

DEGRADATION OF THE BAIKAL REGION AGRICULTURAL GRAY SOILS AS A RESULT OF CONTAMINATION BY FLUORIDES OF ALUMINUM PRODUCTION

N. N. Kirillova, L. V. Pomazkina

Siberian Institute of Plant Physiology and Biochemistry, SB RAS

132, Lermontov St., Irkutsk, 664033, Russia

E-mail: kirillova.n.n@yandex.ru; lvp@sifibr.irk.ru

The paper presents the results of the small field experiment on the long-term effects of technogenic contamination of the Baikal region soils as a result of accumulation of water-soluble fluorides over time. Contamination modeling has been carried out by introducing into the soil different rates of sodium fluoride as the predominant compound in the air emission of aluminum production. Significant changes in soil properties, depending on the increase in the content of water-soluble fluorides (10, 12, 16, 26 and 31 MPC) were revealed. It has been proved experimentally that an increase in fluoride pollution has an effect on the agrophysical state of the soil, which is expressed in a decrease in aggregation, an increase in dispersion, and in a change in the particle-size composition. Negative changes in chemical indicators of the soils are associated with solonetzization and increased alkalinity, especially in soils contaminated at the level 26 and 31 MPC. For the first time, the impact of technogenic contamination on the humus degradation was revealed. The signs of this degradation appeared in a decrease in the depth of humification and a weakening of the polymerization process. Strengthening the fulvate direction of humification processes, especially an increase in the silt fraction with the fulvate composition of humic substances, was considered as a degradation of the qualitative composition of humus, which was most pronounced in soils contaminated at the level 26 and 31 MPC. Changes in the indicators characterizing the physical and chemical properties of the soil, including the state of humus, were used to develop a scale characterizing signs of degradation with increasing soil contamination with fluorides. According to the scale of indicators, the degree of degradation of the soil contaminated at the level 16 MPC corresponded to intense degradation, and the soils contaminated at the level 26 and 31 MPC – to very intense.

Key words: levels of soil contamination with fluorides, change in soil properties, assessment of degradation.