

Results of a Complex Estimation of Varieties of *Hibiscus syriacus* L. in the Conditions of Tashkent

Abdixofiz L. Rakhimov, Shohista A. Samatova

Karshi State University, Karshi, Uzbekistan
Email: abduhofiz@bk.ru

How to cite this paper: Rakhimov, A.L. and Samatova, S.A. (2021) Results of a Complex Estimation of Varieties of *Hibiscus syriacus* L. in the Conditions of Tashkent. *American Journal of Plant Sciences*, 12, 566-572.

<https://doi.org/10.4236/ajps.2021.124037>

Received: March 8, 2021

Accepted: April 13, 2021

Published: April 16, 2021

Copyright © 2021 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

The article presents the results of variety studies on the decorative and economic-biological characteristics of *Hibiscus syriacus* L. in the conditions of Tashkent. It is established that the soil and climatic conditions of Tashkent are quite favorable for the cultivation of Syrian hibiscus. As a result of a comprehensive assessment, the most promising, promising and fewer promising varieties were identified. It is noted that the most promising—both forms and the *Speciosus* variety are characterized by better adaptability. Promising varieties—*Luce*, *Red Heart*, *Russian Violet* in a short time were able to adapt to new conditions, and were able to maintain their decorative and biological qualities. *Pink Flirt*, *Rubis* and *Totus Albus* are among the less promising varieties. These varieties were introduced to Uzbekistan in recent years and have not yet been able to fully adapt. The Aphrodite variety, which is part of the group of less promising varieties, has not been able to sufficiently show decorative and economic and biological qualities for a long time.

Keywords

Hibiscus syriacus L., Tashkent, Climate, Variety Estimation, Decorative, Uzbekistan

1. Introduction

One of the main tasks of introduction work with ornamental plants is to identify the most promising taxa for introduction into the practice of green construction and use in breeding. A special approach requires conducting such studies on varieties with high decorative qualities. This is due to the fact that in some cases these varieties may not fully display decorative features in the new conditions.

Conducting research on variety studies and variety evaluation makes it possible to identify the most promising varieties for this region, which show their biological, decorative, and economically valuable properties as much as possible in the new conditions [1].

Hibiscus syriacus L.—is of great interest because of its high decorative properties and resistance to adverse environmental influences. If the first varieties appeared 200 years ago, today, according to some sources, their number is close to 4000 [2]. In the United States, Canada, France, Italy, Germany, China, South Korea and Japan [3] [4] [5], extensive research is being conducted to create new varieties of this plant. Currently, 2 forms and 10 varieties are grown in Uzbekistan.

Many works are devoted to the introduction assessment [6] [7] and variety evaluation of ornamental plants [8] [9]. Scientific sources provide special scales for evaluating [10] [11] [12] some types of ornamental shrubs [13] [14] [15]. In the conditions of the Krasnodar Territory, the assessment of economic and biological indicators and decorative qualities of 15 varieties of Syrian hibiscus was carried out [16].

Purpose of the Study

The purpose of this work was to conduct a complex estimation of the varieties of *H. syriacus* L. in the conditions of Tashkent (Uzbekistan).

2. Materials and Methods

The objects of research were 2 forms and 10 varieties of *H. syriacus* L. of various origins. Of these, 2 varieties with a double type of flower. The study included 7 summer plants. The number of registered plants of each variety is not less than 10.

The 100-point Timkin scale (2011), based on a modification of the methods Bylova and Zalevskaya, was used for variety evaluation. Each trait was evaluated on a 5-point scale, then indexed by the significance coefficient of this trait. At the same time, considering the assortment and climatic conditions of Tashkent, we increased the significance coefficient of the flower stability attribute due to the “originality” attribute.

When considering the economic and biological qualities, a 50-point scale was used and considered the productivity of flowering, resistance to diseases, winter hardiness, and drought resistance.

3. Result and Discussion

For an objective assessment of the results of the introduction work for each studied variety, it is advisable to allocate primarily decorative indicators. When evaluating ornamental crops, the decisive role belongs to qualitative indicators (color, shape), determined by subjective impressions [17].

Among the numerous varietal characteristics that determine the decorative value of the variety, the color of the flower occupies a special place. The unique-

ness of the general tone or a peculiar shade, saturation, purity and color stability contribute to the rapid recognition and wide distribution of the variety [18]. When assessing the color of the *Syrian hibiscus* flower, considering the requirements for creating a flower garden and the mentality of the population of Uzbekistan, the high score estimated the white, pink and red colors of the flower.

In the conditions of Tashkent, the flowers of the *Luce*, *Totus Albus* varieties with a diameter of 8 - 9 cm were rated 3 points. The other varieties received high scores for this indicator.

On the basis of the shape of the flower of the variety *Russian Violet* and *Totus Albus*, for the bell shape, they received 4 points each. The flowers of the other varieties have a flatter, regular, rounded shape.

The lateral parts of the petals of the corolla *Luce* and *Rubis* touch less than 2/3. At the same time, the *Luce* flower has a large number of petals and petaloids. In other varieties, the edges of the petals overlap each other and form a beautiful rounded shape. The flower of the *Speciosus* variety is anemonic.

In the conditions of Tashkent, the flowers of all the studied varieties received high ratings for their resistance to external environmental factors.

In terms of decorative qualities, the form with a white flower and the *Speciosus* variety received the highest rating (Table 1). The purple flower shape and the *Red Heart*, *Woodbrige*, *Pink Giant* and *Luci* varieties also scored over 75 points. The flowers and leaves of these varieties are very decorative. They bloom profusely. These varieties are more resistant to high summer temperatures.

The decorative qualities of *Aphrodite*, *Pink Flirt*, *Russian Violet*, *Totus Albus* and *Rubis* varieties were rated from 60 to 75 points. According to the shape and size of the flower, the addition of petals, the shape of the bush and the abundance of flowering, these varieties have lower indicators. These varieties were included in group 2.

Among the studied varieties, there were found different varieties belonging to the 3rd group for decorative qualities.

Along with the high requirements for the decorative qualities of the studied varieties in the formation of an assortment for mass reproduction, the importance of evaluating and selecting varieties based on their economic and biological properties increases. The most important task is to evaluate varieties based on such characteristics as flowering productivity, resistance to diseases and pests, and resistance to adverse environmental conditions [18].

Both forms and varieties *Speciosus*, *Red Heart*, *Russian Violet* and *Woodbrige* received high ratings on the flowering productivity index (Table 2). The flowering productivity of *Luce*, *Pink Flirt* and *Aphrodite* varieties was average.

In the conditions of the Western Ciscaucasia, varieties of *Hibiscus syriacus* L. are affected by fungi of the genus *Septoria* sp., *Phyllosticta* sp., *Alternaria* sp., as well as by the Hibiscus yellow vein mosaic virus (Timkina). In the conditions of Tashkent, such damage was not observed. But in all varieties except *Luce*, *Pink Flirt*, *Rubis* and *Russian Violet*, *Heliothis armígera* L.—cotton scoop and *Aphis*

Table 1. Evaluation of decorative qualities of introduced varieties of *Hibiscus syriacus* L. (Tashkent, 2019).

Indicator	Signs	Varieties											
		<i>Aphrodite</i>	shape with a purple flower	shape with a white flower	<i>Luce</i>	<i>Pink Flirt</i>	<i>Pink Giant</i>	<i>Red Heart</i>	<i>Rubis</i>	<i>Russion Violet</i>	<i>Speciosus</i>	<i>Totus Albus</i>	<i>Woodbrige</i>
Flower	Colour	8	8	10	8	8	10	10	8	8	10	8	8
	Size	3	5	4	3	4	4	4	4	5	4	3	5
	Form	8	8	8	8	8	8	8	8	4	8	4	8
	Composition	4	4	4	3	5	4	5	3	5	4	5	4
	Terry cloth	-	-	-	5	-	-	-	-	-	3	-	-
Leaf	Resistance to external environmental factors	8	10	10	8	8	10	10	8	8	10	8	10
	Form	4	4	4	4	4	4	4	4	4	4	4	4
	Colour	4	4	5	4	2	4	4	2	4	4	4	4
	Resistance to external environmental factors	8	10	10	8	8	8	8	8	8	8	8	8
Bush	Form	4	5	5	5	4	5	5	4	5	5	4	5
	Leafiness	5	5	5	5	4	5	5	4	5	5	4	5
	Abundance of flowering	6	8	8	6	4	6	8	4	6	6	6	6
	Originality	6	6	6	6	8	6	6	8	6	8	6	6
	General condition of plants	5	5	5	4	4	5	5	4	5	4	5	5
	Total	73	82	84	77	71	79	82	69	73	83	69	78

Table 2. The results of the assessment of the economic and biological qualities of varieties of *Hibiscus syriacus* L. in the conditions of Tashkent (2019).

Varieties	property				Total
	Flowering productivity	Pest resistance	Winter hardiness	Drought resistance	
<i>Aphrodite</i>	12	8	6	8	34
form a purple flower	15	8	8	12	43
form a white flower	15	8	8	12	43
<i>Luce</i>	12	10	8	8	38
<i>Pink Flirt</i>	9	10	6	8	33
<i>Pink Giant</i>	12	8	8	12	40
<i>Red Heart</i>	15	8	8	12	43
<i>Rubis</i>	9	10	6	8	33
<i>Russion Violet</i>	15	10	8	8	41
<i>Speciosus</i>	15	8	10	12	45
<i>Totus Albus</i>	9	8	8	8	33
<i>Woodbrige</i>	15	8	8	12	43

malvae Koch—mallow aphid were found. But these pests imperceptibly affected the decorative and biological qualities of the varieties.

The introduction of plants outside the range is limited, first of all, by temperature indicators, and then by other environmental factors [19]. In winter hardiness, the variety *Speciosus* is superior to all others. *Aphrodite*, *Pink Flirt* and *Rubis* are less stable. In severe winters, these varieties have damage to annual shoots. The remaining varieties occupy an intermediate position.

The critical weather factors for introduced plants in the conditions of Uzbekistan are high temperature and low humidity in the spring-summer period [19] [20]. In the varieties *Aphrodite*, *Luce*, *Pink Flirt*, *Rubis*, *Russian Violet* and *Lotus Albus*, more than 30% of the plants were damaged by the stress factors of the summer period. In the remaining varieties, damage was observed in less than 30 % of the plants.

According to economic and biological characteristics, the studied varieties were divided into 2 groups: 1—received more than 40 points; 2—received 30 - 40 points. Both forms and varieties of *Pink Giant*, *Red Heart*, *Russian Violet*, *Speciosus* and *Woodbrige* were included in the first group. At the same time, the *Speciosus* variety received the highest rating. The second group includes all other varieties.

As a result of a comprehensive assessment, 3 groups of varieties were identified (Table 3):

Group I—the most promising varieties—received more than 125 points—both forms and the *Speciosus* variety;

Group II—promising varieties—received 110 - 124 points—*Luce*, *Pink Giant*, *Red Heart*, *Russian Violet* and *Woodbrige*;

Table 3. Results of a complex estimation of varieties of *Hibiscus syriacus* L. in the conditions of Tashkent.

Varieties	Points		Total
	Decorative qualities	Economic and biological properties	
<i>Aphrodite</i>	73	34	107
form a purple flower	82	43	125
form a white flower	84	43	127
<i>Luce</i>	77	38	115
<i>Pink Flirt</i>	71	33	104
<i>Pink Giant</i>	79	40	119
<i>Red Heart</i>	82	43	125
<i>Rubis</i>	69	33	102
<i>Russian Violet</i>	73	41	114
<i>Speciosus</i>	83	45	128
<i>Totus Albus</i>	69	33	102
<i>Woodbrige</i>	78	43	121

Group III—fewer promising varieties—received less than 109 points—*Aphrodite*, *Pink Flirt*, *Rubis* and *Totus Albus*.

4. Conclusions

Thus, we can assume that the soil and climatic conditions of Tashkent are quite favorable for the cultivation of *Hibiscus syriacus* L., and all the varieties we have studied can be used in landscaping. The plant is widely used as a landscape. The highest rating score was given to the *Speciosus* variety, which is in good agreement with the data that plants of this variety show their decorative qualities well even under such negative environmental influences as high temperature, lack of moisture, and high insolation [17].

The most promising—both forms and the variety *Speciosus* are characterized by better adaptability. Promising varieties—*Luce*, *Red Heart*, *Russian Violet* in a short time were able to adapt to new conditions, and were able to maintain their decorative and biological qualities. *Pink Flirt*, *Rubis* and *Totus Albus* are among the less promising varieties. These varieties were introduced to Uzbekistan in recent years and have not yet been able to fully adapt. The group of less promising varieties also includes *Aphrodite*. Although it was introduced in the last century, it could not sufficiently show decorative and economic and biological qualities in the conditions of Tashkent.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Zykova, V.K. (2014) Complex Variety Evaluation of *Syringa vulgaris* L. Collection of Scientific Papers of the GNBS. *Journal of Biology*, **136**, 99-106.
- [2] Kwon, H.J., Kwon, S. and Kim, K.S. (2010) Ultrastructural Changes of *Hibiscus syriacus* L. during the Petal Senescence. *Horticulture Environment and Biotechnology*, **51**, 135-140.
- [3] Babkina, V.M. (1976) Results of the Primary Variety Testing of Part on the Southern Coast of the Crimea. In: *Introduction, Selection and Biology of Flower Plants*, Tr. Gos. NBS, Yalta, No. 38, 39-52.
- [4] Bylov, V.N. (1978) Fundamentals of Comparative Variety Evaluation of Ornamental Plants. In: *Introduction and Selection of Flower Plants*, Nauka, Moscow, 7-32.
- [5] Bakanova, V.V. (1983) Flower-Decorative Perennials of Open Ground. Nauk Dumka, Kiev, 15 p.
- [6] Karandasova, O.S., Bazavlutskaya, A.S., Kanakhina, L.I. and Abramova, S.N. (1987) Variety Study and Variety Assessment of Flower-Decorative Cultures. In: *Introduction and Ecology of Plants*, Ylim, Ashgabat, No. 10, 3-37.
- [7] Zaytseva, E.P. and Timokhina, E.T. (1988) The Results They Explore the Garden of Hyacinths in the Main Botanical Garden of the USSR Academy. In: *Introduction to the Study and Breeding of Ornamental Plants*, Nauka, Moscow, 22-31.
- [8] Rusinov, T.S. (1988) Daylilies in the Main Botanical Garden of the USSR Academy.

- In: *Introduction to the Study and Breeding of Ornamental Plants*, Nauka, Moscow, 72-79.
- [9] Ostapko, V.M. (2009) Scale for Assessing the Decorative Nature of Petrophytic Species of Flora in the South-East of Ukraine. *Inproduksiya roslin*. No. 1, 18-22.
- [10] Zalevskaya, E.M. (1991) The Rhythm of Hybrid Hibiscus Development and the Experience of Assessing Their Decorative and Economic-Biological Characteristics. In: *Introduction and Acclimatization of Plants*, FAN Publishing House, Tashkent, 24, 36-41.
- [11] Tereshchenko, S.I. (1994) Evaluation of Decorative Properties of Lilac Species and Varieties. In: *Abstract of International Conference. Donetsk Nerd. Garden of the Academy of Sciences of Ukraine "Industrial Botany: State and Prospects of Development"*, Donetsk, 276-277.
- [12] Zhigunov, O.Yu. and Nasurdinova, R.A. (2012) The Experience of Assessing the Decorative Properties of Varieties of the *Genus clematis* L.—A Promising Crop for the Southern Urals. No. 3, 8-11.
- [13] Tyshchenko, E.L. (2017) New Approaches to the Methodology for Assessing the Decorative and Economic-Biological Characteristics of Hybrid Hibiscus. *Subtropical and Ornamental Gardening*, No. 62, Krasnodar, 122-128.
- [14] Plugatar, S.A., Klimenko, Z.K. and Zykova, V.K. (2018) A Modified Scale for Assessing the Decorativeness of Tea-Hybrid Roses in the Conditions of the Southern Coast of the Crimea. *Bulletin of the GNBS*, **126**, 3-41.
- [15] Zubkova, N.V. (2018) Scale of Integrated Assessment of Clematis L. Varieties under Cultivation in the Conditions of the Southern Coast of the Crimea. *GNBS Bulletin*, No. 129, 3-44.
- [16] Timkina, Yu.V. (2011) Economic and Biological Potential of the *Hibiscus syriacus* L. in the Conditions of the Western Ciscaucasia: Abstract of the Dissertation. Candidate of Agricultural Sciences, Krasnodar, 24c.
- [17] Tyshchenko, E.L. and Timkina, Yu. (2011) A Study of *Hibiscus syriacus* L. in the South Ascimations Aspects of Assessment Decorative Features of *Hibiscus syriacus* (*Hibiscus syriacus* L.). *Scientific Journal of Kubsau*, **66**, 17-24.
- [18] Feofilova, G.F. and Shevchenko, S.V. (1981) Features of Form Formation in Distant Kanna Hybrids/Introduction, Biology and Selection of Flower Plants. Collection of Scientific Works. Yalta, 95-103.
- [19] Yoziyev, L.H. (2001) Experience of Introduction of Woody Plants in Southern Uzbekistan. Fan, Tashkent, 210 p.
- [20] Samatova, Sh.A. (2018) Cannes in a Hot and Dry Climate. Lambert Academic Publishing, Saarbrücken, 128 p.