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RESEARCH ARTICLE

Preliminary Study on the Effect of Nitrogen and Potassium Fertilization on Phytochemical Content Quality of *Gynura procumbens*

Mohamad Fhaizal Mohamad Bukhori[a,b,*], Hawa ZE Jaafar[a], Ali Ghasemzadeh[a], Uma Rani Sinniah[a], Gayatri Karipaya[c]

[a] Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia; [b] Biology, Centre for Pre-University Studies, Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysia; [c] Institute of Biological Sciences, Faculty of Science, Universiti Malaya, 50603 Kuala Lumpur, Malaysia

Abstract *Gynura procumbens* is an herbaceous plant. Despite the progressive reports on the pharmacological properties, many are overlooking at the importance of agronomic requirements, such as fertilization, to produce high phytochemical content which have not been conclusively concluded. The study was carried out to examine the effects of N and K interaction on physiological and phytochemical quality; to identify compositions of phytochemicals, and to determine marker compounds. Physiological and phytochemical attributes were recorded in three harvests of triplicate samples to exhibit the trend for plant quality, and statistically analyzed. Generally, N and K interaction have affected phytochemical content significantly ($p<0.05$) with stronger effect on physiological and biochemical attributes ($p<0.01$). The results have demonstrated that the following combination of fertilizer, 0 kg/ha N and 30 kg/ha K; and 90 kg/ha N and 0 kg/ha K are high and low, respectively affecting metabolite content in the plant. Lowest rate of N, moderate of K had produced significant phytochemical contents. Meanwhile, caffeic acid and kaempferol were demonstrated as marker compounds in this study. Thus, phytochemical content can be further established through the selection of appropriate N and K rates and proper abiotic stress interaction.

Keywords: agriculture, *Gynura,* nitrogen, phytochemical, potassium.

***For correspondence:**
mbmfhaizal@unimas.my

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Introduction

Nutrient that is taken up beyond plant's requirement would offer no further advantage for growth (Chen et al., 2013). Little is known about the response in secondary metabolism effect. If nitrogen (N) and potassium (K) is taken up below the optimal level, it causes stunting, scleromorphism, and increased root to shoot ratio (Galieni et al., 2015). However, the effects of N and K deficiency in secondary metabolism is less known. With limited amount of nutrient available in the environment, plant growth and secondary metabolism may compete for the nutrient, and a trade-off between growth and secondary metabolite synthesis can occur (Caretto et al., 2015). The secondary metabolite synthesis may be at the cost of reducing plant growth, and *vice versa*. Thus, manipulation of N and/or K supply may obtain a balance between plant growth and metabolite synthesis, and provide chances to increase plant yield (Pal et al., 2015), at the same time maintaining the secondary metabolite synthesis. Regulation in secondary