

Effects of different light intensities on total phenolics and flavonoids synthesis and anti-oxidant activities in young ginger varieties (*Zingiber officinale* Roscoe).

Abstract

Nowadays, phytochemicals and antioxidants in plants are raising interest in consumers for their roles in the maintenance of human health. Phenolics and flavonoids are known for their health-promoting properties due to protective effects against cardiovascular disease, cancers and other disease. Ginger (*Zingiber officinale*) is one of the traditional folk medicinal plants and it is widely used in cooking in Malaysia. In this study, four levels of glasshouse light intensities (310, 460, 630 and 790 $\mu\text{mol m}^{-2}\text{s}^{-1}$) were used in order to consider the effect of light intensity on the production, accumulation and partitioning of total phenolics (TP), total flavonoids (TF) and antioxidant activities in two varieties of Malaysian young ginger (*Zingiber officinale*). TF biosynthesis was highest in the Halia Bara variety under 310 $\mu\text{mol m}^{-2}\text{s}^{-1}$ and TP was high in this variety under a light intensity of 790 $\mu\text{mol m}^{-2}\text{s}^{-1}$. The highest amount of these components accumulated in the leaves and after that in the rhizomes. Also, antioxidant activities determined by the 1,1-Diphenyl-2-picryl-hydrazyl (DPPH) assay in both of varieties, increased significantly ($p \leq 0.01$) with increasing TF concentration, and high antioxidant activity was observed in the leaves of Halia Bara grown under 310 $\mu\text{mol m}^{-2}\text{s}^{-1}$. The ferric reducing (FRAP) activity of the rhizomes was higher than that of the leaves in 310 $\mu\text{mol m}^{-2}\text{s}^{-1}$ of sun light. This study indicates the ability of different light intensities to enhance the medicinal components and antioxidant activities of the leaves and young rhizomes of *Zingiber officinale* varieties. Additionally, this study also validated their medicinal potential based on TF and TP contents.

Keyword: Ginger; Phenolics; Flavonoids; Anti-oxidant; Light intensity.