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Investigation of the chemical composition of turnip treated with sodium selenite by atomic absorption spectroscopy

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Abstract

The paper presents data on the study of the chemical composition of Petrovskaya turnip variety when using non-root treatment of vegetating plants with a selenium-containing solution. Treatment of plants was carried out with a solution of sodium selenite with a concentration of 0.0005 and 0.001% by Se. The experiment was carried out according to the following scheme: 1) NPK (background) – control variant; 2) NPK + NRT Se 0.0005%; 3) NPK + NRT Se 0.001%. As a background macro fertiliser, nitroammophosca was added to the soil at the rate of 30 g/m^2. In the background options the treatment of plants was carried out with distilled water. The content of selenium in turnip roots was determined by atomic absorption spectroscopy. It is shown that when treated with a solution of sodium selenite, the selenium content in the product part of plants in the variant of NPK + Se 0.0005% increased by 1.5 times, and in the variant of NPK + Se 0.001% – by 1.8 times compared to the control variant. It was found that non-root treatment of vegetating plants with selenium-containing solution led to a decrease in the content of dry matter in turnip roots by 1.5-1.6%, and the content of dry soluble substances remained at the level of the control variant. At the concentration of selenium in the 0.0005% solution, the content of ascorbic acid in root crops decreased by 7%, and the content of nitrates increased by 10.1% relative to the control variant. An increase in the concentration of selenium in the 0.001% solution led to a decrease in the content of ascorbic acid in root crops by 15.9% and an increase in the content of nitrates in them by 20.6% compared to the control variant.

References

[1] S.L. Belopukhov, I.I. Dmitrievskaya, O.V. Eliseeva, A.V. Zhevnerov. Instrumental Methods of Agrosphere Objects Exploration: textbook. *Moscow: Prospekt.* **2019**. 160p. (russian)
[2] Olga V. Eliseeva, Alexander F. Eliseev, and Sergey L. Belopukhov. Application of atomic absorption spectroscopy for the analysis of chemical composition of *Brassica rapa*. *Butlerov Communications.* **2020**. Vol.61. No.2. P.46-50. DOI: 10.37952/ROI-jbc-01/20-61-2-46
[3] V.V. Ermakov, S.F. Tyutikov, S.D. Khushvakhtova, and others. Features of quantitative determination of selenium in biological materials. *Bulletin of the Tyumen state University.* **2010**. No.3. P.206-214. (russian)
[4] Olga V. Eliseeva, Alexander F. Eliseev, and Sergey L. Belopukhov. Application of atomic absorption spectroscopy for the analysis of chemical composition of *Brassica rapa*. *Butlerov Communications.* **2018**. Vol.54. No.4. P.140-148. DOI: 10.37952/ROI-jbc-01/18-54-4-140
[5] V.V. Ageev. Root Treatment of Agricultural Plants. *Stavrop. GSKhA. Stavropol.* **1996**. 134p. (russian)
[6] A.H. Sheudzen. Biogeochemistry. *Maikop: GURIPP "Adygeya".* **2003**. 1028p. (russian)
[7] N.A. Protasova. Heavy Metals in Black Soils and Cultivated Plants of the Voronezh Region. *Agrochemistry.* **2005**. No.2. P.80-86. (russian)
[8] V.A. Baraboy, E.N. Shestakova. Selenium: biological role and antioxidant activity. *Ukr. biochem. Zhurn.* **2004**. Vol.76. No.1. P.23-32.
[9] I.V. Gmoshinsky, V.K. Mazo. Mineral substances in human nutrition. Selenium: absorption and bioavailability. *Questions of nutrition.* **2006**. Vol.75. No.5. P.15-21. (russian)
[10] I.V. Gmoshinsky, V.K. Mazo, V.A. Tutelyan, S.A. Khotimchenko. Microelement selenium: role in life processes. *Ecology of the sea.* **2000**. Iss.54. P.5-19. (russian)
[11] V.I. Deryabina, L.N. Skvortsova, E.A. Zakharova, G.B. Slepchenko. Voltammetric control of selenium content and its forms in plants and food additives using extraction and ion exchange. *Zavodskaya laboratory. Diagnostics of materials.* **2006**. Vol.72. No.11. P.7-10. (russian)

[12] V.A. Tutelyan, V.A. Knyazhev, S.A. Khotimchenko, and others. Selenium in the human body. Metabolism. Antioxidant properties, role in carcinogenesis. *Moscow: publishing house of RAMS.* **2002**. 219p. (russian)
[13] S.P. Torshin, T.M. Udelnova, B.A. Yagodin. Biogeochemistry and Agrochemistry of selenium and methods for eliminating selenodeficiency in food products and roots. *Agrochemistry.* **1996**. No.8-9. P.127-143. (russian)
[14] S.P. Torshin, B.A. Yagodin, T.M. Udelnova, I.Yu. Zabrodina. Accumulation of selenium by vegetable crops and spring rape when fertilized with selenium. *Agrochemistry.* **1995**. No.9. P.40-47. (russian)
[15] O.V. Eliseeva, A.F. Eliseev. Content of some trace elements in the vegetative organs of radish (*Raphanus sativus L.*). *TSHA news.* **2011**. No.2. P.59-68. (russian)
[16] O.V. Eliseeva, A F. Eliseev. Influence of Na2SeO3 solution concentration on the chemical composition of *Raphanus sativus L. TSHA Reports. Collected papers. Moscow: publishing house of the Russian state agricultural Academy named after K.A. Timiryazev.* **2016**. Iss.288. Part1. P.512-515. (russian)
[17] G.P. Chupakhina. The System of Ascorbic Acid of Plants: Monograph. *Kaliningrad University. Kaliningrad.* **1997**. 120p. (russian)