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ABSTRACT

The article provides data on the use of a complex unit before irrigation, while simultaneously inserting a transverse floor and a longitudinal furrow for irrigation without damaging the plants, also on a scientific basis, it is stated about the uniform provision of irrigation water and the reduction of manual labor (4 hours per person per day), saving irrigation water and elimination of salt stains and reduction of irrigation water costs by 1300 m3/ha, yield addition by 6.0 c/ha and the use of environmentally friendly organic fertilizers "ecophosphoazotin" on cotton on moderately saline, uneven, sloping soils in the Bukhara region.

Keywords: Complex unit, transverse floor, longitudinal ridges, soil clustering, frame, hydraulic cylinder, suspension mechanism, "ecophosphoazotin" water saving, yield, profitability.

1. INTRODUCTION

The rise of irrigated agriculture in Uzbekistan is impossible without the widespread introduction of new generation irrigation systems, which should be based on indicators of high productivity, reliability, environmental safety, ease of maintenance with a minimum of labor costs, and saving irrigation water. At present, at the enterprises of the agro-industrial complex of the Republic of Uzbekistan, great importance is attached to the choice of environmentally friendly fertilizers and cost-effective technical means of irrigation.

A significant part of the land in Uzbekistan (28 million hectares) is allocated for agricultural land. They are located in areas with different natural conditions, which often do not provide the simultaneous presence and optimal ratio of all factors necessary for plant life [2].

In connection with the elimination of such problems, the Decree of the President of the Republic of Uzbekistan "Action Strategies for 2017-2021" was adopted, it is indicated that "... the use of intensive methods of agricultural production, especially the introduction of modern water and resource-saving technologies" is one of the most important tasks. In this regard, conducting scientific research to identify the effectiveness and use of water and resource-saving complex aggregate - the simultaneous rate of the transverse floor and longitudinal ridge on saline and uneven crop fields for an even and economical distribution of irrigation water, and elimination of saline spots, obtaining high and high-quality yields of raw cotton and other crops, cotton complex, is very important [1].

For a uniform and satisfactory supply of crops with irrigation water and mineral nutrition, in order to obtain a high and high-quality yield, subjective factors must be taken into account, such as slope, unevenness, relief and degree of salinity, depth of occurrence, mechanical composition of the soil and hydro modular zoning, preparation of land for irrigation etc. Given that a number of tasks and factors to a certain extent affect the yield and its quality, it is important how to organize irrigation and mineral nutrition, efficient use of water and resource-saving innovative technologies in the irrigation system is one of the most pressing issues.

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To obtain a high-quality high yield of cotton, taking into account the state of variability of the relief of cotton fields, the unevenness and salinity of soils, their slope, ameliorative state, hydro modular zoning and the location of the depth of groundwater, etc. required depending on the slope of the site, transverse checks are inserted on small and large floors. Currently, without damaging the cotton plant, a useful model of a complex aggregate is used for the simultaneous insertion of a check and a longitudinal ridge.

If set by hand, it requires a lot of labor, labor time and effort, and also increases the cost of the product. In such unfavorable conditions, freeing workers from manual labor, working time and at the same time, the simultaneous installation of a transverse floor and a longitudinal ridge, taking into account the state of the soil, to irrigate cotton without damaging plants is of great importance in irrigated agriculture and is the most relevant, economical, water and resource-saving, and in a cost effective way.

2. MATERIALS AND METHODS

During the growing season of cotton, before irrigation, prepare the soil for irrigation, ensure uniform consumption of water and nutrients by the plant, reduce water loss, create the most optimal irrigation system, irrigate in deserts, saline soils and groundwater at a height of 2-2.5 m and Bukhara branch of the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers and the Scientific Research Institute of Breeding, Seed Production and Cultivation of Agro technology of the Bukhara Scientific Experimental Station in 2020-2021 for the development of water and resource-saving technology and the introduction of "ecophosphoazotin" on cotton, on saline soils to obtain a high and high-quality cotton yield. At the same time, studies were carried out to test the complex unit of the palletiser - longitudinal ridge and transverse floor, and an application for a new complex unit registered for the patent of RUz IPA (FAP 2021 0024) [1-4].

The field experiment was based on the experimental farm of the Scientific Research Institute of Breeding, Seed Production and Agricultural Technology of Cotton Growing, Bukhara Scientific Experimental Station. The depth of groundwater in the experimental area is 2-2.5 m, the soil is moderately saline, meadow-alluvial, in terms of the texture of soils, medium-heavy. We studied by comparing the control variant and the experimental variant with the introduction of organic fertilizer "ecophosphoazotin" and the use of a complex unit, the simultaneous rates of the cross check and the longitudinal ridge in the plots of the cotton variety Bukhara-10. In the experiments, the options consisted of 2 options, 4 repetitions and 8 rows, the total land area was 2.5 hectares.

The annual rate of mineral fertilizers was N-250; P-175; K-120 kg / ha in pure form. And in the experimental variant, before sowing, “ecophosphoazotin” was added once at –372 kg / ha in tuk. On the experimental field, the length of the ridges was 100 m, while simultaneously hilling the ridges, transverse floors were inserted without damaging the cotton. The layout of the field experiment for placement on the experimental site is shown in figure 1.

Figure 1. Scheme of placement of experimental options.

Experimental options on the site were placed according to the method of randomization. The studies were carried out in accordance with the methodological guidelines adopted in Uzbek Research Institute of Cotton Growing: "Methodology for conducting field experiments" [6], "Methods of agrochemical, agrophysical studies in irrigated cotton regions of field and vegetation experiments with cotton" [7], Methodology of field and vegetation experiments with cotton in irrigation conditions ”[8], static data processing was carried out according to B.A. Dospekhov “Methodology of field experiment” [9], also with the help of the mathematical-static computer program Microsoft Excel.

3. LITERATURE REVIEW

In Uzbekistan, irrigated land is 3.2 million hectares, on which agricultural products are grown every year to provide for the population. In Bukhara region, the total irrigated land is 274 612 hectares, of which 38903 hectares (14.2%) are non-saline and 235709 hectares (85.8%) refer to tei or another degree of salinity [10-11]. In Bukhara region, in accordance

with the recommended scale of reclamation (semi-hydromorphic and hydromorphic) zonal zones are divided into II, III, IV, V, VI, VII, VIII, IX out of 10 hydromodular regions and depending on the strength of the mechanical composition, structure and composition of the soil soil in the aeration layer and the depth of groundwater (1.0-2.0; 2.0-3.0 m) [12-13].

When watering cotton, depending on the reclamation state of soils and zonal groups of hydromodules, taking into account the growing season, the norms and terms of their irrigation are established.

When preparing cotton fields for irrigation, the technological process of floor irrigation is not taken into account at the regional and national levels. The standard technological maps developed by the Uzbek Research Institute of Agriculture for 2016-2020 do not take into account this technological process, but in some climatic zones (different salinity, deserts, semi-hydromorphic and hydromorphic) in the second and third climatic zones, such as in Bukhara region, in this technological process there is no possibility to irrigate cotton fields [4].

At present, various complex units have been developed to improve the physical properties and structure, desalinate soils, and save irrigated water and resources.

When irrigating such fields, especially on hydromorphic soils, when the soil is saline, and the soils are poor and the water permeability is high, water does not pass along the ridges, penetrates deep into the soil through capillary holes, merges with groundwater, raises groundwater, and creates secondary salinization.

In addition, due to the fact that cotton fields are not saturated with water and fertilizers do not reach the root system, salt solution particles are formed in the upper layer of the soil, which slows down the growth and development of cotton, their height, the accumulation of nutrients and the productivity of photosynthesis decrease. A lot of water is consumed and the duration of irrigation increases. As a result, the cost of the product increases, which negatively affects the yield and its quality [14].

The Bukhara branch of the Research Institute of Breeding, Seed Production and Agricultural Technologies for Cotton Growing has developed recommendations for farms for growing medium-fiber varieties of cotton "Bukhara-6", "Bukhara-8", "Bukhara-10" and "Bukhara-102" him [15].

4. RESULTS AND DISCUSSION

In the soil and climatic conditions of the Bukhara region, every year before the irrigation of cotton, all influencing factors for irrigation are determined and taken into account, such as: mechanical composition, soil relief, depth of occurrence of mineral waters, air temperature, characteristics of varieties and amelioration zone. During the period of mass budding, they are fertilized with the necessary mineral fertilizers, i.e. at this stage; the fields are prepared for irrigation.

In the experimental variant, together with the crops, organic fertilizer “ecophosphoazotin” was applied at 372 kg / ha, but in the control one it was not applied. Before the first watering of cotton, pre-irrigation, the required mineral fertilizers (35% nitrogen, 30% potassium fertilizers) are applied to both varieties of cotton in the phases of mass budding with hilling along the row spacing, while not damaging the plants, longitudinal ridges and transverse floors are placed.

Table 1 shows the scientific data obtained at the experimental site on the effect of “ecophosphoazotin” and the simultaneous rate of the longitudinal ridge and transverse floor on irrigation water consumption, irrigation duration and cotton productivity.

According to the results of studies in field experiments with hydromorphic zonal characteristics of the hydromodule in 2020-2021, cotton in experimental variant 2 with the introduction of “ecophosphoazotin” and the use of a utility model with a simultaneous rate of ridges and transverse floor, the total water consumption during the growing season was 4000 m3/hectares, the duration of irrigation is reduced to 16,5 hours, the interval between irrigations is 16-18-27 days, manual labor is reduced to 4 hours by 2.5 hectares; cotton harvest - 51.4 c / ha; water consumption for obtaining 1 center of the crop is 77.8 m^3 / ha, which is less than the control water consumption by 39.0 m^3/ha (table 1).

The utility model is proportional to the unused version; these indicators were respectively: 5300 m^3/ha; 18 hours; for 16-15-25 days; the yield was 45.4 c / ha; water consumption for one yield center -116.7 m^3/ha (figure 2).

Table 1. Influence of the complex aggregate of the simultaneous rate of the longitudinal ridge and transverse floor on soils with the introduction of “ecophosphoazotin” by the hydromorphic zone on the water consumption and yield of cotton (average for 2020-2021).

Experience options	Water con-sumption during the growing season, m^3/ha	Flood days, day	Duration of wate-ring, hour	yield, c/ha	water costs for obtaining niya 1ts. harvest, m^3/ha	difference in water consumptio n to con-troll m^3/ha, ±
Saline, according to the mechanical property of soils, heavy weight (hydromorph), VI hydromodular zoning						
1. Control (N-250; P-175 kg / ha; K-120 kg / ha)	5300	16-15-25	18	45.4	116.7	0.0
2. Applied organic ferti -lizer "ecophosphoazotin" and a complex aggregate	4000	16-18-27	16.5	51.4	77.8	40.7

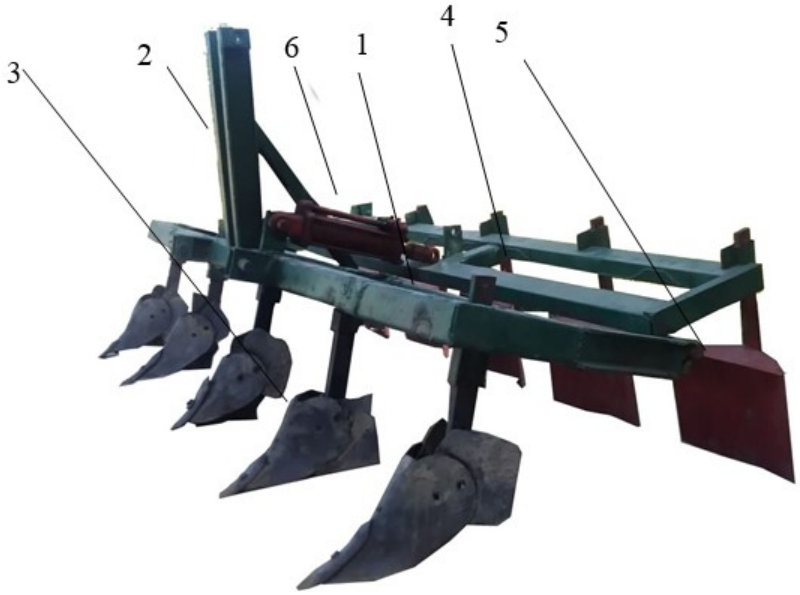

Figure 2. General view of the complex palletiser unit.

Thus, before sowing, by introducing organic fertilizer “ecophosphoazotin” into the soil at 372 kg/ha per fertilizer, and using a complex unit with a simultaneous rate of ridges and cross-floor, the water consumption during the growing season of cotton was - 4000 m^3/ha, the duration of irrigation was reduced to 1, 5 hours, the interval between watering is 16-18-27 days, manual labor is reduced to 4 hours per 2.5 hectares; cotton harvest - 51.4 c/ha; water consumption for obtaining 1 center of the crop is 77.8 m^3/ha, which is less than the control water consumption by 39.0 m^3/ha.

In this regard, special attention should be paid to ensure the quality and quantity of the transverse floor and longitudinal ridge in irrigated fields in reclamation zones.

Before the first and vegetative irrigation, the formation of transverse floors and after irrigation, the dismantling of the transverse floors and, processing between the rows of cotton is also a key task of mechanization.

Until now, these processes were performed entirely by hand. As a result, agro-technical processes were not carried out in a timely manner, which led to an increase in labor and economic costs.

To solve this problem, scientists of the Bukhara branch of the Tashkent Institute of Irrigation and Agricultural Mechanization Engineers have developed a device for the formation of transverse slabs. Information confirming the novelty of this technical solution has been sent to the Intellectual Property Agency of the Republic of Uzbekistan.

To increase efficiency and reduce fuel consumption, it is possible with the help of a complex palletiser unit to simultaneously put the transverse floor and the longitudinal ridge in the designated place. The mechanism of operation of the complex palletiser unit consists of the following:

It is aggregated using a suspension mechanism 2 on tractors LS 100, TTZ 80.11, T-28 X4, MTZ-80.11. When the tractor is started, the hillers 3 mounted on the frame 1 are hilled to irrigate the cotton fields between the rows.

As soon as the waterman or agronomist-specialist where the transverse floor was assigned to the indicated place, the tractor driver starts the working bodies through the distributor and, as a result, attached to the movable beam 4, the bucket-shaped working bodies 5 descend to the ground under the action of hydraulic cylinders 6 and compact the soil until it does not form a transverse floor.

Once it reaches the set point, the implement is lifted and the soil is compacted to form a five-row cross-floor. In subsequent transitions, this process is repeated to form a parallel transverse floor. It should be noted that here the tractor driver needs attention and experience, because the deviation of the resulting transverse floor from the specified line should not exceed 5-10 cm.

In the designated areas along the length of the field, the equipment is lowered and a transverse floor is formed. For example, on a cotton field 200 meters long, there should be from three to five transverse fields, taking into account the terrain. As a result of mechanization of the process, labor costs can be halved, and direct costs - up to 20-25%.

5. CONCLUSION

Thus, in the study, the issue of using a complex aggregate before irrigation was considered, while simultaneously turning on the transverse flooring and the longitudinal furrow for irrigation without damaging the plants.

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