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Resilience of C-assimilation to drought and/or heat conditions in *Coffea spp.*

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Ramalho J.C.[1,2] (cochichor@isa.ulisboa.pt), Dubberstein D.[1,3], Semedo J..N. [2,4], Rodrigues A.P.[1], Partelli F.L.[3], Rodrigues W.P.[5], Pais I.P.[2,4], Silva M.J.[1,2], Simões-Costa M.C.[1], Moura I.[1], Leitão A.E.[1,2], Marques I.[1], Silva M.M.[2,6], Reboredo F. H.[2], Scotti-Campos P.[2,4], Campostrini E.[5], Lidon F. C.[2], DaMatta F.M.[7], Ribeiro-Barros A.I.[1,2]

[1]PlantStress&Biodiversity, CEF, ISA/ Univ. Lisboa, Oeiras and Lisboa, Portugal; [2]GeoBioTec, FCT/UNL,Caparica, Portugal; [3]CEUNES, UFES, São Mateus, ES, Brazil; [4]UIBRG,INIAV I.P., Portugal; [5]Setor Fisiologia Vegetal, CCTA, UENF, Campos dos Goytacazes, RJ, Brazil; [6]ESEAG, Univ. Lusófona, Lisboa, Portugal; [7]Dept. Biologia Vegetal, UFV, Viçosa, MG, Brazil.

BREEDCAFS

Introduction

Climate changes have been pointed to exacerbate water deficit and high temperature events, affecting crops sustainability, namely due to deleterious impacts in C-assimilation pathway that is the basis of crop productivity.

Materials/Methods

Well watered-WW (control), seven year old plants from *C. canephora* cv. Conilon (CL 153) and *C. arabica* cv. Icatu were gradually submitted to severe water deficit (SWD, predawn water potential Ψ_{pd} < -3.0 MPa) and exposed to a temperature rise from 25/20 ºC (day/night) up to 42/30 ºC (0.5 ºC day^{-1}), and a two week recovery (Rec14). Photosynthetic impacts were assessed through gas exchanges, chlorophyll *a* fluorescence, thylakoid electron transport rates, RuBisCO activity (see details in 1,2).

Results/Discussion

Single drought affected all gas exchanges and most fluorescence parameters in both genotypes. Yet, only Icatu kept F_v/F_m and RuBisCO activity, and reinforced electron transport (3). WW plants of both genotypes showed heat tolerance up to 37 ºC, but at 42ºC a limit was exceeded for all parameters. Stresses interaction was found only at the harshest conditions (SWD, 42ºC), with aggravated impacts in PSs and RuBisCO, but unregulated energy dissipation ($Y_{(NO)}$) was reduced by photoprotection processes increase ($Y_{(NPQ)}$) (3). Also, some aftereffects persisted in SWD plants of both genotypes by Rec14 .

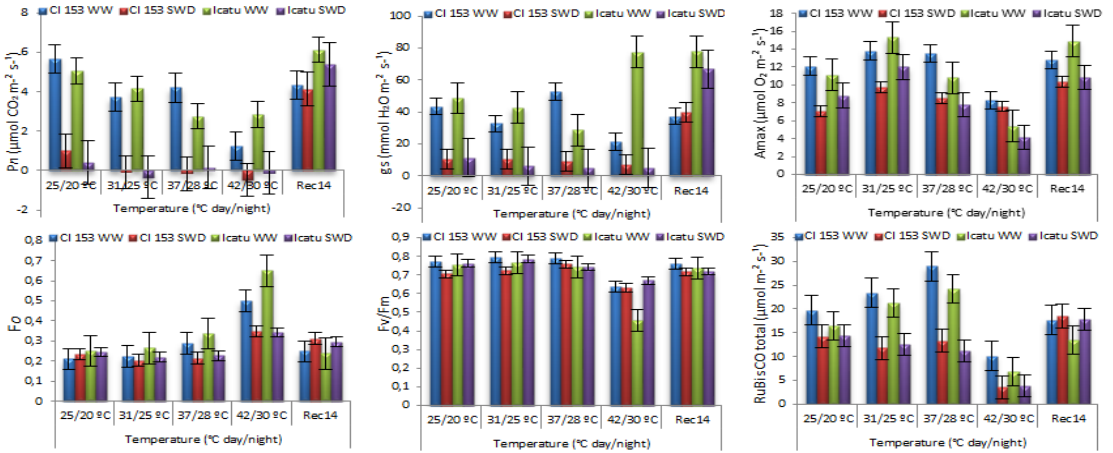

Figure 1: net photosynthesis (P_n), stomatal conductance (g_s); photosynthetic capacity (A_{max}); initial fluorescence (F_o); maximum photochemical efficiency of PSII (F_v/F_m) and Total RuBisCO activity in CL 153 and Icatu under well watered (WW (control) and severe water deficit (SWD) conditions, exposed to increasing temperature (25/20 ºC to 42/30 ºC), and a two-week recovery (Rec14) thereafter.

Conclusion/Perspectives

Different tolerance was observed: Icatu was more tolerant to drought, whereas heat affected both genotypes only by 42 ºC. Photochemical components were highly tolerant to heat and stress interaction (42ºC), contrasting to the high sensitivity of RuBisCO that deserve special breeder's attention to preserve coffee sustainability under future climate change conditions.

References

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