QUANTIFICATION OF XANTHOPHYLL CYCLE PIGMENTS IN *HEVEA BRASILIENSIS*

Jayasree Gopalakrishnan and K. Annamalainathan

Rubber Research Institute of India, Kottayam, - 686009, Kerala, India

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The present study was aimed at optimizing a method using HPLC for qualitative and quantitative assessment of xanthophyll cycle pigments in young plants of *Hevea brasiliensis*. Successful separation of xanthophyll cycle pigments and other photosynthetic pigments was achieved by this method. In the current modified method co-elution of lutein and zeaxanthin was rectified and effective separation of these pigments was obtained. Diurnal variation in xanthophyll pigment content was very much evident according to the change in light intensity, from 08.30 to 16.30 hr. Diurnal changes in xanthophyll cycle pigment pool size and de-epoxidation state were apparently evident in sun exposed young *Hevea* plants. De-epoxidation rate was high at midday (12.30 hr) indicating increased energy dissipation during high light condition. The result suggests that the increased production of zeaxanthin and antheraxanthin with progressive increase in light intensities protects the photosystems from excess light energy and avoid photoinhibitory damage during sunny days in young plants of *H. brasiliensis.*

Keywords: Energy dissipation, *Hevea brasiliensis*, HPLC, Photoprotection, Xanthophyll pigments

INTRODUCTION

During the process of photosynthesis plants often absorb higher amount of light energy than what is required for driving photosynthesis. Photoinhibition of photosynthetic apparatus occurs unless the excess energy is dissipated safely. The excess energy is dissipated as fluorescence and as heat by chlorophyll and xanthophyll cycle pigments in photosystems (Gilmore, 1997; Niyogi *et al*., 1998; Munné-Bosch and Alegre, 2000). In this cycle the excess excitation energy induces the formation of zeaxanthin through de-epoxidation of violaxanthin *via* an intermediate antheraxanthin. Both these pigments scavenge the excess excitation energy present in the reaction centers of the light harvesting complexes and dissipate it as heat. Under low light condition this reaction is reversed and violaxanthin is formed (Eskling *et al*., 1997). This phenomenon of diurnal cycle involving interconversion of xanthophylls operates in plants.

The photoprotective role of xanthophylls has been very well established in other plant species (Demmig-Adams and Adams, 1996; Niyogi *et al*., 1998; Goss and Jakob, 2010; Pompelli *et al*., 2010; Golovko *et al*., 2012). Other carotenoids such as lutein also take part in non-photochemical quenching of chlorophyll fluorescence to some extent (Casper-Lindly and Björkman, 1998). Carotenoid pigments have been

Correspondence: Jayasree Gopalakrishnan (Email: jayag@rubberboard.org.in)