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EFFECT OF HIGH [CO₂] AND TEMPERATURE ON THE PHOTOSYNTHETIC ENZYMES AND ELECTRON TRANSPORT OF *Coffea arabica* L.
EFEITO DO AUMENTO DA [CO₂] E TEMPERATURA NAS ENZIMAS FOTOSSINTÉTICAS E TRANSPORTE DE ELÉTRONS DE *Coffea arabica* L.

Rodrigues, WP^{1,2}; Martins, MQ^{2,3}; Fortunato, AS³; Martins, LD³. Partelli, FL⁴; Campostrini, E¹; Semedo, JN⁵; Pais, IP⁶; Simões-Costa, SC²; Leitão, AE²; Tomaz, MA⁴; Colwel, F²; Scotti-Campos, P⁶; Rodrigues, AP⁶; Ghini, R⁷; Lidon, FC⁸; DaMatta, FM⁹; Ramalho, JC^{2,8,*}.

¹ Centro de Ciências e Tecnologias Agropecuárias, Univ. Estadual de Norte Fluminense, Darcy Ribeiro, Campos dos Goytacazes, RJ, Brasil.

² PlantStress&Biodiversity, BioTrop, Inst. Inv. Científica Tropical, I.P., Oeiras, Portugal.

³ Centro Ciências Agrárias, Univ. Federal do Espírito Santo, Alegre, ES, Brasil.

⁴ Centro Universitário Norte do Espírito Santo. Univ. Federal do Espírito Santo, ES, Brasil.

⁵ URGEMP, Instituto Nacional Investigação Agrária e Veterinária, I.P., Oeiras, Portugal.

⁶ CEF, DRAT, Instituto Superior de Agronomia, Univ. Lisboa, Portugal.

⁷ Embrapa Environment, Jaguariúna, SP, Brasil.

⁸ GeoBioTec, Faculdade de Ciências Tecnologia, Univ. Nova Lisboa, Caparica, Portugal.

⁹ Dept. Biologia Vegetal, Univ. Federal Viçosa, MG, Brasil.

* Autor correspondente: cochichor@mail.telepac.pt

It is expected that future climate changes and global warming conditions will limit the coffee crop yields. However, the real effects of enhanced air [CO₂] and temperature on this plant remain completely unknown. Therefore, this work studied the impact of such environmental changes on the photosynthetic machinery of *Coffea arabica* L. cv. Icatu. Plants were grown for 1 year under controlled conditions (temperature, RH, irradiance, photoperiod), at 380 or 700 μL CO₂ L⁻¹ air, without nutrient, water and root space limitations, and then subjected to temperature increase (0.5°C/day) to 42/34°C. Thylakoid electron transport involving PSI and II, and enzyme activities (RuBisCO and RuB5PK) were assessed at 25/20°C, 31/25°C, 37/30°C and 42/34°C. The results showed a marginal impact until 37 °C irrespective of [CO₂] conditions, configuring a clear tolerance to supra-optimal temperatures. Also, a higher metabolic performance was observed in the plants under high [CO₂]. Only at 42 °C the tolerance limit was exceeded, as shown by significant impacts in all parameters, particularly in enzymes, but under elevated [CO₂] a better performance was preserved regarding the

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photosystems functioning. Our findings showed that the elevated [CO₂] allowed maintenance of higher metabolic activity and seemed to some extent mitigate the heat impact at the photosystems level, what is quite relevant in a context of predict global warming scenarios. This work was supported by Portuguese funds from Fundação para a Ciência e a Tecnologia, through the project PTDC/AGR-PRO/3386/2012.

Keywords: Climate change, Coffee plants, CO₂ effect, Heat.