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ORIGINAL PAPER

The effect of increasing nickel concentrations and the use of re-used rockwool on the yield and chemical composition of lettuce (*Lactuca sativa* L.)

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Abstract

Rockwool is one of the most commonly used substrates in soilless cultivation. Mineral wool has good physicochemical properties, and it is an inert, sterile substrate free from pathogens, toxic and ballast substances. It is a substrate with optimal conditions for the development of the root system, maintaining an optimal air-water ratio. Due to the lack of exchange sorption, it is possible to precisely control the nutrition of plants. In most crops, rockwool is used in one cultivation cycle; therefore, the aim of the conducted research was to determine the possibility of reusing wool in the cultivation of lettuce (*Lactuca sativa* L.) Zeralda F1, the effect on its yield, and chemical composition. The influence of increasing concentrations of nickel in the hydroponic solution on the yield of lettuce and its chemical composition was also studied. The research factors were two types of rockwool (new and re-used) and increasing concentrations of nickel (0-control; 5 and 10 mg dm^{-3}). The plants were grown in a greenhouse in a closed system without nutrient recirculation. It was found that rockwool could be reused for lettuce cultivation. No differences in lettuce yield were found between growing in new and re-used rockwool. The authors compared the content of individual components and heavy metals in lettuce leaves grown in two types of rockwool, to which no nickel was introduced. The higher contents of potassium, calcium, magnesium, zinc, manganese, nickel, lead and cadmium were found in lettuce grown in re-used rockwool. On the other hand, in lettuce grown in new rockwool, higher contents of phosphorus and sulfur were found. Nickel in concentrations of 5 and 10 mg dm^{-3} of the nutrient influenced a higher greenness index of lettuce leaves. Increasing concentrations of Ni did not significantly affect the content of nitrogen, sodium, and copper in lettuce leaves, while the content of other nutrients and heavy metals depended on their concentration.

Keywords: hydroponic, macronutrient, micronutrient, lead, cadmium

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