Geophysical Research Abstracts
Vol. 20, EGU2018-3358, 2018
EGU General Assembly 2018

Determination of the concentration of selenium in the soil of various regions of the Kaliningrad region by the hydride generation atomic absorption spectrometry (HGAAS) after the pressure digestion

Nataliia Chupakhina (2), Luba Skrypnik (1), Pavel Maslennikov (1), Pavel Feduraev (1), and Galina Chupakhina (1)

(1) School of Life Sciences, Immanuel Kant Baltic Federal University, Universitetskaya str. 2, 236040 Kaliningrad, Russian Federation,, (2) Faculty of Bioresources and Nature Management, Kaliningrad State Technical University, Sovetski prospect ave., 1, 236022 Kaliningrad, Russian Federation

The concentration of selenium in plants, animals and man are determined to a greater extent by the level of concentration of this microelement in the soil. At the same time, the availability of selenium for plants, and, consequently, its further propagation along the food chain, is strongly influenced by the physico-chemical properties of the soil (acidity, granulometric composition, organic matter content, etc.).
Since the natural Se concentrations in soil samples are usually low, it is necessary to apply sensitive analytical methods in order to measure it. One of such methods is atomic absorption spectroscopy with flow-injection generation of hydrides.
The purpose of this work was to determine the content concentration of selenium in agricultural soils in different zones of the Kaliningrad region, as well as to reveal the correlation between the content of selenium in the soil, its physico-chemical properties and the level of this trace element in fodder plants.
Samples of soils were selected from the arable layer of the land of 8 agricultural enterprises located in various zones of the Kaliningrad region. Before the analysis, the soil was dried, homogenized and sieved to grain size <2.0 mm. For the mineralization of the samples, an autoclave decomposition method under pressure was used. To do this, a sample of the studied material (soil or plants) was placed in a fluoroplastic beaker, concentrated nitric acid was added, and after 10 minutes a hydrogen peroxide solution was introduced into the reaction mixture. The fluoroplastic beaker was sealed and placed in an oven. The sample was mineralized at a temperature of 180° C for 2 hours. After the glass had cooled, the contents were poured into a colorimetric tube, a concentrated solution of hydrochloric acid (for transferring the selenium ion to selenite) and an amidosulfonic acid solution (to remove nitrite ions, interfering with the atomic absorption determination of selenium) were added and held in a water bath at a temperature of 70° C for an hour. The atomic-absorption determination of selenium with the generation of hydrides is based on reduction of the selenium ion by sodium tetrahydroborate to H2Se, followed by atomization in a quartz cuvette. A 0.2% alkaline solution of sodium tetrahydroborate was used as the reducing agent. The flow rate of the inert gas (argon) was 200 ml / min, the temperature of the quartz cell was 900° C. The intensity of light absorption was measured at a wavelength of 196.0 nm relative to a 3% solution of hydrochloric acid.
As a result of the work, it was shown that the average concentration of selenium in the soils of the Kaliningrad region is 155 μg / kg and varies in the range from 86 to 235 μg / kg. These values allow the Kaliningrad region to be classified as a selenium-deficient region.