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ХАРАКТЕРИСТИКА ВОДНОГО ОБМЕНА В ЛИСТЬЯХ КОЛЛЕКЦИОННЫХ ОБРАЗЦОВ ВИДА *LATHYRUS SATIVUS* L.

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Аннотация. *В данной статье проанализирован один из физиологических показателей особенностей водного обмена листьев в коллекционных образцах вида Lathyrus sativus L. В отобранных для исследования образцах международной коллекции IKARDA показатель общего содержания воды в листе составил 74,5-83,5%. Самый высокий показатель общего содержания воды в зарубежных образцах полевого гороха выявлен у образца Ratanx1307 – 83,4%. Кроме того, самый высокий водоудерживающая показатель в листе растения зафиксирован у образца PrateekxIG 140035 — 69,2%. В листьях зафиксирована средняя скорость транспирации 316,2-837,8 мг. Изученный образец PrateekxIG 140035 имел самый высокий показатель скорость транспирации - 837,8 мг, а самый низкий показатель скорость транспирации - 316,2 мг у образца Ratanx2125. У местных сортов Polvon и Lalmikor фиксировано 351,7-403,1 мг.*

CHARACTERISTICS OF WATER EXCHANGE IN LEAVES OF COLLECTION SAMPLES OF THE SPECIES *LATHYRUS SATIVUS* L.

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Abstract. *The article outlines the physiological and biochemical parameters of Lathyrus sativus L. species collection samples obtained from the international organization ICARDA. In the collection samples, the total water content in the leaf was 74,5-83,5%, in the sample Ratanx1307 as per this trait a higher result 83,4% was observed. In terms of water retention trait, a higher indicator was 69,2% in PrateekxIG 140035 sample. The studied sample PrateekxIG 140035 had the highest transpiration rate – 837,8 mg, and the lowest transpiration rate – 316,2 mg in sample Ratanx2125. Local varieties Polvon and Lalmikor have a fixed content of 351,7-403,1 mg.*

Key words*. Field, pea, phase, leaf stomata, total water content, water retention, transpiration intensity.*

Introduction

Despite the fact that the plants belonging to the leguminous family among agricultural crops have been an integral part of the population's diet for many centuries, the nutritional potential of these plants has not been sufficiently evaluated, their consumption seems to be low. This requires the selection and breeding of samples resistant to stress factors and various diseases, as a result of planting and breeding samples of leguminous grain plants from the world collection (ICARDA), studying their genetic, physiological and biochemical characteristics. Legumes are in high demand because they are important for healthy nutrition and food security (1).

Grass pea is a multi-purpose crop, a drought-tolerant and climate-adaptive legume that can withstand drought, waterlogging and salinity and can be grown under minimal external influences. It is a multi-purpose grain, fodder, vegetable and hay crop that improves soil fertility by fixing atmospheric nitrogen. As such, ICARDA is exploring opportunities to grow crops in areas where other field crops cannot be grown due to poor soil quality and water scarcity, providing an excellent opportunity for sustainable agriculture and nutritional security for resource-hungry farmers and consumers (https://www.icarda.org/research/climate-smart-crops/grass-pea).

In drought conditions, a decrease in water availability and an increase in abscisic acid in plant cells regulate cell metabolism. The increase of substances such as proline and glycine may be one of the main molecular effects of drought stress [8]. Accumulation of solutes to maintain cell volume during water loss is osmotic adaptation (6).

In the study of water exchange of plants in nature and their sensitivity to water deficit in the soil, the characteristic of leaf water retention (BSUX) was also studied (4).

Plants begin to shed their old leaves in order to maintain a moderate level of water in their leaves. This arrangement of leaves is carried out to improve adaptability to long-term environmental changes and water deficit (9). Leaf shedding during water

stress is mainly the result of increased sensitivity in plants (7).

The process of transpiration in a plant is the evaporation of water through a leaf, and it is a physical process in which water becomes intercellular vapor in the leaf, diffuses through the stomata and is released into the environment. The process of transpiration depends on the amount and size of water-conducting tubes (large and small), the number of leaf stomata, the thickness of the cuticle layer, the state of protoplasmic colloids, the concentration of cell sap, etc. Water rises along the stem of the plant, as a result of transpiration, a suction force appears in the leaf cell, which absorbs water from root hairs and delivers it to the leaf (2). In order to prevent water losses, it is necessary to reduce evaporation, i.e. transpiration (10).

Materials and methods

The research was carried out in the experimental field of the Department of "Genetics and Evolutionary Biology" of the Faculty of Natural Sciences and in the Institute of Genetics and Experimental Plant Biology of the Academy of Sciences of the Republic of Uzbekistan

The object of the research was the collection samples Bio 520 x Bio)x273, prateekxIG 140034, Ratanx2125, Jabbouleh, 1330x2125, Ratanx1307, RatanxIG 135481, Bio 520 x Bio)x274, PrateekxIG 140035, Bio 520x1330 belonging to *Lathyrus sativus* L. species and obtained from international ICARDA organization and also local Lalmikor, Polvon (Uzbekistan) varieties.

In research, the important physiological parameters of water exchange in foreign collection samples of *Lathyrus sativus* L species were determined by the following methods:

Total water content in leaves (5); water retention properties of leaves (3); transpiration rate (2).

Results and discussion

The rate of transpiration was analyzed in foreign specimens of *Lathyrus sativus* L. and domestic common pea cultivars.

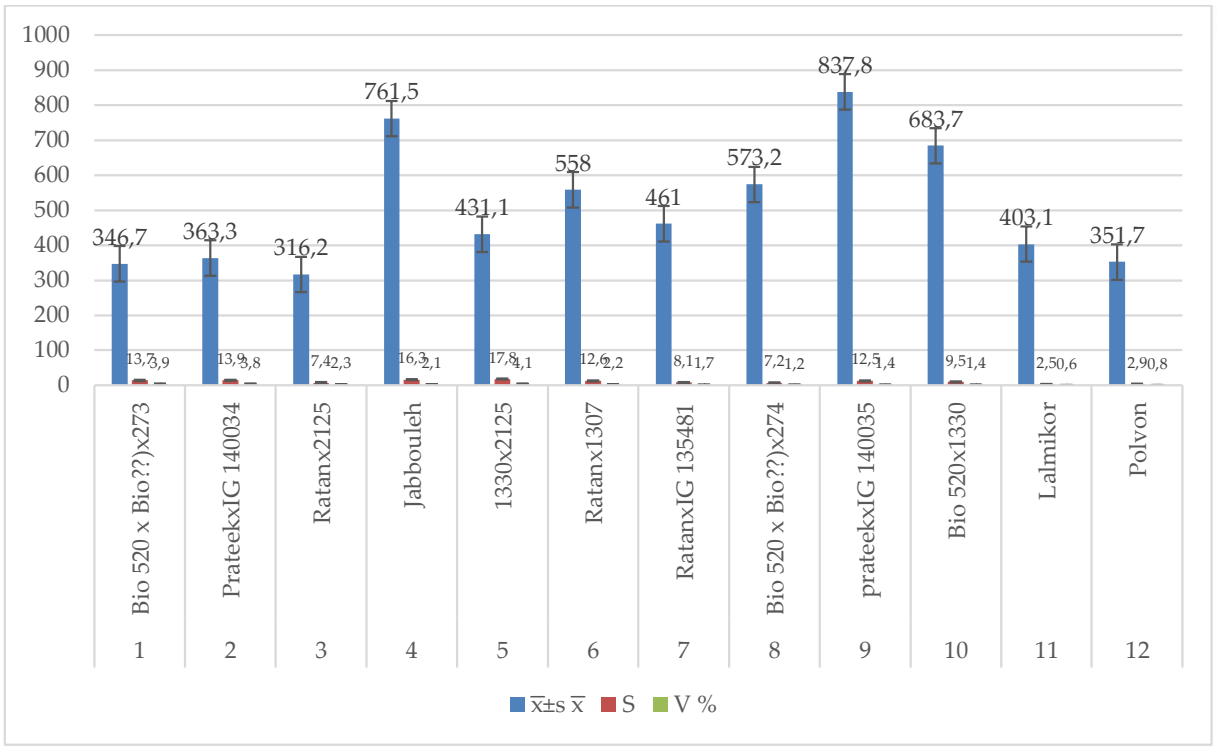

Fig 1. Transpiration rate in foreign collection samples of Lathyrus sativus L. species

In our research, the transpiration rates of foreign samples of Lathyrus sativus L.species and local common pea varieties during the flowering - harvest period were studied. The index of transpiration intensity was analyzed in the leaves of foreign samples and local pea varieties.

As a result of the analysis of the transpiration rate of chickpea (Lathyrus sativus L) variety samples, the highest values were found in the PrateekxIG 140035 sample of 837.8±7.2 mg/g, the coefficient of variation was 1.4%, and the lowest result was in the Ratanx2125 sample of 316.2± 4.3 mg/g, the coefficient of variation of 2.3 % was observed.

The water retention properties of foreign samples of *Lathyrus sativus* L. and domestic common pea varieties were analyzed.

In plants, the water retention capacity of leaves (WRC) is one of the indicators that is very important for the study of physiological processes. In our research, we also studied the trait of water retention capacity of leaves. It should be noted that the higher the figures obtained, the lower the water retention capacity of the leaves, and on the contrary, the lower the figures means the higher the water retention capacity of the leaves. Because this indicator shows what percentage of water has been used for evaporation after 2 hours compared to the initial amount of water in the leaves.

According to the results of leaf water retention capacity of foreign

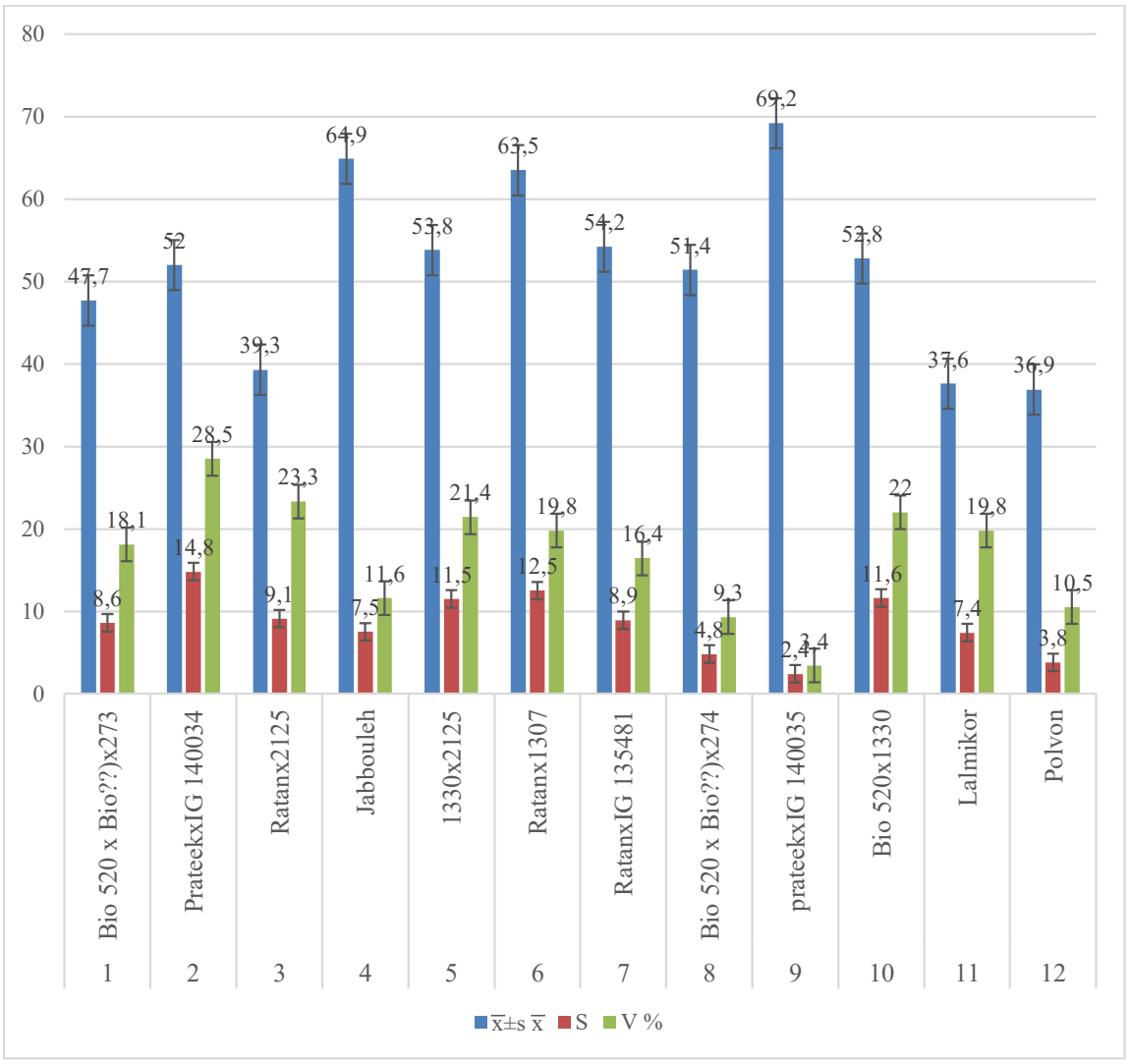

Fig.2. Water retention in foreign collection specimens of *Lathyrus sativus* L. species

samples of grass pea and local common pea varieties, when the water retention property capacity index of leaves was determined after 2 hours, the highest indicators for water retention capacity of leaves was noted in PrateekxIG 140035 sample (69.2%, respectively), a low indicator was recorded in the local Polvon variety (36.9%).

In the collection samples belonging to the *Lathyrus sativus* L. species, the average total water content was 77.4±2 %, and the coefficient of variation was 4.6%. In the Ratanx1307 sample selected for the study, a higher indicator (83.4±7.1 %, coefficient of variation 14.8%) was observed compared to other samples, while in the Bio 520 x Bio)x273 sample (75.4± 2.4 %, coefficient of variation 5.7%), in sample prateekxIG 140034 (75.4±0.8 %, coefficient of variation 1.9%) and in sample 1330x2125 (75.4±1.4 %, the coefficient of variation was 3.3%), a lower indicator compared to other samples. In the control samples, the lowest indicator was 74.5±1.5 % in the Polvon variety, the coefficient of variation was 3.5%.

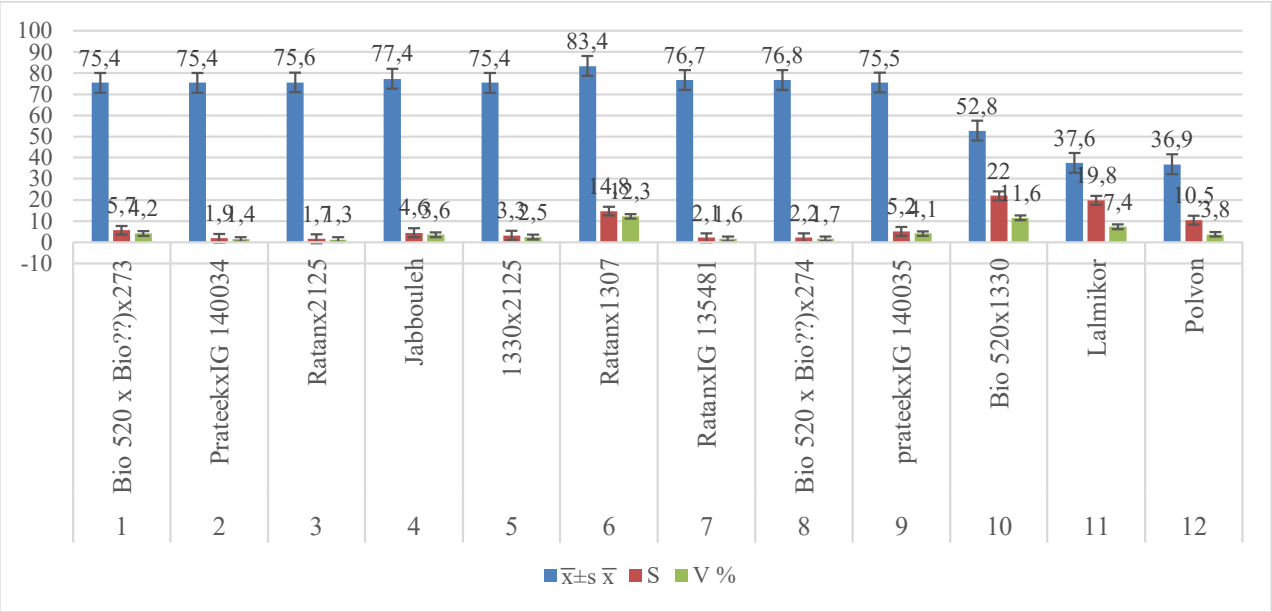

Fig 3. Total water content in foreign collection samples of *Lathyrus sativus* L. species

In plants, the water retention capacity of leaves (WRC) is one of the indicators that is very important for the study of physiological processes. In our research, we also studied the trait of water retention capacity of leaves. It should be noted that the higher the figures obtained, the lower the water retention capacity of the leaves, and on the contrary, the lower the figures means the higher the water retention capacity of the leaves. Because this indicator shows what percentage of water has been used for evaporation after 2 hours compared to the initial amount of water in the leaves.

According to the results of leaf water retention capacity of foreign samples of grass pea and local common pea varieties, when the water retention property capacity index of leaves was determined after 2 hours, the highest indicators for water retention capacity of leaves was noted in PrateekxIG 140035 sample (69.2%, respectively), a low indicator was recorded in the local Polvon variety (36.9%) .

In our research, the transpiration rates of foreign samples of *Lathyrus sativus* L.species and local common pea varieties during the flowering - harvest period were studied. The index of transpiration intensity was analyzed in the leaves of foreign samples and local pea varieties. Average indicator 316,2-837,8 mg of transpiration rate was recorded in the leaves. Among the studied samples the PrateekxIG 140035 sample had the highest transpiration rate index of 837,8 mg, and the lowest transpiration rate index was 316,2 mg in the Ratanx2125 sample. In local Polvon and Lalmikor varieties 351,7-403,1 mg indicators were recorded on this trait.

Conclusions

In the samples of the foreign collection, the indicator of total water content in the leaf was 74,5-83,5%. The highest rate of total water content was found in Ratanx1307 sample – 83,4%.

The high results for water retention capacity of leaves was recorded in the PrateekxIG 140035 sample – 69,2%. The highest rate 837.8 mg for transpiration intensity trait in plant leaves was recorded in sample PrateekxIG 140035.

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According to the decision of the Higher Attestation Commission of the Republic of Uzbekistan dated March 31, 2023 No. 332/5/6, the publication of the main scientific results of dissertations in biological sciences is included in the list of recommended national scientific publications.

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