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## **AMOUNT OF WATER IN THE LEAVES OF SOME VARIETIES OF BLACKBERRY (RUBUS FRUTICOSUS L.)**

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### **Abstract**

In this article, the water content in the leaves of blackberry (*rubus fruticosus*) varieties cultivated in the central field of the Andijan Scientific Experimental Station of the Research Institute of Horticulture, Viticulture and Winemaking named after Academician Makhmud Mirzaev, located in the Izboskan district of Andijan region, was studied.

**Keywords;** Blackcurrant, rubus, berry, dryness, water content, remonstant, humidity, temperature.



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**MAYMUNJON(RUBUS FRUTICOSUS L.) AYRIM NAVLARINING  
BARG TARKIBIDAGI SUV MIQDORI**

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**Annotasiya**

Ushbu maqolada Andijon viloyati Izboskan tumanida joylashgan Akademik Maxmud Mirzayev nomidagi bog‘dorchilik, uzumchilik va vinochilik ilmiy-tadqiqot instituti Andijon ilmiy tajriba stansiyasi markaziy dala maydonida maymunjon (*rubus fruticosus*) navlarining barglaridagi suv miqdori tahlil qilindi.

**Kalit so‘zlar;** maymunjon, *rubus fruticosus*, qurg‘oqchilikk, suv miqdori, remontant, namlik, harorat.

**Аннотасия**

В данной статье исследовано содержание воды в листьях сортов ежевики (*rubus fruticosus*), выращиваемых на центральном поле Андижанской научно-опытной станции Научно-исследовательского института садоводства, виноградарства и виноделия имени академика Махмуда Мирзаева, расположенного в Иzbосканском районе Андижанской области.

**Ключевые** ежевика, *rubus fruticosus*, засуха, количество воды, ремонтант, влажность, температура,



## *Modern American Journal of Biological and Environmental Sciences*

ISSN (E): 3067-7920

Volume 2, Issue 5, May 2026

Website: usajournals.org

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### INTRODUCTION

One of the main global problems facing humanity today is drought, which has a decisive impact on agriculture, causing problems ranging from a sharp decline in productivity to global food security. This problem is seriously affecting agriculture in drought-prone countries around the world, including our country. Reducing the impact of drought

Cultivation of drought-resistant crops: Selection and reproduction of crop species that are suitable for environmental conditions and require less water is one of the problems facing the agricultural sector.

In order to find a partial solution to the above problems, among berry crops, the water content in the leaves of the blackberry (*Rubus fruticosus* L.) varieties is considered a partial solution in agriculture under drought conditions due to its certain level of drought resistance, water storage capacity, and adaptability to various soil conditions. Analysis of the water content in the leaves of *Rubus fruticosus* L. varieties allows us to draw preliminary conclusions about drought resistance.

Blackberry-*Rubus fruticosus* is a valuable resource for various sectors of the national economy. Its nutritional, medicinal and cosmetic properties make it an important plant in the agricultural, pharmaceutical and cosmetic industries, while it contributes to the preservation of the environment and biodiversity.

Literature review. Alekseenko I.V. determined that black raspberry has the highest water retention capacity, its leaves lose less than 20% of water. Blackberry and raspberry hybrids are also very drought-resistant (water loss after fruiting is less than 25%). According to the results of a comparative study of remontant and traditional raspberry varieties, it was found that the highest water retention capacity of leaves is characteristic of the second type. [4; 81-83-b]

L.A. Gruner, O.V. Kulashova [5; 8-b] selected *R. fruticosus* varieties Loch Ness of Scotland and Cheyenne, Thornfree and Agawam of North America as starting material, as valuable donors with high drought and frost resistance, and adapted them to the conditions of the Oryol region.



## *Modern American Journal of Biological and Environmental Sciences*

ISSN (E): 3067-7920

Volume 2, Issue 5, May 2026

Website: usajournals.org

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**Research methodology.** The drought resistance of raspberry varieties was determined using Gonchareva's method [2; 46-62-b.], for which 20 leaves from each variety were taken from one-year-old raspberry shoots at 6:00 in the morning, 13:00 in the afternoon and 18:00 in the evening, and the water deficit and water content were determined.

When assessing the drought tolerance of Maymunjon varieties, the amount of water in the leaves was also determined during the growing season in three periods: before and after irrigation in June, July, and August at 6:00 in the morning, 1:00 in the afternoon, and 6:00 in the evening.

The amount of water in the leaves of Maymunjon (%) was determined using the following formula:

$$SM = \frac{(V_1 - V_2)}{V_1} \times 100$$

Where: SM – water content, %; V1 – initial weight of leaves or branches, g; V2 – dry weight of leaves or branches, g

Assessing drought tolerance of plants Kramer, PJ & Boyer, JS (1995). Water relations of plants and soils. The water content of blackcurrant leaves was calculated as a percentage based on water-related indicator methods. [6; 8-b]

**1-table**

Indicators	Durable	Moderately resistant	Unsustainable
Water content (CM)	High (65–75%)	Moderate (55–64%)	Low (54% and below)

### **Results and discussion**

During the research years, air temperature, relative humidity and soil moisture were determined in the experimental area with the mango orchard before and after irrigation.



**Table 2 Air temperature, relative humidity and soil moisture in the experimental area with the mango orchard (2023-2025), %**

	June			July			August		
	6:00	13:00	18:00	6:00	13:00	18:00	6:00	13:00	18:00
<b>Sug'orishdan oldin</b>									
Temperature, °C	23.5	38.2	28.7	26.3	41.2	32.7	24.6	39.2	27.8
Relative humidity, %	44.2	51.2	46.6	42.3	49.3	47	51.5	49.8	52.4
Soil moisture, %	23.8			18.6			21.9		
<b>After irrigation</b>									
Temperature, °C	24.5	37.2	31.8	26.3	42.8	34.3	25.2	35.7	27.3
Relative humidity, %	59.3	57.8	58.4	41.8	46	43.8	57.5	52.6	54.8
Soil moisture, %	55.1			51.4			58.7		

When the water content in the leaves of the mango tree was studied before irrigation, the lowest water content in the leaves was determined in all months at the hottest time of the day, i.e. at 13:00 in the afternoon, in the “Smutstem” variety, 53.55%, and in the “Loch Ness” variety, 54.20%.

In June, before the experimental area was irrigated, the lowest water content compared to other varieties was 53.01% in the “Ouchita” variety, 53.32% in the “Natchez” variety, 53.96% in the “Loch Tey” variety, and 54.01% in the “Loch Ness” variety. The water content in the leaves was 56.42% in the “Black Jam” variety, 57.06% in the “Chester Thornless” variety, and 57.21% in the “Triple Crown” variety, which were higher than other varieties. In all months, the water content in the leaves was highest at 6:00 in the morning, the lowest at 1:00 p.m., and the water content in the leaves increased again by 6:00 p.m.

In July, a decrease in the water content in the leaves was observed in all varieties. When the water content in the leaves was studied at 1:00 p.m., the lowest water content in the leaves was 52.75% in the “Loch Ness” variety, 52.78% in the “Smutstem” variety, and 53.28% in the “Loch Tey” variety. The water content in the leaves was 55.41% in the “Black Jam” variety, 54.86% in the “Chester



Thornless” variety, and 57.21% in the “Triple Crown” variety, which was higher than other varieties.

In August, the water content in the leaves at 1:00 PM was the lowest among the varieties compared to other varieties in the Smutstem variety (53.73%), Ouachita (53.93%), and Loch Tey (59.2%). The water content in the leaves was 56.62% in the Black Jam variety (56.52%), and Triple Crown (55.74%), showing the highest results among the studied varieties. The water content in the leaves at 6:00 AM in all months was the highest. (Table 3)

**Water content in the leaves of Maymunjon varieties before irrigation (2023-2025), % Table 3**

Varieties	June			July			August		
	Clock								
	6:00	13:00	18:00	6:00	13:00	18:00	6:00	13:00	18:00
	61.63	57.07	59.53	57.35	54.86	59.23	60.73	56.52	58.29
"Black Jam"	62.43	56.42	59.14	58.51	55.41	57.65	60.42	56.62	59.26
"Triple Crown"	62.74	57.21	60.82	56.54	54.92	61.35	61.52	55.74	60.43
Natchez	60.26	53.32	58.27	58.20	53.42	57.79	59.57	54.91	59.46
Loch Ness	61.23	54.01	59.61	57.74	52.75	56.48	60.31	55.85	58.13
Loch Tay	60.08	53.96	59.17	56.95	53.28	58.76	58.34	54.19	56.86
"Smutstem"	61.95	54.15	58.82	58.89	52.78	55.37	58.94	53.73	56.54
Ouachita	60.68	53.01	59.68	57.91	54.36	55.32	58.58	53.93	57.63

When the water content in the leaves of the blackcurrant was studied after irrigation, the lowest water content in the leaves was determined in all months at the hottest time of the day, i.e. at 13:00 in the afternoon, in the “Ouchita” variety, 53.76%, and in the “Loch Ness” variety, 54.20%.

After irrigation of the experimental area, in June, at the hottest time of the day, i.e. at 13:00, the lowest water content compared to other varieties was 59.47% in the Black Jam variety, 60.12% in the “Loch Tey” variety. The water content in the leaves was 62.35% in the “Loch Ness” variety, 62.00% in the “Ouchita” variety, which was higher than other varieties. In all months, the water content in the leaves



**Modern American Journal of Biological and Environmental Sciences**

ISSN (E): 3067-7920

Volume 2, Issue 5, May 2026

Website: usajournals.org

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was highest at 6:00 in the morning, the lowest at 1:00 p.m., and the water content in the leaves increased again by 6:00 p.m.

In July, a decrease in the water content in the leaves was observed in all varieties. When the water content in the leaves was studied at 1:00 p.m., the lower water content indicators compared to other varieties were “Black Jam” variety (58.91%), “Ouchita” variety (60.23%), and “Chester tornless” variety (60.36%). The water content in the leaves was 62.53% in “Natchez” variety (61.84%), and “Loch ness” variety (61.46%), which was higher than other varieties.

**Water content in the leaves of Maymunjon varieties after irrigation (2023-2025), % Table 4**

Varieties	June			July			August		
	Clock								
	6:00	13:00	18:00	6:00	13:00	18:00	6:00	13:00	18:00
"Black Jam"	66.55	61.07	63.21	66.0	60.36	62.91	65.84	60.33	63.30
"Triple Crown"	65.78	59.47	63.7	63.51	58.91	61.8	64.22	61.32	63.26
Natchez	67.24	61.21	64.82	66.95	61.23	63.89	63.27	59.14	60.13
Loch Ness	64.25	60.38	63.33	63.14	62.53	63.97	63.91	57.65	59.46
Loch Tay	65.32	62.35	64.61	63.52	61.46	59.75	64.95	58.95	60.13
"Smutstem"	64.98	60.12	62.37	63.64	60.58	58.76	64.26	59.19	60.03
Ouachita	66.54	60.35	61.85	64.71	61.84	59.37	65.71	62.36	64.56
"Black Jam"	65.86	62.0	63.85	63.95	60.23	62.02	66.24	63.85	64.29

In August, the lowest leaf water content at 1:00 PM was 57.65% for Natchez, 58.95% for Loch Ness, and 59.14% for Loch Tey. The highest leaf water content was 68.85% for Ouchita, 62.36% for Smutstem, and 61.32% for Black Jam. The highest leaf water content was observed at 6:00 AM in all months. (Table 4)



**Table 5**

<b>№</b>	<b>Varieties</b>	<b>Average amount irrigation</b>	<b>water before</b>	<b>Average volume irrigation</b>	<b>water after</b>	<b>Drought resistance</b>
1	"Black Jam"	58.36		63.29		Moderately resistant
2	"Triple Crown"	58.43		62.44		Moderately resistant
3	Natchez	59.03		63.10		Moderately resistant
4	Loch Ness	57.24		62.07		Moderately resistant
5	Loch Tay	57.35		62.34		Moderately resistant
6	"Smutstem"	56.84		61.55		Moderately resistant
7	Ouachita	56.80		63.03		Moderately resistant
8	"Black Jam"	56.79		63.59		Moderately resistant

When the water content in the leaves of the blackcurrant was analyzed before and after irrigation, all varieties were found to be moderately drought-resistant. (Table 5)

Conclusion. Among the blackcurrant varieties, the varieties “Chester Thornless”, “Black Jam”, “Triple Crown” were found to be drought-resistant due to the high water content in the leaves compared to other varieties.

Partial water-resistant was observed in the blackcurrant varieties “Loch Ness”, “Loch Tay”, and Smutstem due to the low water content in the leaves at 13:00 in July.

Based on the water content in the leaves of the blackcurrant varieties, it was found that the varieties are moderately drought-resistant in the conditions of the Andijan region.

Among Maimunjon varieties, "Chester Thornless", "Black Jam", "Triple Crown" and "Natchez" varieties can be planted in areas of Andijan region where water resources are partially limited.



***Modern American Journal of Biological and Environmental Sciences***

**ISSN (E):** 3067-7920

Volume 2, Issue 5, May 2026

**Website:** usajournals.org

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