FEATURES OF WATER EXCHANGE IN PLANTS

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In the body of all plants living on land, a continuous water exchange process takes place. Such a process is called the water regime of plants and it consists of three stages:
1) absorption of water by the roots;
2) movement and distribution along the plant body;
3) evaporation through the leaves - transpiration. Each of these stages includes several processes.
Plants meet very little of their water requirements through their above-ground organs (mainly their leaves). This can happen mainly during periods of precipitation and high humidity. The main amount of water that ensures normal growth and development is obtained from the soil through the root system [1-3].
Problems of drought tolerance of plants in relation to water exchange have been studied for many years. One of the main reasons for this is the frequent recurrence of drought and its negative impact on agricultural plants. During the emergence of drought resistance in plants, they form a number of xeromorphic characters in arid environments. These adaptations protect plants from the negative effects of drought.
Drought tolerance is determined by the ability of the plant cell to withstand water shortage for a long time. Water deficit in tissues is observed not only in xerophytic plants but also in most mesophytic plants. During the ontogeny of plants that are resistant to drought, the property of adaptation to the effects of drought is high. Also, growth development and reproduction continue in such an environment. When studying the degree of resistance of plants to drought, it is necessary to study the following physiological properties: resistance to dehydration, water retention properties of leaves, the return of dehydrated cells to a turgor state, control properties of stomata and the rate of accumulation of dry matter [4-9].
One of the hallmarks of plants' drought tolerance is their efficient use of water, which is directly related to plant adaptation mechanisms. In this case, the size and structure of the leaves change to the xenomorphic side. As a result, the surface of the evaporating leaf is reduced. This leads to a decrease in transpiration. In such conditions, plants can use water effectively, to get them out of uncomfortable drought.
Changes in the water balance of plants under water deficit conditions were studied based on several indicators (water content in leaves, relative turgor, water deficit and water storage properties of leaves, water potential of leaves). Diurnal exchange of water in plants with different levels of drought tolerance has also been observed to have different changes in water balance. A group of plants growing in natural conditions reacts differently to the same level of

drought, that is, the change in water exchange in their bodies is directly related to the degree of adaptation [10-15].

Among chemical compounds in living organisms, water occupies the main place in terms of quantity. Its content reaches 85% in the leaves of mesophytic plants. The emergence and activity of life processes cannot take place without water. The activity of living organisms is not only related to the amount of water. Perhaps, it depends on the condition, shape, concentration energy level of water, reactive properties, mobility, etc.

It is known that transpiration in leaves is one of the important physiological processes, and it is of great importance in studying the growth and development of plants, especially in areas with water shortage. Transpiration is not only the evaporation of water through the leaf, but also water adsorption and the movement of water and dissolved substances throughout the plant. It is known that the activity of the water supply of plants is directly related to the speed of transpiration. 1.5-2% of the water received by plants is absorbed, and the rest is evaporated through the leaves during transpiration [16-21].

When determining the nature of the water balance in plants, it is also important to determine the rate of water consumption depending on external environmental factors. An increase in water deficit in the soil causes a decrease in the rate of transpiration. Otherwise, the opposite pattern is observed. The rate of transpiration is lower in drought-tolerant varieties than in non-tolerant varieties. An increase in the level of water supply to plants also increases the use of water through transpiration. Lack of water in the soil reduces the rate of transpiration in plants. Plants in moderate moisture conditions have higher transpiration rates and higher transpiration productivity than in water-deficit environments. It has been found that the total water content in plants with moderate humidity varies throughout the day. It is closely related to the rate of transpiration. Depending on the amount of water spent in the process of transpiration, it is possible to determine the water demand and need of one or another plant [22-27].

When determining the amount of water used for transpiration, it is necessary to take into account several factors. Including the mass and volume of the root system, the mass of the above-ground organs of the plant, the osmotic pressure of the root cell juice, the depth of underground seepage, the amount of precipitation, the temperature and relative humidity of the air, the moisture reserve in the soil, the value of the water potential of plants, etc.

The rate of transpiration determines the position of the stomata and the amount of water in the leaves, as well as the degree of water supply of plants. In some cases, as a result of rapid dehydration of the leaves, the stomata are unable to control water consumption. As a result, the photosynthetic activity of the leaves decreases. Transpiration of water through the leaf tissue reduces the water potential of the cells and activates the movement of water through the xylem.

Acceleration of transpiration in conditions of water shortage leads to the occurrence of water shortage in the plant body. As a result, plant growth and productivity decrease. In such

conditions, it is recommended to use antitranspirants to prevent water consumption by plants. The condition of the water supply of plants has a great influence on the rate of transpiration. By increasing the level of moisture in the soil, the rate of transpiration and physiological processes related to water exchange can be increased by 1-2 times [28-34].

Therefore, according to the above information, the transpiration process is one of the important physiological indicators in the life of plants, and it is one of the main criteria for determining the level of water exchange and drought resistance of plants. When there is a lack of water, the stomata close, the level of turgor of the leaves and the rate of transpiration, including photosynthesis, decrease. As a result, overall productivity is reduced. The productivity of drought-tolerant plants was higher than that of drought-tolerant plants.

The effects of drought on transpiration in plants of various ecological groups have been studied in many classical studies. Based on this research, the classification of plants according to their response to drought was proposed. The rate of transpiration of cotton in drought conditions, in turn, depends on the penetration of the root system into the deep moisture layer of the soil.

The level of water exchange of plants is directly related to the water retention properties of tissues. This indicator depends on many factors and affects physiological processes and plant productivity. High water retention properties of some varieties at the same moisture conditions indicate the resistance of plants to drought. It is known that the lack of moisture in the soil increases the water retention properties of the leaves. Changes in the water storage properties of leaf cells depend on the degree of water supply of plants. A low level of moisture in the soil leads to an increase in water retention properties. As a result, the water saturation of the cells is high [35-39].

Plants that are resistant to drought conditions have higher water retention properties than those that are resistant to drought. The resistance of plant cells to water consumption and water retention is one of the indicators characterizing the state of water in the cell and the level of water permeability of the membrane. The change in the amount of water in the leaves also causes a change in the water retention. This connection ensures the resistance of plants to adverse factors. This characteristic varies in different varieties, during their growth and development, and depending on nutritional conditions.

Plants that are resistant to drought in water shortage use less water and do not drastically change the turgor state of the cell. Drought-tolerant plants soak up a lot of water after watering and are better adapted to drought. The degree of water saturation of leaves is one of the main factors of assimilation. It was also found that the total amount of water in the leaves of wheat varieties resistant to drought was reduced.

Determining the amount of water in the leaves and other organs of the plant is one of the main parameters for determining the water balance in moderate and limited moisture conditions. In most plants, a decrease in total water content by 3-5% causes the stomata to close. As a result, the photosynthesis process in the leaves slows down.

Determining the total amount of water in the leaves is one of the important indicators in the water supply of plants. If this indicator is determined together with other processes that characterize water exchange, more extensive information can be obtained. By studying the water regime of plants in arid regions, it is possible to determine the activity of physiological processes due to the amount of reserve water in the leaves. During the formation of generative cells in plants and during pollination, there is a need for a large amount of water in tissues and cells. The dynamics of the total amount of water in the leaves is one of the indicators characterizing the daily changes in the water exchange process [39-43].

According to scientific data, the amount of water in the leaves decreases in the middle of the day. This occurs as a result of a change in the relationship between transpiration and the entry of water into plants. It was noted that the reduction of the total amount of water in the experimental plants was much less than in the plants of the control variant.

The amount of water in plants varies during the growing season and the day. The level of such a change is different depending on the living conditions of the plants, external environmental factors and a variety of characteristics. The total water content in a plant cell is about 75-85% of the wet weight, of which about 30% is in the vacuole, and the rest is in the protoplasm and cell envelope.

Physiological processes are moderated when plants are provided with sufficient water, and active metabolism takes place with the participation of water. Therefore, water exchange is one of the main indicators that determine the physiological state of plants.

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