

# Effect of Irrigation Regime on Biometric Indicators of Spring Wheat Varieties

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**Abstract.** It was observed that the biometric indicators of spring wheat varieties were significantly affected by irrigation rates and periods, and it was determined that the biometric indicators changed accordingly. With the increase in the number of irrigations, it became impossible to increase the productivity. In the options of wet tillering (FON), FON+2 irrigation, Fon+3 and Fon+4 irrigation, the mass of grain in one ear is from 1.26 to 1.56 g in Semurg variety, from 1.05 to 1.35 g in South Gavhari variety, respectively. up to 1.29 g to 1.67 g in the Saratov variety. The weight of 1000 grains also varies according to irrigation options, from 40.0 g to 42.0 g in the Semurg variety, from 32.5 to 35.4 g in the Janub gavhari variety, from 39.4 to 41.5 g in the Saratov variety. formed The yield was higher in the FON+3 irrigation option compared to other options. In this case, it was 44.0 t/ha in the Semurg variety, 42.8 t/ha in the Southern Gem, and 46.7 t/ha in the Saratov variety. In this option, the yield of varieties was higher by 24.3-26.2 t/ha compared to the average wet storage (FON) option, and by 15.0-16.5 t/ha compared to the FON+2 irrigation option. Key words: spring wheat, variety, biological characteristics of the variety, marginal field moisture capacity, climate, relief, hydrogeological conditions, irrigation rate, agrotechnical measure.

## 1 Introduction

Most of the available water in our country is used for irrigation of agricultural crops [1-2]. In addition to the scarcity of water resources and the increase in their level of pollution, the melioration of land used for agriculture is decreasing [3-4].

In our country, 55-56 billion cubic meters of water resources are consumed in one year, of which 92 percent is used for agriculture [5].

Abundant and high-quality grain yield from wheat depends on adequate water requirements during growth and development [6]. The cultivation of any agricultural crop requires a specific amount of water. The water demand of crops depends on many natural and economic factors [7], the most important of which are the climate, soil, geological, hydrogeological and relief conditions of the area where the crop is grown, as well as the agrotechnical factors used for their cultivation, the biological characteristics of the variety and the periods of crop growth. The water requirements of wheat are not the same

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according to the development periods. Due to the biological characteristics of wheat, its water needs are not the same according to the development periods. The periods of highest water demand are the flowering and peak periods [8].

Over-irrigation is known to increase the rate and number of saline leaching by causing groundwater to rise. Therefore, in areas where groundwater is likely to rise quickly, the rate of irrigation of spring wheat is determined in a stratified manner [9].

Having studied the methods of irrigation of domestic and foreign varieties of winter wheat, they noted that in order to obtain a grain yield of 70-75 t/ha from winter wheat, soil moisture before irrigation is 65-70% compared to ChDNS, and 60-65% for local varieties [10].

It was recommended that soil moisture should be 70% during the tuberization period of wheat, 80% during the earing-flowering period, and 65% during the ripening period [11].

In the conditions of gray soils, it is suggested to irrigate winter wheat 3-5 times at the rate of 600 - 700 m<sup>3</sup> per hectare, depending on the climatic conditions of the year, when the soil moisture is equal to 70% compared to ChDNS [12].

The effect of nitrogen fertilizers applied during grain formation on the amount of protein and gluten in grain depends on the amount of moisture in the surface 0-20 cm layer of the soil [13]. When the moisture content is low (NS-25 %) or high (80 %), feeding does not have the expected effect [14-16].

Scientists from American and European countries recommend to determine the timing of irrigation of winter wheat according to meteorological indicators, that is, daily average air temperature, relative humidity, lack of moisture in the air, evaporation, heat and radiation balances [17].

In the northern regions of the republic, one of the most urgent problems in grain production is to determine the optimal irrigation standards for spring wheat varieties, in accordance with their biological characteristics, and to introduce them to farms [18-19].

The purpose of the work is to develop and introduce the most optimal irrigation method to farms, which ensures abundant and high-quality harvest based on irrigation periods, norms, and gross water consumption of soft wheat spring varieties.

## 2 Results and discussion

The experimental field is an old irrigated meadow-soil, the mechanical structure and salinity level are average, the depth of underground seepage water is 150-180 cm.

In the experiment, the variants were planted in triplicate and placed consistently in the respective tier. The total surface of the tiles is 20 m<sup>2</sup>, the considered surface is 10 m<sup>2</sup>.

To assess plant growth and development:

- in the 1.0 m<sup>2</sup> areas where the observation is carried out, it was counted in 3 places located diagonally across the patch;

- biometric indicators were carried out on 10 plants in 3 repetitions in average condition plants;

- resistance to lodging was determined on a five-point scale, in the phases of earing and wax ripening of grain.

- in order to determine the structure of the crop, 10 samples were taken in each variant and repetition, the height of the plant, the total and productive stems and the number of spiked stems per 1m<sup>2</sup>, the length of the spike, the number of grains in the spike and spikes, the mass of one spike and 1000 grains, the grain obtained from 1m<sup>2</sup> and grain yield was determined by adjusting the moisture content of the grain to the standard (14%).

Phenological observations, biometric measurements method of the state commission for variety testing of agricultural crops [20];

- Productivity indicators were statistically analyzed by the method of dispersion analysis [21].

Phenological observations were made every two days from the beginning of each developmental period until 75% of the plant appeared.

The rate of development of spring wheat depends on the growing conditions, biological characteristics of the variety, the thickness of the bush, soil moisture, air temperature, seed planting depth, sowing dates, rates, fertilization, irrigation rates and other factors [22-23].

In the options where FON+2 irrigation was set to 60% compared to ChDNS, soil moisture was on average 14.2% compared to the dry weight of soil, and on average 61.0% compared to ChDNS. When FON+3 irrigation was set at 70% relative to ChDNS, moisture content was 16.2% relative to its dry weight and 70.8% relative to ChDNS. FON+4 irrigation was 75% compared to ChDNS, and the pre-irrigation moisture was 18.2% and 75.7% compared to ChDNS.

Pre-irrigation moisture indicators of spring wheat during the growing season given in the table.

**Table 1.** Soil moisture before irrigation of spring wheat

№	Options	In irrigation during the irrigation season			
		1	2	3	4
1	Wet collection (salt wash) (FON)	-	-	-	-
		-	-	-	-
2	FON+2 watering (ChDNS 60 %)	14,2	14,8	-	-
		61,0	61,6	-	-
3	FON+3 watering (ChDNS 70 %)	16,2	17,3	17,6	-
		70,8	71,8	72,0	-
4	FON+4 watering (ChDNS 75 %)	18,2	18,8	19,0	19,4
		75,7	76,2	76,4	76,7

In 2021, spring wheat at the beginning of the growing season, i.e. in March, fully covered the amount of water required during the period of tillering and partial tuberization. In 1-2 ten days of April, the amount of precipitation was not enough for the development of the plant. Starting from April 19, when the soil moisture before irrigation was 75.2% compared to the limit soil moisture, the irrigation works started. In this case, in the FON+3 variant, 750 m<sup>3</sup>/ha were irrigated in the first irrigation, which coincided with the wheat tuber period.

In the variant where soil moisture was 70% compared to ChDNS, the 1st irrigation was carried out on May 5, and 740 m<sup>3</sup> of water was given per hectare.

In the variant with humidity of 60% compared to ChDNS, the first irrigation was carried out on May 10, and 780 m<sup>3</sup> of water was required per hectare.

Seasonal irrigation rates of spring wheat varieties depended on the number of irrigations and irrigation rates. The seasonal irrigation rate was 870 m<sup>3</sup>/ha in the FON+3 option, when soil moisture was 60% relative to ChDNS, 2910 m<sup>3</sup>/ha in the FON+3 option, and 3350 m<sup>3</sup>/ha in the FON+4 option.

The optimal number of wheat plants and the number of productive stalks are important for the formation of high grain yield in irrigated lands. One of the most important indicators of crop formation is the thickness of productive stalks formed on 1 m<sup>2</sup> area.

In spring wheat varieties, the increase in irrigation duration and number of irrigations led to a longer growing season. In the wet storage (FON) variant, full ripening of the Semurg variety was observed in 96-98 days, Saratov variety in 102-104 days, and South Gavhar variety in 90 days. Accordingly, in the FON+4 irrigation option, the varieties matured in 108-112 days.

Soil moisture affects the development of spring wheat differently among varieties, as can be seen from these data, that is, higher soil moisture in the later stages of development led to a delay in the ripening process.

It was observed that the biometric indicators of spring wheat varieties were significantly affected by irrigation rates and periods, and it was determined that the biometric indicators changed accordingly.

In wet collection (FON), FON+2, Fon+3 and Fon+4 irrigation options, the length of the spike is from 9.9 cm to 11.5 cm in the Semurg variety, the grain weight in one spike is from 1.26 g to 1.56 g. In the Saratov variety, the length of the spike is from 9.5 cm to 11.2 cm, the grain weight in the spike is from 1.29 g to 1.67 g. g. from 1.35 g. it was known that it changed up to

The weight of 1000 grains - according to the irrigation method, in the irrigation options of wet irrigation (FON), FON+2, Fon+3, Fon+4, the weight of 1000 grains is 40.0 g to 42.0 g in the Semurg variety, and 42.0 g in the Southern gem, respectively. It was 35.4 g from 32.5 g, and 41.5 g from 39.4 g in the Saratov variety.

### 3 Conclusions

In general, the size of spikes and 1000-grain weight increase of spring wheat varieties, ultimately, in the formation of a high yield, the role of irrigation rates and periods is very important. For example, irrigation of spring wheat varieties when the soil moisture is 70% relative to ChDNS ensures full formation of the plant and leads to high yield.

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