Physiological and Metabolic Alterations of *Arabidopsis thaliana* Mutant *Nia1Nia2* in Response to High Atmospheric CO_2 Concentrations

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Nitric oxide (NO) is involved in maturation and senescence, stomatal closure, seed germination, root development and flowering processes in plants. NO can be produced by the enzyme nitrate reductase (NR). The *Arabidopsis thaliana* double mutant *Nia1Nia2* has only 0.5% of NR activity when compared to wild type plants. Some characteristics of this mutant are already known, as lower NO and nitrate content, higher susceptibility to pathogens and early flowering. Since there have been very few investigations on NO and CO_2 interaction, an attempt was made to study the effects of elevated atmospheric CO_2 concentration (e[CO_2]) on photosynthesis, development and some biochemical parameters of wild type (WT) and NO-limited plants (*Nia*). Plants were cultivated during two months in open top chambers (OTCs). Chlorophyll a fluorescence emission from attached leaves was measured with a PAM fluorometer. Higher electron transport rates (ETR) were observed in WT and *Nia* plants cultivated at e[CO_2], whereas *Nia* at ambient CO_2 showed a significant decrease in ETR in higher light intensities. An increase in NO content has been detected by spectrofluorimetry in WT and *Nia* plants at e[CO_2] and was accompanied by an increase in NR activity. The CO_2 concentration had no effect on relative water content except for WT plants, that showed an increase in water use efficiency under e[CO_2]. Growing *Nia* seedlings at higher CO_2 concentrations enhanced vegetative growth and delayed flowering. Our results show that NO has an important role in coordinating plant growth and development with atmospheric CO_2 conditions.

Key words: elevated CO_2, nitric oxide, NR mutants
Supported by: FAPESP, PIBIC/CNPq