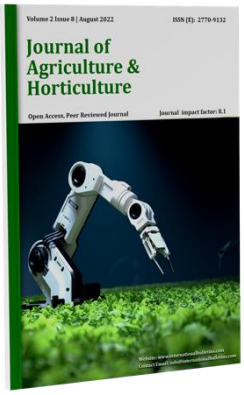

PEAR RESISTANCE TO ADVERSE ENVIRONMENTAL CONDITIONS

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Abstract

This article presents the results of observations on the resistance of pear cultivars to high temperatures under the conditions of Uzbekistan during the summer months. It was found that under the influence of hot air currents coming from subtropical regions into Central Asia, plants, including pear trees, exhibit stress conditions. The obtained results make it possible to assess the level of adaptation of pear cultivars to high temperatures and to determine their resistance potential.

Keywords

cultivar, pear, resistance, high temperatures, conditions of Uzbekistan, stress condition, water-holding capacity.

Introduction

The efficiency of cultivating agricultural crops, including fruit crops, depends largely on their resistance to adverse environmental conditions. In most regions of Uzbekistan, particularly during the summer months of July and August, hot dry winds are common. These winds, known as *garmsel*, usually arise when tropical air masses from the Middle Eastern countries enter Central Asia. Before reaching the Zarafshan Valley, these air flows pass through the Karakum Desert, where they become intensely heated.

Under the sharply continental climate of Uzbekistan, the productivity and quality of pear fruits are closely related to the degree of their resistance to high air temperatures and low soil moisture [2]. According to A.K. Pavlov, in the conditions of Samarkand, leaf scorch caused by heat is observed when daytime air temperature rises above 35 °C, relative air humidity decreases to 20%, and wind speed reaches 5–7 m/s. Leaf desiccation starts from the edges of the lamina and gradually spreads to the entire leaf surface. Leaf burns on trees are first detected on the frontal side exposed to the wind, most often from the southwest direction [3].

At the same time, different pear cultivars are not equally affected by *garmsel*. According to the observations of K.K. Dushutin, conducted in the Pridargom steppe zone, the following cultivars were found to be comparatively more heat-resistant: **Forest Beauty, Olivier de Serres, Josephine de Malines, and Royal Winter** — these varieties demonstrated higher tolerance to heat.

M.D. Kushnirenko notes that Western European pear cultivars are more demanding in terms of moisture. Under artificially created drought conditions, pear trees suffered more severely compared to other pome fruit crops [1].

Method

The studies were conducted according to the methodology outlined in *"Program and Methodology for the Study of Fruit, Berry, and Nut Crops"* (Orel, 1999).

Results

In the study of heat resistance, it is important to understand what determines it and which physiological indicators characterize this trait. The analysis of these factors would make it possible to develop special agrotechnical practices. Identifying increased seasonal

heat resistance in a number of valuable but weakly resistant cultivars, as well as determining the main indicators for assessing newly bred or selected cultivars for heat tolerance, would in turn contribute to a more scientifically justified selection of pear varieties for different zones of Uzbekistan.

For this purpose, we studied such physiological indicators as the water-holding capacity and the intensity of leaf transpiration in pear cultivars with sharply contrasting levels of heat resistance — *Williams* and *Podarok*.

The obtained data show that there are clear differences between these cultivars in the studied parameters. First of all, this concerns the water-holding capacity of the leaves. During the first hours of drying, the loss of moisture per leaf in the *Podarok* cultivar was 21% higher than in *Williams*. In the subsequent observation hours, the leaves of *Podarok* evaporated water significantly more intensively compared to *Williams*. It is noteworthy that with increasing exposure time, the difference in the amount of evaporated water between the cultivars became more pronounced.

It should be noted that before studying the water-holding capacity, the total amount of moisture in the leaves of both cultivars was almost the same: 576.5 mg per 1 m^2 of leaf area in *Williams* and 570.5 mg per 1 m^2 in *Podarok*. Over a period of 6 hours, the total water loss relative to the initial content was 48.6% in *Williams* and 63.4% in *Podarok*. Consequently, in the resistant cultivar, leaves are able to retain about two-thirds of their initial water content after 6 hours, whereas in the less resistant cultivar only about half remains.

Conclusion

In our opinion, indicators such as the degree of water-holding capacity and the intensity of transpiration can be used for the preliminary diagnosis of introduced cultivars during variety testing. However, in order to establish more precise parameters of these studies, it is necessary to conduct specialized physiological and other related investigations.

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