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Assessment of growth and phytochemical quality of *Gynura procumbens* through nitrogen, potassium fertilization and evapotranspiration replacement interaction

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Abstract. Despite the progressive reports on potential pharmacological properties of *G. procumbens*, the importance of agronomic requirements to produce high yields and phytochemical content that may vary due to environmental variations are often overlooked. Therefore, this study was conducted to examine the effects of N, K and ER interaction on the growth and phytochemical content of *G. procumbens*. The study was a three-factorial experiment; two rates of N and K, four rates of ER and three H time. The treatments have affected plant growth and phytochemical content significantly ($p \leq 0.05$) with stronger effect on physiology and biochemical attributes ($p \leq 0.01$). The study has shown discrete effect on growth, physiology, and phytochemicals content with N0K30>N90K0 and ER 75>50>100>25% treatment. The highest and lowest yield of plant biomass and phytochemical were observed under N0K30(70) and N90K0(25), respectively. The results have shown that the interaction and effect of treatments are highly significant ($p \leq 0.0001$) in Cond, CNB, TChlC, TPrC and TFC analysis, ($p \leq 0.05$) in NoL, CF and PWP, and not significant in TLA, Photo, TCC, TLC and TPC. The 75% ER has produced significant output of biomass as well as phytochemical content. The study also showed that low rate of N, moderate rate of K with 75% ER have produced high biomass as well as phytochemical content. Meanwhile, caffeic acid and kaempferol were demonstrated as the lead secondary metabolite compounds in this study.

Keywords: evapotranspiration, fertilizer, growth, *Gynura*, physiology, phytochemical

INTRODUCTION

Many enzymes in photosynthesis and phytochemical (metabolite) processes require nitrogen (N), potassium (K) and water as cofactors (Jimenez-Garcia *et al.,* 2013). Numerous studies have suggested the association between N-, K- and water-dependent enzymes such as nitrate reductase, pyruvate kinase, Rubisco and starch synthase with plant metabolic regulation (Mikkelsen, 2008; Pant *et al.,* 2015; Wu *et al.,* 2011). Due to the increasing understanding of metabolic processes regulation, N, K and water availability-dependent reaction studies have come into the latter mechanisms (Davies *et al.,* 2009; Espírito-santo *et al.,* 1999; Kaiser *et al.,* 2016; Pal *et al.,* 2015; Smith *et al.,* 1993; Soubeyrand *et al.,* 2014). In order to understand how N, K and water affected phytochemical content quality, studies must evaluate metabolic regulation at various biological

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