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Study Of The Optimal Irrigation Procedure Of Repeatedly Planted Soybean Varieties

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Abstract

The article examines the effect of repeatedly planted soybeans on the growth and productivity of Orzu and Tomaris varieties. Phenological observations made on the plant, i.e., the height of the stem, the number of pods and the number of grains in each pod, and the weight of 1000 grains are given. In addition, when each variety was irrigated in the order of 70-70-60, 70-75-65, 70-80-70, the changes in the soil, i.e., the air regime of the soil, the volume mass of the soil, the water permeability of the soil, the moisture content of the soil before irrigation and at the end of the application period were determined and a conclusion was drawn based on the results of the experiment.

Keywords: Seedling thickness , Soil moisture , Productivity

Introduction

Today, the issue of food supply has become one of the priority tasks in all countries of the world. Due to the global warming process that is happening on our planet, floods are occurring in some areas, and excessive water shortages are occurring around the globe. In addition, the increase in various natural disasters is having a negative effect on the agricultural sector. 79% of the available water resources on the globe are glaciers, 20% are groundwater, 2.0% are fresh water and 1.0% are lake and river water, which is very scarce for human needs. In the last five years, soybean production in the world has increased by almost 60%, and in 2021, soybean was planted on 128.0 million hectares as a recurrent and main crop, and its average grain yield was 28.3 t/ha.

In the world, soy plant takes the fourth place after wheat, rice and corn. In 2020-2021, 38.6 million acres of soybeans were grown in Brazil, 33.3 million acres in the United States, and 16.7 million acres in Argentina, and these countries are among the leaders in soybean export. Correct determination of irrigation periods and norms, taking into account soil and climate conditions, is important in increasing soybean yield and improving its quality in soybean-grown countries. In order to ensure the stability of food security for the world's population, it is one of the urgent tasks to carry out research on determining the optimal irrigation periods and norms in the irrigation of sequential planted soybeans. (Tursunov S 8.197-206 p.)

Soy is considered one of the valuable agricultural crops in many countries of the world, and a total of 265 million tons of grain is grown in more than 100 countries. In 2019-2020, globally in the USA (about 35-40% of the world's total area), Brazil (20%), Argentina (12%), China (12-13%), India (8%) and Europe (2 %) soybeans were cultivated in the largest areas, and the average grain yield was 22.5 tons/ha. The United States and Brazil lead the world in soybean production, providing 50 and 20 percent of the total harvest, respectively. Soy is considered an important protein-oil crop in the world, its grain contains 37-42% protein, 19-22% fat, and up to 30%

carbohydrates, vitamins (A, D, C, E) and fat acids that cannot be produced by human and animal bodies. Soybean oil ranks first in the production of vegetable oil consumed in the world (40%).
N. Bellaloui, A. Mengistu [19.261-268-b], S.R. Pinnamaneni, S.S. Anapalli [28.219-231-b], N. Bellaloui, H. Bruns [20.782-795-b] stated that Mississippi peasant farmers improved soil fertility in order to stabilize, more than 60% of cultivated areas are cultivated with soybeans, but adverse weather conditions, decrease and variability of seasonal rainfall limit crop productivity. Therefore, in order to grow a high and quality crop from soybeans, in recent years, soybeans have been planted in double rows in Mississippi and the United States. As the frequency of irrigation of the soybean crop increases, the amount of protein and fat in the grain rises.
According to Y. Hernández [22.120-125-b], R. Martínez [55-b], soybean oil is extracted for human consumption and used as animal feed in Cuba. Global climate warming, drought, lack of moisture in the soil often remains a problem for soybean growers. According to F. Montoya, C. García, F. Pintos, A. Otero [p. 30-45], annual rainfall in Salto, Uruguay, due to the periodicity of water deficit in the soil, three additional waterings should be carried out in addition to rainfall in order to ensure optimal growth and development and increase soybean yield.
Under the conditions of Salto, 8-40% more yield is obtained with row irrigated compared to rainfed cultivation of soybean without irrigation. S.E. Ibrahim [23.773-766-b], S.O. Yagoub [30.59-64-b], G.E. Nwofia [25.164-177-b], C. Pierozan Junior [26.515-523-b], stated that when soybeans are planted in late periods, it can cause the shortening the growing season, decrease in the number of pods per plant, the weight of 1000 seeds, yield, and the amount of protein and fat.
In the experiments of N.A. Yust [18.210–215-b], when soybean yield was studied depending on the soil moisture before irrigation in the active layer of the soil, when the soil moisture before irrigation in the 0-30 cm layer of the soil was 80% compared to LFMC, it was 1.11-1.71 tons/ha, 1.09-1.68 t/ha grain yield was obtained when the soil moisture before irrigation was 80% at a depth of 0-50 cm.
According to the research results of A.Shamsiev and S.Khusanov [16.32-33-b], a high and high-quality crop was grown when the soil moisture before irrigation was 70-75-65% compared to LFMC in the maintenance of the "Oyjamol" soybean variety as a repeated crop. According to the research results of O. Sattorov [28.8-b], when soybean Uzbek-2 and Altintoj varieties were grown as the main crop, the soil moisture before irrigation was 70–75–75% compared to LFMC, and the total seasonal irrigation norms were not to exceed 5200 m3/hectare. According to S.Torrion and A.Jessica [29.54-b], the water use efficiency of soybean depends on the correct determination of optimal soil moisture relative to the limited field moisture capacity. When studying the duration and norms of watering different varieties of soybeans, they determined that the soil moisture before irrigation should not be less than 65% compared to LFMC. In the research of V.I. Zaveryukhin [3.159–161-b], the average grain yield was 2.55 t when the pre-irrigation soil moisture before flowering was 70% compared to LFMC, and the pre-irrigation soil moisture was 80% compared to LFMC during the period from flowering to ripening.
According to the results of the research conducted by B.S. Kamilov and others [9.123-125-b] in the Tashkent region, "Orzu" and "Arleta" soybean varieties were selected as repeated crops. When the pre-irrigation soil moisture in the 0-50 cm layer of the soil was 65-65-60% compared to LFMC, the varieties "Orzu" and "Arleta" fully matured in 99 and 85 days, respectively, and the crop was harvested, and 4.8 tons additional grain yield was obtained from the variety "Arleta" compared to "Orzu"
According to the data of M.A. Tokhtamishev and A.S.Shamsiev [15.395–396-b], soybean varieties "Nafis" and "Orzu" were irrigated by laying a film in rows (pre-irrigation soil moisture in the order of 75-75-65% compared to LFMC). , 8.4 m3 - 9.7 m3 of water were consumed for 1 centner of grain in order to get from "Nafis" and "Orzu" varieties,, and 33.6-31.1 t/ha grain yield was obtained according to the varieties.

2. Material and Methods

Our scientific research on the topic "Development of irrigation procedures for soybean varieties of sequentive crops in the grassland loamy soils of Central Fergana" in the conditions of meadow loamy soils where the underground water is 1.5-2.0 meters in the years 2020-2022 in the sample area of Ulughnor district of Andijan region, farmer "Bobursho‍k" was carried out on the 70-70-60, 70-75-65 and 70-80-70% irrigation regimes of sequential planted soybean "Orzu" and "Tomaris" varieties in the contour of farm No. 67.

The purpose of the research is to determine the growth, development, and water consumption of soybean varieties grown as a repeat crop after winter wheat in the conditions of the grassland soils of Central Ferghana and to develop optimal irrigation procedures that ensure high grain yield. The researches were conducted in field and laboratory conditions, placement of field experiments, biometric measurements of plants were carried out on the basis of "Methods of conducting field experiments", agrophysical and agrochemical analyzes of soil “Методы агрохимических, агрофизических и микробилочных исследований в поливных хлопковых районах”.

From grain quality indicators, protein content was determined by the Keldal method, fatness (defatting) was determined by burning. Economic efficiency was carried out on the basis of N.A. Baranov's methodical manuals, the statistical analysis of the obtained scientific results was carried out on the basis of Microsoft Excel program and B.A. Dospehov's “Методика полевого опыта” methodical manual.

2.1. Biometric Observations in Soybean Crops

Seed germination rate, % (determined at the beginning of the germination, every 2 days);

-seedling thickness was determined from 3 points of each option (after the yagana, at the end of the period of operation);
-the number of true leaves was determined (1.06.)
- the height of the main stem of plants, cm (10.08; 30.08; 20.09 and during ripening);
- the number of harvest branches, pieces (10.08; 30.08; 20.09 and during the ripening period);
- the number of pods, piece (at the end of the validity period);
- weight of 1000 grains, g. (at the end of the validity period) is determined.

Soybean grain yield was determined by weighing the harvested crop from three points set at 14.3 p/m in all plots and variants of the experiment. Protein content of soybean quality indicators was determined by the Keldal method.

2.2. Effect of irrigation procedures on soil volume mass

The volume mass of the soil is one of the important indicators for optimal growth and development of crops. Repeatedly planted soybean leaves a certain amount of root residues in the soil and has a positive effect on the hydro-physical and agro-physical properties of the soil (volumetric mass, porosity, water permeability).

It is known that each type of crop requires its own optimal soil compaction. If the concentration in the soil exceeds the norm, it will have a negative effect on the growth, development and productivity of the plant. According to S. Tursunov [8.197–206-b], when soybeans are grown as a sequential crop on an area freed from potatoes and cucumbers, the volume mass of the soil planted with soybeans is 0.02-0.03 g/cm3 better than mung bean and corn planted fields and the porosity level was bettered 0.5-0.9%. As the bulk density of the soil improves, its porosity also increases. The increase in porosity, in turn, improves the activity of water, air, nutrients, existing microorganisms in the soil, and has a positive effect on the rapid growth and development of crops. In the conditions of irrigated farming, all agrotechnical activities have an effect on the volume mass of the soil. If the volume mass of the soil before planting repeated crops is at an acceptable level, it will be equal to the initial volume mass after the first watering.

2.3. Germination of sequential soybean cultivars

Quick and healthy germination of seeds sown in the ground, achieving optimal seedling thickness serves as an important factor in increasing the efficiency of agrotechnical measures in agriculture. After that, the yield per bush and hectare will be higher. Germination of seeds depends on various factors. Repeatedly planted soybean varieties "Orzu" and "Tomaris" were planted at the rate of 70.0 kg in a scheme of 70 x 10 cm-2 pieces, it was found that percentage of germinated sprouts was 12.7-12.3% in 5 days, 56.8-59.7% in 7 days, 85.7-84.4% in 9 days.

2.4. Effects of irrigation on yield elements of replanted soybean cultivars under different irrigation regimes

When analyzing the three-year data of our conducted research, it was observed that the irrigation regimes changed the development of soybean growth, harvest, the number of grains per pod, the number of grains per plant, the weight of grains per plant, and the weight of 1000 grains.

Irrigation procedures and norms are of great importance in the maintenance of soybean varieties, and if agrotechnical measures are carried out in time and in good quality, it leads to an increase in the weight of grains per bush and the weight of 1000 grains. It was found that the effects of irrigation on the elements of the crop in different orders are different in relation to the pre-irrigation soil moisture LFMC of the repeatedly planted soybean varieties "Orzu" and "Tomaris".

In the experiment carried out in 2020 on “Orzu” variation of sequential soybean, the number of pods per plant was 20.0 units, the number of grains per pod was 1.8 units when the soil moisture before irrigation was 70-70-60% compared to LFMC. When pre-irrigation soil moisture was 70-75-80% compared to LFMC, after irrigation was carried out, it was found that the number of pods per plant was 21, grains in per pod was 1,7. In other experiment, percentage of soil moisture was 70-80-70% before irrigation compared to LFMC, the number of pods per plant was 22,1, grains in per pod was 1,8.

The same experiment was done on “Tomaris” soybean, results were following:

70-70-60%- 21.8 and 1.8, 70-75-80% - 22.5 and 1.8, 70-80-70 % -22.8 and 2.

3. Results

The experimental system is shown in Table 1 and starts in the winter wheat field after its harvest. Experiment options consist of 6 options, arranged in 4 plots, 1 tier. Each section is 100 m long and 5.6 m wide. Each option consists of 8 rows, the surface of the field is 560 m2, the accounting area is 280 m^2.

All tables used in the manuscript must be prepared with the same font size.

Table 1. Experimental system

Variants	Plant	Variety	Pre-irrigation soil moisture compared to LFMC, %
1	Soybean	Orzu	70-70-60
2			70-75-65

3		70-80-70
4		70-70-60
5	Tomaris	70-75-65
6		70-80-70

The following mineral fertilizers were used in the experiment: ammonium nitrate (N-33-34%), urea (N-46%), ammaphos (N-11%, P2O5-46%), potassium chloride (K2O-60%). Agrochemical and agrophysical researches of the soil were carried out according to UzPITI "Metody agrokhimicheskikh, agrofizicheskikh i microbiologicheskih issledovaniy v polivnykh rayonakh" [5.124-b], "Metody agrokhimicheskih analizov pochv i rasteniy" [4.128-b], "Metodika polevogo opyta" [2.248-255-b] and "Methods of conducting field experiments" [6.60–62-b].

Before the experiment, agrochemical analysis was carried out by taking soil samples from the 0-30 and 30-50 cm layers from five points using the envelope method. In this case, before experimenting, the total humus content at the beginning and at the end of the period of repeated crops was determined by I. Tyurin, total nitrogen, phosphorus content by L.P. Gritsenko and M.M. Maltsev's modified methods, nitrate nitrogen content by ionoselective, mobile phosphorus by B.P. Machigin, the exchangeable potassium was determined by P.V. Protasov's method with flame photometer.

The water-physical properties of the researched field soil were determined in the 0-30 cm and 30-50 cm layers of the soil at the beginning and end of the season. The mechanical composition of the soil was determined by the method of M.I. Bratcheva, the water permeability of the soil was determined by the method of S.I. Dolgov, the specific mass was determined by the pycnometric method, and the volumetric mass was determined by the Kachinsky method using a cylinder.

Limited field moisture capacity (LFMC) of the field was determined by filling 3x3 plots with water at 3 points diagonally across the field at the beginning of the growing season. Soil samples were taken from 0-100 cm in every 10 cm layer in 3 plots to determine the moisture content of the monitoring site. Before irrigation of repeated crops, soil moisture was determined by the method of S.N.Ryzhov before watering the soil at the depth of calculation layers from 5 points of each option.

It should be noted that, regardless of irrigation standards of repeated crops, soil density increased from the beginning to the end of the season and porosity decreased in all options.

According to the data obtained in 2020, the bulk density of the soil in the arable layer before planting was 1,315 g/cm3, and in the sub-soil layer was 1,325 g/cm3, after irrigation of sequential soybean the bulk density of soil increased 0.037, 0.051 and 0.071 and 0.044 compared to the beginning of the season when irrigated in the order of 70-70-60, 70-75-65 and 70-80-70% (Table 2 and Appendix 9).

Table 2. Effect of repeatedly planted soybean irrigation regimes on soil volume mass, g/cm3 (2020)

Soil layer, cm	**At the beginning fo the season, g/cm^3**	**At the end of the season**		
		Soybean		
		70-70-60 %	**70-75-65 %**	**70-80-70 %**
0-10	1.306	1.346	1.352	1.368
10-20	1.313	1.358	1.381	1.395
20-30	1.325	1.373	1.392	1.410
30-40	1.336	1.375	1.396	1.414
40-50	1.343	1.381	1.411	1.421
50-60	1.352	1.386	1.382	1.423
60-70	1.358	1.389	1.409	1.425
Average				
0-30	1.315	1.359	1.375	1.391
30-50	1.325	1.378	1.404	1.418
50-70	1.333	1.388	1.396	1.424

It is known that if the porosity of the soil is high, microbiological processes are accelerated as a result of the improvement of air aeration in the soil, absorption of heat, air, water and nutrients dissolved in it by plants, as a result of which optimal conditions for plant growth are created. According to the scientific data of S.J.Eshonkulov [17.11-20-b], soil porosity decreased compared to the to the beginning of the season in a 2.2, 1.8 , 2.6 , 1.8 and 2.6 when i

soil moisture before repeated shade irrigation in the conditions of typical gray soils is 70-70-60; 65-65-60; 75-75-65; When irrigated at 65-65-60 and 75-75-65%, the porosity in the 0-30 cm layer of the soil at the end of the

season compared is 2.2, respectively; 1.8; 2.6; It was determined that it decreased by 1.8 and 2.6 percent when irrigated in the order of 70-70-60, 70-75-65 and 70-80-70%.

In our research, since the specific mass of the soil at the beginning and end of the season was 2.69-2.71 g/cm3, so the average of 2.70 g/cm3 was recorded. It was found that when a repeated crop of soybeans was planted, the soil porosity at the end of the season was 49.67, 49.07, 48.48% in the 0-30 cm layer of the soil, or it decreased by 1.64, 2.23 and 2.83% compared to the beginning of the season, when irrigated in the order of 70-70-60, 70-75-65 and 70-80-70%.

When replanted soybean variety "Orzu" was irrigated in the order of 70-70-60%, the average seedling thickness was 331.8 thousand/ha in three years, when the pre-irrigation soil moisture was irrigated in the order of 70-75-65%, 353, 0 thousand/ha, soil moisture before irrigation was 354.6 thousand/ha when irrigated in the order of 70-80-70% compared to LFMC.

Table 3. Actual seedling thickness of soybean varieties.

Variant	Plant	Plant types	Order of irrigation compared to LFMC	Number of plant, thousand/ha			
				2020	2021	2022	Average 3 years
1	Soybean	Orzu	70-70-60	331,3	333,2	330,9	331,8
2			70-75-65	356,9	351,8	350,4	353,0
3			70-80-70	357,3	351,7	354,8	354,6
4		Tomaris	70-70-60	332,0	335,9	337,2	335,0
5			70-75-65	353,7	350,4	353,6	352,5
6			70-80-70	352,2	354,8	352,4	353,1

When repeatedly planted soybean "Tomaris" variety was irrigated in the order of 70-70-60%, the average seedling thickness was 335.0 thousand/ha in three years, when the pre-irrigation soil moisture was irrigated in the order of 70-75-65%, 352.5 thousand/ha, it was found that soil moisture before irrigation was 353.1 thousand/ha when irrigated in the order of 70-80-70%.

Although the duration of the phases of growth and development of crops mainly depends on the characteristics of the crop type and variety, the norms and periods of irrigation and feeding with mineral fertilizers and the complex of agrotechnical measures have a strong influence.

It was found that the number of pods per plant and the average number of grains per pod increased with the increase of pre-irrigation soil moisture from 70-70-60% to 70-80-70% compared to LFMC.

Table 4. Effects of irrigation on yield elements of replanted soybean cultivars at different pre-irrigation soil moisture

Variants	Plant type	Pre-irrigition soil moisture, compared to LFMC	The number of pods per plant, pcs	The number of grains in one pod, pcs	The number of grains per plant, pcs	Grain weight per plant, g	Weight of 1000 grains, g
2020							
7	Orzu	70-70-60	20,0	1,8	35,5	5,0	139,8
8		70-75-65	21,0	1,7	35,8	5,1	141,7
9		70-80-70	22,1	1,8	39,3	5,6	143,1
10	Tomaris	70-70-60	21,8	1,8	39,8	5,5	137,3
11		70-75-65	22,5	1,8	40,9	5,6	137,8
12		70-80-70	22,8	2,0	45,5	6,4	140,5
2021							
7	Orzu	70-70-60	18,4	1,9	35,5	5,1	142,8
8		70-75-65	19,7	2,0	39,4	5,6	143,2
9		70-80-70	20,1	2,0	40,1	5,8	144,7
10	Tomaris	70-70-60	19,3	1,9	35,6	5,0	139,8
11		70-75-65	20,8	2,0	41,5	5,8	140,5
12		70-80-70	21,1	2,1	43,8	6,2	141,8
2022							
7	Orzu	70-70-60	19,2	1,8	35,0	5,0	143,2
8		70-75-65	19,6	1,9	36,8	5,3	144,1

9		70-80-70	20,3	1,9	38,4	5,6	144,8
10		70-70-60	20,0	1,8	36,5	5,1	140,3
11	Tomaris	70-75-65	21,0	1,9	39,3	5,5	140,7
12		70-80-70	21,9	2,0	43,9	6,2	141,9

In the experiment, the number of grains per plant was 35.5 grains, and the average weight of grains per plant was 5 gram when the "Orzu" variety of replanted soybean was irrigated in the order of 70-70-60%. When this soybean was irrigated in the order of 70-75-65%, the number of grains in one plant is 35.8 grains, the weight of grains in one pod was 5.1 gram, and when irrigated in the order of 70-80-70%, the number of grains in one plant is 39.3 grains, on average one the weight of the grain in the pod was 5.6 gram.

4. Discussion

In the experiment, following were detected: the number of grains per plant is 39.8 grains, the average weight of grains per plant is 5.5 g, when irrigated in the order of 70-70-60%. In another option, when soybean was irrigated in the order of 70-75-65%, the number of grains per plant is 40.9 grains, the average grain weight per plant is 5.6 g, and when irrigated in the order of 70-80-70%, 45.5 grains, the average grain weight per plant was 6.4 g. It was found that it was 5.7 and 4.6 grains or 0.9 and 0.8 grams higher, respectively, compared to the options irrigated in the order of 70-70-60 and 70-75-65%.

In the experiment, the weight of 1000 grains of "Orzu" variety of replanted soybean accounted for when irrigated in the order of 70-70-60% was 139.8 g, and 141.7 g when irrigated in the order of 70-75-65% and when watered in the order of 70-80-70%, it was 143.1 g.

The weight of 1000 grains of "Tomaris" variety of replanted soybean was 137.3 g when irrigated in the order of 70-70-60% and when irrigated in the order of 70-75-65%, the weight of 1000 grains was 137.8 g, when irrigated in the order of 70-80-70%, the weight of 1000 grains was equal to 140.5 g. These data show that when irrigating soybean varieties "Orzu" and "Tomaris" in the order of 70-80-70%, the weight of 1000 grains was higher 3.3-3.2 and 1.4-2.7 respectively than soybean variants which irrigated in the order of 70-70-60 and 70-75-65%.

The amount of product obtained from a unit of cultivated area, that is, the yield indicator was calculated in centners per hectare. The grain yield of soybean cultivars grown as a repeated crop was determined by harvesting and weighing the plants in the calculation plots (280 m2) of all replications and variants at the end of the period of operation for the cultivars, after the seeds were fully matured.

In the experiment, in the 1st option, the repeatedly planted soybean variety "Dream" was irrigated in the order of 70-70-60%, the average grain yield was 16.6 t/ha, in the second option, 70-75-65% irrigation was carried out and average harvest was 18.8 t/ha, irrigated in the order of 70-80-70% in the third option was 20.1 tons/ha, or compared to the 1st option, 2.2 and 3.5 tons/ha additional grain yield was obtained from the 2nd and 3rd options, respectively.

In the 4th option, in which the "Tomaris" variety of replanted soybean was irrigated in the order of 70-70-60%, the average grain yield in three years was 17.4 tons/ha. In option 5, where irrigation was carried out in the order of 70-75-65%, the grain yield was 20.0 t/ha, in option 6, irrigated in the order of 70-80-70%, it was 22.2 t/ha. It turned out that 2.6 and 4.8 tons/ha of additional grain yield was obtained compared to the 4th option, which was irrigated in the order of 70-70-60%.

The amount of humus in the plowed (0-30 cm) and under-ploughed (30-50 cm) layers in the grassland soils of Central Fergana is 0.782 and 0.572%, total nitrogen is 0.064 and 0.041%, and total phosphorus is 0.134 and 0.105%. It was found that the soil of the experimental area is low in nitrate nitrogen, assimilable phosphorus and exchangeable potassium.

When repeatedly planted soybeans are irrigated in the order of 70-80-70%, it was determined that the volume mass of the soil in topsoil and subsoil layer increases by 0.051-0.061 g/cm3 and 0.076-0.093 g/cm3 respectively, compared to the beginning of the season. It was observed that the soil porosity decreased by 2.83% when irrigated by 70-80-70% in soybean crop compared to the beginning of the season.

When repeatedly planted soybean varieties "Orzu" and "Tomaris" were irrigated in the order of 70-80-70%, at the end of the season, the number of fractions larger than 10 mm in the plow layer of the soil was 24.1-24.0%, the number of fractions 10-0.25 mm was 71.8-72.1% and the amount of 0.25 mm fractions was 4.1-3.9%. The amount of the most agronomically important aggregates was 0.3-1.0% more than the variant irrigated in the order of 70-70-60%.

When irrigating soybean varieties "Orzu" and "Tomaris" in the order of 70-80-70%, humus is 0.776-0.572%, 0.778-0.572%, nitrogen is 0.062-0.040%, 0.063-0.041%, phosphorus is 0.134-0.105%, 0.133-0.105%. When "Orzu" and "Tomaris" varieties of soybeans are irrigated in the order of 70-80-70%; 451.2, 420.4; 394.9; 473.0; 418.6 m3/ha and 451.0; 407.7; 382.2; 427.7 400.4 m3/ha irrigation rate is acceptable in 5 irrigations in the 1-2-2 system.

Conclusion

When "Orzu" and "Tomaris" soybean varieties were watered in the order of 70-80-70%, their height was 60.5-65.2 cm, the number of leaves was 4.4-5.0. "Orzu" and "Tomaris" varieties of soybeans, when irrigated in

the order of 70-80-70%, the number of pods per plant is 22.1-22.8, the number of grains per plant is 39.3-45.5, the weight of 1000 grains is 143.1 -140.5 grams and this irrigation rate was found to be superior to other irrigation methods.

In order to grow a high and high-quality grain yield from repeatedly planted soybeans in the conditions of sandy loamy, grassy soils with a mechanical composition of Central Fergana: "Orzu" and "Tomaris" varieties of repeatedly planted soybeans in the order of 70-80-70%, in the 1-2-2 system, 5 irrigations at 382-473 m3/ha irrigation rate of, with a seasonal irrigation rate of 2158-2069 m3/ha is recommended.

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