Effects of Current Levels of Ultraviolet Radiation on Photosynthetic Capacity and Morphological Attributes of Papaya (Carica papaya L.)

Claudio Martins de Almeida, Géssica Monteiro dos Santos, Wallace de Paula Bernado, Miroslava Rakocevic, Eliemar Campostrini

In tropical and subtropical countries, papaya fruit is an important source of vitamins and minerals, being Brazil the third largest fruit producer in the world. In the last years, the information related to impacts of global climate changes on plants, has been the focus of the research efforts, once these changes are affecting the performance of agricultural crops and the food demand of an increasing human population. Among the current climate changes, there is an increase in ultraviolet radiation (UV), mainly UV-B, due to reduction the ozone layer. The increase of the exposure to UV radiation can affect the plant physiology, having impacts in photosynthetic capacity, growth and yield. The aim this work was to evaluate the effects of current UV radiation intensity on photosynthetic capacity and growth, as well as to verify the existence of different responses among genotypes with different leaf chlorophyll concentration. Two distinct genotypes (Sunrise Solo, dark-green leaves, SPAD index≅53; Golden Amarelinho, pale-green leaves, SPAD index≅32) were used. Six plants of each genotypes were randomly distributed and grown in 18 L plastic pots, containing soil and Basaplant® mixture (1:1) maintained under field capacity. The plants were grown under each of three distinct UV radiation conditions: (1) full sunlight (UV_{sun}) (100%), (2) ambient UV (UV_{am}) inside the micro greenhouse, with lateral walls and roof of corrugated glass, which excluded low levels of solar UV (reducing 16% UV-A and 0% UV-B), and (3) reduced UV levels (UV_{red}), reducing 70% UV-A and 90% UV-B solar radiation. Plants were grown during 31 days after transplanting (DAT) under 1, 2 and 3 UV conditions before initiating measurements. After 31 DAT, the youngest leaf of each plant was selected and used for growth measurements (central vein length - CVL, petiole length - PL), SPAD index and chlorophyll fluorescence until that leaf attained the CVL and PL maximum. At the 66 DAT, were performed leaf gas exchange measurements (8 to 10 a.m.), chlorophyll fluorescence (at 5 a.m., 7 a.m., 9 a.m., 1 p.m., 3 p.m. and 7 p.m.) and SPAD index (at 7 a.m. and 12 p.m.). The whole-leaf area and Dickson quality index (DQI) were determined at the 70 DAT. The UV_{sun} reduced photochemical efficiency, chlorophyll *a* content, and nitrogen balance index in both genotypes. Under UV_{sun}, in leaves of Sunrise Solo were reduced SPAD index and net CO_2 assimilation rate, whilst anthocyanin and flavonoids concentration increased in both genotypes grown under full sunlight. However, UV_{sun} did not affect the DQI, CVL and PL in both genotypes. DQI was severely reduced in Sunrise Solo grown under UV_{red}.

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