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RESEARCH OF THE CONTENT OF ZINC AND LEAD IN THE LIGHT-CHESTNUT SOILS ON THE TERRITORY OF ISLANDS "POLKOVNICHII" (KAZAKHSTAN)

Abstract. The aim of the work was to study and evaluate the main regularities of distribution of zinc and lead compounds in light chestnut soils. The study was carried out to assess the impact of man-made pollution on the environment and monitoring of soil pollution. The objects of research were the natural typical light chestnut soils of "Polkovnichii" island, located in the city of Semipalatinsk (Semey), Kazakhstan. For the monitoring, samples of all available genetic horizons of the soil section were applied. It is established that with increase in content of physical clay in the soil the maintenance of a bulk form of lead increases. With increase in maintenance of a humus in the soil the tendency to increase in maintenance of a bulk form of Zn is observed. The total lead content varies from 4.91 to 12.24 mg/kg; the total content of zinc is in the range of 14.84-23.67 mg/kg. It has been revealed that, according to the level of the average content of the mobile form of zinc, the researched soils are related to the average soils provided by these elements. The authors conclude that it is necessary to study the effect of the physical and chemical properties of the region's soils on the effectiveness of zinc fertilizers and to continue research in this direction.

Keywords: light chestnut soils, zinc, lead, "Polkovnochii" island, Semipalatinsk.

Introduction

The soil produces minerals from the substances which are contained in it, the introduced fertilizers, pollinators. The minerals which are contained in them pass into plants. Therefore the plants going to food reflect features of microelement structure of this soil and its geological structure. Emissions of industrial plants also contain harmful impurities deposited on the soil. So, in the soil around the enterprises of non-ferrous metallurgy there are oxides of lead, tin, molybdenum, arsenic, etc.; around factories of ferrous metallurgy contain zinc, lead, phenol, arsenic, sulfur [1-3]. Excess of minerals, such as mercury, lead, cadmium or selenium, obtained from vegetable or animal food, can cause the human body poisoning, whereas copper deficiency, iron, manganese, zinc, iodine, fluorine, cobalt and molybdenum cause a variety of problems related to nutrition [4, 5-8]. In natural, uncontaminated reservoirs and in places where there are no enterprises for production and processing of minerals and where mineral substances are not brought in the soil as fertilizers or growth factors of plants, minerals contain, as a rule, in thousand or ten-thousand shares of milligram on water liter.

At the solution of practical questions of environmental protection from anthropogenic pollution the important place is taken by data on the content of toxiferous ingredients in soils of the concrete region. At pollution level assessment as background usually take uncontaminated territories with a similar soil cover for which concentration of heavy metals are known. The way of analogy in this case is very difficult to observe, since city soils are urban soils, strictly speaking there are no analogues in natural conditions. In this regard, there is an urgent problem of finding a local urbanized background that could be used to assess the level of soil contamination.

The aim of the work was to study and evaluate the main regularities of distribution of zinc and lead compounds in light chestnut soils.

The natural typical light chestnut soils of “Polkovnichii” island (fig. 1), located in the city of Semipalatinsk (Semey), Kazakhstan, were chosen as objects of research. The city of Semey is divided by the Irtysh River on left-bank and right-bank. In the middle of the Irtysh River there is an island “Polkovnichii” (fig.2). The original and present name of the island is associated with the name of Matvei Ivanovich Geytsig, the lieutenant colonel (later Colonel), who was appointed commandant of the Semipalat fortress in 1787. The name of the island “Polkovnichii” is mentioned in plans from the 19th century [8]. The island “Polkovnichii” is one of the main sights of Semey. During its long history, it experienced different periods. To restore the island to its former glory, it is necessary, first of all, to change its consumer attitude to natural resources. Today, the fate of the Polkovnichii’s Island is also worried about environmentalists, public figures, and law enforcement agencies.

Figure 1 – An island”Polkovnichii”, Semey, Kazakhstan, 070000

Figure 2 – General view of the island location map

For tests were taken samples of all of the genetic horizons of the soil profile. Definition of macrocomposition of all tests of soils (pH, a humus, CO_2 of carbonates, granulometric composition) was carried out by standard methods [9].

Among the heavy metals as studying objects lead and zinc have been taken. The choice of these elements is due to two factors: firstly, the physiological importance of zinc in living organisms and in particular for plants, and second - the lack of information on the biogeochemistry of these elements on the island “Polkovnichii” needed to solve a number of scientific and practical issues [10, 11].