



THE STUDY OF HEAT RESISTANCE OF GOLDEN CURRANT (*RIBES AUREUM* PURSH) VARIETIES

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ABSTRACT

The article thoroughly discusses the heat resistance of golden currant varieties which belong to various ecological groups and investigates their damaging level by heat at high temperatures: + 40°C, + 45°C, + 50°C, + 55°C and + 60°C degrees. Accordingly, the most heat resistant varieties have been selected.

KEYWORDS: *Golden currant, Ribes aureum, varieties, temperature, heat resistance, damage level.*

INTRODUCTION

Global warming is one of the major issues causing danger to humanity. Scientists have seriously been concerned that the average temperature of the Earth is continuously raising at low rates, which is still lower than in previous years. Experts say that over the past 100 years, the earth's average temperature has risen dramatically. In the years 2015 – 2018 the hottest climate on the planet was recorded. Particularly, in 2018 the peak of heat was observed in Europe, Eastern Asian countries, in New Zealand and Russia resulting in floods and fire of different levels.

The World Meteorological Organization released a report in January, saying that the highest temperatures were recorded in 2015, 2016 and 2017. Comparing general indications, it has been found that the earth's average temperature has increased by 1.2 degrees over the next four years [3].

Plants are more damaged at higher temperatures than low temperatures. The effects of high temperatures on plants are different. First of all, the accumulation of toxic substances as a result of disturbance of metabolic processes in plants and clotting of protoplasmic proteins under high temperature cause the death of cells. The climate of Uzbekistan is sharply continental with very hot summers. As a result of a sharp rise in air temperatures and a decrease in air humidity, the sensitivity of many crops to high temperatures increases and the resistance of both generative and vegetative organs decreases [1, 2, 4, 5].

The duration of high temperatures (55-65°C) causes heat shock in plants and thermoinactivation

occurs in enzymes. It also affects physiological processes such as photosynthesis, transpiration, and respiration [2, 5, 6, 7].

The study of the heat resistance of fruit and berry crops is one of the prior issues and that's why the heat resistance of golden currant (*Ribes aureum* Pursh) varieties was investigated at the Scientific research institute of horticulture, viticulture and winemaking named after academician Mahmud Mirzaev.

MATERIALS AND METHODS

The heat resistance of plant cells depends on a number of factors, including temperature.

The investigations on the heat resistance of golden currant varieties were conducted according to the methods of F.F. Matskov (1976), under which the level of damage of leaves by artificial high temperatures of 40 °C, 45 °C, 50 °C, 55 °C, 60 °C degrees was studied [6].

The experiments were carried out during the years 2017-2019 and the tables were analyzed on the basis of the results of three years.

As an object of the study the varieties of golden currants belonged to various ecological groups were selected. The heat resistance of samples of golden currant varieties of Central Asia, such as Siyuma (st), Rukhshona, Elixir, Yadgor and Russian varieties, such as Lyovushka, Podarok Ariadne, Valentina was studied by taking samples of their leaves.

RESULTS AND DISCUSSION

The experiments were mainly conducted during the summer months. This is due to the fact that in summer, temperature can reach to its maximum level. In

June, the minimum air temperature was + 11.5°C, the average temperature was + 27.2°C, and the maximum air temperature was + 36.5°C. In July, the maximum temperature constituted + 15.3°C, the average temperature was + 32.1°C, while the maximum

temperature showed + 42.2°C degrees. In August the minimum temperature constituted + 9.5°C, the average temperature was + 27.4°C. and + maximum one was +39.7°C degree (Fig. 1).

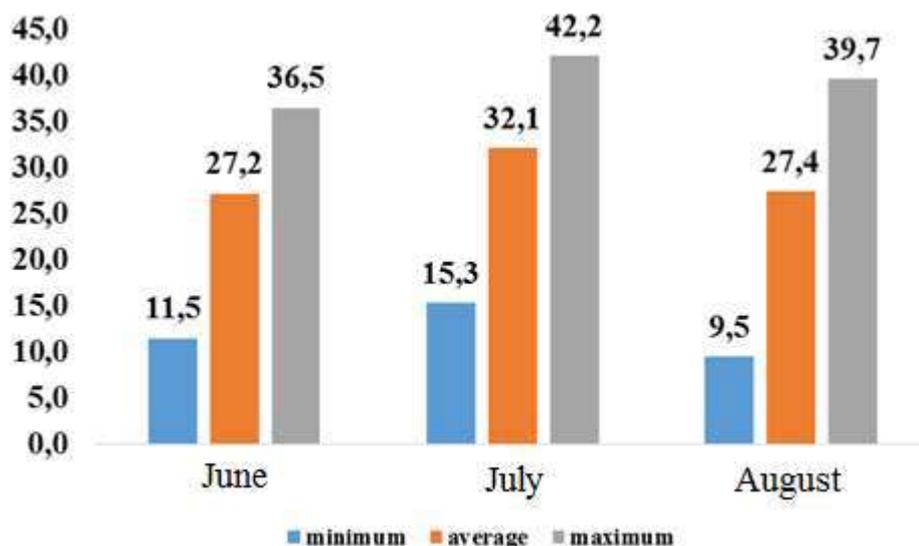


Fig. 1. Air temperature in experimental fields, (average, in 2017-2019), °C

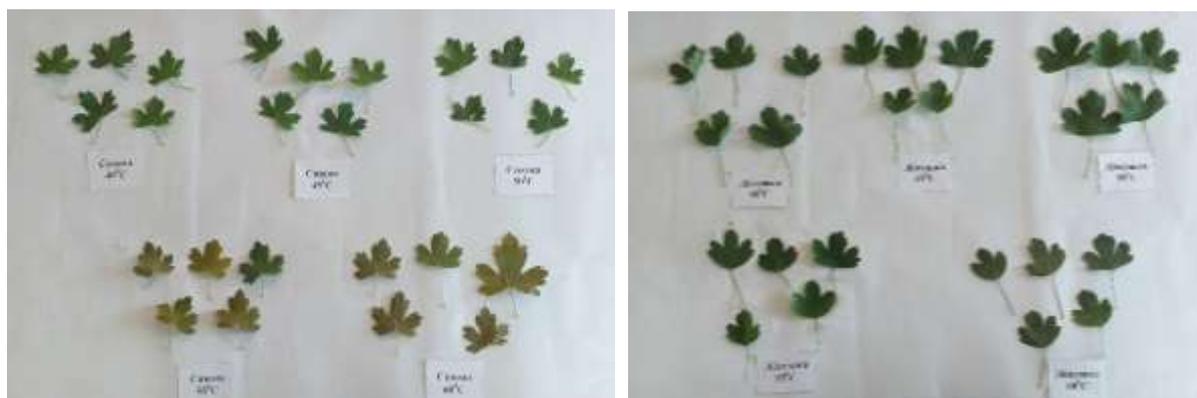


Fig. 2. Damage level of the leaves of golden currant varieties by the heat under various high temperatures, %

According to the results of the study, the highest resistance degree of the leaves of golden currant was in 40°C degree and hereby in all studied varieties damaging level was very low, ranging from 4.5% in Podarok Ariadne variety to 10.7% in Yodgor variety in June, while in July in Podarok Ariadne variety from 5.2% to 10.4% in Yadgor variety, in August in Lyovushka variety from 2% to 9.1% in Yadgor variety.

When the temperature was artificially raised to 45°C degree, the degree of damage in the varieties also increased. In June month the leaves of Siyuma (st) variety was damage by 17.7%, the highest damage was noted in Yadgor variety (28.8%), and the lowest damage was found in Podarok Ariadne variety (10.6%). In July and August, the damage by heat are different at temperature of 45°C and varies from 16 to 16.9% in the Siyuma (st) variety, from 6.7 to 18.6% in the Ruhshona

variety, from 12.2 to 23.9% in the Yadgor, and in Valentina variety 20.6-33.2%, in Podarok Ariadne variety it was 7.9-11,6% and Lyovushka variety was damaged between 10.3-12,3%. The level of damage of the varieties by heat at 55 °C degree was not more than 50% in most varieties. In the Yodgor and Elixir varieties, the level of damage was more than 50%. When the temperature was increased to 55°C degrees it exceeded 80% in all varieties. Just slightly lower in the varieties of Lyovushka and Podarok Ariadne, that is, in June in Lyovushka variety 58.9%, in Podarok Ariadne - 82%. in July month in Lyovushka variety as 78.8% while in Podarok Ariadne - 88.9%, in August in Lyovushka - 96.3% , in Podarok Ariadne variety - 95.4%. When the temperature was increased to 60 °C, the leaves of all varieties changed their color completely and got damaged 100% (Table).

Table
Damage level of the leaves of golden currant varieties by the heat under various high temperatures, %

Varieties	Temperature				
	40°C	45°C	50°C	55°C	60°C
June					
Siyuma (st)	7,1	17,7	47,0	92,1	100,0
Rukhshona	6,3	12,3	47,2	99,2	100,0
Yadgor	10,7	28,8	64,1	97,7	100,0
Elexir	8,4	25,2	46,5	98,0	100,0
Lyovushka	5,5	15,2	35,8	58,9	96,6
Podarok Ariadne	4,5	10,6	33,6	82,0	96,5
Valentina	9,2	20,1	48,3	91,8	100,0
July					
Siyuma (st)	7,9	16,0	54,3	95,3	100,0
Rukhshona	6,2	6,7	38,4	87,5	100,0
Yadgor	10,4	12,2	50,1	90,9	100,0
Elexir	7,4	11,8	78,9	95,7	100,0
Lyovushka	5,9	12,3	46,3	78,8	99,5
Podarok Ariadne	5,2	7,9	35,8	88,9	99,5
Valentina	11,9	33,2	66,5	97,1	100,0
August					
Siyuma (st)	5,2	16,9	56,4	97,1	100,0
Rukhshona	8,0	18,5	53,3	97,4	100,0
Yadgor	9,1	23,9	78,7	99,3	100,0
Elexir	4,7	11,8	82,3	99,6	100,0
Lyovushka	2,0	10,3	63,9	96,3	100,0
Podarok Ariadne	2,5	11,6	54,6	95,4	100,0
Valentina	7,3	20,6	62,4	99,3	100,0

CONCLUSION

It was observed that in the leaves of all varieties of golden currant the dynamics of damage prevention increased by rise in temperature.

An analysis of the results of the study showed that the high-temperature tolerance of golden currant varieties is between 45-50 °C degrees and now “Siyuma” and “Rukhshona” varieties, particularly “Lyovushka” and “Podarok Ariadne” varieties are found to be more resistant to heat than the other varieties.

These varieties will be used as the primary source for the selection to create new varieties resistant to high temperatures. It is also recommended that these varieties be expanded and used as an important food source in future in hot climate conditions on the planet.

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