Influence of agro activities on the amount of nutrients in cotton irrigation

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Abstract. It was also observed in the movement of nitrogenous and phosphorous nutrients in the general form, and it was 0.069 and 0.162%, respectively, in the 0-30 cm soil driving layer at the beginning of the application period, and at the end of the application period, it increased by 0.003 and 0.002% in the double-planted variants, and by 0.001% in single rows. it was stated that a decrease was observed. In the options where seeds are planted under a transparent tape, it is worth noting another important aspect of the tape. As mentioned above, the movement of nutrients is accelerated due to the increase in moisture in the fields under the tape, while the watering intervals are longer due to the longer preservation of moisture in the 0-30 and 0-70 cm layers of the soil. and it was found that the irrigation rates are reduced by 1.5-2.0 times compared to the control option, and by 1.0-1.5 times compared to the options with a black tape between cotton rows.

1 Introduction

When the UzPITI-201 cotton variety was fed with different rates of fertilizer and watered in different order, the movement of nutrients in the soil and their absorption by the plant became uniquely invisible. In order to monitor the movement of nutrients and determine their effectiveness in the experimental options, soil samples were taken at the beginning of the application period, at the stages of tillering, flowering and ripening. According to the average 3-year data of the research results, the seeds of the UzPITI-201 cotton variety were planted in the first planting period (8.03-11.03) in options 1-7, the agrophysical and agrochemical characteristics of the soil directly depended on the soil temperature, humidity and air temperature [1-9].

In particular, compared to the analysis of the total amount of nutrients in the soil, there was no change in the laws of impact of agro-measures on nutrients in the samples at the beginning of the period of operation [10-14].

By the end of the operation period, in the control option (options 1-2), which was sown in the usual open method and applied the annual norms of mineral fertilizers N200P140K100 per hectare, compared to the indicators at the beginning of the operation period, humus was 0.08-0.09, nitrogen and phosphorus in general form were 0.005-0.006 and 0.005, respectively. % was observed to decrease. Because, in these warrants, keeping the soil moist at the beginning of the application period, insufficient factors positively

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affecting the movement of nutrients, increased consumption of nutrients due to the influence of early spring low-temperature weather and soil conditions, and other external factors, led to a decrease in nutrients at the end of the application period [15-30].

2 Materials and Methods

Observations and analyzes in the research are based on the methodology "Conducting field experiments" (2007), studying the agrophysical, agrochemical and microbiological properties of the soil in experimental options according to the methodological manuals " Methods of agrochemical and agrophysical research in irrigated cotton areas " (1963), and the accuracy and reliability of the obtained data is B It was carried out using the method of A. Dospehov "Field experiment methodology" (1985), on the basis of mathematical-statistical analysis.

The experiment consisted of 14 options, making a total of 42 options in 3 returns. The options are three-way, located on one level, the total area of each plot is 360 m^2, the estimated area is 180 m^2.

Agrophysical analyses:

Also, the volume weight and porosity of the soil in the experimental field was determined by N.A. Kachinsky method by taking soil samples from every 10 cm of the 100 cm soil layer at the beginning and at the end of the actual growing period of cotton.

The water permeability of the soil was determined by the methods of S.I. Dolgov and S.N. Ryzhov for 6 hours at the beginning and at the end of the cotton period.

Agrochemical analyses

The analysis of the agrochemical state of the soil was carried out in the 0-30, 30-50 cm layers of each option by taking soil samples at the beginning and at the end of the cotton period: humus in the soil (according to the Tyurin method), total nitrogen, total phosphorus (according to the Maltseva, Gritsenko method), nutrients in mobile form in the soil , nitrate nitrogen (colorometric, Granwald-Lyaju method), mobile phosphorus (Machigin method), exchangeable potassium (Protasov method) were analyzed.

Biometric observations

Based on the goals and objectives of the experiment, phenological observations were made on 100 plants with tags in each variant.

- determining the number of true leaves;
- measuring the height of the plant stem; (1.06, 1.07, 1.08);
- determining the number of crop branches; (1.07, 1.08,);
- determining the number of yield elements; (1.07, 1.08, 1.09);
- determination of cotton yield by harvest in all repetitions and options;
- determination of technological quality indicators of cotton fiber (by terms).
- determination of seedling thickness, thousand/piece, length of 11.1 p/m at two points of the plant at the beginning of the period of operation and at the end of the period of operation.

3 Results and Discussion

Also, in the control option (3 options) in which annual norms of $N_{200}P_{140}K_{100}$ per hectare of fertilizers were applied from the vama with a black tape as a mulch between the rows of cotton (3 options), the consumption of nutrients under the favorable soil temperature and humidity conditions under the tape decreased, and the amount of humus in the tillage layer (0-30 cm) was 0.02; nitrogen was observed to increase by 0.003% and phosphorus by 0.002%.

Similar patterns were observed in options 8-9, in which UzPITI-201 cotton seeds were sown in the second period (19.03-22.03) in an open method in favorable soil and air temperature, and humus 0.06-0, 0.06-0. 09 total nitrogen and phosphorus were observed to decrease by 0.005-0.006 and 0.005%, respectively.

It should be noted here that the seeds of UzPITI-201 cotton variety were sown in the open method in the second period (options 8-9), as it was noted, due to the significant increase in the effectiveness of mineral fertilizers in favorable soil moisture and temperature, in favorable weather conditions, compared to the first planting period. in variants, consumption of nutrients was relatively reduced.

Also, in the control option (option 3) where a black tape was laid as a mulch between the rows and mineral fertilizers were applied at the rate of N_{200} P_{140} K_{100} years per hectare (option 3), the consumption of nutrients under the favorable soil temperature and humidity conditions under the tape decreased, and the cotton variety UzPITI-201 compared to the period of the first planting, nutrients increase by 1.5-2.0 times, the amount of humus in the plow layer (0-30 cm) is 0.04; nitrogen was observed to increase by 0.007% and phosphorus by 0.005%.

According to the research, the concentration of carbon dioxide and methane gases in the air of the soil covered with a polyethylene tape is higher than that of the soil without the tape. As a result of biochemical reactions under the tape, carbon dioxide gas reacts with water to form carbonic acid (H_2 CO_3), and methane gas forms acetic acid (CH_3COON) when cotton is watered through the agates covered with a tape. They, in turn, combine with dicalcium and tricalcium phosphate acids, turning them into forms of monocalcium phosphate salts that are easily soluble and easily absorbed by plant roots. As a result, the efficiency of the use of mineral fertilizers by plants increases.

Accordingly, it was observed that the movement of nutrients accelerated in the fields covered with black and transparent tape during both planting periods of the UzPITI-201 cotton variety, and even in the variants with reduced rates of mineral fertilizers, a significant increase in the efficiency of mineral fertilizers was observed. In this case, significant differences were observed between the planting periods, and in the options planted in the early period (8.03) (options 1-7), a significant decrease in their amount was observed due to the fact that the movement of nutrients did not begin at low temperatures of the soil and air in the early stages of cotton development.

Table 1. Impact of agricultural measures on the amount of nutrients in general form at the beginning of the implementation period, % (2016-2018).

Options	Soil layer, cm	At the beginning of the period of action		
		Hummus	Nitrogen	Phosphorus
Planting in the usual open method, 1-2, 9-10 (control)	0-30	0.698	0.075	0.161
	30-50	0.672	0.062	0.152
Black tape 4, 12 (control)	0-30	0.702	0.077	0.169
	30-50	0.687	0.070	0.150
Transparent tape, 3, 5-8, 11, 13-16	0-30	0.693	0.069	0.162
	30-50	0.681	0.067	0.154

Now, if we talk about the options (options 4-7 and 10-14) where seeds of the UzPITI-201 cotton variety are planted under a transparent tape in double and single rows (options 4-7 and 10-14), in the options of the first term (options 1-7) where the seeds are sown early, at the beginning of the period 0-30 It was found that the amount of humus in the soil plowing layer was 0.693%. At the end of the operation period, due to the positive effect of the soil environment under the tape mentioned above, the amount of humus increased by

0.01-0.02% in the options planted with seeds in a row (options 4-5), and by 0.01% in the options planted in a single row (options 6-7). was observed to increase to In other words, in these options, nutrient depletion was not observed, but soil fertility was maintained at its previous state. A similar pattern was observed in the movement of nitrogenous and phosphorous nutrients in general form. For example, it was 0.069 and 0.162% in the 0-30 cm soil driving layer at the beginning of the operation period, and at the end of the operation period, it increased by 0.001 and 0.003% in double rows, and it decreased by 0.001% in single rows (Table 1).

The seeds of UzPITI-201 cotton variety were sown under a transparent tape in double and single rows in the second period (options 11-14) at the beginning of the operation period with the humus content of 0.693% in the 0-30 cm layer of the soil, by the end of the operation period it was noted above due to the positive effect of the soil environment under the tape, it was observed that the amount of humus increased by 0.05-0.03% in the double-row planting options (options 11-12), and by 0.03% in the single-row planting options (options 13-14). In other words, even in these options, there was no decrease in nutrients, but an increase in soil fertility was achieved due to the positive effect of favorable weather conditions, soil moisture and temperature in the next term.

A similar law is observed in the movement of nitrogenous and phosphorous nutrients in the general form, and at the beginning of the application period, it was 0.069 and 0.162% in the 0-30 cm soil plow layer, respectively, at the end of the application period, it increased by 0.003 and 0.002% in double rows, and by 0.001% in single rows. was observed to decrease to (table 2 gives data for 2016-2018).

The same laws were noted in the mobile forms of nutrients, and due to the favorable soil conditions under the transparent tape in the second planting period, the amount of mobile nutrients increased according to the agro-measures. At the beginning of the first planting period, it was observed that the decrease in soil and air temperature has a negative effect on the activity of mobile nutrients in all options. As a result, in these options (options 1-7), nutrients decreased compared to the second planting period. This was also reflected in the subsequent growth and development stages of cotton.

Table 2. The effect of agricultural measures on the amount of nutrients in general form at the end of the period of operation, % average of 3 years (2016-2018).

Option. №	Planting method	Preparation of the comb	Hummus		Nitrogen		Phosphorus	
			0-30	30-50	0-30	30-50	0-30	30-50
1	It's open	Coupler	0.689	0.664	0.069	0.063	0.156	0.147
2	It's open	Coupler	0.690	0.671	0.067	0.062	0.157	0.147
3	Black tape	A single row	0.704	0.690	0.083	0.074	0.173	0.153
4	Transparent tape	Coupler	0.694	0.682	0.071	0.072	0.163	0.157
5	Transparent tape	Coupler	0.695	0.685	0.072	0.063	0.164	0.156
6	Transparent tape	A single row	0.693	0.681	0.070	0.074	0.160	0.158
7	Transparent tape	A single row	0.694	0.684	0.068	0.070	0.165	0.156
8	It's open	Coupler	0.692	0.665	0.066	0.054	0.154	0.146
9	It's open	Coupler	0.690	0.667	0.065	0.052	0.155	0.147
10	Black tape	A single row	0.706	0.691	0.084	0.077	0.174	0.156
11	Transparent tape	Coupler	0.698	0.686	0.075	0.074	0.165	0.161
12	Transparent tape	Coupler	0.696	0.685	0.077	0.075	0.166	0.160
13	Transparent tape	A single row	0.697	0.689	0.072	0.073	0.164	0.160
14	Transparent tape	A single row	0.696	0.690	0.071	0.073	0.164	0.160

According to the results of the average three-year research, the seeds of the second sowing period were sown in the open field, and in the control variant, where the annual rates of N_{200} P_{140} K_{100} kg per hectare were applied, nitrogen nutrients during the flowering

period of cotton amounted to 32.27-36.14 mg/kg. until the end of the period, it was all consumed and amounted to 37.39-40.02 mg/kg. Phosphorous nutrients were also 37.90-38.35 mg/kg during cotton flowering period. It significantly decreased until the end of the period of operation, and remained on average 37.37 mg/kg. So, we can say that cotton grew and developed only at the expense of mineral fertilizers in the method of open sowing of seeds.

$N_{200}\,P_{140}\,K_{100}$ per hectare of mineral fertilizers are used, although the initial technologies are similar to the 1-2 control options where the seeds are sown in the open, the soil conditions under the tape are watered by laying black tape as mulch between the rows during cotton picking. provided a short-term increase in nutrients due to its positive effect on nutrient movement. For example, 37.72 mg/kg of nitrogen, 39.75 mg/kg of phosphorus and 213 mg/kg of potassium nutrients were accumulated during the flowering period of cotton 200 mg/kg of nutrients remained in reserve at the end of the period of operation.

Also, in the second planting period, the seeds were sown together and mineral fertilizers were applied at the rate of $N_{180}\,P_{125}\,K_{90}$ kg per hectare. it was observed that it increased to 39.79-41.01 mg/kg. By the end of the application period, mobile nitrogen was 43.82-44.45 mg/kg, respectively. Also, it was found that in variants 13-14 planted in a single row under the tape, the effective period was 8.33-8.02 mg/kg at the beginning, and nutrients increased to 33.36-34.16 mg/kg during the flowering period of cotton. Another aspect should be emphasized here, because the nutrient area in the 35-40 cm wide pods under the transparent tape in the feeders is 3.3-5.8% more than the pods in a single row, it was observed that nutrients were accumulated the most in these variants.

As it is known, the larger the size of the pile, the better the volume mass and porosity of the soil and the increase of its moisture and heat capacity, the nitrification processes are accelerated, and the increase of nutrients in the soil environment favorable for the increase of nutrients was observed. Speaking of essential nutrients, the same seeds were found to contain 12.66-13.13 mg/kg at the beginning of the application period in the double-planted options (options 11-12). It was observed that it increased to 40.32-43.25 mg/kg by the flowering period of cotton . At the end of the treatment period, it was found to be 41,79-42,42 mg/kg. It should be said about the exchanger, potassium, because the level of supply of potassium in the field was average, it was also in an intermediate position within the influence of various factors.

In conclusion, in the years of research, in the first planting period, the seeds were sown on the 1st ten days of March, in options 1-7, the rules of establishment of agro-measures were the same, but the results were lower compared to the options 8-14, in which the seeds were planted in the second planting period, on the 3rd ten days of March. received.

Also, in the technology of seeding under the tape, which is considered the main element of resource-saving technology in both planting periods, it was found out that the event of applying mineral fertilizers by 10-15% of the annual cotton fertilization standards in the current recommendations is the most effective way to use mineral fertilizers.

Soil moisture - 500-600 mm atmospheric precipitation, which is necessary for all crops during its growth period, is the minimum for cotton to grow normally. In the opposite case, the need for additional watering of the cotton will arise. Depending on the evaporation of moisture from the soil surface and heat demand, the climate is not the same across the zones. For example, in the northern districts of Karakalpakstan and Khorezm regions, evaporation is about 900-1000 mm per year. This indicates 9-10 times more moist evaporation than precipitation in these regions.

It reaches 1400-1500 mm in the central climatic region of the Fergana Valley, and 1800-2000 mm in the southern districts of the Surkhan-Sherabad Valley. In some regions, 14 times more moisture evaporates than precipitation.

Based on the above problems, in this study, resource-saving technologies were studied, the effects of UzPITI-201 cotton variety seeds were sown in two different sowing periods, in the morning optimal periods, in double and single rows, in the usual open and under tape sowing method, and in different seedling thicknesses. Any technology developed in cotton care, especially irrigation and moisture retention technologies, has an impact on the agrophysical and agrochemical processes of the soil in one way or another, and is reflected in the growth, development and yield of cotton. Also, they have a serious effect on soil moisture and its agrophysical properties.

Table 3. Soil moisture before planting, % relative to CHDNS, 2018 1st planting period (8.03)

Options	Soil moisture relative to volume						Relative to CHDNSgap, humidity (average)
	0-10	10-20	20-30	30-40	40-50	0-50	
The usual open method	14.1	15.7	16.4	16.4	15.9	15.7	71.4
The usual open method	14.6	15.4	16.4	16.9	16.4	15.9	72.5
Laying a black tape between rows of cotton	14.1	15.7	16.4	16.9	17.9	16.2	73.6
Planting seeds under a transparent tape	15.8	15.9	17.4	17.9	18.2	17.0	77.5
Planting seeds under a transparent tape	15.9	16.3	17.4	18.2	17.9	17.1	77.9
Planting seeds under a transparent tape	16.0	16.6	17.0	17.2	17.9	16.9	77.0
Planting seeds under a transparent tape	16.1	16.4	17.4	18.0	18.5	17.3	78.5

In the experiments of 2016-2018, the effect of agro-measures on soil moisture before planting was similar, and the soil moisture in tape-covered options was 1.4-5.7% in 2017, 2.5% in 2018, compared to the option where the seeds were planted in the open method and the black tape-covered option. It was found that 3-7.2% higher moisture was retained (Table 3).

According to the results of the analysis of the seedling of the 2nd planting period, although the soil moisture in the 2016 experiment decreased by 2-3% compared to the soil moisture in the 1st planting period, due to the increased weather temperature, more favorable conditions for the germination of the seed were created. It was 76.6-78.1% for 20.03 days in the usual open method and black tape laying options. In double and single rows under the tape, the soil moisture was 81.3-82.2%, it decreased by 3-4% compared to the soil temperature in the 1st early planting period, and more favorable conditions were created for the germination of seeds. In the experiments of 2017-2018, it was found that the soil moisture of the options covered with a tape, compared to the usual open method and the options covered with a black tape, the soil moisture was kept at a high humidity of 2.4-6.9% in 2017 and 2.6-7.4% in 2018 (4- table).

Table 4. Soil moisture before planting, % relative to CHDNS, 2018 2nd planting period (21.03)

Options	Soil moisture relative to volume						Relative to ChDNSgap, humidity (average)
	0-10	10-20	20-30	30-40	40-50	0-50	
The usual open method	13.4	14.4	15.9	16.8	17.7	15.6	71.1
The usual open method	13.9	14.9	16.4	16.7	17.9	16.0	72.5

Laying a black tape between rows of cotton	14.6	15.3	15.9	16.9	18.4	16.2	73.7
Planting seeds under a transparent tape	15.3	16.2	16.4	17.4	18.8	16.8	76.5
Planting seeds under a transparent tape	15.4	16.3	16.6	17.7	19.0	17.0	77.3
Planting seeds under a transparent tape	15.4	16.4	16.9	17.9	18.4	17.0	77.3
Planting seeds under a transparent tape	15.3	16.8	17.0	18.1	19.1	17.3	78.5

So, in the experiments, based on the analysis of the soil moisture determined before sowing the seeds every year, the favorable soil moisture for sowing the seeds under the transparent tape was found on the 18th-23rd of April in the 2nd sowing period. Thus, it was planned to irrigate the experimental variants in both (8.03-11.03 and 19.03-22.03) planting periods in the optimal irrigation order of 70-75-60% of cotton irrigation compared to CHDNS. Accordingly, cotton was irrigated when soil moisture reached 70% in each variant of agro-measures. Determination of soil moisture in the control variant where the seeds were sown in an open method was determined as usual in the soil layer of 0-50 cm during the first leaf period, 0-70 cm during the flowering period, and 0-100 cm during the flowering and ripening period. In tape options, it was determined in the 0-50 cm soil layer based on relevant recommendations.

According to the results of the research on the 1st planting period, in the conditions of 2016, the seeds were given when the moisture content of the 0-50 cm soil layer was 15.7% and reached 71.2% compared to CHDNS in the control options planted in the usual way. The following waters are 16.0, according to the moisture content of the 100 cm soil layer and plant requirements; 16.4; 17.1; 17.2; At 17.4% soil moisture by weight, 72.9-74.7-m 77.8-78.3-78.9% soil moisture compared to CHDNS, the cotton field was irrigated at specified times. Compared to the 1st water, the 2nd water was placed at an interval of 25 days, the 3rd water at an interval of 18 days, and the 4th water at an interval of 13 days. Water was applied 5 times during the season, and 4501 m^3/ha of water was used.

In the options with a black tape between the rows of cotton, irrigation was different compared to the other options, the first two waters were watered at the same time and rate as the control option, where the seeds were sown outdoors. Because the cotton treatment cycle in this option was the same as the control option with normal seeding in the open field, the treatment was completed during the cotton carding period and a black tape was placed between the rows. Although the black tape was laid down during the period of application of the cotton, its effect in the following waters showed its own importance and the corresponding results were obtained.

In the control option 1, the calculation was made using the method of determining the moisture content of the 0-50 cm soil layer, and it was given when the soil moisture content reached 71.2% compared to ChDNS (see Annexes 18-19). The 2nd water was given when the soil moisture reached 70.0% during the cotton ginning period, when the moisture of the 0-50 cm soil layer was 17.0%, compared to CHDNS, when it reached 70.8%. Compared to the 1st water, the 2nd water was placed at an interval of 25 days, and the 3rd water at an interval of 28 days. During the season, water was applied 4 times, and 2983 m^3 /ha of water was used. It was found that the watering interval was 29-37 days due to the black tape between the rows in the next waters, and the watering interval was extended by 4-5 days compared to the control option. In other words, due to the extension of irrigation periods by

4-5 days and the reduction of water consumption, it was possible to save 1518 m^3 /ha of water compared to the control options where the seeds were planted in the usual way. Also, during the irrigation of cotton during the growth period, it allowed to reduce to 1.0-1.5 water.

4 Conclusion

Although the black tape was laid down during the period of application of the cotton, its effect in the following waters showed its own importance and the corresponding results were obtained. For example, in control option 1, it was calculated using the method of determining the moisture content of the 0-50 cm soil layer, and it was given at 17.0% soil moisture, when the soil moisture content reached 70.8% compared to CHDNS (see Annexes 20-21). Water 2 was also irrigated at the same soil moisture level as the control option. Water was applied 4 times during the season, and 2844 m 3 /ha of water was used. It was found that the watering interval was 29, 37 days due to the black tape between the rows in the next waters, and the watering interval was extended by 6-7 days compared to the control option. In other words, due to the extension of irrigation periods by 6-7 days and the reduction of water consumption, it was possible to save 1568 m3 /ha of water compared to the control options where the seeds were planted in the usual way. Also, during the irrigation of cotton during the growth period, it allowed to reduce to 1.0-1.5 water.

The same patterns were also noted in 2017-2018. In the 2017 experiment, in the 1st planting period, in the options where the seeds were planted under a transparent tape, compared to the options planted in the usual way (options 1 and 8), 2219 m 3 /ha, compared to the black tape, 476 m 3 /ha , 2386 and 226 m 3 /ha in the 2018 experiment , 2676 and 509 in the 2nd planting period of 2017, 2628 and 402 m 3 /ha in 2018, respectively. It was found that the number of waterings was reduced to 1-2, and the watering interval was extended to 10-15 days.

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