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THE ECOLOGICAL STATE OF IRRIGATED GRAY-MEADOW SOILS AND WAYS TO INCREASE THEIR PRODUCTIVITY (ON THE EXAMPLE OF SH. RASHIDOVSKY DISTRICT)

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Abstract:

The article presents opinions on the contamination of irrigated gray-meadow soils with harmful compounds from industrial enterprises, changes in their agrochemical properties, and microbiological activity. In field experiments, samples were taken from soil sections, and in the context of variants, changes in the soil caused by the use of bioorganic fertilizers, re-sowing with moss vegetation, and the combined use of biological preparations were studied.

Keywords: soil, gray-meadow soils, chemical pollution, heavy metals, microorganisms, bioorganic fertilizers, re-sowing, soil section, agrochemical properties, Rizocom-1 biopreparation, root crops, productivity.

Technogenic pollution of the environment is global in nature and negatively affects the quantitative and qualitative indicators of agricultural products. This problem is especially relevant for irrigated lands, since if preventive measures are not taken to reduce the removal of calcium into the soil and reduce the amount of organic matter in the soil, then productivity will decrease and soil pollution will develop. At present, an increase in the content of such metals as chromium, lead, copper, vanadium, nickel and zinc has been recorded in field experimental soils. This situation requires careful study of metal migration and changes in soil properties in irrigated gray meadow soils. Experimental work was carried out on irrigated gray-meadow soils of Sh. Rashidov district of Jizzakh region. The relationship of mobile forms of metals with such properties as humus content, mechanical composition, soil pH, and mineralization has been studied.

The accumulation of the main part of pollutants is mainly observed in the horizon of humus-accumulating soil, where they accumulate with aluminosilicates, non-silicate minerals, and organic matter due to various interaction reactions. The composition and amount of humus to the elements stored in the soil; depends on acid-base and redox conditions, sorption capacity, intensity of biological absorption.

Some heavy metals are firmly retained by these components and not only do not participate in migration along the soil profile, but also do not pose a threat to living organisms. In the soil profile, the anthropogenic flux of substances encounters a number of soil-geochemical barriers. These include carbonate, gypsum, illuvial horizons (illuvial-ferruginous-humus). Part of highly toxic elements can become elements difficult for plants to access, compounds and other elements, moving in certain soil-geochemical conditions, can migrate in the soil layer, which poses a potential threat to biota. The mobility of elements is largely dependent on the acid-base and redox conditions in the soil.

For the analysis of soil samples, atomic absorption, gas chromatographic, photometric, photocolorimetric, gravimetric, spectrophotometric, titrimetric, and other physicochemical methods were used.

The mineralization of water was determined by the gravimetric method. The determination method is based on the gravimetric determination of dissolved substances, which is determined by filtering the sample to constant weight, evaporating the residue and drying at 150°C for low-mineral waters (105-110°C) and highly mineralized waters.

Ammonium ions were determined photometrically. The main method for determining ammonium nitrogen is the calorimetric method using Nessler's reagent. It allows you to determine ammonium ions in an amount from one hundred to 5 mg/l (with a high content of NH^{4+}, it is necessary to dilute the test water).

Sulfate ions were determined by the complexometric method, chlorine - by the argonometric method, total hardness - by the complexometric method.

Methods for the analysis of heavy metals. Heavy metals were determined by photometric and photocolorimetric methods. For example, a yellow complex compound in a ferric iron medium was determined by the hydroxide formation reaction, forming a colored complex compound in the presence of copper xylenol.

Based on the results of field and laboratory studies and observations, the sources and level of soil pollution in the Sh. Rashidovsky district were determined.

An analysis of the diversity of bacteria in the soil and rhizosphere at the level of taxonomically heterogeneous physiological groups, such as ammonifiers, oligonitrophils, actinomycetes, microscopic fungi, showed that oligonitrophilic bacteria develop more intensively; 38-72 thousand/g, actinomycetes 5-24 thousand/g and fungal populations - 2.0-11.0 thousand/g.

In accordance with the established system of experience, the studies were carried out on the re-sowing mash of the Durdona variety in the fields of the Yakub farm in the Sh. Rashidov district of the Jizzakh region in 2020-2022.

The studies were carried out in 4 variants and 4 repetitions under the conditions of irrigated light gray soils (2020-2022). The surface of each option was 50 m^2, the total area was 1500 m^2.

1st version of the experimental system - control re-sowing slurry (without fertilizers) and 2nd option - re-sowing slurry (biofertilizer 20t/ha), 3rd option - re-sowing slurry (Rizokom-1), 4th option, re-sowing wort (biofertilizer 20t/ha + Rizokom 1).

In the experiment, a variety of re-sowing mash "Durdona" was planted in accordance with the planting standards specified in the recommendations.

The Durdona variety was created at the Research Institute of Plant Growing and in 2011 was included in the State Register. There are no analogues to the variety in the republic in terms of cooking speed. The first collection of pods can be done 45 days after the appearance of the grass. The period of biological maturation (vegetation period) of seeds corresponds to 65-70 days. The formation of pods in the upper part of the stem (25-30 pieces) facilitates the picking process. The yield is 20.8 q/ha. Weight of 1000 seeds - 60 g. Seeds contain protein - 18.7% and starch - 1.7%. Its seeds are larger than regional puree varieties. It goes well with vegetable and grain crops in a crop rotation system. Improves soil fertility. It is suitable for planting in the spring-summer sowing season, allows you to get high yields. It can be used in the preparation of various dishes. The blue mass of the plant is a nutritious fodder for livestock.

Increasing the productivity of irrigated soil cover, preventing degradation and using biological methods to combat it, in particular, re-seeding technology, is the basis for increasing the physical, physico-chemical and biological activity of the soil. Microorganisms have high biological activity and constantly break down a large amount of organic and mineral substances in the soil and synthesize their new forms.

During these processes, the circulation of the main biogenic elements occurs, and biologically active substances are released. Microorganisms are essential to improve soil fertility. With their participation in the soil, the processes of accumulation of mineral elements necessary for plants take place. Microorganisms are also of great importance in increasing soil fertility and obtaining abundant crop yields.

Accounting and study of the functional diversity of microbial communities in the soil and plant rhizosphere was traditionally assessed at the level of physiological groups in the appropriate medium: ammonifying bacteria on meat-peptone agar (MPA), spore bacteria with the addition of MPA.1:1), oligonitrophils, actinomycetes on starch-ammonia medium, microscopic fungi on Zapek medium. Bacterial abundance was expressed in colony forming units per 1 g of soil.

As a result of the reclamation technology, the chemical and physical properties of the soil improved, the number of microorganisms increased, and the initial restoration of fertility was achieved. The coefficients of the minimum increase in the productivity of technogenically degraded soils after reclamation have been developed.

According to the economic analysis of the reclamation of technogenically disturbed soils, it is necessary to recultivate such lands as soon as possible, since if irrigated soils in need of reclamation are not recultivated for a long time, such great economic damage to agriculture will be caused. Also, each time spent on recultivation affects the increase in economic value, therefore it is recommended to study and recultivate technogenically degraded soils in a short time.

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