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Proceeding Paper

Wheat Developmental Stage Conditions Different Photosynthetic Strategies under Elevated CO_2 Conditions †

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Abstract: Although climate scenarios have predicted an increase in CO_2 concentration that may favor C assimilation, previous studies show that, processes involved in biochemical and/or stomatic processes might reduce photosynthetic efficiency under elevated [CO_2]. Among others, [CO_2] impact on crop phenology, together with nutrient assimilation and translocation factors have been identified as relevant ones conditioning photosynthetic performance. In this study, the effect of elevated [CO_2] (400 *versus* 700 ppm) on photosynthetic apparatus was characterized through the corresponding gas exchange, chlorophyll fluorescence analyses combined with the determination of genes involved in light reactions (*ferredoxin-NADP(H) oxidoreductase* and *ferredoxin*), CO_2 diffusion (*CA1*, *CA2*, *CA3*) and N transport (*AMT1.2*, *NRT1.1* and *NRT2.1*) as well as primary metabolites like carbohydrates and secondary metabolites like cytokinins contents were studied in durum wheat (*Triticum durum*, var. Amilcar) plants was studied. Our results show that photosynthetic machinery was affected differently in plants at the end of elongation stage (Z39) and at the beginning of ear emergence (Z51). Sucrose was accumulated under elevated CO_2 conditions in leaves of wheat at Z39, whereas starch was the carbohydrate accumulated at Z51. Both sucrose and start accumulation in leaves were significantly correlated with the decrease of Vc_{max} in these plants. Wheat plants exposed to elevated CO_2 presented high contents of zeatin and isopentenyl adenine in leaves that may promote N reallocation, delay senescence and prolong C assimilation in these plants. The current study highlights the importance of a deeper characterization target C and N metabolic pathways in crops during the different phonologic periods. Furthermore, the relevance of apical leaves as sources for developing organs is described in this study.

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