Stable isotope ratio (δ13C) responses of Platycerium bifurcatum at different light intensity levels

ABSTRACT

Platycerium bifurcatum is an epiphyte known as one of the common plant used for its ornamental value. Living in such environment, they were always exposed to several types of stresses such as water deficit and high light intensity. This plant is known as C3 plant and when exposed to stress environment, it might change its photosynthetic pathway to survive in harsh environment. For determination of the photosynthetic pathway used by plants, isotope screening technique was widely used. Therefore, the objective of this work was to classify the photosynthetic pathway type of P. bifurcatum through investigation of the carbon 13 isotope (δ13C) composition after they were subjected to different levels of light stress. In this study, P. bifurcatum were grown under four different Photosynthetic Active Radiation (PAR) levels which were 20 μm/m2s (T1), 70 μm/m2s (T2), 200 μm/m2s (T3) and 1500 μm/m2s (T4). All measurements were carried out after plants were subjected to 12 weeks of light stress. Two plants from each treatment were selected where two leaves from each plant were used as samples. Leaf samples were dried at 600oC for 48 hr and grounded. Plant responses were measured through its carbon isotope composition by using isotope ratio mass spectrometer. Results showed that there was no significant difference observed for both day and night samples. However, it was confirmed that all treatments were found to have C3photosynthesis in both day and night with T1 value of -27.04 ‰, T2 of -28.33 ‰, T3 of -27.82 ‰ and T4 of -25.61 ‰ at day and T1 with -28.11 ‰, T2 with -28.02 ‰, T3 with -28.50 ‰ and T4 with -27.01 ‰ at night. The results suggested that light stress does not alter the photosynthetic pathway of P.bifurcatum.

Keyword: Piphytes; Ferns; Platycerium bifurcatum; C3 plant; Canopy; Photosynthetic Active Radiation; PAR; Carbon 13 isotope