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The effect of changes in soil temperature on planting systems and cultivator

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Annotation. This article describes the Andijan-36 variety of medium-fiber cotton in the light gray soils of Andijan region. valuable scientific information has been provided on planting systems and the effect of sowing on the change in soil temperature.

Key words. Cotton, soil, temperature, soil temperature, humidity, row spacing, air exchange, planting systems, sowing in a row, temperature change.

Introduction:

Today, a special attention is being paid to the development of optimal cotton range through the effective use of modern agro-technologies, improving the agronomic properties of the soil and the production of high quality crops in the world of cotton growing. "Now cotton is being grown in more than 80 countries around the world, on more than 32 million hectares, and produces more than 25 million tons of fiber a year." [11]. At the same time, special attention is being paid to the development of promising agro-technologies for high and high-quality cotton, as well as the development of new planting schemes in the rational use of arable land.

At present, the world cotton industry is focusing on scientific research to determine the effectiveness of inter-row intervals of 60 (70, 76, 80 and 90 cm) along with 90 (60x30) 70x56, 80x40 cm and several other intervals. It is important to develop optimal row spacing in the care of cotton, to conduct research on the norms of feeding cotton in different row spacing and to determine the thickness of seedlings and the optimal number and depth of tillage between rows.

In our country, one of the important factors in the efficient use of land is the correct delineation of cotton rows. Paragraph 3.3 of the decree of the President of the Republic of Uzbekistan "On the Action strategy for the development of the Republic of Uzbekistan for 2017-2021" [2] states that "... significant tasks have been identified to significantly increase the export potential of the sector. It was also noted that in order to increase the productivity of cotton fields and efficient use of land, it is necessary to introduce the sowing of seeds on the basis of "double raw and "sixties schemes and gradually abandon the ineffective "nineties" scheme. In this regard, it is advisable to develop optimal schemes of cotton row spacing and expand research on the number, depth and feeding measures of its processing.

We know that temperatures above 30-35 degrees have a negative effect on the plant, due to excessive evaporation of water from the leaves, the tissue dries out and the crop nodes begin to shed. Soil temperature is one of the main factors in the life cycle of plants and is important for seed germination, growth and development. When the soil temperature is low, the seeds may rot due to excess moisture, and vice versa under the influence of high temperatures. In various soils of the country, including light gray soils, it is difficult to raise the temperature of the driving layer of the soil under the influence of precipitation in the spring. Therefore, all applied agro-technical measures will have to focus on raising soil temperature. There are many ways to do this, with manure, charcoal powder, paper, polyethylene film.

Many scientists point out that the main force influencing soil fertility is the soil structure. According to them, although the root part of annual plants mainly develops in different layers of soil, the root does not develop widely in the drive part of the soil. On the surface of the soil there is very little organic-forming mass. It therefore does not produce enough humus, resulting in a negative impact on the structure of the soil.

ne of the agrophysical properties of soil is the bulk density of the soil. The bulk density of the soil is of great importance for the normal growth and development of the plant. In well-grained soils, the yield is high

only if the volume weight is acceptable. As a result of agro-technical measures and tillage, the volume weight of the soil increases. At an acceptable weight of the soil, the plant grows well, creating a favorable opportunity for high yields. Because the bulk density of the soil alternates the agrophysical, hydrothermal, aeration, microbiological, and nutrient regimes of the soil. One of the agrophysical properties of soil is its porosity. When the porosity of the soil is high, air exchange improves, the passage of microbiological processes accelerates, heat regimes change in a positive direction, and as a result create conditions for soil fertility.

One of the agrophysical properties of soil is its temperature. Soil temperature is one of the most important factors in plant growth and development. The cotton plant is heat-loving, the average daily temperature in the soil layer in which the seeds are planted should not be less than 12- 13 ^{0}C. In addition, the seeds begin to germinate when the soil temperature reaches 14-15 ^{0}C and require 25-30 ^{0}C during the next development.

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In the scientific research of B.M.Kholikov, S.Sh.Ubaydullaev, X.Egamov [8; pp. 3-22, the different positive effects of sowing cotton seeds in different schemes on soil temperature and humidity became clear from the day of sowing.

According to the research of N.Urazmatov [9; 11-12-pp], the influence of seed sowing methods, systems and seedling thickness on the soil temperature during the sowing period in the conditions of the meadow soils of the Fergana region. This is especially observed in the variants in which the seeds are planted in piles with high soil temperature.

According to N.N.Urazmatov [10; 403-406-pp] it is recommended to plant at a seedling thickness of 90-95 thousand / ha and apply fertilizers at the rate of N-150, P_2O_5-105, K_2O-75 kg / ha in the spring at the most optimal time in the system 90x12-1 based on Fergana scientific experiment station of SRICBSPCA. Also, by preparing the soil in the fall on the basis of resource-saving technologies, bringing a wide range of seedlings will result in higher germination rates when the soil temperature in the spring is optimal for seed germination.

Research methodology. In our experiments, the effect of seed sowing systems, seedling thickness, double sowing and row spacing on soil temperature changes in light gray soils of Andijan region was determined using an **"ama-digit"** electronic thermometer made in Germany before sowing and germination.

Analysis and results. It should be noted that since the survey years (2020-2021) are close to each other, we will limit ourselves to the statement that soil temperature changes and all other data were obtained in 2020 conditions. We have provided average data as the fertilizer norms have not yet been fully applied at the time of sowing.

It should be also noted that in the spring of 2021, due to the relatively high rainfall during sowing, the seeds were sown twice and the soil temperature was 0,2–0,5 ^{0}C lower than in previous and subsequent years. But in the days following the sowing of the seeds, the air and soil temperatures continued to rise.

In 2020, during the observations done at 8^{00} o'clock in the morning, the seeds were sown in a row at a distance of 60 cm, the thickness of the seedlings was set at 90-100 thousand / ha. In the variant planted in seed 90 (60x30) system with a seedling thickness of 120-140 thousand / ha, these values were 12.1 and 12.3 ^{0}C, respectively, while in the other variants the soil temperature was almost the same. It was found to be around 12.1-12.6 ^{0}C.

However, from the second day of the observation, it was observed that the change in soil temperature depends on the planting systems, seedling thickness and sowing in the furrow. we could not determine, more precisely, we could not determine. Therefore, on the second day of sowing, the row spacing was 60 cm, and in the variant with 90-100 thousand seedlings per hectare, the temperature in the 0-5 cm layer of soil was 12.8 ^{0}C, and in 5-10 cm - 13.6 ^{0}C. Hence, it was observed that the soil temperature in the lower layer was slightly higher, and this situation was repeated in other variants. In the variant in which the seed is sown in the system 90 (60x30) with a seedling thickness of 120-140 thousand / ha, the soil temperature is 12.4 and 12.8 ^{0}C, respectively, in relation to its layers, which is 0.4 and 0.6 ^{0}C lower than the 60 cm row spacing. observed. This means that as the seedling thickness increased from 90-100 thousand / ha to 120-140 thousand / ha, it was found that the soil temperature decreased slightly, which can be attributed to the effect of seedlings.

The seeds were sown in the 80x40 cm system at a seedling thickness of 120-140 thousand / ha, and it was found that the soil temperature was 12.8 ^{0}C to 14.2 ^{0}C, which is 0.0-0.6 ^{0}C higher than the control in the variants with different processing and fertilizer standards was seeds were sown at row spacing of 80x60 cm with a seedling thickness of 140-160 thousand / ha. 2-0.3 ^{0}C, and 0.3-0.3 ^{0}C higher than the 80x40 cm row spacing. Due to the increase in air temperature over the observation period, the soil temperature also rose in all variants.

According to the data obtained in the last 10 days of the observation, the soil temperature was 16.8 ^{0}C in the 0-5 cm layer and 17.0 ^{0}C in the 5-10 cm layer in the variant where the seeds were left to 90-100 thousand / ha in the 60 cm row spacing. When the seeds were sown in the 90 (60x30) system at a seedling thickness of 120-140 thousand / ha, it was 0.2-0.2 ^{0}C higher. In the experiment, relatively high rates of observation during this period were observed when the seeds were sown at 80x40 cm row spacing, 17.8-18.3 ^{0}C, and the control was 1.0-1.3 ^{0}C, 0.2-0.1 ^{0}C compared to those sown at 80x60 cm row spacing. It was found to be higher than 1 ^{0}C, which indicates the optimal use of seedlings from sunlight and air temperature when sowing seeds in row spacing of 80x40 cm.

Influence of sowing systems and tillage on changes in soil temperature, (^{0}C), 2020-year

Option mode	Planting systems, cm	Theoretical seedling thickness, thousand / ha	Fertilizer standards	The day the seeds were sown		Second day		Fourth day		Sixth day		Eighth day		Tenth day	
				Soil layers, cm											
				0-5	5-10	0-5	5-10	0-5	5-10	0-5	5-10	0-5	5-10	0-5	5-10
1	60 (control)	90-100	N-200	12.4	12.8	12.8	13.6	13.0	13.2	14.8	14.9	15.2	15.3	16.8	17.0
2	90 (60x30)	120-140	P2O5-140	12.1	12.3	12.4	12.5	13.1	13.2	14.6	14.5	15.0	15.1	17.0	17.2
3	80x40	120-140		12.3	12.4	12.8	12.9	13.2	13.5	14.5	14.6	15.1	15.2	17.1	17.3
4	80x40	120-140	K2O-100 kg / ha	12.2	12.6	13.5	14.2	15.6	16.2	16.1	16.8	17.1	18.1	17.8	18.3
5	80x40	120-140		12.3	12.6	13.4	14.1	15.5	16.0	16.0	16.7	17.0	18.0	17.5	18.0
6	80x60	140-160		12.3	12.1	12.6	12.8	13.2	13.6	14.2	14.5	14.8	14.9	17.6	17.7
7	80x60	140-160		12.6	12.5	12.7	12.8	13.0	13.5	13.5	14.5	14.8	14.4	17.7	17.8
8	80x60	140-160		12.0	12.6	12.5	12.9	13.1	13.6	13.5	14.6	14.4	14.7	17.6	18.2

Conclusions and recommendations

1. In the experiment, relatively high values were observed when sowing seeds in row spacing 80x40 cm, the soil temperature was 17.8-18.3 ^{0}C, and the control was 1.0-1.3 ^{0}C, when the seeds were planted in row spacing 80x60 cm, 0.2 Found to be higher than 0.1 ^{0}C, which indicates the optimal use of seedlings from sunlight and air temperature when sowing seeds at intervals of 80x40 cm.

2. When cotton is grown in different row spacing (60, 90 (60x30), 80x40 and 80x60), it is acceptable to use N-200, P_2O_5-140, K_2O-100kg / ha at 80x40 cm row spacing compared to other row spacing for plant nutrition and development. conditions were observed to be created.

3. N-200, P_2O_5-140, K_2O-100 kg / ha in the range of 80x40 cm in the background, 120-140 thousand / ha as a resource-saving technology, which has a positive effect on soil fertility to obtain high and quality yields of cotton in light gray soils. It is recommended to cultivate at a depth of 5–7 cm 1 time during the period of care and (narrow) row spacing, leaving the seedlings.

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