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THE STUDY OF AGROCHEMICAL COMPOSITION OF GREENHOUSE SOILS

[1]Jollibekov Bakhtiyar
Scientific advisor, Doctor of Geographical Sciences, Karakalpakstan Institute of Agriculture and Agrotechnologies
[2]Sabirbaeva Zlikha
2nd year master student of the specialty "Agrochemistry", Karakalpakstan Institute of Agriculture and Agrotechnologies
[3]Khamedullayev Temirbek
2nd year master student of the specialty "Agrochemistry", Karakalpakstan Institute of Agriculture and Agrotechnologies
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ABSTRACT

Currently, more and more people are growing heat-loving plants in their personal subsidiary plots, using hotbeds and greenhouses. Thanks to this, they have the opportunity to try out new varieties and hybrids of crops and get considerable economic benefits. At the same time, it must be remembered that plants require not only a certain temperature regime and watering, but also the qualitative composition of the soil, rich in nutrients and with the desired indicator of soil acidity. The soil in the greenhouse is determined by the properties of the natural soils of the area. As a result, the article presents the investigation of agrochemical composition of greenhouse soils.

Introduction. To increase the productivity of agricultural crops, improve their quality and improve soil fertility, it is necessary to study the processes of transformation of nutrients in the soil, their entry into plants and the regulation of methods of influencing these processes. Agrochemical studies are needed to elucidate the features of the interaction between plants, soil, microorganisms, and fertilizers [3, 45-48].

Among the most common analyzes in research is the determination of soil response. The presence of free acids and bases, acidic and basic salts in the soil solution determines the most important property for plant life and soil formation processes - the actual reaction of the soil solution. The reaction of the soil solution has a direct and indirect effect on plants. Agricultural crops show different sensitivity to acidic and alkaline environments. Many cultivated plants and soil microorganisms develop better with a slightly acidic or neutral soil reaction [2, 234-237].

It is the acidity of the soil that creates the conditions for growing plants. According to the classification scale for the level of soil acidity (ranging from 0 to 14), acidic ($0 < pH < 5$), slightly acidic ($5 < pH < 6$), neutral ($6 < pH < 7$), slightly alkaline ($7 < pH < 8$) and alkaline ($8 < pH < 14$) soils. For the prevailing number of agricultural crops, a neutral soil environment is optimal with some allowable deviations towards a weakly alkaline or slightly acidic reaction [5, 98].

In the soils of greenhouses, it is important to know the composition of salts that cause soil salinization. For this purpose, a soil extract is prepared and analyzed [1, 49].

For plant nutrition, highly soluble soil compounds are important. However, their excessive amounts can reduce soil fertility. The most harmful for plants are sodium carbonate Na2CO3, sodium, magnesium and calcium chlorides (NaCl, MgCl2, CaCl2), sodium sulfate Na2SO4. Calcium and magnesium carbonates (CaCO3, MgCO3), calcium sulfate (CaSO4) do no harm [3, 49-52].

We have carried out experiments to determine soil acidity using litmus paper and a pH scale, experiments on the qualitative determination of the content of carbonate ion, chloride ion, sulfate ion, sodium ion and the qualitative determination of iron oxides (II and III). For analysis, we prepared an aqueous extract of the soil. To prepare a soil extract, according to the method, we ground 25 g of a soil sample well, transferred it to a 200 ml flask and added 50 ml of distilled water. Mix thoroughly and let stand for 10 minutes.After a brief agitation, it was filtered through a double filter. The resulting filtrate was used to conduct a qualitative analysis of the main cations and anions contained in the soil of the greenhouse. Further, experiments were carried out to study the soil extract for the content of mobile H+ ions, the presence of carbonate, chloride, sulfate ions, as well as the determination of sodium, iron (II) and (III) ions. The results of the conducted studies are shown in the table.

Description of experience	**Observations and reaction equations**	**conclusions**
Experience 1. Determination of soil acidity using indicator paper [5]		
5 ml of 1 M potassium chloride solution was added to a soil sample with a volume of 2–3 cm3. Mixed. Put indicator paper on the mixture.	The indicator paper turned into a color corresponding to pH = 5.4	The soil sample has a slightly acidic environment, which is favorable for the development of tomatoes.
Experience 2. Qualitative determination of carbonate ion content		
A small amount of soil sample was placed in a porcelain cup and a few drops of a 10% hydrochloric acid solution were added with a pipette.	The soil slightly "hisses" due to the formation of carbon monoxide (IV). 2H+ + CO32- = CO2↑ + H2O	The soil sample contains an insignificant amount of carbonates, therefore it does not belong to the group of carbonate soils.
Experience 3. Qualitative determination of the chloride ion		
A few drops of 10% nitric acid solution were added to 5 ml of the filtrate, and 0.1 M silver nitrate solution was added	A slight turbidity of the solution was observed: Ag+ + Cl- = AgCl↓	Since there is no white flaky precipitate of silver chloride, but only cloudiness, this indicates

dropwise.		hundredths and thousandths of a percent of the chloride ion in the sample.
Experience 4. Qualitative determination of sulfate ion		
A few drops of concentrated hydrochloric acid and 2 ml of a 20% barium chloride solution were added to 5 ml of the filtrate.	Cloudiness of the solution from the formed barium sulfate was observed: Ba2+ + SO42- = BaSO4↓	The turbidity of the solution indicates hundredths of a percent of the sulfate ion. Weak turbidity, noticeable on a black background, occurs at thousandths of%; the precipitation of white finely crystalline barium sulfate indicates the presence of SO42-
Experience 5. Qualitative determination of sodium ion		
A drop of water extract on a glass rod was brought into the flame of an alcohol lamp.	A slight bright yellow coloration of the flame was observed	In the studied sample of soil extract, a small amount of sodium ion
Experience 6. Qualitative determination of iron oxides (II and III) [3]		
The first test tube with 3 ml of the filtrate was filled with a solution of red blood salt A few drops of a 10% solution of potassium thiocyanate were added to the second test tube with 3 ml of the filtrate.	In the first test tube, blue staining ("turnbull blue") was not observed: 3Fe2+ + 2[Fe(CN)6]3- = = Fe3+2[Fe+3(CN)6]2↓ In the second test tube, the formation of a red solution was not observed: Fe3+ + 3NCS- ↔ Fe(NCS)3	Qualitative reaction to iron (II) cations - the formation of iron (III) hexacyanoferrate iron (II) Qualitative reaction to iron (III) cations - the formation of a low-dissociating salt of iron (III) thiocyanate Iron oxides (II and III) practically do not occur in the sample under study.

Thus, the results of the greenhouse soil study indicate that the acidity of the environment corresponds to the norms for growing tomatoes. The soil is not carbonate. The percentages of chloride ions, sulfate ions and sodium ions are normal. There are practically no iron (II) and (III) cations.

Conclusion. After conducting a study of the soil of the greenhouse, the following conclusions can be drawn. The acidity of the greenhouse soil corresponds to favorable conditions for growing tomato crops on it. No critical values of the content of salts harmful for growing plants were found in the soil of the greenhouse. This soil will allow to get a good crop of tomatoes. It is known that the quality of plant nutrition and their fruiting is affected by potassium, phosphorus, nitrogen salts, microelements, the qualitative determination of the content of which has not been carried out. If reagents are available, this can be done.

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