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Organic fertilization method to increase the quantity and quality of carrot (*Daucus Carota*) production using natural zeolites

Lucian Dordai*; Anca Becze; Marius Roman

INCDO-INOE2000, Research Institute for Analytical Instrumentation, ICIA Cluj-Napoca Subsidiary, 400293 Cluj-Napoca, Romania

* Corresponding author: lucian.dordai@icia.ro

Abstract

Carrot is a vegetable and medicinal plant with a high content of vitamins and minerals such as potassium, calcium and magnesium. Regarding the culture of carrots, their capacity to acclimatize to the conditions of the area means their adaptation to the natural environmental conditions, specifically to the climatic and pedological ones. [1,2] Obtaining superior quantitative and qualitative harvests, while maintaining a production cost as low as possible, involves the use of fertilizers rationally and the most accurate use of irrigated land, choosing the most appropriate method of fertilization and watering. Zeolites have three main properties that are of great interest for agricultural purposes: high cation exchange capacity; high water retention capacity in free channels; high adsorption capacity, which make them particularly attractive for use as fertilizers. It is desired that through the new carrot fertilization technology made with the protection of the environment and, within the limits of economic efficiency, to obtain both the increase of production and their quality for use as a functional food.[3,4]

Material and Methods

The experimental factors studied were: the fertilization regime, with three graduations (basic fertilization / chemical fertilization / zeolite fertilization) and the biological material, with three graduations (Royal Chantenay, Atomic Red and Purple Haze F1). The experiments contained a number of 3 repetitions ($n = 3$), the number of variants analyzed in the experiment is 9 ($v = 3 \times 3$), the total number of experimental plots was 27 (9×3). The comparative cultures were ordered in a multifactorial system, completely randomized, with subdivided plots.

The fertilization method consists in applying natural zeolite in 2 phases of vegetation for the carrot culture. The first stage of fertilization is done when the plants have 3-4 leaves, using an amount of zeolite of 350 kg / ha, and the second stage of fertilization is carried out when the roots of the plants begin to thicken, using an amount of zeolite of 300 kg / ha and an irrigation rate of 600 l / ha, the zeolite being incorporated into the soil in maximum 24 h by the drip irrigation method. The zeolite used in this study is Z500 purchased from the company ENVIRO NATURALS AGRO SRL, having a license for use in organic farming according to REG. CE834 / 2007 and 889/2008 and Ecocert certificate.

Results

Chart 1. The influence of fertilization on carrot production (t/ha)

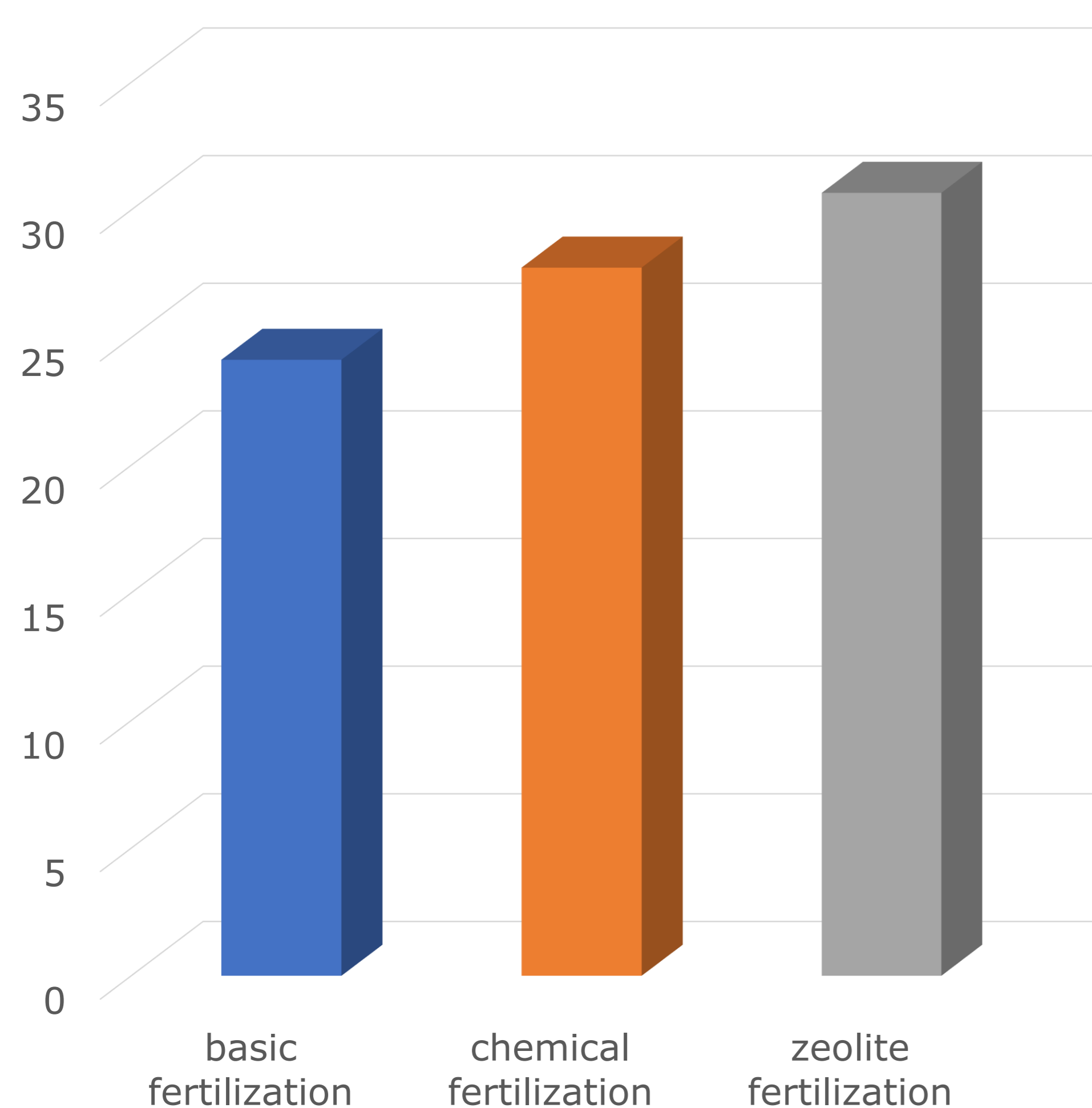


Chart 2. The influence of fertilization on the antioxidant content of carrots ($\mu\text{g}/\text{mg}$)

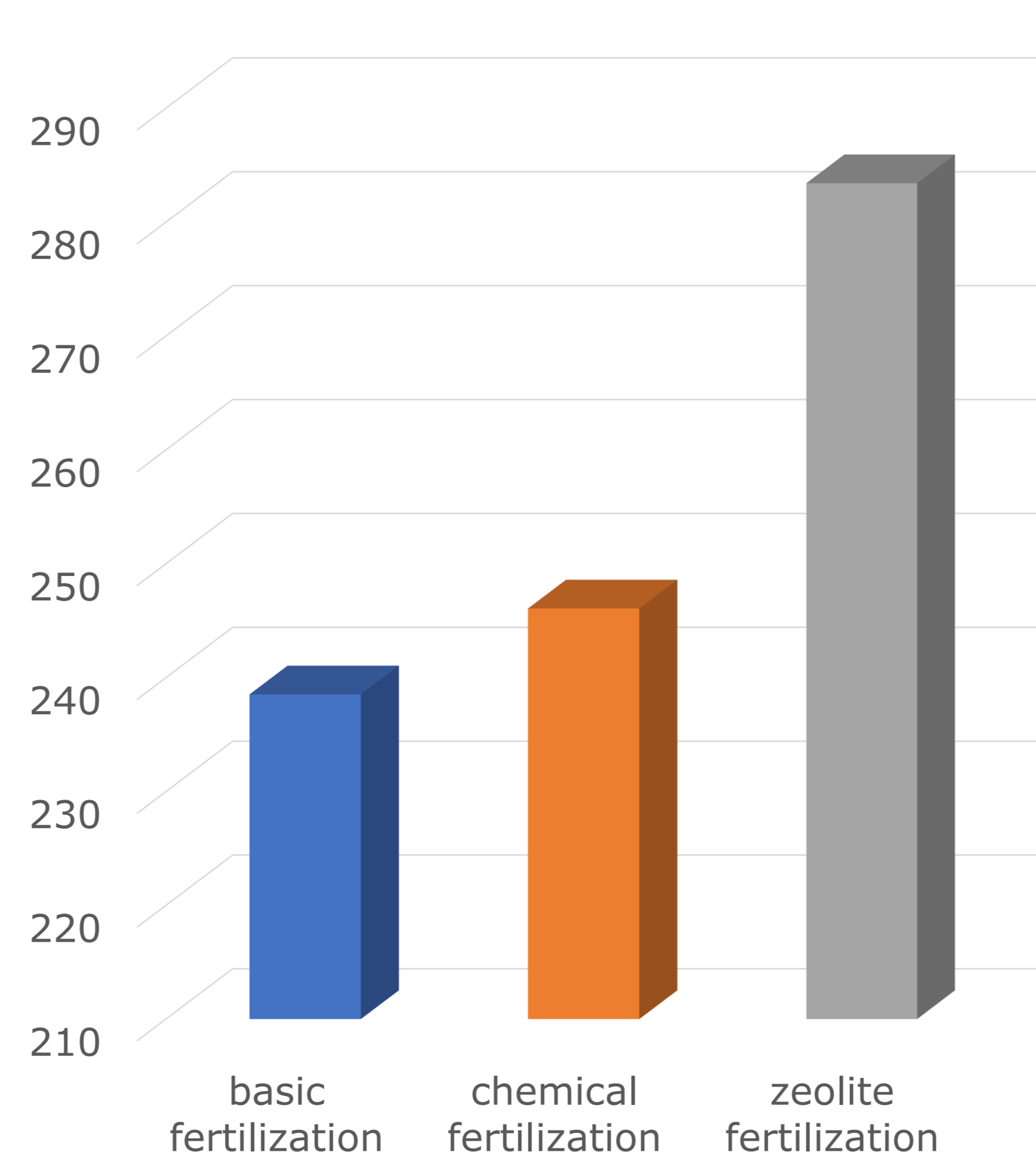
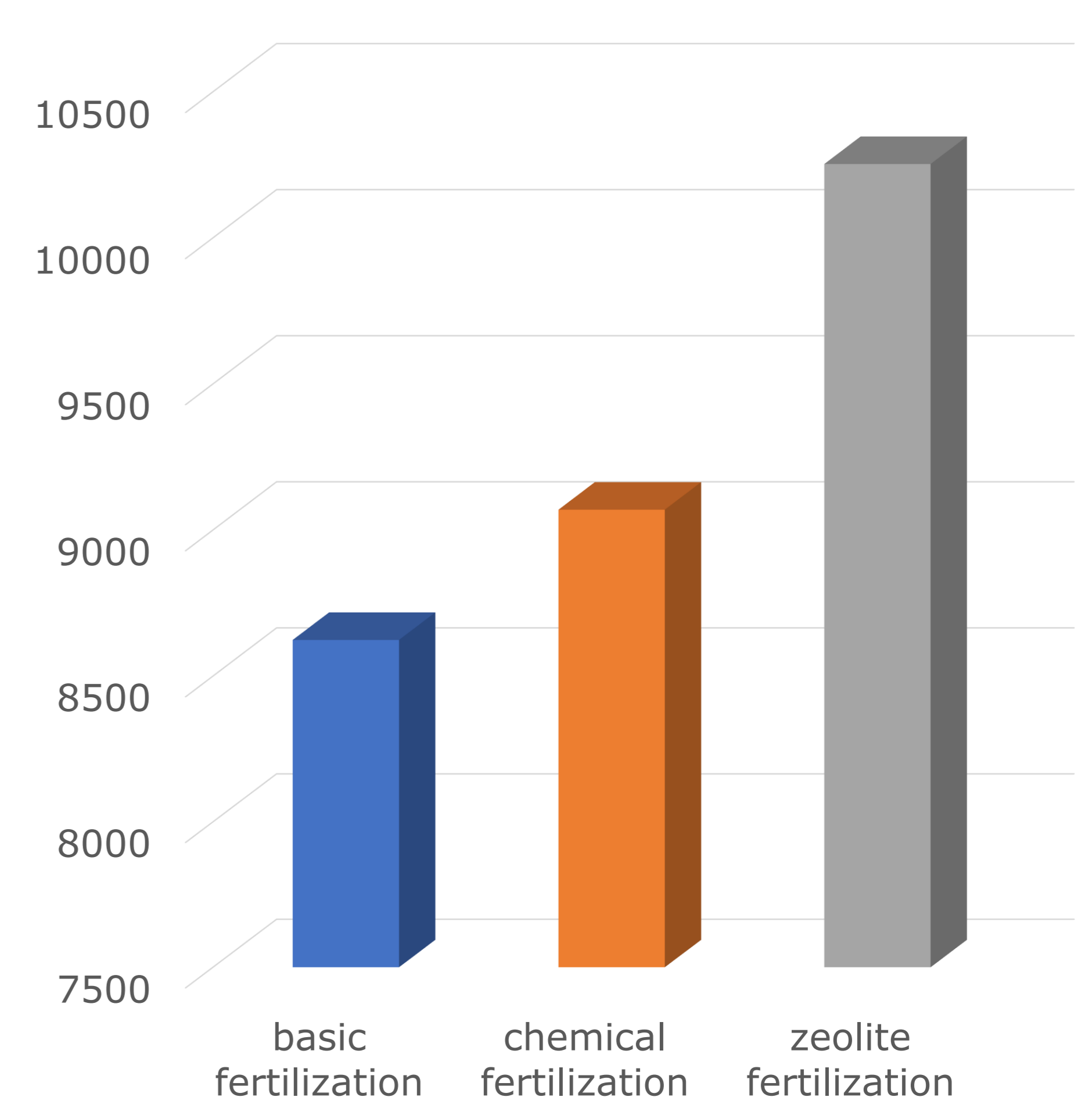


Chart 3. The influence of fertilization on the mineral content of carrots (mg/kg)



Conclusions

- the production at the carrot culture registers an increase of production of 27.1% compared to the basic fertilization, respectively 12.1% compared to chemical fertilization
- the antioxidant content increases by 18.8% compared to the basic fertilization, respectively 15.6% compared to the chemical fertilization
- the content of mineral elements increases by 18.9% compared to the basic fertilization, respectively 13.4% compared to the chemical fertilization

References

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Acknowledgment

- Romanian Research and Innovation Ministry under the PROINSTITUTIO project, contract no. 19PFE/17.10.2018 funded this research