

Stomatal and photochemical limitations of photosynthesis in coffee (*Coffea* spp.) plants subjected to elevated temperatures

Weverton P. Rodrigues^A, Jefferson R. Silva^A, Luciene S. Ferreira^A, José A. Machado Filho^{A,C}, Fabio A. M. M. A. Figueiredo^B, Tiago M. Ferraz^B, Wallace P. Bernardo^A, Luan B. S. Bezerra^A, Deivisson P. de Abreu^A, Letícia Cespom^A, José C. Ramalho^{D,E} and Eliemar Campostorini^{A,F}

^ASetor Fisiologia Vegetal, Centro de Ciências e Tecnologias Agropecuárias, Universidade Estadual Norte Fluminense Darcy Ribeiro, 28013-602, Campos dos Goitacazes, RJ, Brazil.

^BDepartamento de Zootecnia, Centro de Ciências Agrárias, Universidade Estadual do Maranhão, 65055-310, São Luís, MA, Brazil.

^CInstituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural, 29052-010, Vitória, ES, Brazil.

^DLaboratório de Interações Planta-Ambiente e Biodiversidade (Plant Stress & Biodiversity), Linking Landscape, Environment, Agriculture and Food, Departamento Recursos Naturais, Ambiente e Território, Instituto Superior de Agronomia, Universidade de Lisboa, Avenida República, 2784-505, Oeiras, Portugal.

^EGeoBioTec, Faculdade Ciências e Tecnologia, Universidade NOVA de Lisboa, 2829-516, Caparica, Portugal.

^FCorresponding author. Email: campostenator@gmail.com

Appendix 1. Summary of analysis of variance for net photosynthesis rate (*A*), stomatal conductance (*gs*), photosynthetic capacity (*A_{max}*), instantaneous water-use efficiency (*iWUE*), carbon isotope composition ($\delta^{13}C$), membrane permeability (*MP*), stomatal density (*SD*), content of chlorophylls (*Chl a*; *Chl b* and *Chl total*), total carotenoids (*Car total*), ratios *Chl a/b* and *Chl total/Car total* ratios, maximum quantum yield of PSII (*Fv/Fm*), and photosynthetic index (*PI*) in *Coffea canephora* cv. Conilon (Clone 02) and *Coffea arabica* (Catuaí Amarelo IAC 62) plants, during spring (September 2014) and during summer (March 2015) seasons

| Source of variation | d.f. | MS | | | | | | | |
|--------------------------|------|--------------|--------------|------------------------|------------------|----------------|----------------|--------------|-----------|
| | | <i>A</i> | <i>gs</i> | <i>A_{max}</i> | <i>WUE</i> | $\delta^{13}C$ | <i>MP</i> | <i>SD</i> | |
| Genotype | 1 | 8.42 | 3564.8** | 15.16 | 2.93* | 0.05 | 2.19 | 48846.91** | |
| Season | 1 | 1.82 | 3529.58** | 1.51 | 4.27 | 0.05 | 0.54 | 355.28 | |
| Genotype \times Season | 1 | 26.08** | 5187.63** | 2.29 | 0.83 | 3.40** | 0.06 | 8582.11** | |
| Residue | 20 | 2.36 | 328.38 | 19.39 | 1.12 | 0.30 | 0.89 | 437.58 | |
| Overall average | | 5.72 | 46.61 | 19.67 | 4.36 | -25.87 | 4.11 | 165.46 | |
| Source of variation | d.f. | <i>Chl a</i> | <i>Chl b</i> | <i>Chl total</i> | <i>Car total</i> | <i>Chl a/b</i> | <i>Chl/car</i> | <i>Fv/Fm</i> | <i>PI</i> |
| Genotype | 1 | 1.63* | 0.16 | 2.81* | 0.01 | 0.0004 | 10.89* | 0.003* | 7.61 |
| Season | 1 | 0.64 | 0.03 | 0.97 | 0.06 | 0.36 | 2.98 | 0.00001 | 4.86 |
| Genotype \times Season | 1 | 0.17 | 0.001 | 0.19 | 0.001 | 0.56 | 0.16 | 0.0001 | 0.92 |
| Residue | 20 | 0.21 | 0.02 | 0.35 | 0.002 | 0.25 | 1.05 | 0.0005 | 2.58 |
| Overall average | | 1.45 | 0.44 | 1.90 | 0.21 | 3.33 | 8.69 | 0.78 | 4.50 |

MS = Mean squared; d.f. = degrees of freedom; *, **significant at 1 and 5% probability by *F* test, respectively.