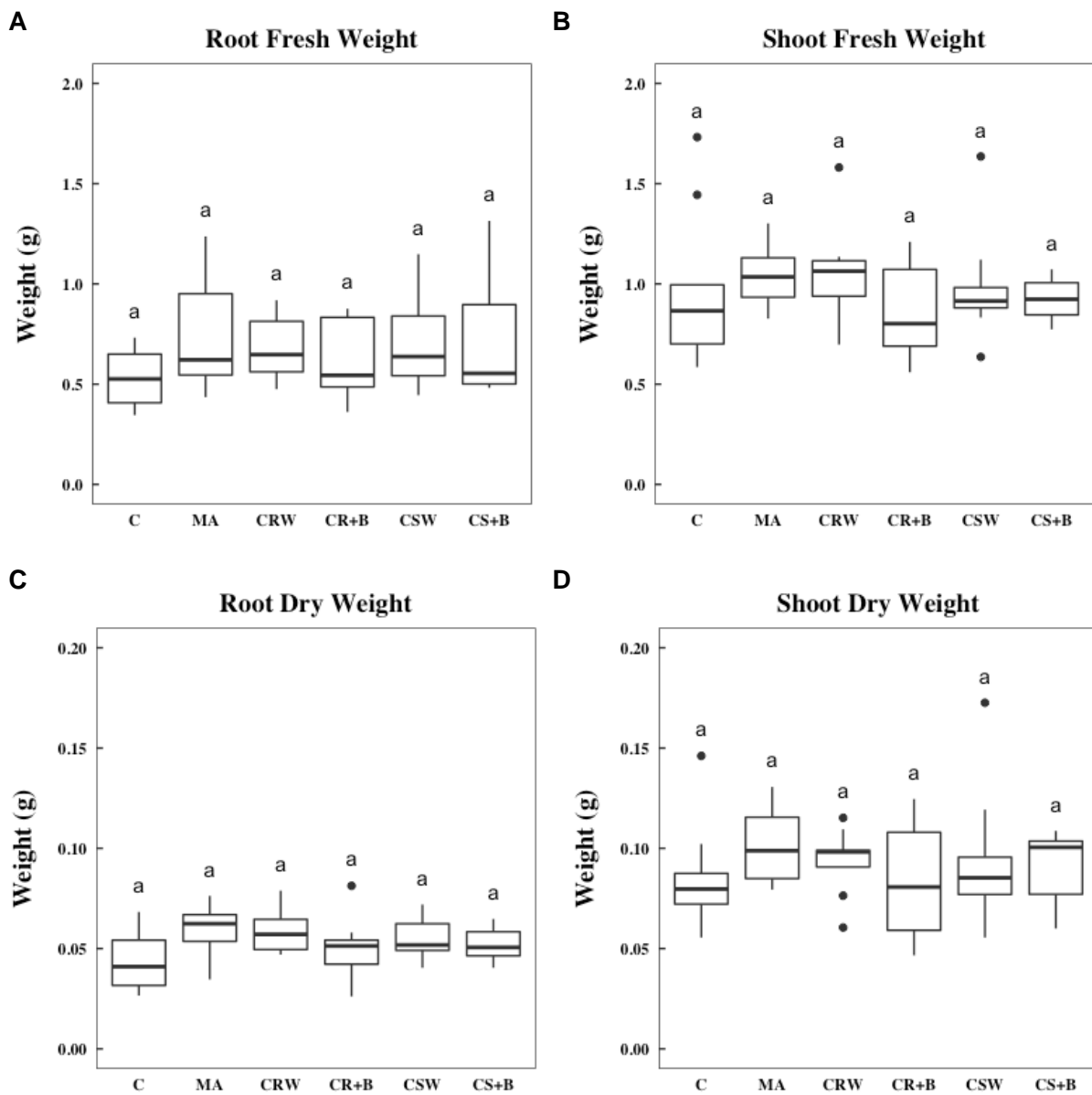
## Supplementary Material

Figure S1:



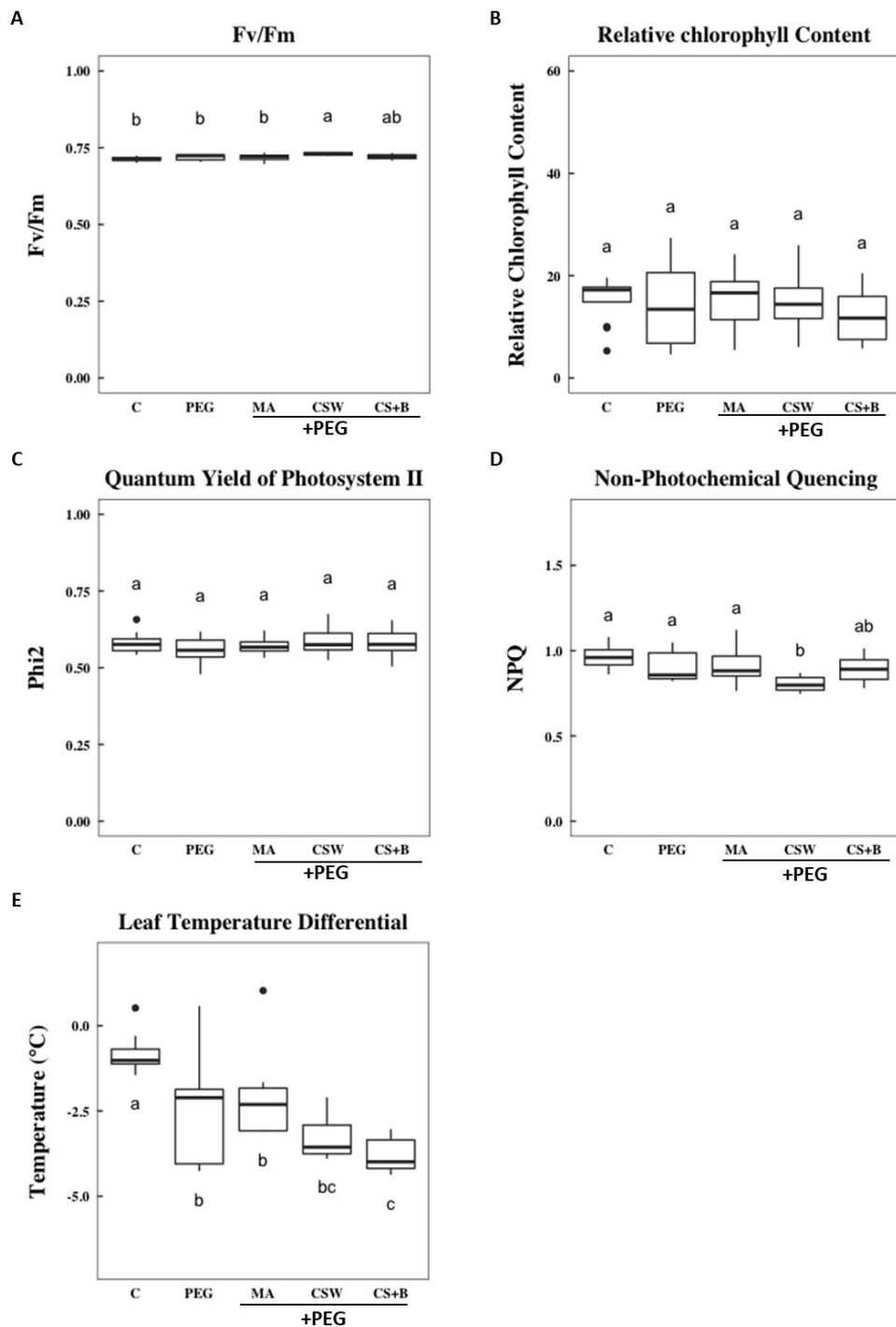
**Supplementary Figure S1: *Chlamydomonas reinhardtii* (CR) and *Chlorella sorokiniana* (CS) biomass preparation: whole cells in the fresh cultures (CRW, CSW) and disrupted cells after the physical treatment (CR+B and CS+B).** The efficiency of cell disruption was evaluated by comparing the absorption spectra of pigments extracted from intact cells (black) or from disrupted cells (red). The differences between the absorption of pigment extracts from intact cells or disrupted cells is due to the removal of unbroken cells after cell disruption treatment by a centrifugation step at 1000xg for 3 minutes. Chlorophyll extraction and spectra were performed in acetone 80% for CR (A) and in DMSO for CS (B) at the concentration of  $1 \times 10^7$  cell/ml. In Panel (C) it is reported the quantification of the proteins released in solution after resuspension in water of the four different freeze-dried microalgae cultures. In Panel (D) it is reported the total nitrogen (N) and carbon (C) amount of CR and CS preparations analyzed by the mean of the CHN analysis. The average values are reported, and error bars refers to standard deviation (SD,  $n=3$ ).

Figure S2:



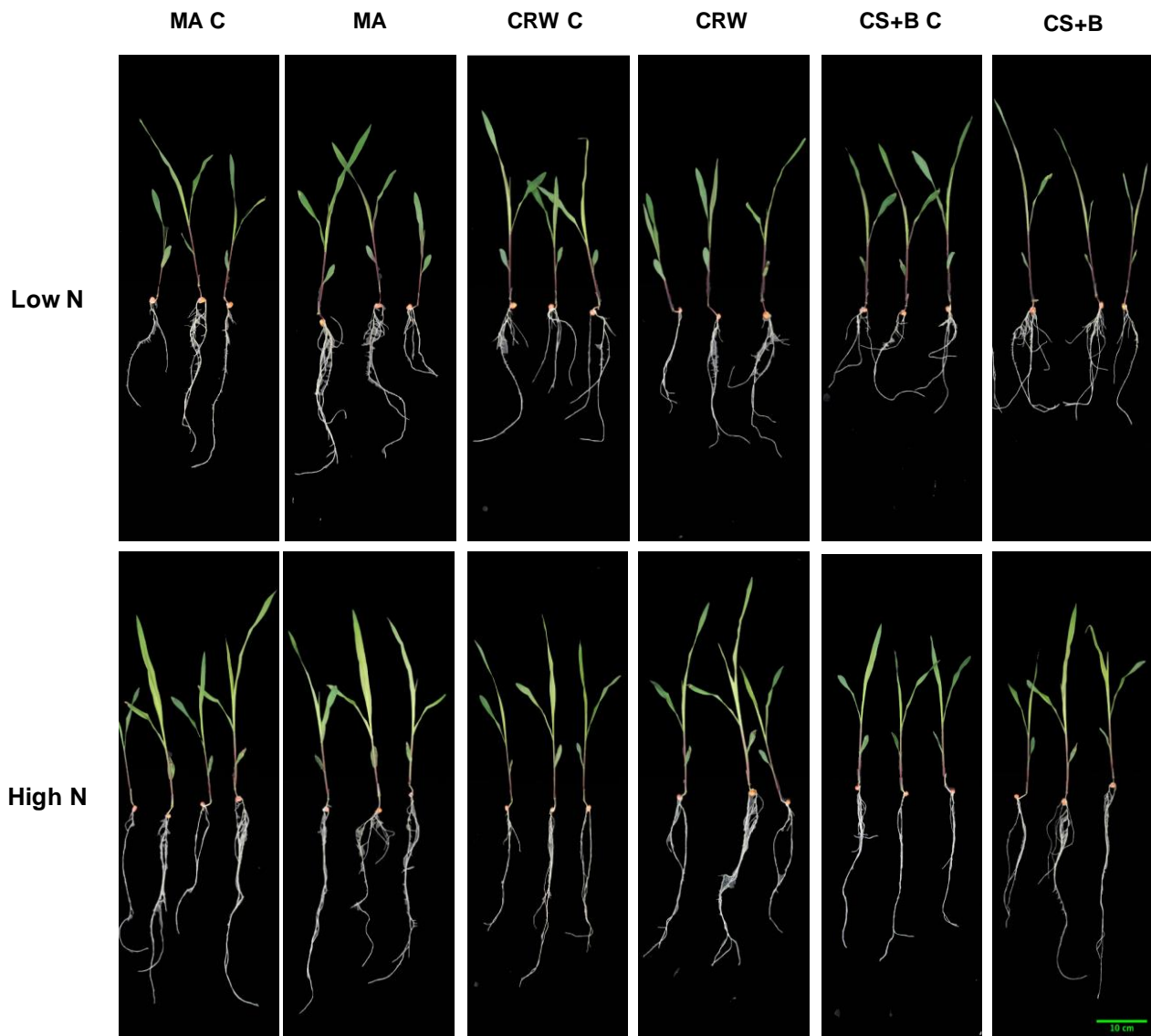
**Supplementary Figure S2: Fresh (FW) and dry (DW) weight of hydroponically grown maize plants after 5 days of treatment: control (C), MA, CR whole culture (CRW), CR broken cells (CR+B), CS fresh culture (CSW) and CS broken cells (CS+B).** Fresh (A, B) and dry (C, D) weight of roots (A, C) and shoots (B, D) of maize seedlings measured at the end of the experiment. The boxes represent the interquartile range (IQR) with the median line inside the boxes and the whiskers that represent 1.5 times the IQR ( $n=3$  plants,  $N=3$  independent experiments). Statistical analysis of data was performed using the one-way analysis of variance (ANOVA) followed by a post hoc Tukey's test. Letters denote statistically significant variations ( $p < 0.05$ ).

**Figure S3**



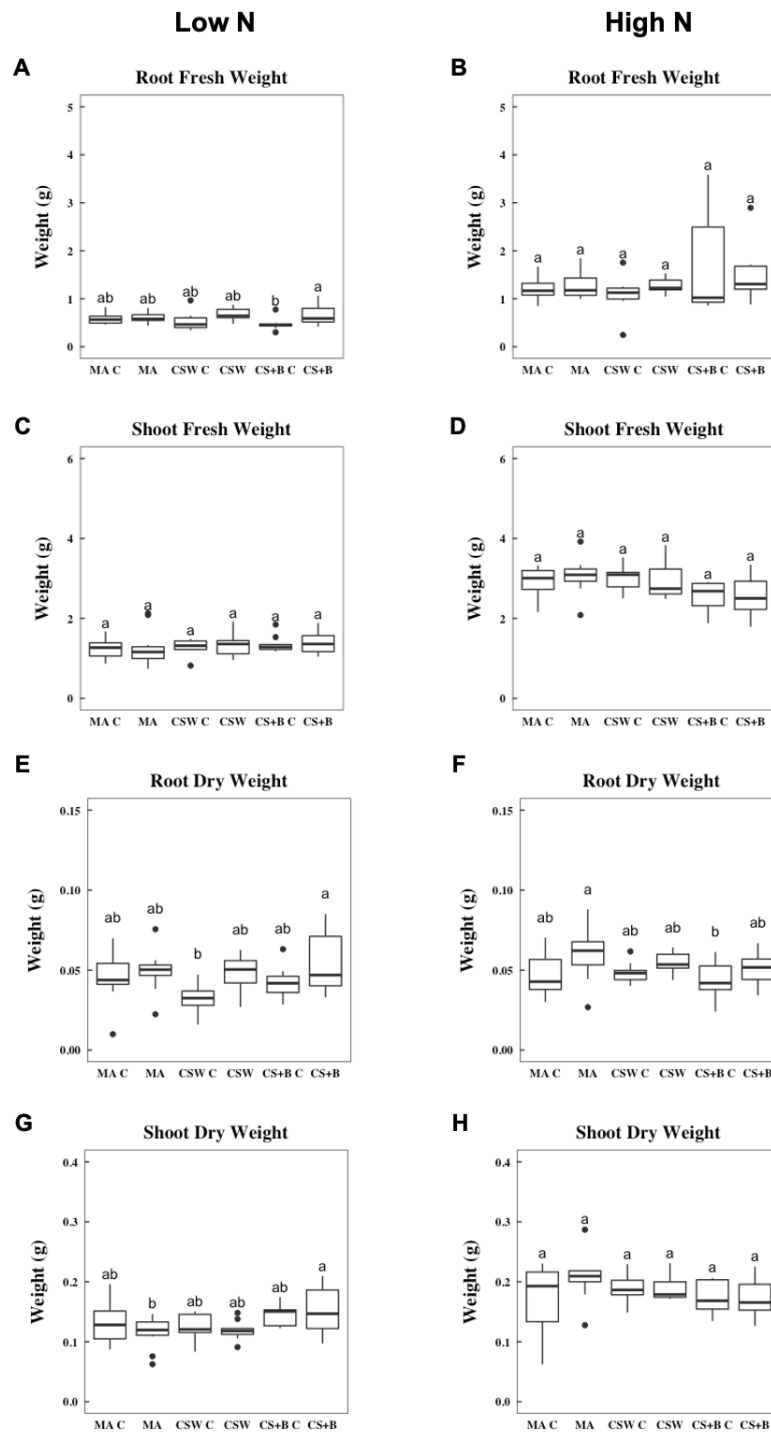
**Supplementary Figure S3: Photosynthetic parameters of hydroponically grown maize plants under PEG-induced drought stress after 7 days of treatment: nutrient solution without PEG6000 (C), PEG treatment without algae addition (PEG), PEG with MA (MA), PEG with CS whole culture (CSW) and PEG with CS broken cells (CS+B). Fv/Fm (A), relative chlorophyll content (B), quantum yield of PSII (Phi2) (C), non-photochemical quenching (NPQ) (D) and leaf temperature differential (E) of maize shoots, measured by the MultispeQ V2.0 instrument and software. The boxes represent the interquartile range (IQR) with the median line inside the boxes and the whiskers that represent 1.5 times the IQR ( $n=3$  plants,  $N=3$  independent experiments). Statistical analysis of data was performed using the one-way analysis of variance (ANOVA) followed by a post hoc Tukey's test. Letters denote statistically significant variations ( $p < 0.05$ ).**

Figure S4



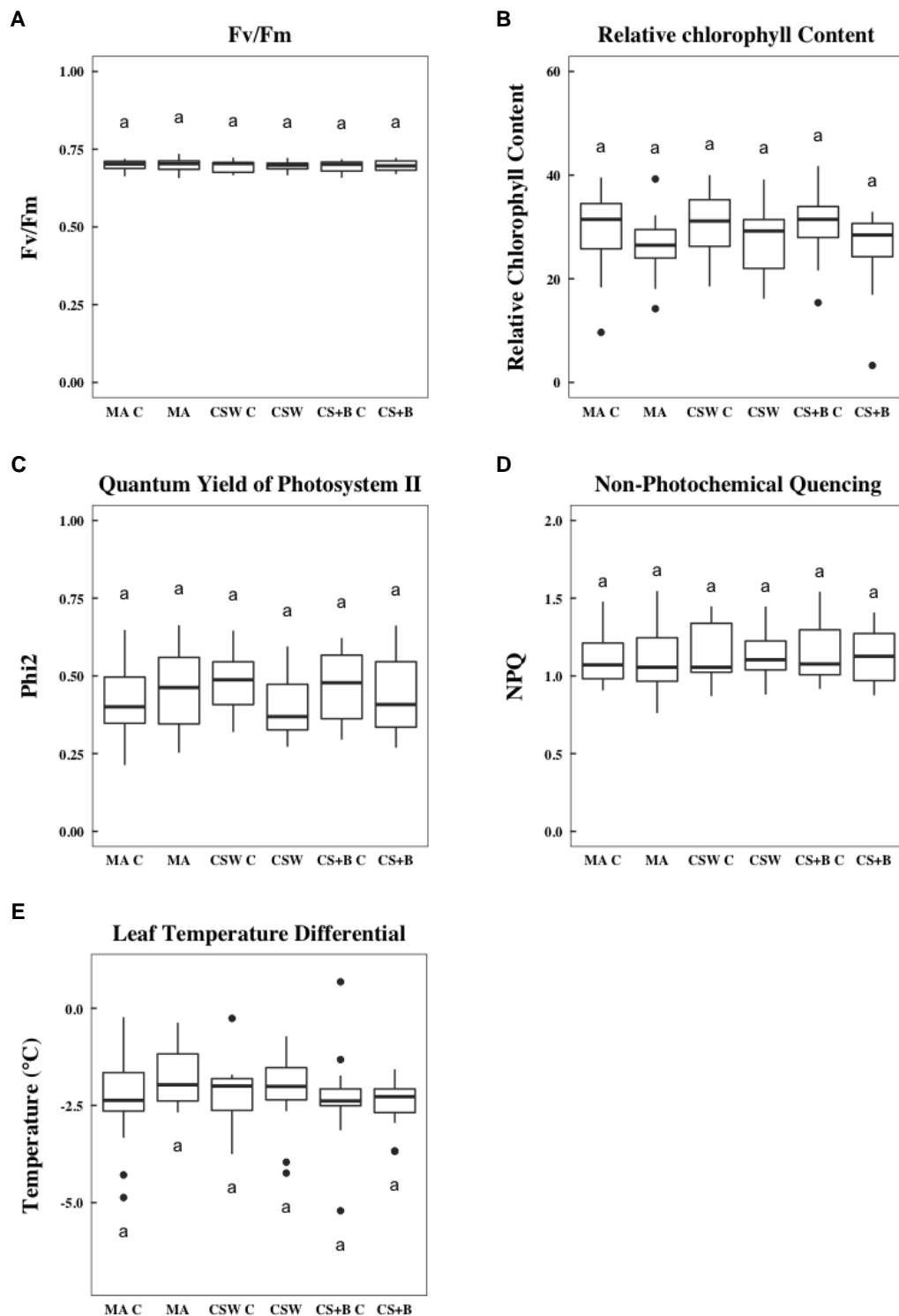
**Supplementary Figure S4: Phenotypic characterization of hydroponically grown maize plants under low and high N after 7 days of treatment: MA C (control of MA), MA, CSW C (control of CSW), CSW, CS+B C (control of CS+B) and CS+B. Images of the root apparatus at the end of the experiment analyzed by the mean of the WinRHIZO™ software. Scale bar refers to 10 cm.**

Figure S5



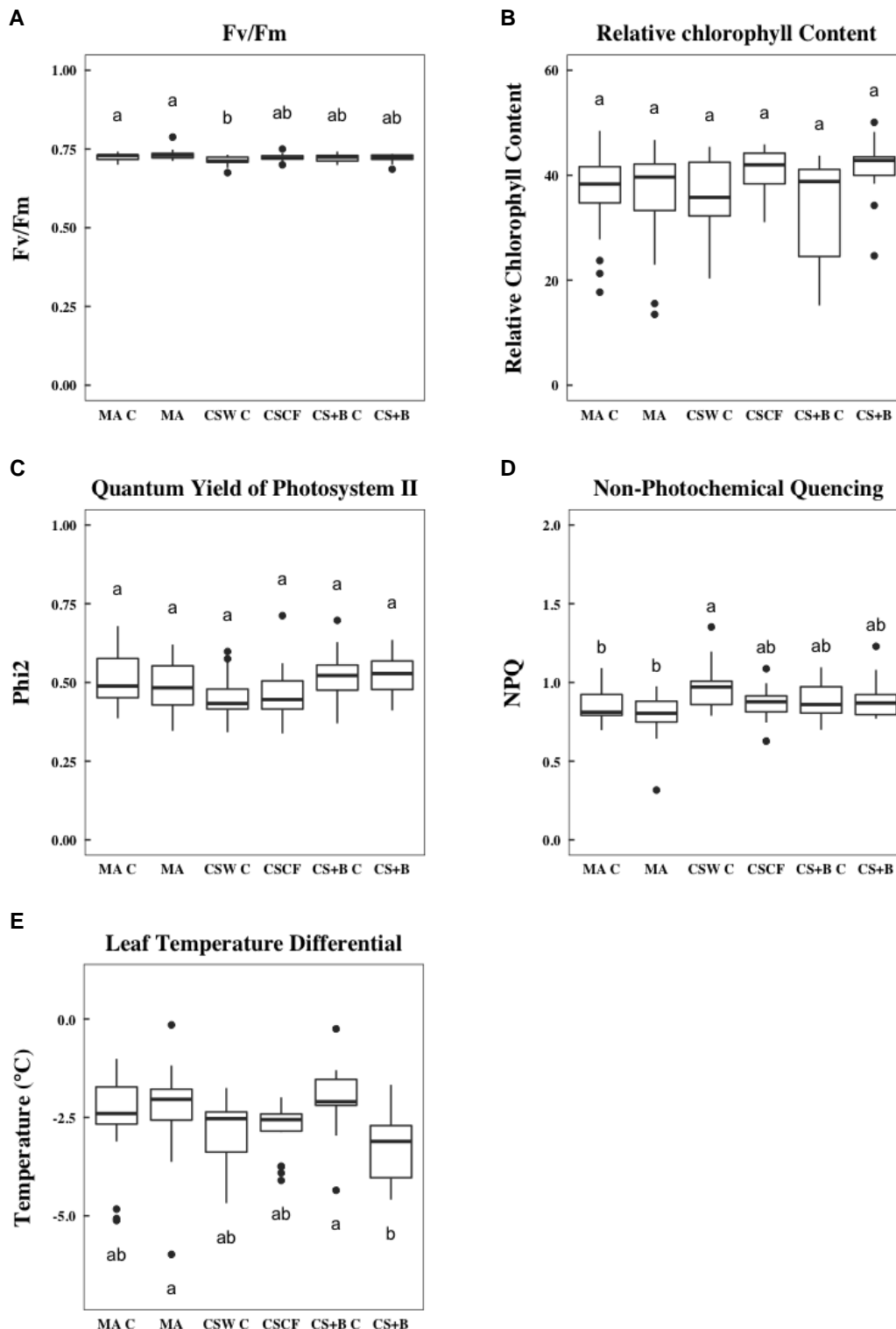
**Supplementary Figure S5: Fresh (FW) and dry (DW) weight of hydroponically grown maize plants under low and high N after 7 days of treatment: MA C (control of MA), MA, CSW C (control of CSW), CSW, CS+B C (control of CS+B) and CS+B. Fresh (A, B, C, D) and dry (E, F, G, H) weight of roots (A, B, E, F) and shoots (C, D, G, H) of maize seedlings grown under low (A, C, E, G) and high (B, D, F, H) nitrogen measured at the end of the experiment. The boxes represent the interquartile range (IQR) with the median line inside the boxes and the whiskers that represent 1.5 times the IQR ( $n=3$  plants,  $N=3$  independent experiments). Statistical analysis of data was performed using the one-way analysis of variance (ANOVA) followed by a post hoc Tukey's test. Letters denote statistically significant variations ( $p < 0.05$ ).**

Figure S6



**Supplementary Figure S6: Photosynthetic parameters of hydroponically grown maize plants under low N after 7 days of treatment: MA C (control of MA), MA, CSW C (control of CSW), CSW, CS+B C (control of CS+B) and CS+B. Fv/Fm (A), relative chlorophyll content (B), quantum yield of PSII (Phi2) (C), non-photochemical quencing (NPQ) (D) and leaf temperature differential (E) of maize shoots, measured by the MultispeQ V2.0 instrument and software. The boxes represent the interquartile range (IQR) with the median line inside the boxes and the whiskers that represent 1.5 times the IQR ( $n=5$  plants,  $N=3$  independent experiments). Statistical analysis of data was performed using the one-way analysis of variance (ANOVA) followed by a post hoc Tukey's test. Letters denote statistically significant variations  $P<0,05$ .**

Figure S7



**Supplementary Figure S7: Photosynthetic parameters of hydroponically grown maize plants under high N after 7 days of treatment: MA C (control of MA), MA, CSW C (control of CSW), CSW, CS+B C (control of CS+B) and CS+B. Fv/Fm (A), relative chlorophyll content (B), quantum yield of PSII (Phi2) (C), non-photochemical quenching (NPQ) (D) and leaf temperature differential (E) of maize shoots, measured by the MultispeQ V2.0 instrument and software. The boxes represent the interquartile range (IQR) with the median line inside the boxes and the whiskers that represent 1.5 times the IQR ( $n=5$  plants,  $N=3$  independent experiments). Statistical analysis of data was performed using the one-way analysis of variance (ANOVA) followed by a post hoc Tukey's test. Letters denote statistically significant variations ( $p < 0.05$ ).**