Effect of pyrophyllite application on quality of lettuce

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INTRODUCTION

The use of different granulations of natural minerals in agricultural production is helping to preserve and improve soil quality, whose degradation, on a global scale, is a growing problem. In this study, the influence of the use of pyrophyllite in the production of lettuce (*Lactuca sativa* L.; cv. Zeralda F1) in a greenhouse without heating system was examined in accordance with organic production principles. Pyrophyllite was used in two granulations: 5 mm and 100 μm.

MATERIAL AND METHODS

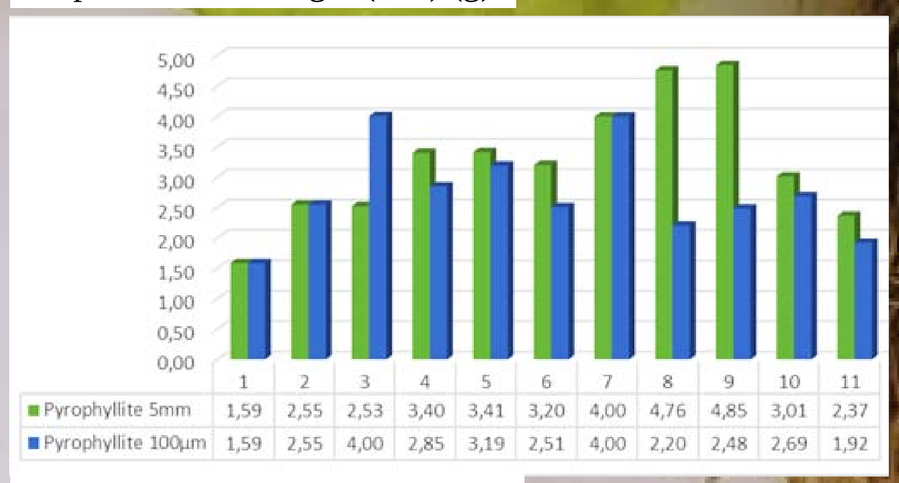
The experiment was set up under controlled conditions in special greenhouse chambers of the Faculty of Agriculture in Banja Luka (koordinate). Lettuce seedlings (*Lactuca sativa* L., Zeralda F1) produced from nursery production up to the stage with 4-5 fully developed leaves. The plants were planted in a nutrient substrate in pots with a volume of 1 L and were initially divided into several different groups depending on the composition of the growing substrate, ie. additional fertilizers and pyrophyllite, which is part of the substrate. The nutrient substrate was "Fantazija". The plants were grown in this way for 21 weeks (from December 7, 2018 to May 3, 2019), after which the leaves were sampled, and the samples were forwarded to the laboratory for analysis. Leaf sampling was performed by taking and mixing leaves from all levels of the leaf rosette to obtain a representative sample composed of leaves of different ages. All results were obtained as a result of three replicates and presented as the average. The final RWC value was calculated according to the formula for determining the RWC using the FW, TW, and DW values: RWC (%) = [(FW - DW) / (TW - DW)] x 100 (Weatherley, 1950).

Table 1. Description of codes used in the experiment

Code	Description
1	negative control - substate without any additional nutrition and pyrophyllite
2	positive control - substate whose total mass was supplemented with 20% of fertilizer
3	substate with 20% of added fertilizer in the total mass, in the composition of which the ratio of pyrophyllite: fertilizer is 30%: 70%
4	substate with 20% of added fertilizer in the total mass, in the composition of which the ratio of pyrophyllite: fertilizer is 50%: 50%
5	substate with 20% of added fertilizer in the total mass, in the composition of which the ratio of pyrophyllite: fertilizer is 70%: 30%
6	substate with 20% added pyrophyllite
7	positive control of excessive fertilization - substate in which 40% of the total weight was added fertilizer
8	substate with 40% added fertilizer in the total mass, in the composition of which the ratio of pyrophyllite: fertilizer is 30%: 70%
9	substate with 40% added fertilizer in the total mass, in the composition of which the ratio of pyrophyllite: fertilizer is 50%: 50%
10	substate with 40% added fertilizer in the total mass, in the composition of which the ratio of pyrophyllite: fertilizer is 70%: 30%
11	substate with 40% added pyrophyllite

RESULTS

Graph. 1. Fresh Weight (FW) (g)



Graph. 2. Turgid Weight (TW) (g)

Graph. 3. Relative Water Content (RWC) (%)

Graph. 4. Average Weight of lettuce (kg)

CONCLUSION

Larger granular pyrophyllite (5 mm) in most of the tested parameters gave better results. It is important to emphasize, as seen in the graph. 1., that lettuce leaves grown in a 5mm pyrophyllite granulation in most variants had a higher average fresh leaf weight.

Generally observed, in 7 of 11 variants (64%), plants grown in a substrate with a granulation of 5mm had a slightly better yield compared to plants grown in a substrate with a granulation of 100 μm. The highest weight of lettuce was recorded in plants in substate with 40% added pyrophyllite at granulation of 5 mm (0.42 kg).

Also, the results of this study suggest that pyrophyllite usage could be an effective technique for improving soil quality and crop production.

5mm

100 µm