Journal of Elementology ISSN 1644-2296

Ramut, R., Jama-Rodzeńska, A., Gałka, B. and Czaplicka, M. (2025)
'Optimization of struvite application in stagnant hydroponic in tomato cultivation',
Journal of Elementology, 30(4), ,
available: https://doi.org/10.5601/jelem.2025.30.3.3616

RECEIVED: 8 July 2025
ACCEPTED: 4 October 2025

ORIGINAL PAPER

Optimization of struvite application in stagnant hydroponic in tomato cultivation*

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Abstract

The aim of the study was to determine the effect of nutrient solution with different pH values on the yield and nutritional status of tomato plants cultivated in stagnant hydroponics using struvite. The plants were fertilized with a standard nutrient solution at different pH values: 4.5, 5.5 and 7.0 and control. The pH value of the nutrient solution and the type of phosphorus fertilizer applied significantly influenced the tomato yield of the Maskotka variety. The yield of was not dependent on the pH of the nutrient solution or the type of phosphorus fertilizer applied. However, the type of phosphorus fertilizer and the pH of the nutrient solution had a significant impact on the nutritional status of the plants. Despite the considerable variation in the average concentrations of mineral nutrients in the tomato leaves, the growth and development of the plants were normal, both in the roots and the fruits. The average content of available phosphorus in the fruits depended on the factors studied, such as pH, phosphorus fertilization, and the sampling time. In the second sampling period, the application of struvite resulted in a significant increase in its content under all tested pH values. The content of available phosphorus in the leaves was significantly highest at a pH of 5.5, while in the roots, the effect of this factor was not significant. The effect of struvite was particularly manifested with respect to the nutrient content. Its presence in the roots was strongly dependent on the type of phosphorus fertilizer used, with struvite causing a significant decrease compared to superphosphate (SUP). In contrast, struvite had a positive impact on the available magnesium content in the fruits. During the second sampling period, a statistically significant increase in magnesium was observed across all tested conditions when struvite was applied. This highlights the distinct influence of struvite on magnesium dynamics in different plant parts.

Keywords: nutrient solution, pH values, struvite, tomato yield

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* Funding by Wrocław University of Environmental and Life Science (grants N020/0001/24 and N0N00000/0241/14/2024).