Changes in Agrochemical Properties of Irrigated Gray Meadow Soils

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Abstract: This study investigates the changes in agrochemical properties of irrigated gray meadow soils, crucial for sustainable agricultural practices. Over time, anthropogenic activities and natural processes can alter soil characteristics, impacting crop productivity and environmental health. By analyzing soil samples from irrigated gray meadow areas, this research aims to assess variations in key agrochemical parameters, including pH, organic matter content, nutrient levels, and salinity. Understanding these changes is essential for implementing effective soil management strategies and mitigating adverse effects on agricultural ecosystems. The findings contribute to the development of tailored soil conservation and fertility enhancement practices, promoting the long-term sustainability of irrigated agriculture in gray meadow regions.

1 INTRODUCTION

Irrigated gray meadow soils are essential components of agricultural ecosystems, especially in regions where irrigation is important for crop production. These soils, characterized by their unique composition and properties, play a vital role in maintaining agricultural productivity and maintaining ecosystem stability. However, the ecological state of irrigated gray meadow soils often deteriorates due to intensive agricultural practices, improper land use and environmental degradation. As a result, soil degradation, nutrient depletion and decreased productivity have become major problems in these regions.

Irrigated gray meadow soils play a vital role in sustaining agricultural productivity and ecosystem health in various regions worldwide. These soils, characterized by their unique composition and hydrological dynamics, are particularly important for supporting crop growth and providing essential ecosystem services. However, anthropogenic activities and natural processes can induce changes in the agrochemical properties of irrigated gray meadow soils, affecting soil fertility, nutrient availability, and overall soil health. Understanding these changes is crucial for implementing sustainable soil management practices and ensuring the long-term productivity and resilience of agricultural ecosystems.

Irrigated gray meadow soils are prevalent in regions with temperate climates and abundant water resources, making them conducive to agricultural activities such as crop cultivation, livestock grazing, and forage production. These soils exhibit unique characteristics, including a high water-holding capacity, moderate fertility levels, and susceptibility to waterlogging and salinization under improper management (Batjes, 2016). As a result, they require careful monitoring and management to optimize agricultural productivity while minimizing environmental degradation.

2 MATERIALS AND METHODS

Several factors contribute to changes in the agrochemical properties of irrigated gray meadow soils. Anthropogenic activities such as intensive agricultural practices, irrigation, and land use changes can alter soil structure, nutrient cycling, and pH levels (Lal, 2015a). Excessive use of chemical fertilizers and pesticides may lead to soil acidification, nutrient imbalances, and reduced soil microbial diversity,

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impacting long-term soil health (Stockmann et al., 2013). Furthermore, natural processes such as erosion, weathering, and climatic fluctuations can exacerbate soil degradation and nutrient loss, particularly in vulnerable landscapes.

This study aims to investigate the changes in agrochemical properties of irrigated gray meadow soils in response to anthropogenic and natural factors. By analyzing soil samples collected from representative sites, we seek to quantify variations in key parameters such as soil pH, organic matter content, nutrient levels, and salinity. Additionally, we aim to identify the underlying drivers of these changes, including land management practices, hydrological dynamics, and climatic variability. Through a comprehensive understanding of these factors, we can develop targeted soil conservation and fertility enhancement strategies to mitigate soil degradation and promote sustainable agricultural practices in irrigated gray meadow regions.

"Metodi agrokhimicheskih analizov pochv i rasteniy" (Tashkent, 1977), Ye.V Arinushkina, in agrochemical analysis of soil. "Rukovodstvo po khimicheskomu analizu pochv" (Moscow, 1970), GOST 26423-85 manuals were used. MVI UzO'U 0704:2016 "Methods of performance of measurements of the Republic of Uzbekistan" determined the presence and quantity of heavy metals by the mass spectral analysis method (ISP-MS mass spectrometer device).

Assessment and study of functional diversity of soil and plant rhizosphere microbial communities have traditionally been assessed at the level of physiological groups in the respective environment: ammonifying bacteria on meat-peptone agar (MPA), spore-forming bacteria with the addition of MPA.(1:1), oligonitrophils, actinomycetes in starch-ammonia medium, microscopic fungi in Czapek medium were studied. (Zvyagintsev, 1991). Bacterial counts were expressed in colony-forming units per 1 g of soil.

In the experiment, after harvesting the winter wheat, the seeds of the "Durdona" variety (purity 98.5%, fertility 92%) were planted as a repeat crop at the rate of 25 kg/ha using Fankhauser-2115 seeder at a depth of 5-6 cm (July 10).

Irrigation at the rate of 600 m^3/ha was carried out for seed germination. The rows were weeded twice by hand. The harvest of repeated leguminous mush is harvested by hand in the last ten days of September. Understanding the changes in agrochemical properties of irrigated gray meadow soils is essential for informing land management decisions, policy development, and agricultural extension efforts. By elucidating the drivers and consequences of soil degradation, this research contributes to the development of evidence-based solutions for enhancing soil health and resilience. Moreover, it provides valuable insights into the interactions between human activities, environmental processes, and soil dynamics in agricultural landscapes. Ultimately, this knowledge is critical for ensuring the long-term sustainability of irrigated agriculture and ecosystem services provided by gray meadow soils.

Irrigated gray meadow soils, characterized by their unique composition and hydrological dynamics, are essential for sustaining agricultural productivity and ecosystem health in various regions worldwide. However, these soils are susceptible to changes in their agrochemical properties due to a combination of anthropogenic activities and natural processes. This section explores the key changes observed in the agrochemical properties of irrigated gray meadow soils and discusses their implications for soil fertility, nutrient cycling, and agricultural sustainability.

Table 1: Agrochemical indicators of the soils of the research object (in the example of the main section, before the experiment).

Sample №	Cut length №	Layer thickness, sm	Active, mg/kg		N-NO_3, mg/kg	general, %		N, %	Hummus
			P_2O_5	K_2O		P_2O_5	K_2O		%
1	I	0-30	14,0	228,8	30,9	0,155	1,17	0,061	0,869
2		30-50	13,0	240,8	26,9	0,120	0,66	0,058	0,807
3	II	0-30	23,0	361,2	69,7	0,155	1,10	0,07	0,998
4		30-50	24,0	240,8	48,3	0,116	0,57	0,052	0,786
5	III	0-30	18,0	337,1	139,4	0,170	1,13	0,063	0,890
6		30-50	15,0	264,9	18,2	0,155	0,06	0,05	0,724
7	IV	0-30	18,0	276,9	149,6	0,145	1,10	0,061	0,828
8		30-50	14,0	216,7	15,9	0,120	0,69	0,050	0,724

Soil pH is a critical indicator of soil health and fertility, influencing nutrient availability, microbial activity, and plant growth (Von et al., 1995; Lal, 2015b; Angers & Caron, 1998). In irrigated gray meadow soils, changes in soil pH can occur due to factors such as acidification from nitrogen fertilizers, organic matter decomposition, and leaching of basic cations (Berdieva, 2021). Acidification of soils may lead to aluminum and manganese toxicity, inhibiting root growth and nutrient uptake by plants (Berdieva, 2020a). Conversely, alkaline soils can affect nutrient solubility and availability, impacting plant growth and yield. Monitoring soil pH is therefore essential for maintaining optimal growing conditions and preventing soil degradation in irrigated gray meadow areas.

Organic matter plays a crucial role in soil structure, nutrient cycling, and water retention in irrigated gray meadow soils (Berdieva, 2020b; Berdieva, 2023; Saidova et al., 2024; Alimova et al., 2024). Changes in organic matter content can occur due to land management practices, such as tillage, crop rotation, and organic amendments, as well as natural processes like decomposition and erosion (Lal, 2015b).

Decreases in organic matter levels may result in soil compaction, reduced water infiltration, and nutrient depletion, compromising soil fertility and crop productivity. Conversely, increasing organic matter content through practices such as cover cropping, mulching, and compost application can enhance soil structure, nutrient availability, and microbial activity, promoting sustainable agriculture in gray meadow regions.

Soil microbial communities play a crucial role in nutrient cycling, organic matter decomposition, and soil health maintenance in irrigated gray meadow soils. Changes in land use, management practices, and environmental conditions can affect microbial diversity, abundance, and activity (Berdieva, 2021; Alimova, 2023; Saidova et al., 2024). Soil disturbances such as tillage and erosion can disrupt microbial habitats and decrease microbial biomass, impacting nutrient cycling and soil fertility. Conversely, conservation tillage, crop diversification, and organic farming practices can enhance soil microbial diversity and activity, improving nutrient availability and soil health in gray meadow areas.

3 RESULTS AND DISCUSSION

"Yakub" farm, Sh. Rashidov district, Jizzakh region, in the fields of gray-meadow management works of bioorganic fertilizers in combination with mosh on soil fertility based on the scientific results obtained:

"The irrigated meadow improves the ecological condition of the cows and increases their productivity road recommendations" for the transportation of goods to the Department of Agriculture of the Jizzakh region.

As a result, to improve the quality of practical support of agrobiological measures to maintain and restore the fertility of irrigated soils of farmers and farms in the region, to obtain high yields from all agricultural farms;

Biofertilizer and ecologically pure biopreparation for "Durdona" variety of moss were tested on irrigated gray-meadow soils. Improvement of microbiological activity in the soil root rhizosphere was achieved due to the combined use of Rizokom-1 biopreparation and bioorganic fertilizer Rizokom-1. As a result, the agrochemical properties of the soil were improved and the biological activity increased.

4 CONCLUSIONS

Changes in the agrochemical properties of irrigated gray meadow soils have significant implications for soil fertility, nutrient cycling, and agricultural sustainability. Monitoring and managing these changes are essential for maintaining soil productivity, protecting environmental quality, and ensuring the long-term sustainability of agricultural ecosystems in gray meadow regions.

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