TROCAS GASOSAS EM FOLHAS DE Coffea arabica SOB INCREMENTO DE TEMPERATURA E CO2

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Abstract

Carlos Cesar Ronquim (Presenting) Embrapa Monitoramento por Satélite; Av. Soldado Passarinho, 303; CEP 13070-115; Campinas - SP - Brasil ronquim@cnpm.embrapa.br The increase of greenhouse gas emissions (GHG) in the atmosphere is causing wide changes in atmospheric events, influencing climate change and variability with critical impacts on vegetations. In Latin America, the air temperature is supposed to increase 1 °C to 5.8 °C and the rainfall 15% in the tropical areas of Brazil; and agriculture and water resources are most affected through the impact of extreme temperatures and changes in rainfall. Arabica coffee vegetates and fructifies very well in the Southeast area of Brazil. It is usually affected in their growth stages by the environmental conditions, especially by the meteorological conditions, mainly, the rainfall distribution and air temperature that interfere in the crop phenology, and consequently in the coffee bean productivity and quality. High temperatures are known to disturb plant metabolism. Coffee cultivation in the open is the usual practice in Brazil, and this provokes leaf exposure to high irradiance and the absorption of much more energy than that usable by photosynthesis. Such conditions may cause an energy overcharge and to an overheating of leaves, especially if stomata are closed, as occurs on sunny days in unshaded crops. The relationships between the climatic parameters and the agricultural production are quite complex, because environmental factors affect the growth and the development of the plants under different forms during the phenological phases of the coffee crop. The optimum mean annual air temperature for arabica coffee range from 18 to 23 °C. Above 23 °C, development is accelerated, often leading to loss of quality. Continuous exposure to daily temperatures as high as 30°C could result in not only depressed growth but also in abnormalities such as yellowing of leaves. In this study, photosynthetic responses of Coffea arabica L. cultivars subjected to different thermal treatments during 14 h were analyzed to determine the optimal temperature for maximum carbon net assimilation (PNmax) and if elevated CO2 concentration modifies responses to temperature stress. The optimal temperature for PNmax measured at 355 ppm CO2 was from 17-23 °C. At temperatures of above 23 °C the decline in PNmax was associated with decrease in apparent quantum yield. The difference in optimal temperature range of PNmax when compared to apparent maximum electron transport rate through

photosystem II (Jmax) as a function of irradiation (26-29 °C), showing an imbalance between photochemistry and biochemistry phases of photosynthesis, resulting in electron excess. Elevated CO2 concentration did not affect the response of PNmax to temperature, despite the variation in optimal range between 23-29 °C for Catuaí Vermelho. At temperature of above 29 °C were measured the higher mesophyll limitations to photosynthesis (Lm), which was greater than stomatal limitations (Ls). Photosynthetic process of C. arabica is strongly inhibited at leaf temperature about 32 °C.

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