



Policy and agronomic practice of sustainable management of salt-affected soils in Ukraine

¹⁻⁴ National Scientific Center «Institute for Soil Science and Agrochemistry Research named after O.N. Sokolovsky», Kharkiv, Ukraine

Introduction

In Ukraine irrigation by brackish water is the cause of soil salinization. There are about 350 thousand hectares of salt-affected soils on irrigated lands (Baliuk S. at al, 2020). Sustainable management of salt-affected soils should primarily be decided at the state level through the formation of a state system of control over their condition, use and protection. **The state the objectives of the work** are the indicators and components of the system of sustainable management of salt-affected soils in Ukraine.



Figure 1: Salt-affected soils in Steppe zone of Ukraine

Methodology

Researches were carried out in Steppe zone of Ukraine on secondary salt-affected soils. Monitoring of irrigated soils was carried out according to national normative documents and methods. At the same time, the interconnected system “irrigation water-soil-plant” was studied. In field experiments the effectiveness of a system of agronomic practices on restoration of salt-affected soils and the sustainable management was studied. It included such methods as soil leaching, deep ploughing (to 75 cm), chemical amelioration (by different Ca-containing amendments), selection of crops on their salt tolerance, bioremediation.

Table 1: Chemical composition of irrigation water used for irrigation in the experiment.

Parameter	Mineralization, g/l	pH	Ion content, meq/l			
			HCO ₃ ⁻	Cl ⁻	Ca ²⁺	Na ⁺
mean	2.9	8.0	7.1	10.0	10.9	22.0
standard deviation	± 0.23	±0.09	±0.29	±1.11	±2.5	±2.10

Table 2: Ameliorants used in the experiment.

Treatments	Dose, t/ha
Kontrol	-
Ameliorative deep ploughing and manure (on 75 cm)	100
Phosphogypsum	7.9
Chalk sludge decomposed by acid	7.5
Calcium ameliorant of the phenol plant in stable water suspension	4.6

Results and Discussion

Policy and legal instruments for sustainable management of salt-affected soils should be based on their monitoring, diagnostics of the properties and condition. In Ukraine, by the Decree of the Cabinet of Ministers of Ukraine standards for environmentally safe irrigation have been established. They determine the possibility of irrigation based on water quality and soil properties so as not to degrade properties, soil quality, ecosystem services. We developed the Concept of sustainable management of reclaimed lands. It includes organizational issues of formation of the state system of balanced management of reclaimed lands at different levels of organization and power. The sustainable management system includes 5 blocks: informational, organizational, technological, economic and regulatory (Baliuk at al, 2020). The **informational block** includes monitoring and diagnostics of the state of lands, the creation of information databases. The **technological block** includes a complex of differentiated synergistic measures to protect and increase the fertility of salt-affected soils

Deep ploughing to 75 cm ensured the saturation of the absorbed complex with calcium (from 7 to 3.9-4.8% of exchangeable cations), an increase in the buffer capacity of the soil. Ca-ameliorants increased the carbonate content of the soil (from 1.5% to 2.7%), improved the cation-anion composition of the water extract and soil adsorption complex. Crop yields increased by 10 to 30%. The **organizational block** includes the organization and coordination of activities in the land reclamation by the central bodies of the executive power, control over the use of irrigated lands, and the organization of environmentally safe functioning of irrigated agricultural landscapes. The **block of economic support** includes financial support for the implementation of soil protection measures. The **block of normative-legal support** includes the development of a normative and legal framework in land reclamation.

Conclusions

A system of sustainable management of salt-affected soils in Ukraine has been developed. It includes 5 blocks (informational, normative, technological, economic and organizational) and is aimed at the rational use and increasing the fertility of these soils.

References

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