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## INCREASING SOIL FERTILITY AND IMPROVING THE RECLAMATION CONDITION BY LOWERING THE GROUNDWATER LEVEL

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**Annotation.** *The article presents the results of studies of highly moistened irrigated garden-meadow and meadow soils, a decrease in the groundwater level, and an increase in their fertility. According to the obtained data on soil salinization in the Peshku district, 79.5% of irrigated soils from the total area of arable land is subject to salinization, which are classified as slightly, moderately and strongly saline. To improve the ameliorative state of soils, mulberry plantations should be introduced into practice, which help reduce excessive moisture on the soil surface.*

**Key words:** *soil, meadow soil, saz-meadow soil, gypsum-arzyk, melioration, ameliorative state, salinization, humus content, nutrients.*

### INTRODUCTION

At present, irrigated soils used in agricultural production primarily need to be preserved and increased in fertility based on the use of scientifically based agricultural technology. It is known that water is one of the indirect factors of soil fertility. Water has a significant impact on the accumulation of organic matter in the soil, on the formation of structural elements, on the physical and mechanical properties of the soil and the quality of various agricultural measures used in agriculture. As a result of excessive use of water for irrigation without taking into account soil conditions and the needs of cultivated crops, underground waters are formed and their level rises, and in the case of mineralization of the parent rock, undesirable phenomena such as salinization, waterlogging, etc. occur. As a result, the melioration and ecological state of meadow and meadow-saz soils deteriorates [1].

Irrigated agriculture has been an extremely important source of food production in recent decades. We know that the highest yields that can be obtained with irrigation are more than twice as high as the highest yields that can be obtained with dry farming [3]. However, irrigated agriculture produces less food than rainfed agriculture. Globally, rainfed agriculture is practiced on 83 percent of cultivated land and supplies more than 60 percent of the world's food.

The environmental costs of traditional irrigation schemes are also high (and not reflected in food prices) - high-intensity irrigation often leads to waterlogging and/or salinization. About 30 percent of irrigated land is currently severely or moderately affected. Salinization of irrigated areas reduces the existing irrigated area by 1-2 percent per year [2]. We know that there are five main types of irrigation: surface irrigation, sprinkler irrigation, drip irrigation, subsurface irrigation, sub irrigation.

The first two of these, surface and sprinkler irrigation, are collectively known as



conventional irrigation. Surface irrigation is currently the most common technology, and is used particularly by small farmers because it does not involve the operation and maintenance of complex hydraulic equipment [5]. For the same reason, surface irrigation is likely to still dominate in 2030, even though it is wasteful and is a major cause of waterlogging and salinity. Drip irrigation and subsurface irrigation are examples of localized irrigation, an increasingly popular form of irrigation that maximizes water efficiency by applying water only where it is needed, with little wasted. Technology is not everything, however. Things like small-scale irrigation and the use of urban wastewater promise to improve water productivity as much as changes in irrigation technology.

### **MATERIALS AND METHODS**

The soils of the Peshku district are characterized by properties inherent in desert zones - salinization, low humus and nutrient content, the presence of shakhovy and gypsum-arzic horizons, etc. For example, the soils of the region are characterized by heavy, medium, light loamy and sandy, sandy loam, and in places clayey mechanical composition. In this region, 29.26% of irrigated lands by mechanical composition are sandy loam, 26.97% are sandy, 23.89% are medium and 5.44% are heavy loamy, 14.26% are light loamy, clayey make up only 0.18 percent [9]. If incentives are in place (and higher irrigation water prices are likely to be a major one), farmers will use water-saving irrigation technologies. The main technologies likely to be used in developing countries, where labor is typically plentiful but capital is scarce, are subsurface and drip irrigation. Both technologies rely on frequent, small applications of water as directly as possible to the roots of crops. The main advantage of water-saving technologies, especially drip irrigation, is that in addition to saving water, they can increase crop yields and reduce the rate of salinization. In addition, since none of the systems allow water to come into contact with foliage, they can be used with brackish water for crops that are not too sensitive to salinity. Some of the underground irrigation systems are simple methods that do not require expensive equipment, but are labor-intensive [1].

Drip irrigation has only been used in a small fraction of the area for which it is suitable. It relies on a pressurized system that forces water through perforated pipes laid above ground at a rate of 1-10 liters per hour per emitter. Although the technology is simple, it requires both investment and careful maintenance - emitters can easily become clogged. However, results from many countries show that farmers who switch from furrow (trench) or sprinkler systems to drip systems can reduce their water use by 30 to 60 percent. Yields often increase at the same time.

Today, drip irrigation systems, costing between US\$1,200 and US\$2,500 per



hectare, are generally too expensive for most small farmers and for use on affordable crops, but if research is conducted to reduce these costs, the efficiency of drip irrigation systems can be further improved. The key to reducing costs is simplicity of materials and portability: instead of each row of crops having its own drip tube, one tube, moving about once an hour, can be used to irrigate up to ten rows. Drainage of irrigated lands serves two purposes: to reduce waterlogging and, equally important, to control and reduce the salinization that inevitably accompanies waterlogging in semi-arid and arid regions. Proper drainage also allows for crop diversification and intensification, the cultivation of high-yielding varieties, the efficient use of inputs such as fertilizers, and mechanization [6].

The problem is limited to about 100-110 million hectares of irrigated land located in semi-arid and arid zones. Currently, about 20-30 million hectares of irrigated land are seriously damaged by salt accumulation, and an estimated 0.25-0.5 million hectares are lost annually due to salt accumulation. The current drained area of 25-50 million hectares is insufficient. Therefore, drainage of irrigated lands is urgently needed [7]. For example, 60 percent of the crop areas of the Peshkun district are located in the desert zone. Sh. Ergashev. Navoi, Bukhoro, Mustakillik massif is mainly located in the desert zone, with a high level of salinity. Despite the high salinity in the Mustakillik region, the grain yield is 50-60 centners. Drainage of most of the irrigated lands of the Peshku district serves two purposes: reducing swamping and, most importantly, controlling and reducing salinization, which is inevitably accompanied by swamping in semi-arid and arch-alpine areas. Direct drainage, as well as diversification and intensification of crops, cultivation of high-yielding varieties allow for the effective use and mechanization of such resources as fertilizers [7].

The problem is limited to about thousands of hectares of irrigated lands located in semi-arid and arid zones. As is known, at present, calculations show that 0.25-0.5 thousand hectares of irrigated lands in the district have seriously suffered from salt accumulation, and it disappears every year. The current thousand hectares of dry areas are not enough. Therefore, it is very necessary to prevent the drying of irrigated lands. However, drainage has two important drawbacks. First, drainage runoff is often contaminated with salts, trace elements, sediments and traces of agricultural inputs. Drainage runoff must be disposed of safely. Second, improved drainage in upstream areas results in increased flows downstream, increasing the risk of flooding [8]. Therefore, new drainage projects must take into account not only the benefits of sustainable agricultural production, but also the side effects on the environment.

Also, if 40% of groundwater pollution with heavy metal ions occurs due to



precipitation, the remaining 60% of anthropogenic factors occur due to wastewater discharged directly into water bodies. It is known that water contains large amounts of lead, nickel, cadmium, zinc, copper and other chemical elements. Measures aimed at reducing the content of ions of such chemical elements in water should be widely used, especially in fishing and cleaning polluted waters. In this case, it is necessary to use biological and physical methods. For example, a magnet of heavy metal ions - a neodymium-iron-boron alloy containing Nd (33%), Fe (61.8%), B (1.1%), Al (0.5%), Nb (0.5%), Co (1%), Cu (0.1%), Dy (2%), as well as an aluminum-nickel-cobalt magnet containing Al (9-10%), Co (15-20%), Cu (6%), Ni (19-21%) and Fe (43-51%) in polluted waters, has the ability to retain ions of metals and other chemical elements [1]. Reducing pollution of water used by farms, industry, and cities will allow greater recycling of water for irrigation. The potential for using wastewater for irrigation is great. The fertilizing value of wastewater is almost as important as the water itself. Typical nutrient concentrations in treated wastewater from conventional wastewater treatment are: nitrogen, 50 mg/liter; phosphorus, 10 mg/liter; and potassium, 30 mg/liter. At an application rate of 5,000 m<sup>3</sup>/ha/year, the annual fertilizer contribution to the wastewater would be: nitrogen, 250 kg/ha; phosphorus, 50 kg/ha; and potassium, 150 kg/ha [8]. Thus, all of the nitrogen and most of the phosphorus and potassium normally required for crop production would be supplied by the wastewater. In addition, other valuable micronutrients and organic matter contained in the wastewater will provide additional benefits. An added benefit is that since most of these nutrients are taken up by the crop, they are removed from the water cycle and therefore do not play a further role in the eutrophication of rivers and the creation of dead zones in coastal areas. In the upper horizons of hydromorphic meadow-sazo and meadow soils, the amount of salts by solid residue is 0.310-450% (0.3-1.0%) and the amount of chlorine ion is 0.007-0.028%, which refers to slightly, moderately and strongly saline. In the lower horizons, their amount varies within 0.230-1.260% and 0.010-0.077%, respectively. According to these indicators, the lower horizons are non-saline, as well as moderately and strongly saline. According to the chemistry of soil salinization, it is mainly of the sulfate type. In the qualitative composition of salts, the leading place is occupied by salts of Na<sub>2</sub>SO<sub>4</sub> and MgSO<sub>4</sub>, then salts of CaSO<sub>4</sub> and Ca (HCO<sub>3</sub>)<sub>2</sub>. The amount of chlorine is not high, from 0.007-0.010% to 0.028-0.038% and in highly saline horizons it reaches 0.077-0.112% [10].

## CONCLUSIONS

Improvement of the meliorative state of the superficially highly moistened irrigated sazo-meadow and meadow soils of the Peshku district, reduction of the



groundwater level, increase of their fertility, primarily the creation of mulberry plantations that perform the function of correcting excess surface moisture to ensure the flow of groundwater from crop areas, the introduction of a scientifically based crop rotation system into practice. The natural conditions of the lands in this zone were considered poor, and the quality scores were estimated from 0 to 20. These lands make up a certain percentage of the total volume of irrigated agricultural lands in the republic. They are small contours that are inconvenient for mechanized processing, therefore, in order to use these lands, it is necessary to carry out washing and drainage works, to reduce their leaching and sedimentation by using biological impact measures.

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