



WATER USE EFFICIENCY AND IRRIGATION STRATEGIES FOR SOYBEAN CULTIVATION IN ARID REGIONS: A CASE STUDY OF SURKHANDARYA

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Abstract: The article presents data obtained from the study of the daily intensity of transpiration during the flowering stage of soybean varieties. According to the data on the diurnal variation of transpiration intensity, this process was accelerated in Vilana and Ustoz MM-60 varieties of soybeans, and a relative decrease in intensity was observed in Baraka and Tomaris man-60 varieties. Different variations in the intensity of transpiration in the cross section of the studied varieties may depend on the biological characteristics of the varieties as well as the air temperature and its relative humidity level.

Key words: Soybean varieties, transpiration rate, temperature, humidity, water exchange, productivity.

Introduction. Water is a major part of plants and they play an important role in life activities. The role of water in plant life is extremely important, as 70-95% of the composition of plant tissues consists of water, the amount of which in the seeds decreases sharply and ranges from 5 to 15%. Water is the main mass in all organs of the plant: 90% in the leaf, 70-80% in the branch, 50-60% in the root, 10% in the seed, 98% in the vacuole, 80% in the cytoplasm, 50% in the bark. Some wet fruits contain a lot of water: tomatoes - up to 94%, watermelons-up to 92% [1].

To increase plant biomass to 1 gram, approximately 500 g of water must be absorbed by the root system, assimilated by the plant, and released into the atmosphere



from the surface of its vegetative organs. Due to its unique properties, water is of great importance in all processes of cell life. Even a slight violation of the water regime causes significant changes in metabolic processes [2].

It is known that transpiration is one of the most important and necessary physiological processes in plants, protecting plants from overheating and dehydration in dry and hot weather, as well as the movement of water and water-soluble substances throughout the plant body, gas exchange [3]. The temperature of a highly transpired leaf is about 7 °C lower than that of a non-transpired withered leaf [4].

Research results and its discussion. In the early stages of growth, evaporation from the soil surface predominates, after which most of the water is assimilated by plants for transpiration. The soybean consumed during the flowering, legume formation and ripening stages accounted for 60-70% of the water consumed during the entire growing season. Violation of the water regime during this period leads to the shedding of buds, flowers and fruits, especially in the period of gross flowering drought leads to a decrease in soybean yield by 50% or more.

According to information scientists, transpiration rates are lower in drought-tolerant varieties than in non-drought-tolerant varieties. Increased water supply to plants also increases water consumption through transpiration. Lack of water in the soil reduces the rate of transpiration in plants. In plants with moderate humidity, transpiration rates are higher than in water-deficient environments, and transpiration productivity is also higher [14].

In contrast to other crops in the shade plant, the plant is characterized by long flowering and ripening of legumes. From the data obtained, it was observed that the transpiration intensity of soybean varieties varies depending on the variety characteristics and air temperature. In all shade varieties studied, transpiration rates were low in the morning, highest in the afternoon, and low again in the evening. Studies have shown that the intensity of transpiration of soybean leaves depends significantly on the phases of plant development, with development being maximized during the period of formation of generative organs, i.e., periods of gross flowering and fruiting.



According to the data obtained, 145.38 grams of water evaporated in 1 hour at the level of 1 m² of leaves of Vilana variety, while 116 grams of water evaporated from the leaves of Tomaris man-60 variety during this period, that is, during this period, Vilana evaporated 29.38 grams less water than Tomaris man-60 navigator. The remaining varieties also took intermediate positions, evaporating less water than the Vilana navigator, that is, Baraka variety evaporated 12.41 grams, Master MM-60 variety evaporated 3.93 g less water. It was noted that this indicator differs sharply from each other in terms of transpiration intensity of varieties.

As the level of water supply increases, so does the rate of transpiration and water consumption of plants. Decreasing the soil moisture level from optimal to minimum sharply reduces the transpiration rate, resulting in reduced plant growth and productivity [15,16].

The change in transpiration intensity during the day is affected not only by air temperature but also by the activity of the leaf axils, which open at sunrise, are open during the day and close again only at sunset, so transpiration occurs several times weaker at night than during the day. It was observed that air temperature and relative humidity varied during the measurement of transpiration during the day in different years and periods of the growth period, which affected the intensity of transpiration. Therefore, it was noted that the process of transpiration in the leaves of the studied soybean varieties varies depending on the conditions of their cultivation.

Hence, based on the above data, the transpiration process will be one of the important physiological indicators of plant life, it is one of the main criteria in determining the level of water exchange and resistance of plants to stressors.

Conclusion. Thus, the research conducted is the basis for our conclusion in soybean crops as well as in other agricultural crops. The transpiration intensity of the studied varieties was mainly directly related to the location of the leaves on the plant, the time of day, the increase in temperature, and the relative humidity.

The maximum point of the curve representing the intensity of transpiration occurred in all varieties between 14-16 hours. The intensity of transpiration in the leaves of local



varieties of shade was 189.3 in Baraka variety at 1400-1600 hours; 164.8 in Tomaris man-60 variety; Teacher MM-60 navida 171.6; in the foreign Vilana variety 197.4 g/m² h, minimum at 800 in the morning: 82.6, respectively; 57.6; 78.5 and 86.4 g/m² per hour.

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