

STUDY OF WATER DEFICIENCY IN RASPBERRY VARIETIES

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Annotation: This article provides information on the results of the study of water deficiency in leaf tissue of raspberry varieties. The leaves of raspberry varieties before irrigation and after irrigation were determined in three periods, ie in June, July and August of the summer, when the plant has a high demand for water, at 6 am, at 1 pm and at 6 pm.

Annotatsiya: Ushbu maqolada malina navlarining barg to‘qimalarida suv tanqisligi o‘rganish natijalari haqida ma’lumotlar berilgan. Bunda sug‘orishdan oldin va sug‘orishdan keyin malina navlari barglari uch muddatda ya’ni o‘simlikning suvga bo‘lgan talabi yuqori bo‘lgan yozning iyun, iyul, avgust oylarida ertalabki soat 6⁰⁰ da va kunduzi soat 13⁰⁰ da va kechki 18⁰⁰ da aniqlab borilgan.

Аннотация: В данной статье приведены сведения о результатах изучения водного дефицита в тканях листьев сортов малины. Листья сортов малины до полива и после полива определяли в три периода: в июне, июле и августе лета, когда растение испытывает повышенную потребность в воде, в 6 часов утра, в 13 часов дня и в 18 часов вечера.

The course of the most important physiological and biochemical processes in plants depends on the water supply of plants. As a result of water deficiency, metabolism is disrupted and this affects the growth, development of plants and their productivity [4]. The study of water deficiency in leaves is one of the most important processes in determining the drought resistance of plants.

Drought is one of the unfavorable environmental factors in the cultivation of raspberries. Heat, dry air and lack of moisture in the soil during the growing season, like other plants, adversely affect the growth and development of raspberries [1]. The level of drought resistance is understood as the ability of plants to maintain the length of the cropping period and the decrease in yield as a result of insufficient supply of moisture, and it depends on several factors. Drought-resistant plants are characterized by high water permeability, which is due to the content of water bound by colloids [5].

Assessment of water deficit of plants is carried out using laboratory experiments based on artificial drying of leaves at the stage of fruit ripening, and this allows to assess the resistance of plants to drought [2].

As a result of changing climatic conditions in the country, frequent water deficiency in the summer, the stages of growth and development of plants are difficult. Based on this problem, today it is important to study and select varieties suitable for the climatic conditions of our republic, which are highly resistant to abiotic factors, especially drought. Therefore, research on the effects of drought on raspberry cultivation is very relevant [3].

In order to study the drought resistance of raspberry varieties, the water deficiency in raspberry leaves was determined during the research.

To assess the drought resistance of raspberry varieties, a study of water deficiency in leaves was carried out according to the method of E. A. Goncharova “Evaluation of resistance to various stresses of fruit and berry and vegetable (succulent) crops” (1988). In three periods (June, July, August) the annual branches of raspberries was studied by taking 20 leaves from each variety at 6 am, 1 pm. and 6 pm. Leaf water deficit (%) was determined using the following formula:

**3-YO'NALISH: DAVOM ETAYOTGAN IQLIM O'ZGARISHI SHAROITIDA OZIQ-OVQAT
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XILMA-XILLIKDAN BARQAROR FOYDALANISH**

$$CT = \frac{(TC \times 100)}{MC}$$

Here: *CT* – water deficit; *TC* – the amount of saturated water, the difference in weight between the leaves before saturation and after saturation; *MC* – available water, the difference between the dry weight of the leaves and the weight of the leaves after water saturation.

RESULTS AND DISCUSSION. The water deficit of raspberry leaf tissue was determined before irrigation and after irrigation in three periods, that is, in June, July, and August, when the plant's demand for water is high.

Air temperature, relative air humidity, and soil moisture were determined before and after irrigation in the experimental field where the raspberry plantation was located during the research years (Table 1).

Table 1

Air temperature, relative air humidity and soil moisture in the experimental area where the raspberry plantation is located (2019-2021)

Factors	June			July			August		
	6 am	1 pm	6 pm	6 am	1 pm	6 pm	6 am	1 pm	6 pm
before irrigation									
Temperature, °C	23,5	35,4	31,8	25,2	40,2	33,4	20,2	34,6	31,2
Relative humidity, %	68,2	60,4	62,7	63,4	55,0	57,6	79,5	67,2	70,4
Soil moisture, %	17,5			15,8			17,2		
after irrigation									
Temperature, °C	24,3	38,8	36,2	26,7	39,4	35,4	18,7	32,4	29,5
Relative humidity, %	72,5	64,3	61,6	62,4	57,5	59,1	79,2	65,2	76,4
Soil moisture, %	21,2			19,6			22,5		

Before irrigation. At 6 am in June, the water water deficiency in the Barnaulskaya variety was 15,4%, the lowest water water deficiency was 14,1% in the Progress variety, and the highest water water deficiency was 18,6% in the Polka variety. At 1 pm when the air temperature reached a maximum, the water deficiency in all varieties increased, with the highest water deficiency in the Polka variety being 30,6%, while the lowest water deficiency in the Vislukha variety was 24,3%. At 6 pm, a decrease in air temperature also led to a slight decrease in leaf water deficit, with the highest water deficit being 23,5% in the Polka variety, while the lowest water deficit in the Progress variety was 19,8%.

In July, the highest water deficiency was observed in the leaves compared to other months due to the increase in air temperature. At 6 am in the morning, the water deficiency in the variety Barnaulskaya was 19,5%, the lowest water deficiency in the Vislukha variety was 16,6%, and the highest water deficiency in the Polka variety was 26,2%. At 1 pm, when the air temperature reached a maximum, the water deficiency increased in all varieties, with the highest water deficiency being 33,5% in the Polka variety, while the lowest water deficiency in the Vislukha variety was 27,2%. At 6 pm, the water deficiency in the varieties decreased slightly and the highest water deficiency was 26,8% in the Polka variety, while the lowest water deficiency in the Progress variety was 20,2%.

In August, the highest water deficit in varieties was observed at 1 pm, when the air temperature rose to the highest level, as in other months. Among raspberry varieties, the lowest water deficit before irrigation was 25,4% in Vislukha variety, 26,6% in Progress variety, while the highest water deficit among studied varieties was Polka variety 31,7%, Izobilnaya variety 30,5%, Laszka made up 29,2%. In August, the lowest indicator of water deficit among raspberry cultivars before irrigation was observed at 6 am, as in other months (Table 2).

Table 2

Water deficit in the leaves of raspberry varieties before irrigation (2019-2021), %

Varieties	June			July			August		
	6 am	1 pm	6 pm	6 am	1 pm	6 pm	6 am	1 pm	6 pm
Barnaulskaya	15,4	27,8	21,6	19,5	28,9	22,4	16,6	27,7	21,4
Vislukha	14,4	24,3	20,7	16,6	27,2	20,7	13,6	25,4	18,5
Sugana	14,7	26,2	20,2	20,2	28,5	21,5	16,2	28,2	20,2
Izobilnaya	16,8	28,7	21,5	24,4	31,3	24,3	17,4	30,5	25,2
Laszka	17,8	29,5	22,8	22,7	31,8	25,5	18,2	29,2	26,7
Malboro	16,0	27,4	22,1	20,5	30,2	23,6	15,5	28,8	20,6
Polka	18,6	30,6	23,5	26,2	33,5	26,8	19,6	31,7	25,5
Progress	14,1	25,5	19,8	17,4	27,8	20,2	15,5	26,6	19,4

When the water deficit of raspberry leaf tissues was studied after irrigation of the experimental plot, the highest water deficit was observed at 1 pm, similar to the pre-irrigation experiments (Figure 1).



Figure 1. The process of determining the water deficit of raspberry varieties under laboratory conditions.

In June at 6 am, the water deficit in the Barnaulskaya variety was 14,2%, the lowest water deficit was 12,8% in the Vislukha variety, and the highest water deficit was 16,8% in the Laszka variety. By 1 pm, when the air temperature to the highest level, the water deficit in all varieties increased, the highest water deficit was 27,7% in the Laszka variety, while the lowest water deficit was 23,2% in the Progress variety. At 6 pm due to the drop in air temperature, the water deficit in the leaves also decreased slightly, and the highest water deficit was 23,5% in the Laszka variety, while the lowest water deficit was 19,2% in the Sugana variety.

The highest water deficit in leaves was observed in July compared to other months due to the increase in air temperature. At 6 AM, the Barnaulskaya variety had a water deficit of 17,6%, the lowest water deficit was 15,1% in the Vislukha variety, and the highest water deficit was 22,8% in the Polka variety. By 1 pm, when the air temperature to the highest level, the water deficit in all varieties increased, the highest water deficit was 32,2% in the Polka variety, while the lowest water deficit was 24,6% in the Progress variety. At 6 pm, the water deficit in the varieties slightly decreased, the highest water deficit was 23,9% in the Laszka variety, while the lowest water deficit was 20,3% in the Vislukha variety (Table 3).

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Table 3

Water deficit in the leaves of raspberry varieties after irrigation (2019-2021), %

Varieties	June			July			August		
	6 am	1 pm	6 pm	6 am	1 pm	6 pm	6 am	1 pm	6 pm
Barnaulskaya	14,2	25,9	22,5	17,6	26,8	21,1	12,5	23,2	19,2
Vislukha	12,8	23,6	19,5	15,1	25,4	20,3	11,4	21,5	16,9
Sugana	13,5	24,8	19,2	18,7	26,6	21,4	14,8	26,3	18,2
Izobilnaya	15,3	27,4	22,6	22,4	28,7	23,6	14,5	26,4	20,7
Laszka	16,8	27,7	23,5	21,5	30,4	23,9	17,4	29,2	22,3
Malboro	14,5	25,2	20,7	19,7	27,6	21,8	13,2	25,4	18,1
Polka	15,7	27,4	21,2	22,8	32,2	22,6	16,3	28,7	24,5
Progress	13,2	23,2	17,6	15,8	24,6	21,3	12,6	22,1	17,5

In August, the highest water deficit in varieties was observed at 1 pm, when the air temperature to the highest level, as in other months. Among the raspberry varieties, the lowest water deficit after irrigation was 21,5% in the Vislukha variety and 22,1% in the Progress variety. The highest water deficit was 29,2% in Laszka variety and 28,7% in Polka variety.

In raspberry varieties, the highest level of water deficiency occurred during the day, but decreased in the evening. Water deficiency in raspberry varieties peaked in July compared to other months of the summer. In July, the highest water deficiency was 26,2-33,5% in the Polka variety and 22,7-31,8% in the Laszka variety. The lowest water deficiency was 16,6-27,2% in Visluxa, 17,4-27,8% in Progress and 20,2-28,5% in Sugana.

So, we can see from the above results that the Polka and Laszka varieties with a high water deficit are not drought-resistant, while the Progress, Visluxa, and Sugana varieties with a low water deficit are drought-resistant.

References

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