

MICROELEMENTS CONTAINING IN ROCK OF THE ARAL REGION. AGROCHEMICAL PROBLEMS.

Zhumamuratov A.

Institute of Nuclear Physics, Tashkent, Uzbekistan

Lately chemization of agriculture has been done not only by mineral nitrification and pesticides but also by melioration with rocks and industrial waste [1,2]. However, increase in soil fertility and the related efficiency of production requires systematic control and analysis of the chemization so as not to disturb the existing balance in ecosystem. The experiment on bringing mountain rocks up 30ton/hectar in soil shows that the rocks has variable element contents (up a few orders of value) [2,3] and under this condition the soil may be poisoned with undesirable toxic elements.

This, it becomes actual to analyse the total element contents of soil and the inserted meliorants (rocks and other resources available in the region) used in agroclulture production. Besides, the obtained information about element contents of mountain rocks allows to solve not only geochemical problems but also to evaluate soil formation process. Choose of a mountain rockhaving soil. Lack of microelements in soil can be made up by fitting optimal doses of meliorants consisting of mineral (NPK) and local fertilizers, mountain rocks or industrial waste.

On the territory of the South Aral at different depths of many chinks and paleogenic terrigenous thicks being opened in hills of Krantau, Khoja-Kul, Beshtube, Khojeily and also in the South-East Sultanuezdag, there are mountain rocks rich in not only macro- but also in microelements. Not deeming into details of the formed agrogeochemical situation in The Aral area, in some cases it is necessary to carry out urgent agrogeochemical intervention for improving the state of the soils, especially sour and enslaved. For this purpose we selected samples of rocks from Bozatau, Amudarja, Karauzyak, Nukus regions and the Lazarev island (the midst of the Aral sea), Beltau and Sultanuezdag. The samples were dried till the steady state weight, milled till powder state (0,5-1 mesh), then an averaged schedule in the thermal column (channel) of the Reactor WWR-SM with the flux of $5 \cdot 10^{13}$ neutr/cm²s. Determining elements was carried out over short-, medium- and long-living radionuclides [4]. The results of the analysis of several rocks are listed in Table 1 together with values of CC [7] and mean arithmetic quantities of several elements in soil.

According to CC values, contents of chemical elements in soils varies on the scheme: Hg-Ag-Se-Br-Yb-As-Hf-Sb-Ca-Zn-Au-Mo-Cr-Ce-U-Sc-Cl-Eu-Cu-Sr-La-Na-K-Ba-Co-Mn-Rb-Lu-Sm-Fe-Ce-Ta-Ni-Tb. This descending row for the soils of Karakalpakstan characterizes in some degree the biochemical mobility of chemical elements in ecosystem and shows, that the soils of the main

cotton planting regions of Karakalpakstan are impoverished ($CC < 1$) with K, Sc, Cr, Mn, Co, Fe, Ni, Cu, Rb, Sr, Cs, Ba, R (except Yb), Th and U. This statement is reliable when considering the distribution of these elements over the whole Republics. $CC > 1$ means technogenic pollution of the cotton planted soil with Zn, Se, Br, Ag ($CC = 71$), Sb, As, Hf, Yb, Au, Hg. Such a situation is probably related not only to domination cotton plant, but also to erosion of soil, because there are traces of this process in many places. Significant accumulation of heavy metals in the soil (up to 70 times of the clark) of several regions can be explained by their proximity to gold containing ores, for examples Beltau and Sultanuezdag [5].

Let us analyze briefly microelement composition of the rocks and the soils of cotton planted regions of Karakalpakstan.

Porlytay chalk. Microelement contents and the concentration coefficient (relating to the earth crust clark) demonstrate its enrichment with Cl, Mn, Sr, and Yb and also ($CC < 1$) Cu, Zn and REE. On sum $CC_{mean} = 1,27$ the chalk is rich of microelements. A high concentration of Cl is probably due to proximity to underground water and airsole pollution of the soils.

Sandstone. We studied Kozhakul caolin sandstone (Amu-Darja region) and that of the Lazar island (the midst of the Aral Sea). The both are less rich of microelements than the chalk. The sum element contents on CC_m is 0,93 and 0,27 respectively. Caolin containing sandstone is rich in K ($CC > 1$) and Hf, and that of the Lazarev island is rich in Sr.

Bentonit. These soil forming rocks are rich in microelements ($CC_m < 1$) and occur in many regions of Uzbekistan including Karakalpakstan. Maximal $CC_m = 3,1$ are found for Sc, Cu, Zn, Sb, Cs, Hf, U, As, Yb, Au and less ($CC_m < 1$) for Cl. Contents of Cr, K, La and Eu is on a clark level.

Clay. It has complex element composition and enriched with K, Sc, Cu, Zn, Sb, Cs, Eu, Hf, U, Yb ($CC > 1$). The concentration of these elements in the clay higher than both the clark of the earth crust and that of the regional background (up 2 times for several elements). The concentration of As is especially high, and that of Na is close to the clark. Such a tendency occurs in the clays selected in North regions of Karakalpakstan. The clays contain a low concentration of Mn, Ba, Ce, Sm, Tb, La, Ta and several other elements. The value of CC_m is 1.29 not taking into account the CC_{Cl} .

Mixed ground is rich in Sc, Zn, Sb, Cs, La, Eu, Hf ($CC > 1$). Concentrations of Th and U in it are much less than the clarks of the earth crust. The value of CC_m is 1,44 including Cl and 1,12 concentrations however it is much higher than the mean contents in the regional soil.

Krantau glowconit contains a great deal K, P, Zn, As, Sb, Eu, Yb, Hf with the of $CC_m = 1,65$. So it can be used as a meliorant for inserting into soil, especially in the cases of scarcity varies within the limits of 2,0 – 7,7 wt.% and 80 – 180 mg/kg respectively. One can find Cl, Cu, Cs, La, Ce, U in noticeable amounts. Not taking into consideration the CC of Cl polluting the region, the $CC_m = 1,23$ which is much higher than CC of the soil ($CC_m = 1,33$).

Phosphorites. There is deposit of phosphorites on the territory of Karakalpakstan, which contains P_2O_5 up 40-45%, the mean arithmetic value is 27wt.%. Besides P, there is a great amount of Mn ($Q = 2342,0 \text{ mg/kg}$), As ($Q = 1,4 \text{ mg/kg}$), Sr ($Q = 506,0 \text{ mg/kg}$), U ($Q = 14,2 \text{ mg/kg}$) and REE. The phosphorites are very rich in microelements. Not taking into account P, the mean clark is 1,22.

Often after exploring soil for agriculture for a long time, when agrochemical standards are not fulfilled, there occur exhaustion of the soil with main nutritious elements, change in pair elements' ration and their associations, pollution with toxic metals, all resulting in crop's yield drop. That is why the task to recover nutritious element composition of soils becomes important and actual. The chalk, clay, bentonit, glowconit and phosphorit selected in Karakalpakstan are rich not only in microelements, but also in P and K. The highest value of $CC = 3,1$ is assigned to the bentonit of Beltau and the C_m changes in the descending sequence: clay (1,29), chalk (1,27), glowconit (1,23), phosphorit (1,22) mixed ground (1,12), sandy rock (0,93 and 0,27).

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