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Research Article

ROOT SYSTEM DEVELOPMENT OF NEW AND PROSPECTIVE VARIETIES OF COTTON IN DRIP IRRIGATION IN TYPICAL SIEROZEM SOIL CONDITIONS

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ABSTRACT

In this article, information is given on the effect development of the root system of cotton when irrigated in the order of 70-70-60% in furrow irrigation, 70-70-60%, 65-70-65% and 70-75-65% in drip irrigation (DI) of new and regional varieties of cotton S-6524, S-6570 and S-8298 in the conditions of irrigated typical sierozem soils of Tashkent province.

KEYWORDS

Typical sierozem soils, drip irrigation, root system of cotton, taproot, arable layer.

INTRODUCTION

It is of urgent importance to carry out scientific research in the field of creating agrotechnology for growing cotton varieties with a root system adapted to drip irrigation, effectively using the best achievements of local and world science and practice.

Influence of irrigation methods on the development of the root system of cotton In the field studies conducted by M.Mukhammadjanov and S. Suleymanov (1973), it was noted that the main taproot of cotton usually grows up to 1 meter, and the side roots grow up to 30-40 cm. In the conditions of automorphic soils with a deep water level, the root system of cotton is mainly formed under the influence of the irrigation system. Usually, in the agrotechnics of cotton cultivation, cutting of side roots by the working bodies of the cultivator was observed during inter-row processing. As a result, it has led to a decrease in the yield. If the yield of cotton grown without damage to the root system is taken as 100 percent, when 5 cm of the cotton root system is cut, 7.3 percent is lost, when 10 cm is cut, 19.5 percent is lost, and when 20 cm is cut, 20.6 percent of the yield is lost (3).

In the research conducted by J.Noraliev, A.Avliyokulov in the conditions of takir soils of Surkhandarya region,

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the root system of the thin fiber Termiz-31 cotton variety grew by 0.8-1.2 m, Namangan-77 cotton variety by 0.7-1.0 m, Yulduz cotton variety reaches 0.6-0.7 m. Early cotton varieties have a weaker root system than late cotton varieties and are less resistant to drought. Therefore, quick-growing cotton varieties require frequent watering. In the 15-day period of cotton, the main root is 3-4 times longer than the main stem. The main root grows an average of 2.5-3.2 cm per day in the first two weeks, and the lateral roots grow 1.5-4.9 cm per day. Cotton root grows rapidly for the first 35-40 days, and after 42-70 days, the root development continues to decrease (4).

The growth and development of cotton varieties, yield and seed quality indicators are mainly directly related to the root system of cotton. Different irrigation technologies and regimes determine not only the surface weight, but also the development of the root system. The length of the roots of cotton varieties grown in meadow and meadow-swamp soils is two or three times shorter than the roots of cotton varieties grown in sierozem soils (2).

According to the results of research carried out by N.Durdiev in the Samarkand region, when the root system of cotton variety S-8286 was studied by the method of drip irrigation in the arable layers of the soil, in the 10% budding phase, it was observed that the root length was 24 cm when watering the 30-50-50 cm soil layer, 30 cm in the 50-70-50 cm soil layer, and 36 cm in the 70-100-70 cm soil layer, the roots are strongly developed (1).

MATERIALS AND METHODS

Field experiments on this subject were carried out in 2021-2023 in the conditions of irrigated typical sierozem soils of the Tashkent province, the mechanical composition of the soil is heavy sand, and the ground water is located at a depth of less than 15 meters. Local, new and promising S-6524, S-6570 and S -8298 cultivars were tested on the effect of soil moisture on the root system development in the order of 70-70-60%, 65-70-65% and 70-75-65% relative to LFMC. In the variants using drip irrigation technology, the arable layer was set at 50-50-50 cm in accordance with the phases of growth and development of cotton, and in the options of direct irrigation, the arable layer was set at 70-100-70 cm. "Methodology of field experiments with cotton under irrigation conditions", "Methods of conducting field experiments" (UzCRI, Tashkent. 2007) were carried out based on the methodological manuals, and agrotechnical activities were carried out in the order adopted by the farm.

RESULTS AND DISCUSSION

As a result of observations on the development of the root system of cotton in 2021, it was observed that the root system penetrated mainly to a depth of 0-74 cm in the irrigated options, while in drip irrigation, the main root system of cotton was spread in the 0-49 cm layer of the soil. This led to the development of the root system in the fertile layer of the soil in drip-irrigated options, and in turn, increased yield.

As a result, soil moisture before irrigation was controlled in the order of 70-70-60% in relation to LFMC, in the controlled irrigated variants, the arable layer of the soil was 70-100-70 cm, and the main developed layer of the cotton root system was 0-73 cm in variant 1 in S-6524 variety, in variant 2 S-6570 variety was 0-70 cm and in variant 3 S-8298, it was observed that the main developed root system was distributed in the 0-74 cm soil layer (Fig. 1).

In the method of drip irrigation, the arable layer of the soil was 50-50-50 cm, and the soil moisture before irrigation was 70-70-60% in relation to LFMC. It was

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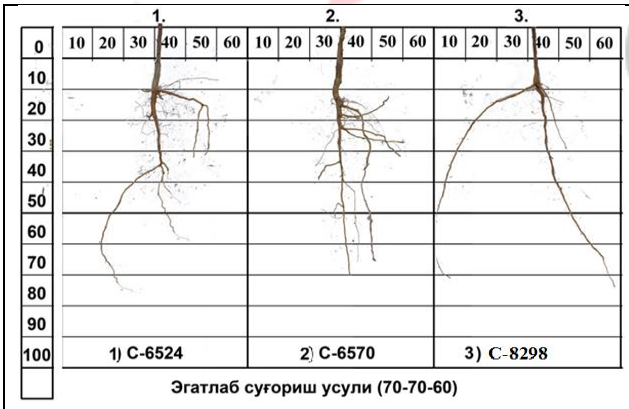
observed that the root system of S-6524 cotton variety developed 2-5 cm deeper than the root system of other varieties.

Drip irrigation was applied and the soil moisture before irrigation was 65-70-65% in the order of LFMC, and the root system of cotton was 0-44 cm, 0-42 cm and 0-46 cm of soil in cotton varieties S-6524, S-6570 and S-8298 respectively. It was found that it developed in layers.

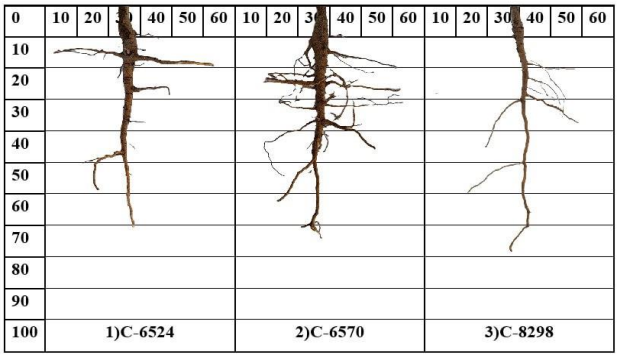
The soil moisture before irrigation was 70-75-65 percent compared to LFMC, in the options where DI was used, the root system of cotton was at 0-45 cm in the 10th option S-6524 variety, 0-47 cm in the 11th option S-6570 variety and 12th option in the variety S-8298, the main developed root system was 0-49 cm. It was observed that the axial root system and lateral roots of the cotton variety S-8298 were strongly developed (Table 1).

In the second year of the research, the soil moisture was 70-70-60 percent compared to LFMC, the control, in the fully irrigated options, the main root system of cotton developed layer was 0-70 cm in S-6524 variety, 0-75 cm in S-6570 variety and 0-77 cm in S-8298. cm was observed to be distributed in the soil layer.

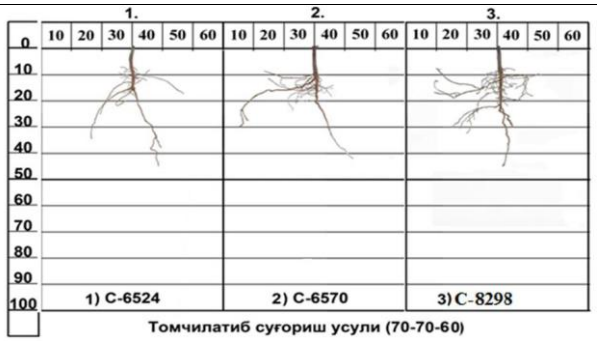
When the soil moisture before irrigation is 70-70-60% compared to LFMC, the development of the taproot in the cotton variety S-6524 is faster than in the cotton varieties S-6570 and S-8298, and the lateral roots are also well developed, according to the soil 50-50-50 cm, it was observed that the length of the arrowroot was 49 cm, and it was 2-4 cm longer than the above varieties.



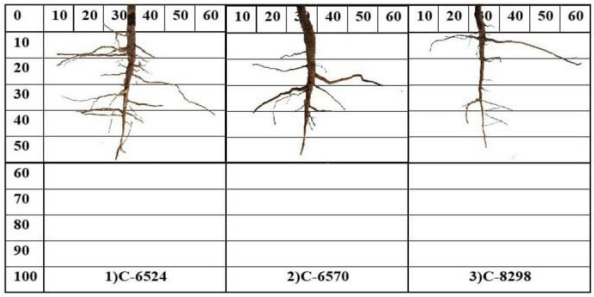
Furrow irrigation method, 2021 year



Furrow irrigation method (70-70-60%), 2022 year



Drip irrigation method (70-70-60), 2021 year



Drip irrigation method (70-70-60%) 2022 year

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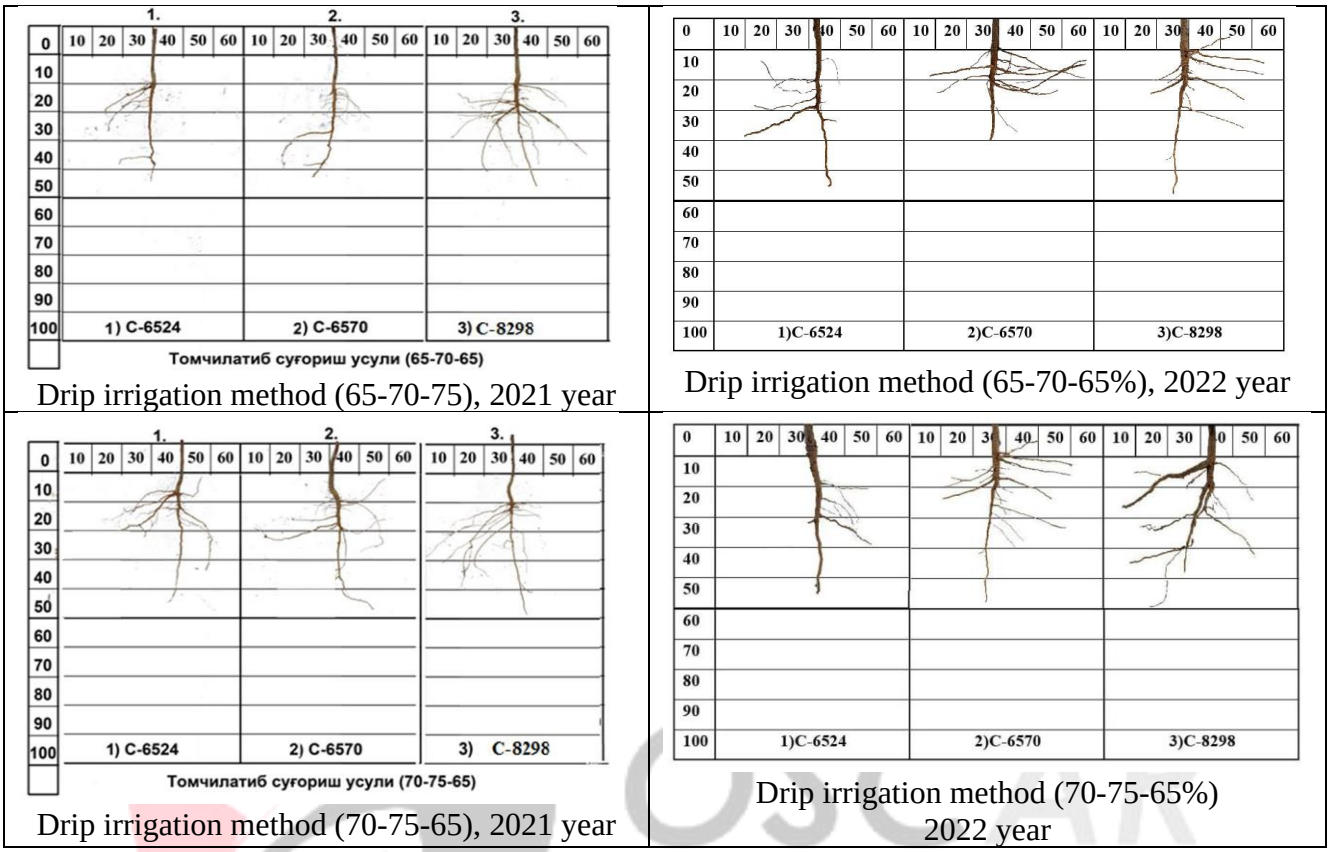

Fig 1. Development of the root system of cotton varieties under different irrigation methods (2021-2022)

In drip-irrigated variants with soil moisture in the order of 65-70-65% relative to LFMC, the root system of cotton in S-6524 variety had a main developed layer at 0-45 cm, in S-6570 variety at 0-39 cm, and in S-8298 the main root was at 0-47 cm was developed in the soil layer, in the same irrigation method, soil moisture was 70-75-65% relative to LFMC, the root system of cotton was 0-43 cm, in S-6524 variety, 0-48 cm in S-6570 variety, and it was observed that the main developed root system in S-8298 variety developed in the 0-50 cm soil layer. In this case, it was observed that the root system of S-8298 cotton variety was better developed (2-7 cm deeper) than other varieties, and the yield was also high (Fig 1).

CONCLUSION

It was found that it has optimal water and physical properties for obtaining a guaranteed abundant and high-quality harvest of cotton varieties by applying the drip irrigation method in the heavy sand and typical sierozem soils of Tashkent province, which have been irrigated since ancient times. As a result of observations on the development of the root system of cotton in furrow and drip irrigation, it was observed that the root system developed mainly in the 0-77 cm soil layer in the drip irrigation options, and in the 10-49 cm soil layer in the drip irrigation technology. In this case, the soil moisture in drip irrigation was 70-70-60% compared to LFMC in the order of S-6524 cotton variety and 70-75-65% compared to LFMC, the root system of S-6570 and S-8298 cotton varieties was well developed compared to other varieties and the yield

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was also observed to be high. As a result of the introduction of drip irrigation technology, the main root system of cotton will develop in the fertile layer of the soil and the cotton yield will be relatively high.

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