Increased Carbon Dioxide concentration improves the antioxidative properties of the Malaysian herb Kacip Fatimah (Labisia pumila Blume).

ABSTRACT

A randomized complete randomized design (RCBD) 3 by 3 experiment was designed to investigate and distinguish the relationships among production of secondary metabolites (total phenolics, TP; total flavonoids, TF), glutathione (GSH), oxidized glutathione (GSSG), soluble carbohydrate and antioxidant activities of the Malaysian medicinal herb Labisia pumila Blume under three levels of CO₂ enrichment (400, 800 and 1,200 µmol mol⁻¹) for 15 weeks. It was found that the treatment effects were solely contributed by interaction of CO₂ levels and secondary metabolites distribution in plant parts, GSH, GSHH and antioxidant activities (peroxyl radicals (ROO), superoxide radicals (O₂), hydrogen peroxide (H₂O₂) and hydroxyl radicals (OH). The records of secondary metabolites, glutathione, oxidized glutathione and antioxidant activities in a descending manner came from the leaf enriched with 1,200 µmol/mol CO₂ > leaf 800 µmol/mol CO₂ > leaf 400 µmol/mol CO₂ > stem 1,200 µmol/mol CO₂ > stem 800 µmol/mol CO₂ > stem 400 µmol/mol CO₂ > root 1,200 µmol/mol CO₂ > root 800 µmol/mol CO₂ > root 400 µmol/mol CO₂. Correlation analyses revealed strong significant positive coefficients of antioxidant activities with total phenolics, flavonoids, GSH and GSHH indicating that an increase in antioxidative activity of L. pumila under elevated CO₂ might be up-regulated by the increase in production of total phenolics, total flavonoids, GSH, GSHH and soluble sugar. This study implied that the medicinal potential of herbal plant such as L. pumila can be enhanced under elevated CO₂, which had simultaneously improved the antioxidative activity that indicated by the high oxygen radical absorbance activity against ROO, O₂, H₂O₂, and OH radicals.

Keyword: Elevated CO2; Secondary metabolites; Soluble carbohydrate; Glutathione; Antioxidative properties.