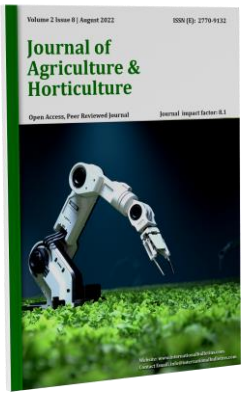

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WATER RETENTION CAPACITY OF THE LEAVES OF MULBERRY PLANTED IN DIFFERENT SCHEMES BY INTENSIVE METHOD

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Abstract.
This article analyzes the data on the dynamics of water evaporation from mulberry leaves in the experiments conducted on intensive mulberry plantations planted in 1.4x0.5m, 1.2x0.22m, 09x09m schemes. Also, the effective use of land and the efficiency of using new schemes in the establishment of new mulberry plantations are presented.
Key words: productivity, water, evoparation, mulberry leaf, yield, nutritious, intensive, scheme, cocoon, mulberry plantations, shoots.

In the hot climate of Uzbekistan, the transpiration process in the leaves of agricultural crops, fruit trees and decorative trees accelerates, which greatly affects the characteristics of plant growth and fruiting. Especially in hot summer days, it is very important to irrigate and meet the water demand of trees during the growth of leaves, branches, flowering, fruit formation and ripening of fruits.

Dehydrated plant roots, stems, and leaves stop growing due to transpiration, resulting in shedding of leaves, flowers, and even fruits.

Mulberry silkworms do not drink water like other animals or insects, they get the water necessary for the normal life processes in their caterpillar, pupa and butterfly stages of development only from mulberry leaves, which are the only food of worms. It is stated in the literature that the amount of water in the leaves of the mulberry plant depends on the proper cultivation of mulberry trees, that is, the implementation of agrotechnical activities such as softening the soil between rows of mulberry trees, fertilizing, watering. Acquaintance with the publications related to sericulture shows that the dependence of growth and development of mulberry silkworms, the weight and silkiness of the cocoons they wrap on the amount of water in the leaves grown in mulberry plantations planted in different schemes and the water content of the leaves on which the worms are feeding is hardly covered in the literature.

Enrichment of mulberry leaves grown in the hot days of the summer season with nitrogen addition in an antiseptic solution increased the cocoon quality indicators, in particular, made 72.5% share of high-grade cocoons. The author studied the decrease in nutritional properties and the water content of mulberry leaves with the sudden warming of the air during the period of repeated worm rearing, and developed the methodology of how to use additional enrichment substances biostimulators and achieved positive results [3; p. 31].

The researcher found out that it is possible to grow cocoons in the summer season. The researcher found that the silk shell weight of Orzu and Yulduz cocoons was 414-419 mg, the same as spring cocoons. In the experimental option where additional food substances were used, it was proved that the weight of cocoon silk shell increased by 12.3-12.5% [6; p. 27].

In the scientific research on the productivity, nutritional value and disease resistance of mulberry cultivars, Yuesang 11 mulberry cultivar proved to be higher in protein, polysaccharide, glucose, nitrogen, moisture, vitamins and ash content than the comparative cultivars. Especially in intensive mulberry plantations, it was determined that the nutritional value of mulberry leaves varies depending on the age of the mulberry tree and in regions with different agrotechnics of mulberry cultivation [6; p. 19].

In experiments on the use of mulberry tree leaves as a food base for mulberry silkworms, the viability and average weight of cocoons and cocoon productivity of Orzu silkworm breeds with large cocoons were found to be higher when reared with the leaves of Tajikistan seedless mulberry and Lixi-5 varieties. In addition, the author scientifically substantiated that the high yield of cocoons obtained from 1 box of worms depends on mulberry varieties [4; p. 27].

The amount of water in the mulberry leaves grown in newly established intensive mulberry plantations is extremely important for the completion of cocooning, especially for the end of worm rearing. Water retention property of mulberry leaves is more important for good digestion and absorption of leaves in the body of worms. An important part of our research is the study of these issues. The water retention property of mulberry leaves is especially important in feeding worms with leaves prepared in intensive mulberry plantations.

It is known that today the population of our Republic is increasing rapidly. This, in turn, requires efficient use of available land. To do this, it is necessary to determine the schemes for the establishment of new effective mulberry plantations in the intensive method suitable for the climate of different regions of Uzbekistan and harsh continental climatic conditions. It takes 4-5 hours or even more time to cut mulberry branches from the fields, transport them, prepare the branches and to feed the worms with them. Due to the heat, water evaporates from the mulberry leaves and they become withered. The worms don't eat well these withered leaves, most of them go to waste. In this process, the search and selection of mulberry varieties with more water retention capacity in their leaves and the use of mulberry leaves grown in mulberry plantations under new intensive schemes to feed worms can be an important factor in increasing cocoon productivity and silk productivity.

Taking into account the stated considerations, the issue of water retention in leaves grown in intensive mulberry plantations organized on the basis of the new 1.4x0.5m (14286), 09x09 (12346), 1.2x0.22 (37878 pieces) schemes and, as a comparison, the widely used 4x0.5m (5000 pieces) scheme in our Republic was studied comparatively. For this, the samples were taken from the leaves of mulberry trees planted in the same agrotechnical care in the 1.4x0.5m, 09x09, 1.2x0.22 and 4x0.5m schemes in the middle of the instars of worms. Samples were taken until 8:00 am (100 grams per replication) and the dynamics of water loss or evaporation from the leaves was monitored until 8:00 pm. Leaf samples were weighed every two hours.

Experiments to determine the water retention capacity of mulberry leaves planted in 1.4x0.5m, 1.2x0.22, 09x09 and 4x0.5m (comparative) schemes were conducted comparatively in spring and autumn seasons. The results of long-term observations are presented in Tables 1 and 2

Table-1

Water evaporation dynamics of leaves of mulberry trees planted in different intensive (1.4x0.5m, 1.2x0.22, 09x09 and 4x0.5m) schemes in the spring season

Indicators	Weight change of 100 gram leaf samples due to water evaporation					
	10 oo a.m.	12oo p.m.	14oo p.m.	16oo p.m.	18oo p.m.	20oo p.m.
scheme 1,4x0,5m						
Weight of sampled leaf, g	100,0	95,6	88,2	81,1	78,3	76,4
Evoparated water, g	0	4,4	11,8	18,9	21,7	23,6
scheme 1,2x0,22m						
Weight of sampled leaf, g	100,0	94,8	87,5	81,7	77,8	74,9
Evoparated water, g	0	5,2	12,5	18,3	22,2	25,1
scheme 09x09m						
Weight of sampled leaf, g	100,0	93,9	86,1	80,8	76,4	72,8
Evoparated water, g	0	6,1	13,9	19,2	23,6	27,2
comparative scheme 4x0,5m						
Weight of sampled leaf, g	100,0	93,0	82,1	75,6	71,2	68,4
Evoparated water, g	0	7,0	17,9	24,4	28,8	31,6

Table-2

Water evaporation dynamics of leaves of mulberry trees planted in different intensive (1.4x0.5m, 1.2x0.22, 09x09 and 4x0.5m) schemes in the autumn season

Indicators	Weight change of 100 gram leaf samples due to water evaporation, g					
	10oo a.m.	12oo p.m.	14oo p.m.	16oo p.m.	18oo p.m.	20oo p.m.
1	**2**	**3**	**4**	**5**	**6**	**7**
scheme 1,4x0,5m						
Weight of sampled leaf, g	100,0	92,4	83,0	77,5	72,1	69,2
Evoparated water, g	0	7,6	17,0	22,5	27,9	30,8
scheme 1,2x0,22m						
Weight of sampled leaf, g	100,0	91,0	81,8	77,5	69,6	68,1
Evoparated water, g	0	9,0	18,2	23,5	30,4	31,9
scheme 09x09m						

Weight of sampled leaf, g	100,0	88,8	80,9	75,7	68,9	66,4
Evoparated water, g	0	11,2	19,1	24,3	31,1	33,6
comparative scheme 4x0,5m						
Weight of sampled leaf, g	100,0	87,6	78,6	73,2	65,9	62,9
Evoparated water, g	0	12,4	21,4	26,8	34,1	37,1

Like the spring season, leaf samples were taken until 10:00 a.m. in the autumn season also in the intensive mulberry plantations planted in 1.4x0.5m, 1.2x0.22m, 09x09m schemes and 4x0.5m and comparative scheme plntation and then their weight was determined every two hours.

It is known that the leaves brought from the fields are stored in the shade under the trees, on the sidewalks and are fed to the worms until the new leaves are brought in the evening. During this period, water evoparates from the leaves. Many years of observations confirm that leaves given to worms every two to three hours starting at 6:00 in the morning may lose some water, it was considered appropriate to determine the level of evaporation of water from the leaves during this period.

The amount of evaporation of water from newly cut leaves is from 7.6 grams to 12.4 grams in the spring season between 10-12 o'clock in the morning, as the temperature rises, the evaporation of water from the leaves increases, from 17.0 grams to 21.4 grams at 2 p.m., from 22.5 grams to 26.8 grams at 4 p.m., from 27.9 grams to 34.1 grams at 6 p.m., and finally from 24.7 grams to 30.6 grams by 8 p.m. (Table 2). Now let's look at the dynamics of water loss from the leaf in the summer season for the same varieties of mulberry.

If we look at the dynamics of evaporation of water from the leaves in the autumn season according to Table 2, it can be observed that the evoparation of water from the leaves is somewhat accelerated in the hot summer days of July. In this case, the amount of evaporated water in the period from 10 o'clock to 12 in the morning is from 7.9 to 11.2 grams, at 2 p.m. from 17.1 to 20.1 grams, at 4 p.m. from 22.9 to 26.7 grams, at 6 p.m. 28.4 grams to 33.4 grams and at 8 p.m. from 30.8 grams to 37.1 grams.

Table-3

Rating on number of leaves, average weight of leaves and water content in the leaves in 100 gram samples taken from intensive mulberry trees in the autumn season.

Planting schemes of intensive mulberry plantations	Number of leaves in 100 gr samples, pieces		Average weught of the leaf, gr		Water amount in the leaf, %		Rating of leaves by their water retention properties	
	spring	autumn	spring	autumn	spring	autumn	spring	autumn
1,4x0,5m	28	30	3,57	3,33	75,2	72,1	1	1
1,2x0,22m	29	33	3,44	3,03	69,4	68,3	3	3
09x09 m	32	36	3,12	2,77	68,3	66,7	4	4
comparative 4x0,5m	30	32	3,33	3,12	74,8	71,9	2	2

Table 3 shows the number of leaves in a 100-gram sample of mulberry, the average weight of a leaf, the amount of water in the leaves, and the water retention properties of the leaves of mulberry trees of different schemes in the spring and autumn seasons, and the number of leaves and the average weight of one leaf. Also, in Table 3, the rating and ranking of intensive mulberry plantations in different schemes according to these signs are described.

High transpiration of water in the plant stems, especially in leaves, under the influence of heat often has a negative effect on the productivity of agricultural crops. In order to reduce this negative effect, increasing intensive plantations of mulberry trees in new optimal schemes with high water retention properties of leaves and stems can solve the problem. However, there are very few publications that describe the results of special studies in this regard.

The researchers have created the technology of producing valuable full weight cocoons even in summer and autumn seasons. The problem is that under the influence of hot summer temperatures and dry air, water and nutrients in mulberry leaves decrease, the leaves become hard, and worms absorb them poorly [1; pp. 34-36].

There are many mulberry leaves in tall mulberry plantations in the summer and autumn seasons. When mulberry silkworms were fed with preserved mulberry leaves in practice and in the experiment, it was found that the feed digestion process was 25% after the 3rd instar of silkworms due to the decreased quality of the feed and the change in the contents of the mulberry leaves [2; pp. 60-64].

In their research, Indian scientists have shown that soil erosion and drought caused by external environmental factors have different effects on the growth and development of mulberry trees, and water shortage has a negative effect on the development of silkworms, and the less than normal amount of water in mulberry leaves grown in special mulberry plantations affects the process of nutrient absorption and assimilation [7; pp. 803-810].

The data obtained in the experiments indicate that there is a correlation between the amount of water in the leaves obtained from intensively organized mulberry plantations, the average weight of the leaf and the water retention property of the leaves. It should be noted that the

study of this law is very important for the mulberry silkworm. From our research, it can be concluded that the smaller the number of leaves per 100 gram sample, the higher the average leaf weight. In turn, the higher weighed leaf is thick, which slows down the process of evaporation of water, which means that the leaves grown in the mulberry plantations organized on the basis of such new intensive schemes have a better water retention capacity.

Based on the tests and analysis of the above indicators of the newly selected 1.4x0.5m, 1.2x0.22m and 09x09m schemes, it was found that most of the indicators of the 1.4x0.5m and 1.2x0.22m schemes are higher than the comparative 4x0.5m scheme, and it should be also noted that some indicators of these compared schemes were equal.

The rating of the leaves grown in intensive mulberry plantation planted in the 09x09m scheme for water retention was somewhat lower. The results of this study can be used as a new method to evaluate leaves grown in intensively established mulberry plantations.

The results of feeding Ipakchi 1 hybrid of silkworm with mulberry leaves prepared in intensive plantations planted in the 1.4x0.5m, 1.2x0.22m, 09x09m and 4x0.5m scheme on the land plots of the farm "IPAK KOCHAT CLUSTER" in Markhamat district in the spring and autumn seasons are reflected in Table 4.

Table-4

Changes in the productivity of silkworms fed on leaves grown in spring and autumn vegetation according to the new 1.4x0.5m, 1.2x0.22m, 09x09m and 4x0.5m schemes to study water content in leaves

(Ipakchi 1 hybrid) ($\overline{X}$ ±S $\overline{x}$)

The amount of moisture in the leaves of intensive mulberry plantations of different schemes, %	Worm viability, %	Average weight of cocoon, g	Average weight of silk shell, mg	Cocoon silkiness, %	Cocoon yield per box, kg
Silkworm rearing in spring					
I option. Scheme 1.4x0.5m. Water content in the leaves 75,2%	86,9±0,16	1,72±0,014	406±2,3	23,6±0,17	68,8±0,17
II option. Scheme 1.2x0.22m. Water content in the leaves 69,4%	82,7±0,12	1,65±0,022	348±0,18	21,1±0,15	66,0±0,18
III option. Scheme 09x09m. Water content in the leaves 68,3%	79,8±0,11	1,59±0,022	366±0,19	23,0±0,18	63,6±0,18
Comparative option. Scheme 4x0.5m. Water content in the leaves, 74,8%	85,6±0,14	1,71±0,014	415±1,9	24,2±0,17	68,4±0,17
The level of reliability of the difference between options (P)	0,993	0,996	0,998	0,990	0,979

Silkworm rearing in autumn					
I option. Scheme 1,4x0,5m. Water content in the leaves 72,1%	82,8±0,17	1,43±0,015	338±2,5	23,6±0,20	57,2±0,11
II option. Scheme 1,2x0,22m. Water content in the leaves 68,3%	78,5±0,12	1,37±0,010	314±2,1	22,9±0,17	54,8±0,18
III option. Scheme 09x09m. Water content in the leaves 66,7%	77,4±0,17	1,30±0,015	301±2,5	23,1±0,21	52,5±0,12
Comparative option. Scheme 4x0,5m. Water content in the leaves 71,9%	80,5±0,12	1,41±0,010	326±2,1	23,1±0,18	56,4±0,18
The level of reliability of the difference between options (P)	0,981	0,992	0,998	0,991	0,980

As can be seen from Table 4, the amount of water contained in the leaves given to worms had a certain effect on productivity indicators in both spring and autumn. In the spring season, the average weight of the cocoon was 1.72 grams when using mulberry leaves grown in plantation of a 1.4x0.5m scheme, while this indicator was 1.65 grams when using mulberry leaves from 1.2x0.22m scheme plantation, and 1.59 grams when using leaves from 0.9x0.9m scheme mulberry plantation, silk shell weight was 406, 348 and 366 milligrams respectively. In the comparative option planted in a 4x0.5m scheme, water amount was 1.71 grams and silk shell weight were 415 milligrams.

In autumn repeated worm rearing, these indicators, i.e., the average weight of a live cocoon was 1.43 grams when using mulberry leaves grown in plantation of a 1.4x0.5m scheme, and 1.37 grams when using leaves from a mulberry plantation planted in a 1.2x0.22m scheme, while in a 0.9x0.9m scheme plantation the leaves were 1.30 grams and in the comparative variant planted in a 4x0.5 m scheme, 1.41 grams, and the weight of the silk shell was 338, 314, 301 milligrams respectively while in a comparative option 326 milligrams.

Spring season differences between the new schemes were 8.2 percent in worm viability, 7.6 percent in cocoon weight, 11.9 percent in silk content, 3.1 percent in silkiness, and 7.6 percent in yield per box of worms.

In autumn repeated worm rearing, the effect of intensive mulberry plantations of 1.4x0.5m, 1.2x0.22m, 09x09m and 4x0.5m schemes on productivity was higher, the differences between options by worm viability (6.6%), cocoon weight (9.1%), amount of silk in the cocoon (11.0%) and silkiness of cocoons (3.0%), yield of cocoons per 1 box of worms (8.2%) was even higher. It was found that the effect of silkworms fed with mulberry leaves grown in intensive plantations on productivity traits in spring and autumn repeated worm rearing was analytically reliable.

Conclusion

Based on the above data, it is possible to come to a theoretical conclusion that silkworm viability and silk yield largely depend on the amount of water in the mulberry leaves given to the worms.

The results of our research on the dynamics of water evaporation from mulberry leaves, which were conducted for the first time on intensive plantations with schemes of 1.4x0.5m, 1.2x0.22m, 09x09m, made it possible to use the land effectively, to establish new mulberry plantations and make appropriate changes in the and planting schemes.

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