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DEVELOPMENT OF RESOURCE-SAVING IRRIGATION REGIMES FOR SOYBEAN VARIETIES IN SALINE MEADOW-ALLUVIAL SOILS (IN THE EXAMPLE OF BUKHARA REGION)

J. A. Dustov

Research Institute of agrotechnologies of cotton selection, seed growing and cultivation, doctoral student

Abstract

In this article, in the conditions of saline meadow alluvial soils, the soybean varieties "Uzbek-6", "Nafis" and "Tumaris" were drip-irrigated and the pre-irrigation soil moisture was 65-70-70%, 70-75-75%, and Information on the scientific results obtained in connection with the scientific research works on obtaining a high grain yield from soybean varieties when irrigated in 75-80-80% regimes and economical use of irrigation water is presented.

Keywords: soybean varieties, water physical properties of the soil, soil moisture, irrigation method, irrigation procedure, soybean varieties growth, development, grain yield.

В данной статье в условиях засоленных лугово-аллювиальных почв сорта сои «Узбек-6», «Нафис» и «Тумарис» поливали капельным способом и предполивная влажность почвы составляла 65-70-70 %. 70-75-75%, а также представлены сведения о научных результатах, полученных в связи с научно-исследовательскими работами по получению высокого урожая зерна от сортов сои при орошении в 75-80-80% режимах и экономном использовании оросительной воды.

Ключевые слова: сорта сои, водно-физические свойства почвы, влажность почвы, способ орошения, порядок орошения, рост, развитие сортов сои, урожайность зерна.

Currently, soy is the main part of agricultural crops in the USA, Russia, China, Brazil, Argentina and a number of European countries. 106 million per ear in the USA. more than tons of soybeans are grown and 60% of them are exported.



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Soybean cultivation areas in Uzbekistan are expanding ear by ear. In 2022, 146,500 hectares of soybeans were grown and 165,000 tons of soybeans were harvested, and in 2023, 151,200 hectares of soybeans were grown. It is important to develop drip irrigation systems for growing soybean as a main crop, achieving high yields and improving soil fertility.

The aim of this research study is to development of resource-efficient irrigation methods for obtaining high and quality grain yield from soybean varieties and efficient use of irrigation water in the conditions of saline meadow alluvial soils of Bukhara region.

The object of the study are alluvial soils of the irrigated meadow of the Bukhara region and Nafis, Uzbek-6 and Tumaris soybean varieties.

The scientific novelty of the research is as follows:

for the first time, it was determined that drip irrigation of Nafis, Uzbek-6 and Tumaris varieties of soybeans in the conditions of saline meadow alluvial soils of Bukhara region is acceptable in the order of 70-75-75% relative to the limited field moisture capacity before irrigation;

elements of resource-saving drip irrigation techniques were developed in the cultivation of soybean varieties;

It was determined that the duration of the growing period of soybean varieties in the resource-efficient drip irrigation method was reduced to 12-14 days in the Uzbek-6 variety, 9-7 days in the Tumaris variety, and 7-14 days in the Nafis variety;

When soybean varieties are irrigated by resource-saving drip irrigation method, according to the irrigation procedures, 0,89-0,76 t ha⁻¹ in the Uzbek-6 variety, 0,27-0,19 t ha⁻¹ in the Tumaris variety, and 0,48-0,35 t ha⁻¹ in the Nafis variety. It is scientifically based that it is possible to grow an additional grain crop.

Implementation of the research results. Based on the results of research on the development of resource-saving irrigation procedures for soybean varieties in the conditions of saline meadow alluvial soils of the Bukhara region:

The recommendation entitled "Development of resource-efficient irrigation procedures for soybean varieties in the conditions of saline meadow alluvial soils"



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was approved (Reference No. 03/28-766 of the Ministry of Water Management of the Republic of Uzbekistan dated March 2, 2024). This recommendation is being used as a guide in soybean farms;

Uzbek-6 and Nafis varieties of soybeans were irrigated using the resource-saving drip irrigation method. The soil moisture before irrigation was 70-75-75% relative to the limited field moisture capacity. It was introduced on the 54-hectare farm "Zarifota" in the Bukhara district of the Bukhara region (2024 of the Ministry of Water Management of the Republic of Uzbekistan reference No. 03/28-766 dated March 2). As a result, when soybean varieties are irrigated 8 times during the season, at the rate of 220-240 m³ ha⁻¹, and at the rate of 1800-1850 m³ ha⁻¹ seasonal irrigation, the weight of 1000 grains is 132-148 grams, the grain yield is 2,4-3 t ha⁻¹, the level of profitability was 88-45,4 %;

Soybean varieties were pre-irrigated by drip irrigation method. Soil moisture was 70-75-75% relative to the limited field moisture capacity. Irrigation by wetting a 30-50-50 cm layer of soil in the order of 30 ha in "Bahor baraka iftikhori" and "Temir maston" farms in Bukhara district, Bukhara region. introduced in the field (Reference No. 03/28-766 dated March 2, 2024 of the Ministry of Water Management of the Republic of Uzbekistan). As a result, a grain yield of 2-2,3 t ha⁻¹ was obtained from soybean varieties, irrigated 6 times during the season at the rate of 500-520 m³ ha⁻¹, the seasonal irrigation rate was equal to 3000-3100 m³ ha⁻¹, the mass of 1000 grains were 130-135 grams, the level of profitability was 52,2-34,6 %. The purpose of the study is to develop resource-saving drip irrigation methods and water consumption for obtaining high grain yield from soybean varieties in the conditions of saline meadow alluvial soils of Bukhara region.

Research methods. Biometric measurements of the plant, soil, plant samples, laboratory analysis, phenological observations, and oiliness level of soybean grains were determined in the research.

Scientific research was conducted in 2021-2023 in an experimental system consisting of 18 variants of the alluvial mechanical composition of the irrigated meadow of the Bukhara region in the conditions of medium sandy loam soils.



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Table 1 Experience system

№	Soy varieties	Irrigation method	Soil moisture before irrigation, % (relative to the marginal field moisture capacity)	Estimated moisture layer depth, sm		
				During flowering, sm	During flowering and podding, sm	During ripening, sm
1	Uzbek-6	Conventional irrigation (control)	65-70-70	30	50	50
2			70-75-75			
3			75-80-80			
4	Tumaris		65-70-70			
5			70-75-75			
6			75-80-80			
7	Nafis		65-70-70			
8			70-75-75			
9			75-80-80			
10	Uzbek-6	Drip irrigation	65-70-70	30	50	50
11			70-75-75			
12			75-80-80			
13	Tumaris		65-70-70			
14			70-75-75			
15			75-80-80			
16	Nafis		65-70-70			
17			70-75-75			
18			75-80-80			

Note 1: The annual rate of mineral fertilizers N-60, P-90, K-60 kg/ha was used in all options.

At the beginning of the experiments, the morphological structure of the soil layers, the mechanical composition, the severity of the volume are determined, and the water capacity is determined. Before each irrigation, a soil moisture sample is taken at a density of one meter and a three-way meter soil moisture is used.

During the season, it was found that Uzbek-6 variety, Tumaris variety, and Nafis variety are the least demanding during the season. If the Uzbek-6 variety of soybeans in the order of 65-70-70 % had a seasonal irrigation rate of 1625,2 m³/ha, this indicator was equal to 1606,5 m³/ha in the Nafis variety of soybeans or 18,7 compared to the Uzbek-6 variety. m³/ha required less water, 70-75-75 % required 13,2 m³/ha, 75-80-80 % required 36,3 m³/ha less water.

During the studies, it was found that the yield index of the variants irrigated using the drip irrigation method was higher than that of the variants irrigated by direct irrigation. In this case, the highest yield was 32,5 c/ha in late-ripening soybean variety "Uzbek-6" before irrigation in the order of 70-75-75 % according to relative



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to the marginal field moisture capacity, and 30,7 c/ha in the order of 65-70-70 %, 75-80-80 % was 28,8 c/ha. In the mid-season "Tumaris" and "Nafis" varieties, when the soil moisture before irrigation was 70-75-75 % compared to relative to the marginal field moisture capacity, the yield was positive compared to other methods, and the soybean "Tumaris" variety, depending on the irrigation order, was 21,5-22,5 c/ha, and from "Nafis" variety of soybean, depending on irrigation methods, 24,3-25,6 c/ha of grain yield was obtained.

Based on the above, it is possible to make the following conclusions about the development of resource-saving drip irrigation procedures and water consumption in obtaining a high grain yield from soybean varieties in the conditions of the saline alluvial meadow of Bukhara region.

Conclusions:

Pre-irrigation soil moisture when irrigating soybean varieties is 65-70-70% according to relative to the marginal field moisture capacity, irrigation rate is 657-522 m³/ha, 5 times during the season in 1-3-1 system, seasonal irrigation rate is 2682-3153 m³/ha, the rate of irrigation in the order of 70-75-75 % is 553-500 m³/ha, 6 times during the season in the 1-3-2 system, the rate of seasonal irrigation is 2683-3199 m³/ha, the rate of irrigation in the order of 75-80-80 % is 488- 407 m³/ha, 7 times during the season in 1-4-2 system, seasonal irrigation rate of 2930-3233 m³/ha required irrigation. When soybean varieties are irrigated using drip irrigation, soil moisture before irrigation is 65-70-70 % relative to relative to the marginal field moisture capacity in the order of 2-3-2 system, 234-226 m³/ha irrigation rate 6 times, 1606-1629 m³/ha seasonal irrigation 232-211 m³/ha in the order of 70-75-75 %, 8 times in the 2-3-3 system, 1743-1758 m³/ha of seasonal irrigation, in the order of 75-80-80 % in the 3-4-3 system 10 times at the irrigation rate of 180 m³/ha, irrigation at the seasonal irrigation rate of 1912-1943 m³/ha was the most optimal, as a result, compared to conventional irrigation 1076-1524; 940-1441 and 1018-1290 m³/h.



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