

Morphology, leaf gas exchange and quality of Pegaga (*Centella asiatica*) under different nitrogen fertilization rate

ABSTRACT

Aims: To investigate the physiological, leaf gas exchange and quality of *Centella asiatica* (pegaga) under different nitrogen fertilization rates.

Study Design: *Centella asiatica* were exposed to four different nitrogen fertilization rates (0, 50, 100, 150 kg/ha) using urea (46% N) as nitrogen sources. The experiment was conducted in a randomized complete block (RCBD) design with three replications. Each treatment consisted of eight plants making the total of plants used in this study is 96 plants.

Place and Duration of Study: Department of Biology, Faculty of Science, Universiti Putra Malaysia From May 2016-June 2016.

Methodology: The growth parameters measured include total leaves numbers, leaf area, total chlorophyll content and total plant biomass. The carbon assimilation parameters were measured using LICOR 6400 XT Portable Photosynthesis System i.e net photosynthesis (A), Transpiration rate (E) and water use efficiency (WUE). Total phenolic and flavonoids contents from the leaves extracts were measured using Folin-Ciocalteu reagents.

Results: The growth parameters such as leaves number, chlorophyll content, leaf area and total biomass were significantly influenced by nitrogen fertilization ($P \leq 0.05$), However, there were no significant difference observed between 50, 100 and 150 kg N/ha suggesting that 50 kg N/ha was the efficient rates to apply to enhance the growth of this plant. Meanwhile, the net photosynthesis (A) and water use efficiency (WUE) were enhanced with the increasing rate of nitrogen from 0>150 kgN/ha. The production of total phenolics and flavonoids was found to be highest under 100 kg/ha. The harvest index of total phenolics also showed the applications of 100 kg/ha gave the highest harvest index compared to the other nitrogen treatments.

Conclusion: This study indicated growth and carbon assimilation parameters were enhanced under higher nitrogen fertilization and production of secondary metabolites was decreased with high rates of nitrogen. The recommended nitrogen fertilization for *C. asiatica* was at 100 kg N /ha, where it obtained the highest harvest index.

Keyword : *Centella asiatica*; Physiological; Leaf gas exchange; Phenolic; Flavonoid; Nitrogen; Fertilization