



Aysabar, Z., Kaya, A. and Eryiğit, T. (2026)

'Evaluation of macro- and micronutrient responses in confectionery sunflower (*Helianthus annuus* L.) seeds to different fertilizer applications',*Journal of Elementology*, 31(4), ,available: <https://doi.org/10.5601/jelem.2026.31.1.3767>

RECEIVED: 8 March 2026

ACCEPTED: 30 August 2026

ORIGINAL PAPER

Evaluation of macro- and micronutrient responses in confectionery sunflower (*Helianthus annuus* L.) seeds to different fertilizer applications*

Ali Rahmi Kaya¹, Zeliha Aysabar¹, Tamer Eryiğit²

¹ Department of Field Crops, Agricultural Faculty,

Kahramanmaraş Sütçü İmam University, Kahramanmaraş, Türkiye

² Department of Plant and Animal Production, Gevaş Vocational School,

Van Yuzuncu Yıl University, Van, Türkiye

Abstract

This two-year field study, conducted in Kahramanmaraş, Türkiye, in 2021-2022, used a Randomized Complete Block Design (RCBD) with three replications to investigate the effects of 12 different fertilizer applications on the macro- (g kg⁻¹) and micronutrient (mg kg⁻¹) content of confectionery sunflower (*Helianthus annuus* L.) seeds. Significant Year × Fertilizer Application interaction effects were detected for most analyzed nutrients, indicating that treatment responses varied between growing seasons. Different fertilizer applications – chemical, organic, and organomineral – had a clear influence on both macro- and microelement levels in sunflower seeds. The highest increases in grain P (4.036 g kg⁻¹), Ca (2.092 g kg⁻¹), and Mn (4.771 mg kg⁻¹) were obtained with cattle manure applied at 10000 kg ha⁻¹ (CM1). This treatment also resulted in noticeable improvements in N (1.79 g kg⁻¹), Mg (2.224 g kg⁻¹), and Mo (0.118 mg kg⁻¹). When cattle manure (1000 kg ha⁻¹) was combined with chemical fertilizer (90 kg ha⁻¹ N and 50 kg ha⁻¹ P) as an organomineral treatment (CMCF), the seeds showed the highest N (1.87 g kg⁻¹) and P (4.035 g kg⁻¹) levels, along with marked increases in Mn (4.249 mg kg⁻¹), Zn (54.620 mg kg⁻¹), and Cu (7.424 mg kg⁻¹). The highest Fe content (52.10 mg kg⁻¹) was recorded with gyttja at 20000 kg ha⁻¹ (G2), and the highest Mg content (2.332 g kg⁻¹) was determined with gyttja at 80000 kg ha⁻¹ (G3). In comparison, chemical fertilizer alone led to lower P, Ca, Mg, Zn, and Na contents than the control and organic or organomineral applications. These results highlight how different fertilizer types can distinctly shape the nutrient profile of sunflower seeds, offering useful insights for refining fertilization practices in confectionery sunflower production.

Keywords: cattle manure, gyttja, seed macro- and micro-element content, vermicompost

Prof. Dr. Tamer Eryiğit, 2Department of Plant and Animal Production, Gevaş Vocational School, Van Yuzuncu Yıl University, 65700, Van, Türkiye, e-mail: tamereryigit@yyu.edu.tr

* The authors received no financial support for the research, authorship, and/or publication of this article.