

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.