Ilmiy tadqiqotlar va ularning yechimlari jurnali
Aoka guvohnoma № 323759 ISSN: 3060-4818

MEASURES TO COMBAT LAND DEGRADATION AND IMPROVE SOIL FERTILITY

G'ulomjonov Azizbek Muhammadjon o'g'li
Second-year Master's student in the Department of
Land Resources and Cadastre, specializing in Land Resource Use
and Management at the National Research University
"Tashkent Institute of Irrigation and Agricultural Mechanization Engineers"
Scientific Supervisor: PhD, Associate Professor **S. Ro'ziboyev**
Tel: +998942753626
Doi: https://doi.org/10.5281/zenodo.20445740

Abstract

This article analyzes the main causes of land degradation, its negative impact on agriculture and environmental sustainability, and modern approaches to improving soil fertility. The study highlights the rational use of land resources, improvement of meliorative conditions, effective use of organic and mineral fertilizers, erosion control measures, and the implementation of innovative agricultural technologies. The research concludes that a comprehensive approach is necessary to preserve soil fertility and prevent land degradation.

Keywords: land degradation, soil fertility, erosion, salinization, melioration, agricultural technologies, environmental sustainability, land resources.

INTRODUCTION

Today, land degradation is considered one of the major global environmental problems. Population growth, intensive agricultural activities, water scarcity, and climate change have significantly reduced soil fertility in many regions of the world. In arid and semi-arid areas especially, salinization, erosion, and the decline of organic matter negatively affect agricultural productivity and ecological balance.

In Uzbekistan, land degradation is also a serious issue. Irrigated lands are increasingly affected by salinity, water and wind erosion, improper irrigation practices, and overgrazing. These factors reduce the natural fertility of soils and threaten sustainable agricultural development. Therefore, developing scientifically based measures to protect land resources and improve soil fertility has become an urgent task.

The purpose of this article is to analyze the major factors causing land degradation and to examine effective measures aimed at increasing soil fertility.

MAIN PART

The Essence and Main Causes of Land Degradation

Land degradation refers to the deterioration of the physical, chemical, and biological properties of soil, resulting in reduced productivity and fertility. It occurs under the influence of both natural and anthropogenic factors.

The main causes of land degradation include:

- soil erosion;
- salinization and waterlogging;
- improper irrigation systems;
- excessive use of mineral fertilizers;
- deforestation;
- overgrazing;
- industrial pollution;
- climate change and drought.

Soil erosion is one of the most dangerous forms of land degradation. Water and wind remove the fertile topsoil layer, reducing the amount of humus and nutrients necessary for plant growth. As a result, crop productivity declines significantly.

Salinization mainly occurs due to poor irrigation management and the rise of groundwater levels. Saline soils hinder plant growth and reduce both the quality and quantity of agricultural yields.

Main Directions for Improving Soil Fertility

Improving soil fertility requires the implementation of scientifically based agrotechnical, meliorative, and ecological measures.

Rational Use of Organic and Mineral Fertilizers

The restoration of soil nutrients largely depends on the balanced use of organic and mineral fertilizers. Organic fertilizers increase the amount of humus in the soil and improve its biological activity. Mineral fertilizers provide essential nutrients required for plant development.

However, excessive use of fertilizers may disrupt the chemical balance of soils and lead to environmental pollution. Therefore, fertilizer application should be based on agrochemical analyses and soil testing.

Measures to Prevent Soil Erosion

The following measures are important in combating soil erosion:

- establishment of protective forest belts;
- contour plowing;
- cultivation of perennial plants;
- application of minimum tillage technologies;
- sustainable pasture management.

Protective forest plantations play an important role in reducing wind speed, preserving soil moisture, and protecting the fertile soil layer from erosion.

Improvement of Meliorative Conditions

Improving the meliorative condition of irrigated lands is one of the key factors in increasing soil fertility. For this purpose, it is necessary to:

- reconstruct collector-drainage systems;
- introduce water-saving technologies;
- apply drip irrigation methods;
- organize effective salt-washing activities.

Drip irrigation technology significantly reduces water consumption and helps maintain optimal soil moisture conditions.

Introduction of Modern Agricultural Technologies

Today, digital and innovative agricultural technologies play a crucial role in the efficient use of land resources. These technologies include:

- Geographic Information Systems (GIS);
- remote sensing technologies;
- agrochemical monitoring systems;
- smart irrigation technologies;
- biological preparations;
- crop rotation systems.

Crop rotation helps maintain nutrient balance in the soil and reduces the spread of diseases and pests.

RESEARCH RESULTS AND DISCUSSION

The analysis shows that preventing land degradation cannot be achieved through a single approach. The restoration and preservation of soil fertility require the integrated application of agrotechnical, ecological, and meliorative measures.

In addition, increasing environmental awareness among farmers and implementing scientific recommendations in agricultural practice are essential for sustainable land management. Government support for land monitoring systems and water-saving technologies can also contribute to positive results.

CONCLUSION

In conclusion, land degradation is one of the major threats to agricultural productivity and environmental sustainability. Soil erosion, salinization, improper irrigation, and anthropogenic impacts reduce the quality and fertility of land resources.

To address these problems, it is necessary to implement erosion control measures, strengthen meliorative activities, use organic and mineral fertilizers rationally, introduce water-saving technologies, and apply modern agricultural innovations.

A comprehensive approach to protecting land resources and improving soil fertility will ensure sustainable agricultural development and ecological security.

REFERENCES

1. Abdullaev S. Fundamentals of Rational Use of Land Resources. Tashkent: Fan Publishing, 2020.
2. Qodirov A., Rasulov H. Soil Science and Agrochemistry. Tashkent: O‘qituvchi Publishing, 2021.
3. Hamroyev Q. Methods for Improving the Meliorative Condition of Irrigated Lands. Tashkent, 2019.
4. Food and Agriculture Organization (FAO). Status of the World’s Soil Resources. Rome, 2021.
5. United Nations Convention to Combat Desertification (UNCCD). Global Land Outlook. New York, 2022.
6. Mirzayev T. Ways to Ensure Environmental Sustainability in Agriculture. Tashkent, 2023.
7. Karimov B. Land Degradation and Its Consequences. Samarkand, 2020.
8. Islomov N. Fundamentals of Agroecology. Tashkent, 2021.