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A 2D in vivo approach to study photosynthesis in grape berry

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Abstract

Is argued that fruit photosynthesis serves mainly as a respiratory CO_2 refixation mechanism [1] but its contribution to growth and metabolism, localization and dynamics during fruit development are poorly known. Unlike the leaves, fruit volume imposes a constraint to photosynthesis by limiting light penetration. However, the patterns of chlorophyll distribution are apparently independent of a light intensity gradient. Microscopic observations of transversal slices of green stage grape berries (6-8 weeks after fruit set) of Alvarinho cultivar, revealed that exocarp cells, mesocarp cells next to vascular bundles, and seed coat cells present higher chlorophyll contents than inner mesocarp cells. The photosynthetic activity was determined on this material by Imaging-PAM fluorometry, a powerful tool for 2D mapping of *in vivo* photosynthesis. In 2 mm-thick grape berry discs, chlorophyll fluorescence parameters were estimated (F_v/F_m and Φ_{II}), and rapid light curves (RLC) were performed. Exocarp and seed coats of green berries showed the highest F_v/F_m values (*ca.* 0.6-0.7), and mesocarp cells around 85% of that value. Exocarp from mature grapes maintained F_v/F_m values during maturation, but in mesocarp and seed coats this value strongly decreased. ETR_r were very sensitive to increasing light intensities and decreased with grape berry maturation. Our future prospects include the implication of photosynthesis on grape berry solute contents (sugars, acids), fruit and seed development.

[1] Guido Aschan & Hardy Pfanz, (2003): Non-foliar photosynthesis-a strategy of additional carbon acquisition-Flora **198**, 81-97