

Supplemental Material

Nitrogen source matters: High NH₄/NO₃ ratio reduces cannabinoids, terpenoids, and yield in medical cannabis

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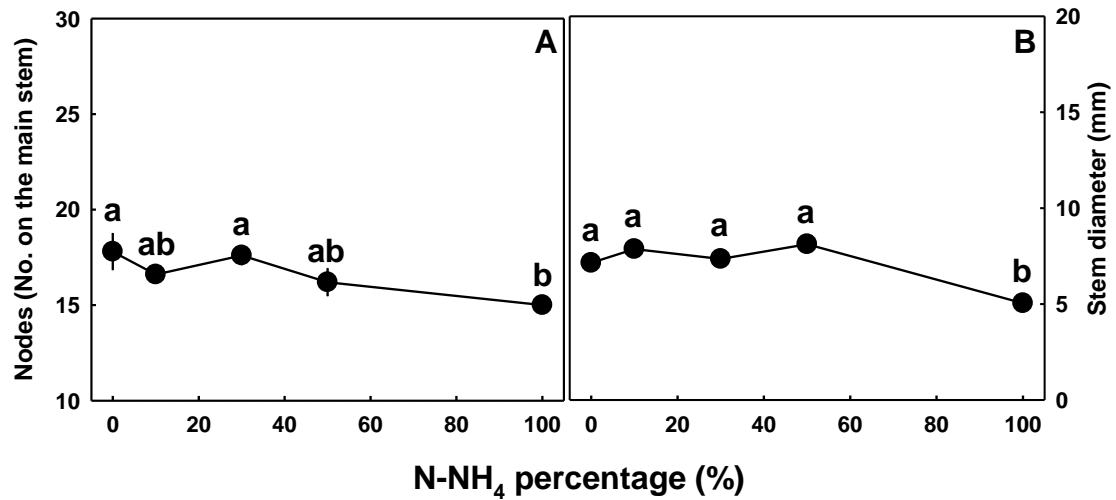
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Supplemental Table 1: Concentrations of NH₄ and NO₃ in the experimental treatments*.

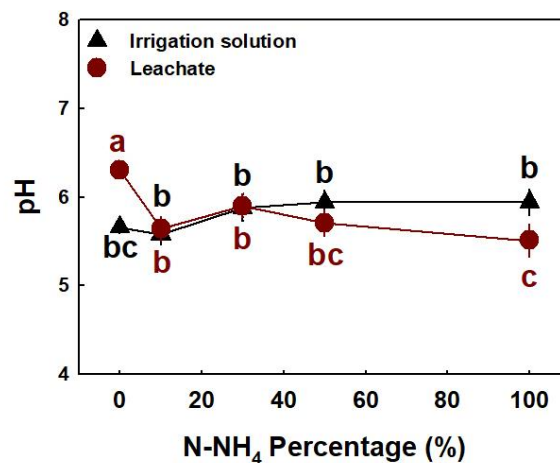
Treatment (% NH ₄)**	NH ₄ Concentration (mg L ⁻¹)	NO ₃ Concentration (mg L ⁻¹)
0	0	200
10	20	180
30	60	140
50	100	100
100	200	0

* Concentrations of the other nutrients in the irrigation solution (in mM): 2.8 K⁺, 1.9 P-PO₄²⁻, 1.42 Ca²⁺, 1.55 Mg²⁺, 3.5 S-SO₄²⁻, 1.7 Na⁺, 1.43 Cl⁻, 0.024 Fe²⁺, 0.011 Mn²⁺, 0.009 B³⁺, 0.005 Zn²⁺, 0.002 Cu²⁺, and 0.0003 Mo²⁺.

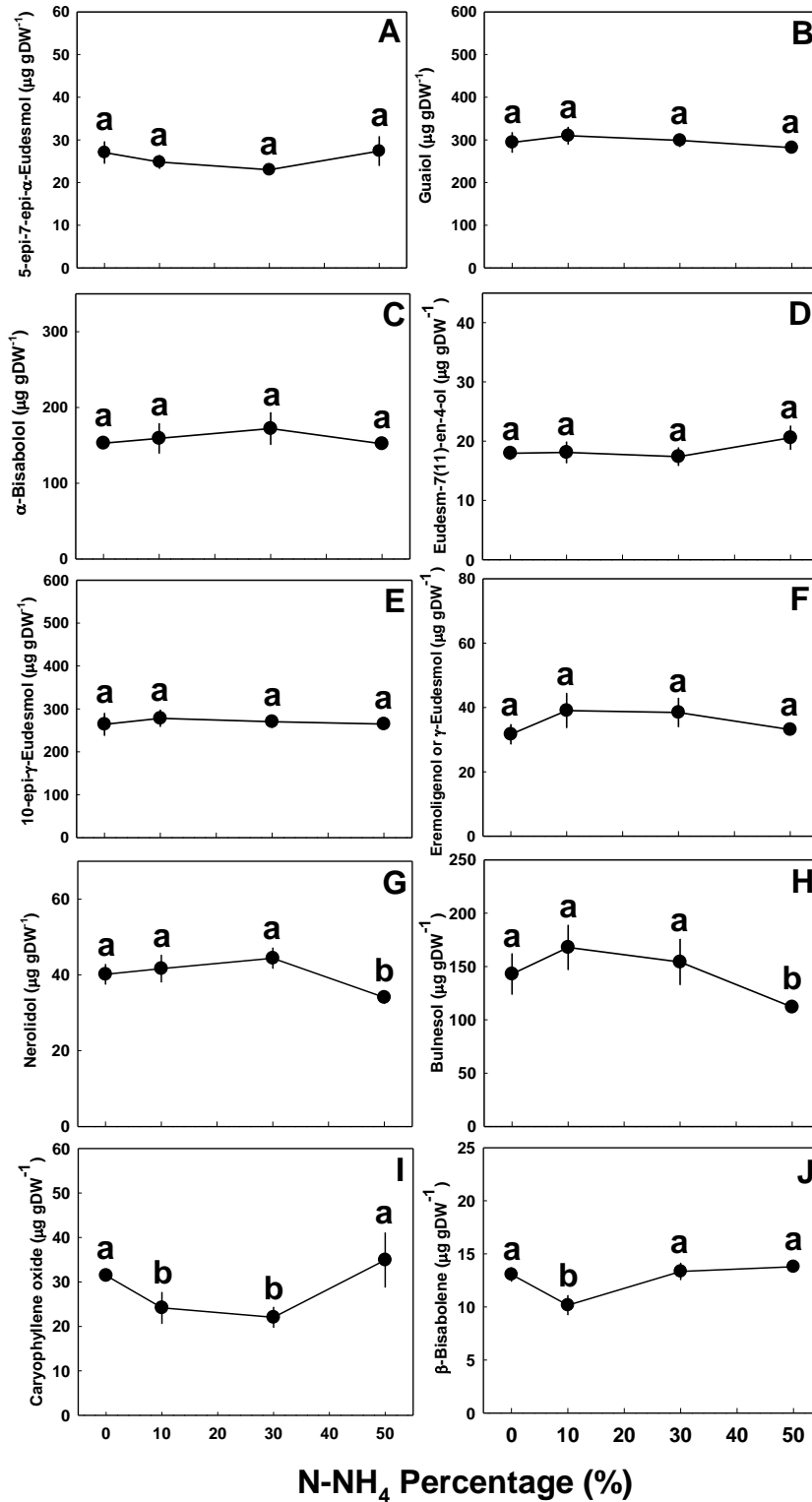
**Electrical conductivity (EC) of the irrigation solution was 1.7, 1.7, 1.8, 2.1, 2.5 (dS m⁻¹) for the 0, 10, 30, 50, 100 %NH₄ treatments, respectively.



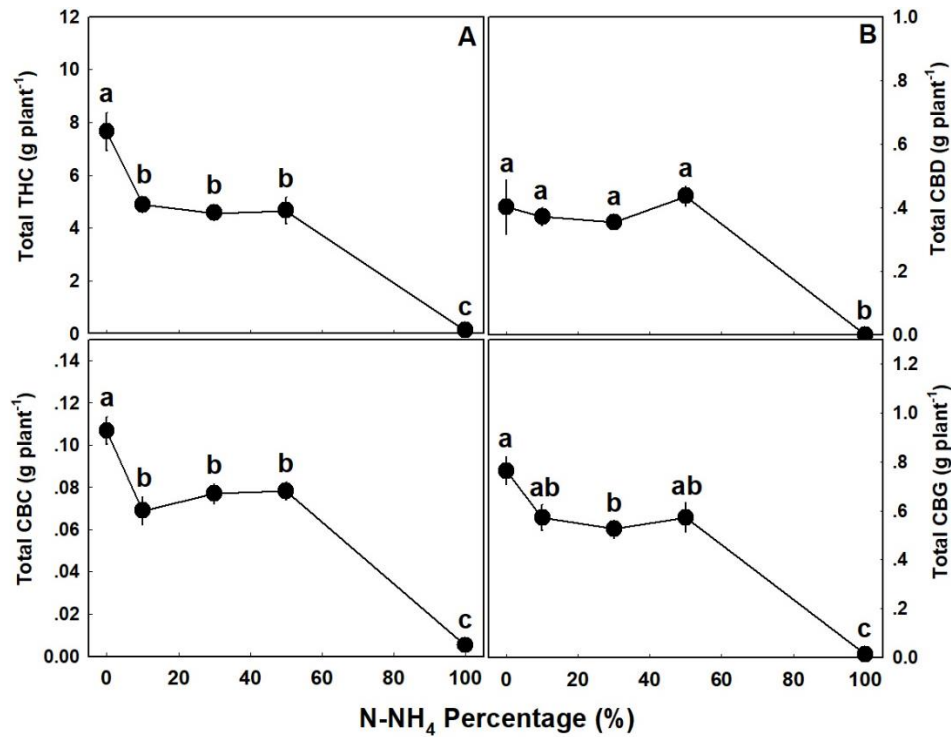
Supplementary Figure 1. Effect of NH₄/NO₃ ratio on the development of medical cannabis plants at the reproductive growth phase. Number of nodes on the main stem (A) and stem diameter (B). Presented data are averages ± SE (n=5). Different small letters above the means represent significant differences between treatments by Tukey HSD test at α=0.05.



Supplementary Figure 2. Mean pH values of the irrigation and leachate solutions. Different small letters above the means represent significant differences by Tukey HSD test at α=0.05.



Supplementary Figure 3. Effect of NH₄/NO₃ ratio on sesquiterpene concentration in the top inflorescence of medical cannabis plants. 5-epi-7-epi- α -Eudesmol (A), guaiol (B), α -bisabolol (C), eudesm-7(11)-en-4-ol (D), 10-epi- γ -eudesmol (E), eremoligenol or γ -eudesmol (F), nerolidol (G), bulnesol (H), caryophyllene oxide (I), and β -bisabolene (J). Presented data are averages \pm SE (n=5). Different small letters above the means represent significant differences between treatments by Tukey HSD test at $\alpha=0.05$.



Supplementary Figure 4. Effect of NH₄/NO₃ on production of cannabinoids in medical cannabis plants. The total THC (A), CBD (B), CBC (C), and CBG (D) produced per plant. Total weight of each cannabinoid was calculated from the concentrations of the carboxylated plus the decarboxylated forms as is detailed in the material and methods section. Presented data are averages \pm SE (n=5). Different small letters above the means represent significant differences between treatments by Tukey HSD test at $\alpha=0.05$.