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), gluthatione (GSH), oxidized gluthatione (GSSG), soluble carbohydrate and antioxidant activities of the Malaysian medicinal herb Labisia pumila Blume under three levels of CO_2 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 CO_2 levels and secondary metabolites distribution in plant parts, GSH, GSHH and antioxidant activities (peroxyl radicals (ROO), superoxide radicals (O_2), hydrogen peroxide (H_2O_2) and hydroxyl radicals (OH). The records of secondary metabolites, glutahione, oxidized gluthathione and antioxidant activities in a descending manner came from the leaf enriched with 1,200 µmol/mol CO_2 > leaf 800 µmol/mol CO_2 > leaf 400 µmol/mol CO_2 > stem 1,200 µmol/mol CO_2 > stem 800 µmol/mol CO_2 > stem 400 µmol/mol CO_2 > root 1,200 µmol/mol CO_2 > root 800 µmol/mol CO_2 > root 400 µmol/mol CO_2. 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 CO_2 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 CO_2, which had simultaneously improved the antioxidative activity that indicated by the high oxygen radical absorbance activity against ROO, O_2, H_2O_2, and OH radicals.

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