# SOIL EROSION AND METHODS FOR ITS RESTORATION
# ЭРОЗИЯ ПОЧВЫ И МЕТОДЫ ЕЕ ВОССТАНОВЛЕНИЯ

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**Annotation.** The most effective and simple agrotechnical method for protecting soils from water erosion is deep autumn plowing across the slope to a depth of 25-35 cm. The depth of plowing depends on the thickness of the humus layer and the exposure of the slope. Effective agrotechnical techniques are soil mowing and slicing.

**Key words:** soil, fertility, measure, erosion, concentration, fertilizer, microorganism, humus, element.

**Аннотация.** Наиболее эффективным и простым агротехническим методом защиты почв от водной эрозии является глубокая осенняя вспашка поперек склона на глубину 25-35 см. Глубина вспашки зависит от толщины гумусового слоя и экспозиции склона. Эффективными агротехническими приемами являются скашивание и нарезка почвы.

**Ключевые слова:** почва, плодородие, мера, эрозия, концентрация, удобрение, микроорганизм, гумус, элемент.

Soil is a valuable natural resource, because the development of plants, a source of nutrition for both people and animals, depends on its condition. Therefore, it is so important to take measures to reduce its wind and water degradation. Otherwise, being deprived of fertile lands, a person falls into direct dependence on technology and imports.

However, in the conditions of modern civilization, such a global problem as soil erosion is becoming more and more common. It is caused by natural and anthropogenic factors. In the first case, this is the influence of water and wind, the presence of slopes and mountainous terrain. Anthropogenic factors are caused by human activity: irrational use of land, deforestation, peculiarities of crop cultivation, the presence of various buildings and infrastructure. Both processes lead to undesirable and partially irreversible changes - a decrease in fertility and distortion of natural landscapes.

Unfortunately, today the soil layer is being eroded, good fertile lands are becoming less and less, and they are quickly becoming unusable. Throughout history, humanity has lost about a billion hectares of land (cities, settlements, buildings, roads, erosion, salt water, evaporation, etc.). Currently, 1.5 billion hectares of land are planted with crops around the planet. According to the data received, 6-7 million hectares of land are lost annually in the world, as mentioned above.

Considering that two-thirds of the world's population lives in poverty and hunger, and assuming that there is less arable land per inhabitant of the planet than 10-20 years ago, increasing soil fertility, doubling and tripling crop yields is an essential part of agriculture in the near future, it is obvious that it should remain the main task.

In order to provide legislative support for reforms in the agrarian sector of our country, a number of laws and their projects have been developed. Among them, the Land Code of the Republic of Uzbekistan, the Laws on the Land Cadastre and other laws aimed at developing and regulating land relations on the basis of the law, rational use and protection of land were adopted and approved by the Oliy Majlis. Under the influence of various improperly organized human activities, erosion and pollution of the soil layer occurs.

The problem of soil protection from erosion is an urgent problem for many countries located in the arid climatic region of the world, including the territory of Uzbekistan. Since the eroded areas of land in the republic are 2 million square meters. about a hectare or more than 40% of the total arable land.

According to our data, on the territory of Uzbekistan there are more than 3 million hectares of drylands suitable for use, of which about 1 million hectares are low- maintenance and semi-maintained drylands, and more than 70% of these drylands are subject to surface impact water erosion.

It is known that as a result of soil erosion due to irrigation erosion on slopes with a slope of more than 50, up to 100-150 tons per hectare or more, or even up to 500 tons of soil, can be washed away. Together with this soil, 500-800 kg of humus, 100-120 kg of nitrogen, 75-100 kg of phosphorus and even more nutrients can be lost per hectare per year. It should be noted that erosion processes have a negative impact on the soil ecosystem, negatively affecting the amount of solar energy used in biomass and reducing it. As a result of erosion processes, 30-50 percent or more of solar energy is lost, absorbed by phytomass, humus and soil microorganisms, while the intensity of biological and soil processes occurring in the soil is mainly associated with solar energy reserves and changes in the appearance of scattered light can be imagined. the scale of damage caused by erosion to the ecosystem.

In our country, every year the prevention and control of soil erosion, increasing the productivity of soils eroded by water and wind is recognized as an event of national importance. Laws have been adopted to protect soil from water and wind erosion. The law defines organizational, agrotechnical, forest reclamation, hydrotechnical and other measures for the protection of soils from water and wind erosion.

To protect the soil from erosion, it is necessary to carry out agro-complex measures:

*when farming in mountainous areas, level the land in the form of terraces (supachs), plant fruit trees and vineyards around the fields;

*proper organization of transverse plowing and irrigation work on steeply sloping lands;

*landscaping the edges of ravines, preventing the expansion of erosion of ravines, preventing the flow of water from irrigated fields into ravines, building various barriers and water collectors;

*to combat wind erosion, the most basic and necessary measures are planting shrubs hedges. As well as planting various grasses, rational use of pastures, creating various fences, as well as creating a thin top layer of sand using chemicals with adhesive properties (oil waste, nerosin, K-4 polymers, SKS-65 LATEX);

*in order to prevent irrigation erosion, taking into account the physical and chemical properties of the soil and the slope of the site, using the experience of advanced irrigators, it is extremely important to plan the amount of water supplied to wells for proper irrigation of crops, as well as freezing and diversion of water on lands prone to erosion.

To prevent the compaction of the subsoil layer of irrigated soils, it is necessary to widely introduce the technology of sowing and minimum tillage. Experience has shown that soil density per cubic centimeter during the growing season is 1.20-1.35 g/cm3 and is maintained in an optimal state.

Currently, the problem of soil pollution with heavy metals in technogenic and agricultural industries is acute. Heavy metals occupy one of the leading places among environmental pollutants. Many representatives of this group of substances, such as lead, copper, zinc, cadmium, even in very small quantities, can cause immunological, oncological and other types of diseases. As a result of studies conducted by scientists from different countries, it has been proven that about 70 percent of heavy metals enter the human body with food.

The purpose of this work is to study the significance of changes in the composition of soils of heavy metals and their influence in the Sh. Rashidov district of the Jizzakh region.

Sh. Rashidovsky district is considered the administrative center of the

Jizzakh region, the main lands around the city of Jizzakh are located in the north-eastern part of the city of Jizzakh. The total area of irrigated land in the region is 34,690 ha, of which: non- saline land - 8,935 ha (25.8%), saline land - 25,755 ha (74.2%). Irrigated gray-meadow soils of the Sh. Rashidovsky district were chosen as the object of study.

Today, Sh.Rashidovsky district is one of the regions where the quality of agricultural land has declined, the main lands of the district are considered close to the city center, the soil is polluted with various pollutants by industrial enterprises, the balance of nature is disturbed, and the ecological environment is considered very serious.

Human use of chemicals in economic activities and their inclusion in the cycle of anthropogenic transformations in the environment is constantly growing.

According to GOST 17.4.1.0283 pollutants in the soil are divided into three classes: Class I (high risk) - As, Cd, Hg, Se, Pb, F, benzo (a) pyrene, Zn;

Class II (moderately dangerous) - B, Co, Ni, Mo, Cu, Sb, Cr; Class III (low risk) - Ba, V, W, Mn, Sr, acetophenone.

Heavy metals far outperform common pollutants such as carbon dioxide and sulfur and are second only to pesticides in terms of pollution. In the future, they may turn out to be more dangerous than NPP and MSW emissions.

According to the results of the monitoring, more than 40 elements of the table of D.I. Mendeleev were found in the soil. Including: V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Mo, Cd, Sn, Hg, Pb, Bi, etc.

The most powerful suppliers of metal-containing waste are enterprises for the smelting of non-ferrous metals (aluminum, aluminum oxide, copper-zinc, lead-smelting, nickel, titanium-magnesium, mercury, etc.), as well as enterprises for the processing of non- ferrous metals (radio engineering), electrical engineering, instrumentation, galvanic sky, etc.).

When determining and assessing the composition of soils in the Sh. Rashidovsky district by ingredients in July 2020, 9 samples were taken from the sampling point with soil layers of 0-30 cm, 30-50 cm and 50-70 cm.

The pH of the soil composition pH was determined in the field.

For the analysis of water 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 a constant weight evaporating the residue and drying at 150°C for weakly mineral waters (105-110°C) and highly mineralized waters.

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.

Conclusions. Thus, the analysis of soil contamination with heavy metals at the landfill in Sh. Rashidovsky district shows that most of the pollutants were found in soil samples. Analysis of soil pollution with heavy metals in the region shows that the content of chromium, manganese, cobalt, nickel, copper, silver, zinc and other elements slightly exceeds the maximum allowable concentrations for soils. The concentration of all other heavy metals does not exceed the MPC, which confirms the conclusions made in the review part of the work about the low information content of heavy metals in environmental monitoring.

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