

# CHEMICAL ELEMENTS IN SOILS AND PLANTS OF SPASSKI REGION, PRIMORSKI KRAI

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Spassk-Dalniy city and Spasski region are considered to be environmentally neglected areas in terms of atmospheric air. The main input to the pollution of Spasski region is made by companies of building industry belonging to OJSC “Spassktsement” and OJSC “Spasski plant of spray asbestos and cement products”. The constant source of environmental pollution with toxic elements in Spassk-Dalniy city are motor transport and boiler-houses working on fuel oil.

The soils of small and average settlements of Primorskiy Krai and Spasski region are actively exploited by citizens for cultivation different horticultural crops. The pollution is likely to be made by heavy metals of urban soils as well as soils of garden suburbs, horticultural cooperatives located within the city and suburban zone. Contaminated soils containing great amount of heavy metals become useless for cultivation.

The purpose of the present paper is to define the content of Fe, Mn, Cr, Zn, Cu, Pb, Ni in soils and plants of Spasski region, Primorskiy Krai in connection with ecosystem exploitation.

The objects of study are soil (A1 horizon), terrestrial plants such as *Agropyrum repens*, *Setaria faberi*, *Artemisia siversiana*, *Artemisia scoparia*, *Achillea millefolium*, *Plantago asiatica* frequently met in the city.

Soil samples were selected according to the state standard 17.4.4.02-84 in the central part of the city within 1.5, 2.3, 3 km to the north from Spasski Cement Plant (SCP), within 6 km to the north from SCP on two plots of horticultural cooperative “Veteran”, and within 12 km to the north from SCP (broad-leaved forests of Sikhote Alin foothills). The plants were selected within city limits at a distance of 1.5 km

from SCP on the same territory where soil samples were taken. Preparing of the soil samples was carried out according to the ISO 11466 methods.

Measurement of elements' concentration was carried out by method of atomic absorption spectrophotometry using "Shimadzy" device, AA-6601 F model.

Comparative analysis of the data showed that eco-geochemical characteristic of the soil of Spasski region is presently regarded as favorable. The volume of concentration of 1<sup>st</sup> and 2<sup>nd</sup> hazard class elements is not high as to their natural level. The level of pollution is likely to increase due to anthropogenic load because of accumulating of highly toxic and moderately toxic elements in the soils of the region under study.

Maximum concentration of industrial Zn and Pb is fixed within the area of SCP influence where concentration of Zn in the soil exceeds the concentration of Zn in the samples selected in forest zone by 2.3 and 1,4 times correspondingly at the distance of 1, 2.3, 3 km from the plant. The highest concentration of Pb was fixed in the soils within SCP at the distance of 1.5, 2.3 and 3 km from the plant. The content of Pb in the soils of these regions exceeds concentration of the chemical element in the soils of the conditionally clean region (12 km away from Spassk –Dalniy city) by 3 times (1.5 and 2.3 km from SCP) and by 2 times (3 km from SCP) correspondingly.

It was fixed that concentration of Zn in the soils of the city exceeds approxible permissible concentration of this element by 1.5 times within the area of SCP influence at the distance of 1.5 km; by 2.5 times at the distance of 2.3 km; by 1.1 times at the distance of 3 km. Concentration of Pb in the soils of the regions within 1.5 and 2.3 km from SCP was at the level of maximum permissible concentration.

High concentration of Co was fixed in all samples of plants as well as concentration of Cu in *Artemisia Scoparia* and genesic organs of *Artemisia siversiana* against normal concentration of these elements for ground vegetation.

Index of biological accumulation of Cu in *Artemisia scoparia* is 1.14. The content of Cu in *Artemisia* reaches the concentration causing phyto-toxic effect.