



RESPONSE OF ANTICANCER COMPOUNDS TO NITROGEN FERTILIZER IN NAEIN-E HAVANDI (*ANDROGRAPHIS PANICULATA*)

Daryush Talei^{1,*}, Alireza Valdiani², Nur Faezah Omar³

¹*Medicinal Plant Research Center, Shahed University, Tehran, Iran*

²*Department of Biochemistry, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor DE, Malaysia*

³*Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia*
E-mail: D.talei@shahed.ac.ir

Naein-e Havandi (*Andrographis paniculata*) is a medicinal herb in the family Acanthaceae. The plant extract contains three major compounds namely diterpenes, flavonoids and stigmasterols with the active compounds identified as andrographolide (AG), neoandrographolide (NAG) and 14-deoxy-11, 12-didehydroandrographolide (DDAG) with a wide scope of pharmaceutical properties such as anti-HIV, anti-H1N1, anticancer and anti-hepatitis [1]. Phytochemical responses to nitrogen fertilization are useful measurements to determine favorable habitat conditions for the cultivation of medicinal plants. The goal in commercial medicinal plant production is to produce high dry herbage yields with high phytochemical content. We analyzed the leaf diterpenoid contents in *A. paniculata* at five nitrogen rates using (33.5%) ammonium nitrate (50, 100, 150, 200 and 250 kg ha⁻¹) using HPLC. The experiment was arranged in a randomized block design with three replications. Before flowering stage, the plants were harvested. The results revealed significant effects of nitrogen levels on total shoot (S_w), leaf (L_w) and stem (St_w) dry weight, NAG and DDAG concentrations, while there were no significant difference on root dry weight (R_w) and AG amount ($P < 0.01$). The greatest S_w (29.72 g), L_w (17.53 g) and St_w (12.20 g) were observed at the highest rates of N (250 kg ha⁻¹). The highest amount of AG (3.49 $\mu\text{g g}^{-1}$) and NAG (1.15 $\mu\text{g g}^{-1}$) per leaf dry matter were observed at the rate of 200 kg ha⁻¹ nitrogen fertilization, and the highest amount of DDAG (0.25 $\mu\text{g g}^{-1}$) was observed at the rate of 150 kg ha⁻¹. The highest rates of nitrogen fertilization (250 kg ha⁻¹) significantly decreased the amount of all three main compounds. These results suggested that *A. paniculata* could reach high biomass and yield of diterpenoids with 250 and 200 kg ha⁻¹ nitrogen fertilization respectively. In agreement with the reports of Gayler et al. [2] and Yasmeeen et al. [3], the findings of this study indicated that increasing nutrients, especially nitrogen, increased diterpenoid concentrations but decreased phenolics contents.

References

- [1] Valdiani A.; Mihdzar AK.; Tan SG.; Talei D.; Puad MA.; Nikzad S. *Mol Biol Rep.* **2012**, 39, 5409-5424.
- [2] Gayler S.; Grams EE.; Heller W.; Treutter D.; Priesack E. *Annals of Botany (Lond).* **2008**, 101 (8), 1089-1098.
- [3] Yasmeeen S.; Tajul MI.; Yuvarani N.; Sariah M.; Oil B. *Scientia Horticulturae*, **2011**, 130, 289-295.