

Short Reports

THE PE(A)RLITE SULPHUR– CONTAINING WASTE PRODUCTS EFFECTS UPON THE LEAD INFLOW INTO PLANTS

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Every year, there is the further intensity increase of the soil environment pollution with the heavy metals, so the efficient economic – environmentally method search and development, having provided the access to the clean crop production, is the actual and urgent challenge for the agro-industrial complex. The certain practical – scientifically interest on this challenge decision is presented itself the geochemical barriers' creation in the soil system, in order to be inhibited the translocation process of the heavy metals in the plants.

Among the heavy metals, the lead by its occurrence, the biological hazards, and its ability to be included into the trophic and the food chains, is practically occupied one of the priority places and their areas. Having proceeded into the soil system, it may be inflow and be the part of the exchangeable cations' composition, to be formed a number of the soluble and insoluble compounds. To be reduced the lead toxicity and the other heavy metals, having influxed into the soil system, the inactivation with the sorption properties using and their converting methods into the insoluble forms is one from the promising ways.

The main purpose of the current research – is the using possibility study of the non-toxic seep-

age and its filtration of the sulphuric acid production waste for the lead binding in the soil and its prevention further entering into the plants, with the examples of the potatoes, the corn, and the clover. So, the lead has already been included into the grey soils, in the 150 and 500 mg/kg concentrations, in the acetate form. The filtration waste products of the sulfuric acid CPS – U plant (e.g. the Kyzylorda Region, Kazakhstan), having presented itself the mixture, which is comprised the pe(a)rlite, the gypsum, the hydrated lime and also the various sulfur – containing salts, with the ratio of the components 1:1:1:0,05, respectively, has already been introduced into the 5 and 10% doses from the soil mass weight.

Thus, the special experiments have been conducted in the areas of the Botanic Garden of the Kazakh – Turkish University after Kh.A. Yasavy. The average content of the organic matter in this grey soil – is 1,0–1,3%, the average content of the available mobile phosphorous by Chirikov – is 67,8 mg/kg, the pH of the soil solution before any withdrawal making – is 5,1–5,4. And the special experiments repeatability – is the 4-fold.

So, the lead available mobile forms have been removed from the arable soil top level by the ammoniac – acetately buffer solution with the pH = 4,8, the vegetable and the plant material has been subjected by the dry ashing, then the lead definition has been performed with the atomic adsorption method using.

In the Tables 1–2 the obtained experimental results have already been presented here.

Table 1

The Pb Immobilization Coefficients Values, when Incorporated the Filtration Seepage and Filtration Waste (FW) and the Individual Components, Having Entered into its Composition

Soil	The introduced sorbates into soil	The immobilization coefficient Pb, %
Grey Soil	Gypsum	32
Grey Soil	Pe(a)rlite	40
Grey Soil	Gypsum + pe(a)rlite + slaked lime + thiosulfate and calcium polysulfide (5%)	96
Grey Soil	Gypsum	34
Grey Soil	Pe(a)rlite	41
Grey Soil	Gypsum + pe(a)rlite + slaked lime + thiosulfate and calcium polysulfide (10%)	99

As, it is followed from the experimental data, having shown in the Table 2, the lead number, which is being entered into the plants, is not exceeded the sanitary and hygienic standard level of 0,5 mg/kg in the food products at the geochemical barrier creation (e.g. The Sanitary and Epidemiological Rules and Regula-

tions. The SanPinR 2.3.2.1078-01), and the maximum regulatory level (MRL) of the lead content in the plants, having used for the feed purposes, is equal to 5 mg/kg. (e.g. The Provisional maximum regulatory level of the chemical elements in the feed of the farm animals № 123-41281-87, dated from 15.07.87).

Table 2

The Pb Content in Soils and Plants without Making
and with the Filtration Waste (FW) Introduction, mg/kg

Object	Without FW introduction				With FW introduction and Pb in plants	
	Pb in soils		Pb in plants			
	grey soil	grey soil	grey soil	grey soil	grey soil (5%)	grey soil (10%)
Corn (grain)	150,2	500,3	10,4	15,3	0,08	0,24
Potatoes (tuber)	150,1	498,9	11,4	22,7	0,09	0,33
Clover (plant tops)	150,3	501,0	15,6	24,2	1,8	Not be found

Thus, the introduction into the lead – contaminated soils of the filtration waste (FW) of the sulfuric acid production, having presented itself the mixture of the pe(a)rlite, the gypsum, the slaked

lime, and the sulfur – containing salts, can be eliminated the undesirable lead effects upon the plants and, moreover, to be got the environmental friendly production.