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SCIENTIFIC BASIS OF THE CONTENT AND DISTRIBUTION OF MICROELEMENTS IN THE SOIL PROFILE OF THE REPUBLIC OF KARAKALPAKSTAN

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ABSTRACT

The article presents the results of the study of the content of gross and available for plants forms B, Mn, Co, Cu, Zn, Mo in the soils of the Karakalpakstan deposits. The results of the diagrams analyzes in the soil trace elements are presented. The possibility of obtaining patterns of distribution along the profile, the effect of microfertilizers on the germination of vegetables, the establishment of the role of cobalt in metabolism and the development of technology for its application are shown.

According to long-term indicators, the air temperature in the Republic of Karakalpakstan is 43,7-38,7 °C in summer and 28,4-22,3 °C in winter, the average duration of the hot period is 167-174 days.

The territory of the Republic of Karakalpakstan is 166,600 km^2 and occupies about 40% of the Republic of Uzbekistan. in the northern part, 600-720 km from east to west, the boundary is 43°10′ in the east and 58°45′ in the west, at this distance it gradually decreases and widens in the west, south-west, the natural-geographical conditions and agrochemical conditions of each oasis The description is different.

Field work was carried out on the basis of an expedition route along the base areas, which describes the type of irrigated soil. In this case, soil samples were taken by drive, subsoil and parent rock (Fig. 1-6). For agrochemical characterization of soils humus, pH, mobile phosphorus, exchangeable potassium, trace elements B, Mn, So, Cu, Zn, Mo were determined [1-3].

Water-soluble boron in the topsoil contains 0,32-2,83 mg / kg, which belongs to the group of low and very low-income (Fig. 1). The dependence of water-soluble boron on soil properties obeys the equation y = a+bx, and on exchangeable potassium y = a-bx. According to our data, as the fine fractions increase and the alkalinity increases, the content of boron available to plants increases.

The manganese available for plants in the soil contains 70,40-200,13 mg / kg, which belongs to the group of soils with a high content (Fig. 2). The dependence of the content of available manganese on soil properties obeys the equation y = a+bx, a noticeable dependence (r>0,7) is noted on the particle size

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distribution and pH. The relationship between the content of available manganese and the content of mobile phosphorus manifested itself in the form of a hyperbola ($y=a+bxcx^2$), while, with a low content of P_2O_5, the dependence is positive, and with an increase in P_2O_5, it changes in the opposite direction [4].

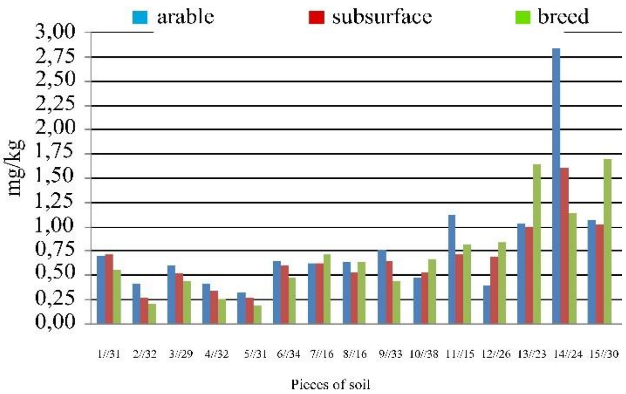


Fig. 1. The amount of watersoluble boron in the soil of the Republic of Karakalpakstan.

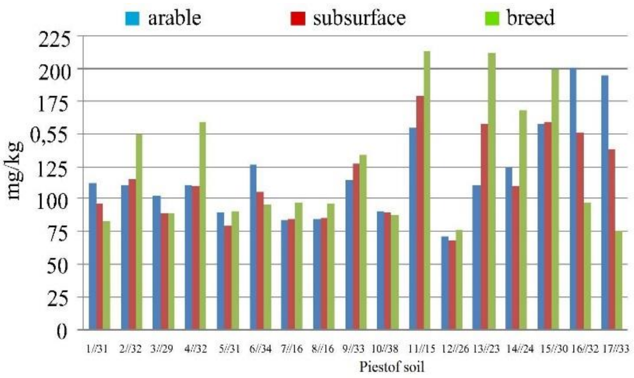


Fig. 2. The amount of manganese in the form of assimilation in the soil of the Respublic of Karakalpakstan.

The content of cobalt available for plants in the arable layer is 0,13-0,52 mg/kg. These soils belong to the group of very poorly provided (Fig. 3). The dependence of its content on the source rock and particle size distribution (r>0,7), that is, as the bulk forms in the source rock and the clay fraction of the available cobalt increase.

Copper assimilated by plants in the arable soil layer was 0,24-1,89 mg/kg and belongs to the group of very low and low-income (Fig. 4), while as the silt fraction and humus increase, the available copper becomes less, which is due to - apparently, with the formation of inaccessible compounds with the anions of the soil solution.

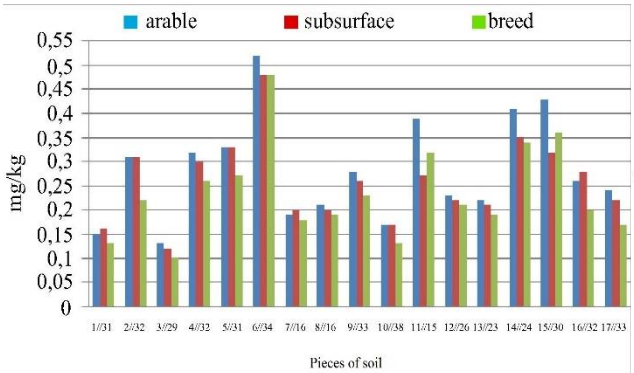


Fig. 3. The amount of cobalt in mobile form in the soil of the Respublic of Karakalpakstan.

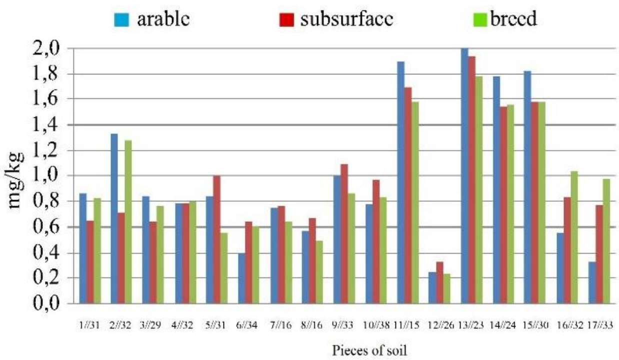


Fig.4. The amount of copper in the assimilated form in the soil of the Respublic of Karakalpakstan.

The content of zinc available for plants in the arable soil layer is 0,71-2,99 mg/kg, which belongs to the group of low-supply soils (Fig. 5), while the dependence on the parent rock and particle size distribution (r>0,7), and the humus state (r>0,3), that is, with a large number of gross forms in the parent rock, an increase in clay fractions of the soil, the availability of zinc increases markedly, and with an increase in the humus content, the increase in the content of available zinc is insignificant.

It should be noted that the dependence of the available zinc in the soil on the amount of mobile P_2O_5 obeys the equation $y=a+bx-cx^2$ and takes the form of a hyperbole, that is, with a low content of mobile phosphorus, the availability of zinc slightly increases, and with a high content, it decreases, which, apparently, associated with the formation of poorly soluble zinc phosphates.

The content of molybdenum available for plants in the arable soil layer is 0,11-0,41 mg/kg, which refers to the moderately provided (Fig. 6), while the dependence on the particle size distribution is noticeable (r>0,7), pH and the amount of Mo in the parent rock it is less noticeable (r=0,3-0,7), and with an increase in the content of mobile phosphorus and exchangeable potassium in the soil, the availability of molybdenum decreases (y = a-bx).

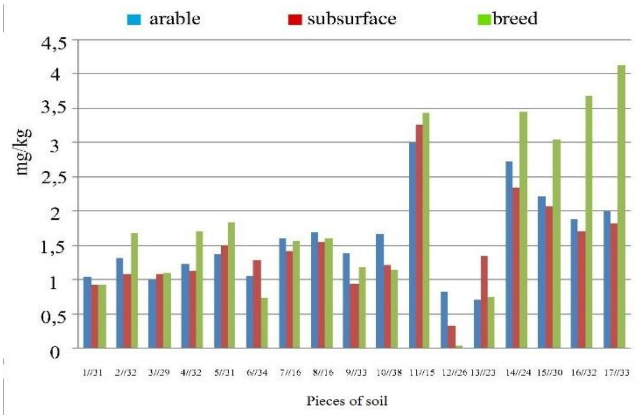


Fig.5. The amount of assimilate torm in the soil of the Respublic of Karakalpakstan.

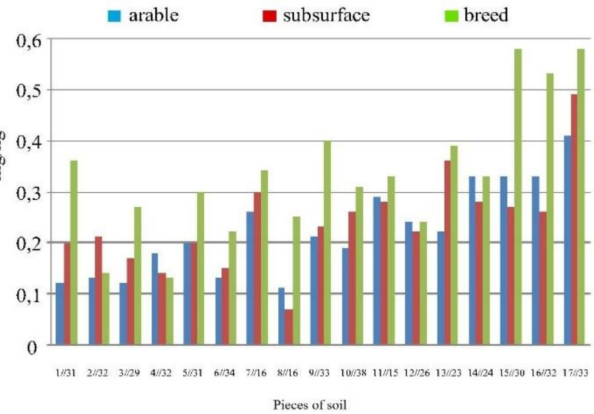
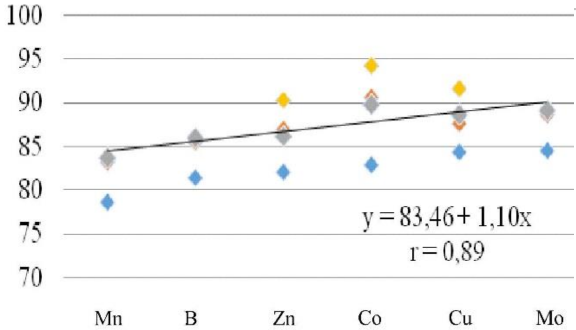


Fig.6. The amoun of molybdenum in the assimilated form in the soil of Respublic of Karakalpakstan.

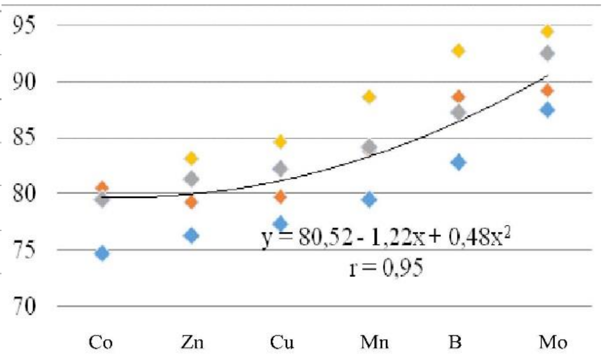
that the seed lock in 0,01 % solutions of cobalt, copper and zinc salts, 0,05 % solutions of molybdenum and boron salts, as well as 0,1 % manganese salt solution had a slight positive effect on seed germination. An increase in the concentration of trace elements did not have a significant effect, and higher concentrations (0,5 %) had a negative effect.

A linear relationship was established between the seed lock in a 0,01 % solution of microelements and their germination (y=83,46+1,10x; r=0,89). At the same time, the most significant effect was exerted by the salts of cobalt, copper and zinc (Fig. 7).

When soaked in 0,05 % solution, the dependence between germination on the concentration of trace elements manifested itself in the form of a parabola (y = 80,52-1,22x + 0,48x2; r = 0,95). At the same time, there is a high efficiency of the concentration of solutions of molybdenum and boron salts – 0,05% (Fig. 8).



Pic. 7. Influence of 0.01% solution of trace elements on seed germination,%

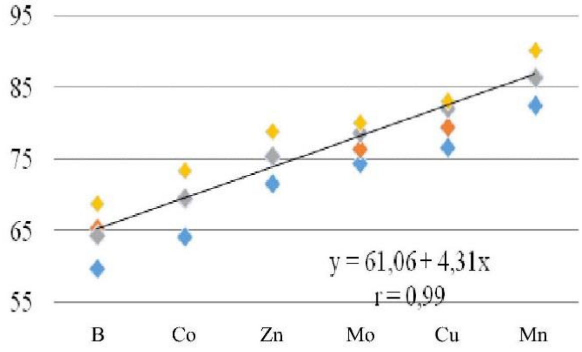


Pic. 8. Influence of 0.05% solution of microelements on seed germination,%

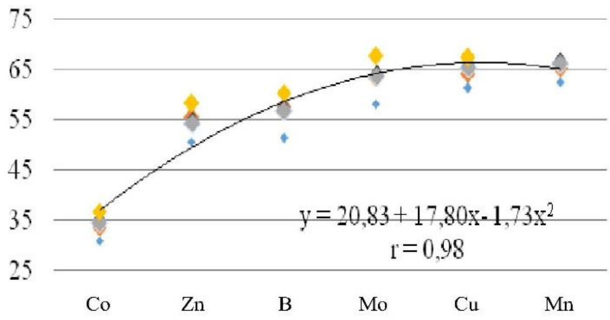
Seed lock in 0,1 % manganese sulfate solution turned out to be the most effective, it manifests itself in a linear correlation (y=61,06+4,31x; r=0,99) (Fig. 9).

Higher concentrations, especially 0,5 % solutions of microelement salts, had a negative effect on seed germination, and its dependence manifested itself in the form of hyperbole (y =

$20,83 + 17,80x-1,73x^2$; r = 0,98). Based on the results of statistical analysis, it can be concluded that the use of 0,5 % solutions of trace elements is impractical (Fig. 10).



Pic. 9. Influence of 0.1% solution of microelements on seed germination,%



Pic. 10. Influence of 0.5% solution of microelements on seed germination,%

The study of the effect of microelements on seed germination, in an artificially created environment saline with sulfates and chlorides, showed that when the seeds were soaked in a 0,01 % solution of copper, zinc and cobalt sulfates, in a 0,05 % solution of ammonium molybdic acid and boric acid, as well as in a 0,1% manganese sulfate solution, the germination capacity increased by 1,5-6,5 and 2,8-9,1 %, respectively, compared to the control.

At the same time, in a more saline environment, the effect of trace elements decreases, and at a high concentration, the germination of seeds is significantly reduced.

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