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The Effect of Zeolite and Fertilizers on Yield and Qualitative Characteristics of Cabbage in the Southeast of Kazakhstan

Authors : Tursunay Vassilina, Aigerim Shibikeyeva, Adilet Sakhbek

Abstract : Research has been carried out to study the influence of modified zeolite fertilizers on the quantitative and qualitative indicators of cabbage variety Nezhenka. The use of zeolite and mineral fertilizers had a positive effect on both the yield and quality indicators of the studied crop. The maximum increase in yield from fertilizers was 16.5 t/ha. Application of both zeolite and fertilizer increased the dry matter, sugar and vitamin C content of cabbage heads. It was established that the cabbage contains an amount of nitrates that is safe for human health. Among vegetable crops, cabbage has both food and feed value. One of the limiting factors in the sale of vegetable crops is the degradation of soil fertility due to depletion of nutrient reserves and erosion processes, and non-compliance with fertilizer application technologies. Natural zeolites are used as additives to mineral fertilizers for application in the field, which makes it possible to reduce their doses to minimal quantities. Zeolites improve the agrophysical and agrochemical properties of the soil and the quality of plant products. The research was carried out in a field experiment, carried out in 3 repetitions, on dark chestnut soil in 2023. The soil (pH = 7.2-7.3) of the experimental plot is dark chestnut, the humus content in the arable layer is 2.15%, gross nitrogen 0.098%, phosphorus, potassium 0.225 and 2.4%, respectively. The object of the study was the late cabbage variety Nezhenka. Scheme for applying fertilizers to cabbage: 1. Control (without fertilizers); 2. Zeolite 2t/ha; 3. N45P45K45; 4. N90P90K90; 5. Zeolite, 2 t/ha + N45P45K45; 6. Zeolite, 2 t/ha + N90P90K90. Yield accounting was carried out on a plot-by-plot basis manually. In plant samples, the following was determined: dry matter content by thermostatic method (at 105ºC); sugar content by Bertrand titration method, nitrate content by 1% diphenylamine solution, vitamin C by titrimetric method with acid solution. According to the results, it was established that the yield of cabbage was high – 42.2 t/ha in the treatment Zeolite, 2 t/ha + N90P90K90. When determining the biochemical composition of white cabbage, it was found that the dry matter content was 9.5% and increased with fertilized treatments. The total sugar content increased slightly with the use of zeolite (5.1%) and modified zeolite fertilizer (5.5%), the vitamin C content ranged from 17.5 to 18.16%, while in the control, it was 17.21%. The amount of nitrates in products also increased with increasing doses of nitrogen fertilizers and decreased with the use of zeolite and modified zeolite fertilizer but did not exceed the maximum permissible concentration. Based on the research conducted, it can be concluded that the application of zeolite and fertilizers leads to a significant increase in yield compared to the unfertilized treatment; contribute to the production of cabbage with good and high quality indicators.

Keywords : cabbage, dry matter, nitrates, total sugar, yield, vitamin C
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