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Advantages of growing winter wheat using water-efficient irrigation technologies in light gray soils.

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Annotatsiya. *Ushbu tadqiqot ishida hozirgi kunda och tusli bo‘z tuproqlar sharoitida kuzgi bug’doy yetishtirishdagi umumiy holat, yerlarning tuproq-suv-tuz balansi, kuzgi bug’doy yetishtirishdagi asosiy tavsiyalar, suv tejamkor texnologiyalardan foydalanish zarurati hamda kutiladigan natijalar bayon qilinadi. Och tusli bo‘z tuproqlar sharoitida kuzgi bug’doy yetishtirish uchun suvdan samarali foydalanish, tuproqning holatini to‘g’ri baholay olish hamda mineral o‘g’itlardan samarali foydalanish kabi masalalarga doir fikrlar va hisob-kitoblar keltiriladi.*

Kalit so‘zlar. *Kuzgi bug’doy, iqlim, sug’orish, tuproq, ekish muddati, namlik, ekinlar, qishloq xo‘jaligi, o‘g’it, maydon, yomg’irlatib sug’orish.*

Аннотация. *В данной научно-исследовательской работе описано общая ситуация выращивания озимой пшеницы в легких сероземах, почвенно-водно-солевой баланс земли, основные рекомендации по выращиванию озимой пшеницы, необходимость применения водосберегающих технологий и ожидаемые результаты. Представлены мысли и расчеты по таким вопросам, как эффективное использование воды при выращивании озимой пшеницы в условиях легких сероземах, умение правильно оценивать состояние почвы, эффективное использование минеральных удобрений.*

Ключевые слова. *Озимая пшеница, климат, орошение, почва, сроки посева, влага, посевы, сельское хозяйство, удобрения, площади, дождевание.*

Annotation. *This research work describes the general situation of growing winter wheat in light gray soils, the soil-water-salt balance of the land, basic recommendations for growing winter wheat, the need to use water-saving technologies and expected results. Thoughts and calculations are presented on such issues as the efficient use of water when growing winter wheat in light gray soils, the ability to correctly assess the condition of the soil, and the effective use of mineral fertilizers.*

Keywords. *Wheat, climate, irrigation, soil, sowing time, moisture, crops, agriculture, fertilizers, areas, sprinkling.*

Introduction. Global climate change has the following negative consequences in Uzbekistan. In particular, the increase in water evaporation as a result of the increase in temperature affects the reduction and scarcity of water resources in the regions. In the fields of our country, it is very important to rationally and efficiently use available water resources and use modern water-saving technologies to grow winter wheat on light gray soils and achieve high productivity.

According to the information on the response of the Ministry of Agriculture to the article published in Kun.uz entitled “Fertilizers are used inefficiently in agriculture in Uzbekistan,” 1 million 28,000 tons (206 kg) per hectare were planted for the 2023 crop nitrogen, 727,000 tons (146 kg per hectare) of phosphorus and 358,000 tonnes (72 kg per hectare) of potassium fertilizer are required. In the draft order of the Cabinet of Ministers "On the balance of the production of mineral fertilizers in the period 2023-2025", local chemical companies will supply agriculture with 875,000 tons (85% of the requirement, i.e. 175 kg per hectare) of nitrogen. 157,000 tons (21% or 31 kg per hectare) phosphorus and 80,000 tonnes (22% or 16 kg per hectare) of potassium mineral fertilizer provided. From the foregoing it can be seen that in accordance with the scientifically based requirements for planned crop production, the planned crop production is achieved

through the layered application of mineral fertilizers in the specified periods. Otherwise, the overall yield will decrease and quality indicators will decrease [1].

Research methodology. Based on the above urgent tasks, this work explains the general situation of winter wheat cultivation on light gray soils in our country, the soil-water-salt balance of the country, the main recommendations for winter wheat cultivation, the need for use of water-saving technologies and the expected ones Results are discussed.

Analysis and results. When growing winter wheat on light gray soils, special attention must be paid to the fertility of the soil, which is free of weeds and well moistened. Proper placement of winter wheat in the crop rotation is important for a stable and bountiful harvest. Normally, winter wheat should be planted as a subsequent crop for the next year in areas cleared by early crops on irrigated land.

Winter wheat places high demands on soil fertility. The amount of fertilizers applied to the soil to obtain the planned harvest is determined on the basis of the data of the agrochemical cartogram, based on the amount of nutrients leaving the soil with the crop, the nutrients absorbed by the crop and the amount of fertilizer applied Floor. Winter wheat has high nitrogen requirements. Wheat requires a lot of nitrogen during tuber formation and spike formation, phosphorus during the first 1-5 weeks of growth and potassium from the beginning of the growth phase to flowering. Phosphorus and potassium fertilizers increase the winter resistance of winter wheat and accelerate grain ripening. Prevents stem shedding and various fungal diseases. When a large amount of nitrogen fertilizer is applied, the flowering period is prolonged and the ears on the stems do not ripen at the same time [2].

According to the Scientific Production Association of Uzbekistan “Grains”, the following fertilizer rates should be applied to irrigated areas for autumn grain cultivation: nitrogen – 180 kg/ha, phosphorus – 90 kg/ha and potassium – 60 kg/ha. However, in soils with low fertility, this amount increases by 10-15%. The specified annual amount is given in several periods - before planting and in feeding

during plant growth. Before sowing in irrigated areas, 30 kg/ha nitrogen, 90 kg/ha phosphorus and 60 kg/ha potassium are administered. At the same time, 10-12 t/ha of manure are spread per hectare [3].

It is very important to plant winter wheat at the right time. Winter wheat should be sown earlier on irrigated areas than on dry areas. Since such areas are supplied with water and the lawns can be harvested through irrigation after sowing the seeds. Wheat sown early forms a lawn in the fall and the plants can take root before frost. Such plants are cold-resistant.

Therefore, wheat should be sown in autumn in October and harvested by the end of October and November and overwintered in this development phase [4].

Quality seeds are one of the most important factors for high yields. Seed wheat is obtained from high-yield seed plots. Larger, heavier, flat, undamaged seeds with a high germination rate are predominantly planted. In special grain cleaning companies, the seeds to be sown are cleaned, sorted, treated and covered. It is then distributed to the farms via grain receiving points. Wheat seeds used for sowing must meet the state standard. According to this model, premium seeds should be at least 95% fertile and 99% pure. Second class seeds should have a fertility of 92% and a purity of 98.5%. Seeds of the 1st and 2nd grades should be used for sowing. Before planting, cleaned and sorted seeds are treated with federally registered chemicals against black moths, fusariums and other diseases.The sowing rate for winter wheat should be 200-250 kg/ha depending on seed quality and planting conditions. The planting depth of winter wheat is of great importance for its cold resistance. If the seed is planted deeper, the root joint will also be deeper. Even if autumn-winter frosts affect the stems, the plant will not die if it does not affect the connection. Taking this into account, winter wheat seeds should be buried 6-7 cm deep during sowing and 6-8 cm deep during early sowing on dry soil [5].

Another important parameter when choosing an irrigation method is the physical properties of the soil. Taking into account the mechanical composition,

morphometry and water permeability of the soil, the choice of the best irrigation method and irrigation technique is one of the main factors for high productivity.

Different soil moisture thresholds are based on water exchange within the tensiometer. When the soil moisture limit is below zero, the water in the tensiometer flows through the ceramic part until the soil moisture reaches the acceptable limit.

This process occurs between waterings when the soil is dry. Irrigation causes repeated drying out and moistening of the soil when the soil is evenly moistened in dry areas. To ensure the smooth operation of the tensiometer during its operation, a working mixture without the addition of microorganisms and soil sludge is poured into the inner ceramic part through a hole of 0.7–1 μm and replaced frequently [6].

The irrigation times of agricultural crops are determined using the following table, depending on the mechanical composition of the soil, salinity and the growing season of crops:

Table 1

Indicators of the lower moisture limit of agricultural crops

Crop type and soil conditions	Optimum humidity before watering, (%)		The required limit of soil suction pressure, (centibar)	
	from CHDNS	from volume	start watering	stop watering
- Autumn wheat - in medium and heavy non-saline soils;	70-75	18-22	48-53	10
- in light and saline soils.	75-80	17-18	30-40	10

The following table shows the soil's physical properties and water absorption capacity.

Table 2

Sinflar	Water permeability of the soil	The mechanical composition of the soil	Average relative water absorption consumption per 100 m, l/s
A	At a high level	Sandy	0,4 higher than
B	Increased	Kumok	0,2
V	Average	Light saz soil	0,1
G	Faded	Medium saz soil	0,05
D	Slow	Heavy saz soil and clay	0,03 from little

Climate, soil, topography, hydrological, hydrogeological, biological, economic, hydrological, economic and other factors are taken into account when choosing an irrigation method in a particular irrigation area. Agricultural crops are divided into field crops and row crops, annual and perennial crops, each of which requires appropriate irrigation methods.

In surface and sprinkler irrigation, water interacts with the soil, water is absorbed into the soil and accumulates in the voids of the soil. This process can be divided into three phases: absorption, saturation and exhaustion. Soaking is the first stage of soil water saturation, where irrigation water gradually fills the voids in the soil. In horizontal, overhead, and sprinkler irrigation, water percolates downward, while water percolates downward, sideways, and upward using capillaries. The rate of shrinkage varies depending on the condition of the soil surface, its mechanical composition and its moisture content. The infiltration rate is determined by the size of the water infiltration depth over a certain period of time (cm/hour, m/day, etc.) [7].

It is a set of methods and activities for distributing water in irrigated areas and transferring water from runoff to soil and atmospheric moisture. Irrigation technology refers to the technology and technical means for transferring water from the flow form to the ground and the humidity. The following irrigation methods are

used in irrigated agriculture: overland irrigation, sprinkler system, soil irrigation, drip irrigation, sub-irrigation, aerosol (mist, finely distributed).

Sprinkler irrigation refers to the delivery of water to the soil surface and the plants in the form of artificial rain using special machines, devices and units. Advantages of sprinkler irrigation: Change the depth of soil moisture by reducing or increasing the irrigation rate, increase the relative humidity and reduce the temperature of the surface layer of the air, ensure that the plants are not hit by cold water throughout the field Distribution and no demand for its relief, no need to build irrigation ditches and ditches, possibility of administering mineral fertilizers with irrigation water, water-saving method, high FIK.From the above points, it can be concluded that rain irrigation of winter wheat on the territory of Uzbekistan is an effective method given the global water shortage due to climate change. Rain irrigation increases the moisture content of the top soil layer. Traditional drip irrigation results in an increase in moisture in the 20-60 cm wide part of the lower soil layer. If we take into account that the root zone of winter wheat is located mainly in the soil layer up to 60 cm, the moisture stored in this layer provides comfort in the development of the crop. The main thing is that sprinkler irrigation uses about 40% less water per 1 hectare of cultivated land than irrigation. This saves water.The number of sprouts of winter wheat is 25-30% higher in the rain-irrigated field than in the rain-irrigated field. Watering wheat seedlings with rain makes it possible to save not only water, but also mineral fertilizers, as well as reduce equipment and other costs.

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