

# Morphological and Phenological Characteristics of Ornamental Lianas (on the Example of Samarkand City)

Shukurova Mokhigul Erkin Qizi\*, Haydarov Khislat Kudratovich

Department of Botany, Samarkand State University Named after Sharof Rashidov, Samarkand, Uzbekistan

Email: \*mohigulshukurova518@gmail.com

**How to cite this paper:** Qizi, S.M.E. and Kudratovich, H.K. (2025) Morphological and Phenological Characteristics of Ornamental Lianas (on the Example of Samarkand City). *American Journal of Plant Sciences*, 16, 35-40.

<https://doi.org/10.4236/ajps.2025.161005>

**Received:** June 18, 2024

**Accepted:** January 12, 2025

**Published:** January 15, 2025

Copyright © 2025 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

Lianas are distributed as ornamental, perennial plants that are widely used in landscaping and popular all over the world. However, in recent times, ornamental lianas have also been used for vertical landscaping in residential buildings. Today, many lianas occupy a leading position among plants, due to their landscape features, such as the colorfulness of flowers, the variety of leaf shapes, and their aroma. The practice of growing flowers in Uzbekistan dates back to ancient times. Floriculture came to our republic through the Great Silk Road from China, Egypt, and India. Because of this, ornamental plants have been widely used for landscaping in cities such as Samarkand, Bukhara, Khiva, Shahrisabz, Kokand, and Margilan. Nowadays, perennial lianas are planted on the grounds of the Botanical Garden at Samarkand State University, and collections of these plants have been created. The garden area contains various species of lianas, including *Lonicera japonica* Thunb, *Clematis florida* Thunb, *Parthenocissus quinquefolia* (L.) Planch, *Parthenocissus inserta* (A.Kern) Fritsch, *Hedera spiral* L, *Hedera canariensis* Willd, *Campsis radicans* L, *Wisteria sinensis* (Sims) DC, *Actinidia chinensis* var. *deliciosa* (A.Chev.), *Humulus lupulus* L, *Aristolochia clematidis* L, and several varieties of *Rosa canina* L. such as Golden Celebration, Paprika, Aspirin, Burgund, and Rosarium Uetersen.

## Keywords

Liana, Ornamental, Flower, Plant, Greenery, Rotting

## 1. Introduction

In modern urban planning, the problem of greening the surroundings of central

streets and notable buildings is one of the most significant areas. Due to the rapid growth of new cities' populations, the issue of greening has become particularly acute and urgent. Rapid industrial development leads to increased pollution of the environment, particularly air and water bodies, through aerosol and gas emissions from factories, industrial plants, thermal power stations, heating systems, and cars, which adversely affects human health. Uzbekistan lies in a region with a harsh continental climate. Ornamental plants are used for vertical landscaping in city streets, parks, public buildings, industrial buildings, and residential buildings. These plants typically have attractive leaves, different flower colors, and unique shapes, such as fruits and upright branches. In the past, small gardens were built in residential buildings. The only decorative accents were trees, fountains and statues. The ancient Roman gardens, usually surrounded by columns, were characterized by a detailed interaction between natural and architectural elements. Artificial ponds and fountains as well as trees and bushes, which were given special shapes, played a significant role in the ancient Roman horticultural arts. In addition to statues and fountains, plants grew in crevices, rot and crevices. From history, we know that in the 12th - 13th centuries, our historic cities such as Samarkand, Bukhara, Shakhrisabz, and Khiva had gardens with magnificent views. Marco Polo, who visited central Asia during the mid-13th century, wrote: "Samarkand is a great city surrounded by beautiful gardens, surrounded by plains in which various fruits and ornamental plants grow". Today, many collections of lianas are grown in the Botanical Garden at the Samarkand State University, which was founded in 1971. This botanical garden is situated on the right bank of the Dargam Canal, a tributary of the Zarafshan River, southwest of the city of Samarkand. It is situated at an altitude of 650 - 660 metres above sea level and has a total area of 20 hectares. The garden now has greenhouses, stelages and special rooms for interns.

## 2. Material and Methods

Today, an increase in the number and variety of plants can be achieved through the use of perennial ornamental lianas in vertical landscaping of the city. The categories, types, and systematics of ornamental lianas vary. Thanks to this, their home of origin is also different. Lianas are plants with flexible stems that need support to grow tall. The morphology and ecology of lianas can be traced back to Kostirko's study [1], which divided them into three groups: first, second, third.

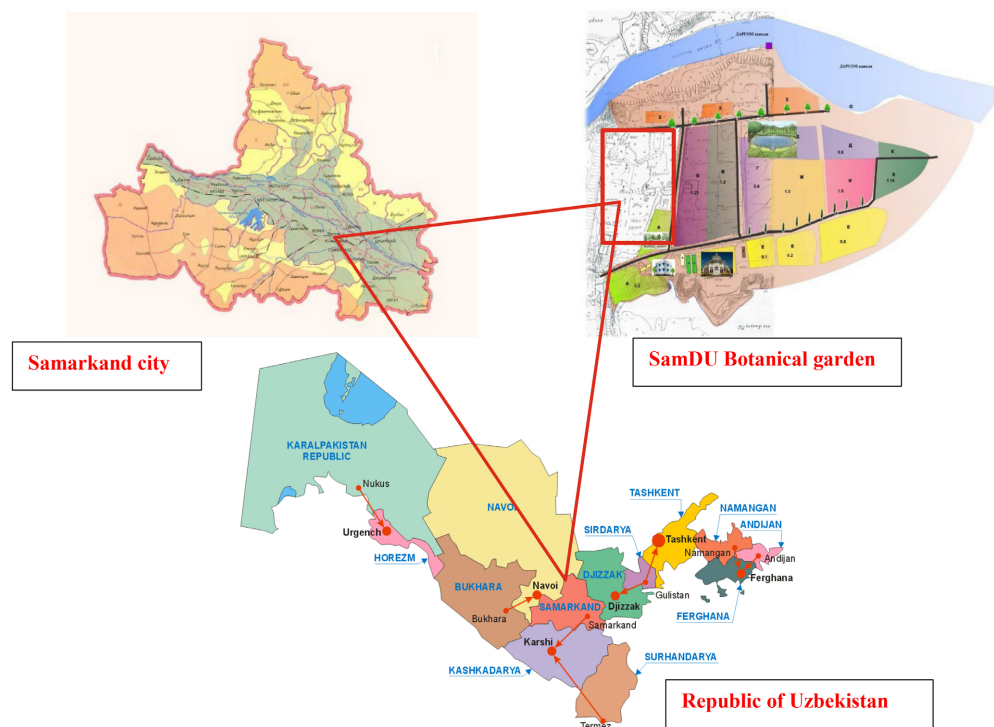
Early scientific work on the morphology and ecophysiology of lianas was carried out by I.G Serebryakov [2]. Currently, liana research is divided into two categories: 1) herbivorous (annual or perennial) and 2) dioecious [3] [4].

The biological characteristics of the seeds of perennial ornamental vines and the conditions for good germination were studied by K.M. Firsova [5], who used the methodology of I.D. Yurkevich [6] and I.N. Beideman [7]. The method of I.T. Vasilichenko (1960) [8] was employed to describe the sprouting of grass. The flowering biology of ornamental vining plants was analyzed based on the methodology

of A.N. Ponomarev [9].

One of the simplest methods of propagating lianas is vegetative propagation, which is widely used in practice. This method was described by L. F. Pravdin (1938), M. S. Shalt (1960), and V. K. Babushka (1983) [10].

The research was carried out at the Botanical Garden of Samarkand State University in Samarkand (2022 - 2024). Nine species of lianas from nine different families are grown in the garden, providing the garden with special beauty and grandeur (Figure 1).



**Figure 1.** The area where ornamental lianas are grown in Samarkand City.

### 3. Results and Discussion

As a result of our research, we have described lianas, which are characterized by their scenic features. A table of perennial lianas has been compiled, which is widely used for vertical greening. Garden lianas differ from each other in their leaves, flowers, stems, hooks at the base, suckers, stalks and gills. *Lonicera japonica*, from the family Caprifoliaceae, is grown in the Botanical Garden. It is green throughout the four seasons. Its flowers are beautiful and elegant, fragrant [11]. The duration of its flowering is long. The color of the flowers is white or yellow. Its fruit is a black berry with fleshy flesh. *Clematis florida* liana is also grown from the Ranunculaceae family (Figure 2). *Clematis florida* is a liana that attracts humans because its flowers create a special landscape during mass flowering. The flower's color is mainly dark purple. Two species from the Vitaceae family grow in the Botanical Garden: *Parthenocissus quinquefolia* and *Parthenocissus inserta* (Figure 3). These species differ from each other in terms of adhesive wedges. Also, there are

two species from the Araliaceae family: *Hedera spiral* and *Hedera canariensis*, which are distinguished from other species by their evergreen nature. *Wisteria sinensis* is grown from the Fabaceae family and blooms in early April, while *Campsis radicans* grows from the Bignoniaceae family. The *Campsis radicans* fruit is not found in any other family due to its coeliac shape (Figure 4). *Actinidia chinensis* var. *delicious* is grown for its fruit. *Humulus lupulus* from the Cannabaceae family for its scenic character. In her studies, G.N. Ergasheva [12] studied phenological indicators of several liana species. Our phenological indicators are similar. In Shavladeze's observations, T.S.H. breeding methods for species such as *Parthenocissus quinquefoila*, *Wisteria sinensis*, *Campsis radicans*, *Actinidia chinensis* var. *delicious* and *Lonicera japonica* showed similar seed germination rates of 60% - 70% [12] [13].

The flowering stage is considered to be one of the most important processes in plant life. In different plants, the flowering process starts at different times, and the length of flowering also varies. Some plants bloom in just a few days, while others bloom over weeks or months. Early or late flowering in plants depends on climatic conditions.



Figure 2. A, B—*Clematis florida* Thunb.



Figure 3. A, B—*Parthenocissus quinquefolia* L.



Figure 4. A, B—*Campsis radicans* L.

As a result of our study, the period of the beginning of the growing season for lianas lasts from the beginning of February to 15 May, and the end of the season lasts until the end of December. The flowering season lasts from May to late October, and fruiting begins in June and ends by December (Table 1).

Table 1. Seasonal development of perennial vines growing in the botanical garden of Samarkand State University (2022 - 2024).

№	Name of plants	Seasonal development of vines (phenophase)							
		Swelling and budding	Massive leaf unfolding	Flowers begin to bloom	Massive blooming of flowers	Beginning of fruit formation	Fruit ripening	The beginning of leaf fall	End of the growing season
1.	<i>Lonicera japonica</i> Thunb	02 - 06. II	05 - 12. II	05 - 07. V	25. VI - 25. VII	5 - 15. X	21 - 28. XI	-----	5 - 10. XII
2.	<i>Clematis florida</i> Thunb	20 - 25. II	15 - 20. III	23 - 30. IV	01. V - 15. VII	11. X - 20. X	20. X - 20. XI	10. XI - 15. XI	25. XI - 30. XI
3.	<i>Parthenocissus quinquefolia</i> (L.) Planch	10 - 15. III	25. III - 15. IV	10 - 25. V	25 - 30. V	25. VI - 20. VII	15. VIII - 25. X	28. X - 10. XI	25. XI - 10. XII
4.	<i>Parthenocissus inserta</i> (A.Kern) Fritsch	15 - 20. III	01 - 20. IV	25. V - 05. VI	06. VI - 25. VI	05 - 25. VIII	26. VIII - 25. X	05 - 15. XI	05 - 10. XII
5.	<i>Hedera spiral</i> L	20. III - 25. III	25. III - 10. IV	15 - 20. IX	25. IX - 20. X	15. X - 20. X	15. I - 25. II	-----	15 - 25. XII
6.	<i>Hedera canariensis</i> Willd	18 - 15. III	25. III - 7. IV	18 - 23. IX	24. IX - 15. X	15. X - 20. X	17. I - 27. II	-----	18 - 29. XII
7.	<i>Campsis radicans</i> (L.)	10 - 15. III	25. III - 05. IV	20. VI - 05. VII	10. VII - 15. VII	02. IX	20. IX	25. IX - 20. X	21. XI - 29. XI
8.	<i>Wisteria sinensis</i> (Sims) Sweet	25. III - 05. IV	01. V - 15. V	06. IV - 10. IV	10. IV - 05. V	02. IX	28. IX	05. XI - 20. XI	20 - 30. XI
9.	<i>Humulus lupulus</i> L	5 - 15. III	15 - 25. III	25. VII - 10. VIII	10. VIII - 10. IX	20. IX - 15. X	15. XI - 05. XII	25. XI - 05. XI	10 - 15. XII

#### 4. Conclusions

In conclusion, a collection of 9 species of perennial ornamental lianas was created on

the territory of the Botanical Garden of Samarkand State University. The morphology, ecology, and phenology of *Lonicera japonica*, *Clematis florida*, *Parthenocissus quinquefolia*, *Parthenocissus inserta*, *Hedera spiral*, *Hedera canariensis*, *Campsis radicans*, *Wisteria sinensis*, *Actinidia chinensis* var. *deliciosa* and *Humulus lupulus* were studied in the garden area. These species were bred from seeds and cuttings and are resistant to drought and air pollution.

### Conflicts of Interest

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

### References

- [1] Kostyrko, D.R. (1987) Introduction of Vines to Donbass and Prospects for Their Use in Ornamental Gardening and National Economy. Abstract of Doctoral Dissertation, Kishinev, 52 p. (In Russian)
- [2] Serebryakov, I.G. (1952) Morphology of Vegetative Organs of Higher Plants. *Sovetskaya Nauka*, 74-82. (In Russian)
- [3] Ergasheva, G. (2017) Historical Aspects of Introduction, Geography of Distribution and Testing in the Culture of Tree Lianas. *Hortus Botanicus*, **12**, 694-700. <https://doi.org/10.15393/j4.art.2017.4143>
- [4] Shukurova, M., Khaydarov, K., Ashurov, M., Shernazarov, S. and Alavdinov, M. (2024) The Use of Perennial Decorative Lianas in Vertical Landscaping in the City of Samarkand. *E3S Web of Conferences*, **577**, Article No. 03008. <https://doi.org/10.1051/e3sconf/202457703008>
- [5] Firsova, K.M. (1969) Seed Control. *Kolos*, 156-265. (In Russian)
- [6] Yurkevich, I.D., Golod, D.S. and Yaroshevich, E.P. (1980) Phenological Studies of Woody and Herbaceous Plants: Method. Manual/I.D. Science and Technology, 87 p. (In Russian)
- [7] Beideman, I.N. (1960) Study of Plant Phenology. In: *Field Geobotany*, Vol. 2, Publ. USSR Academy of Sciences, 333-366. (In Russian)
- [8] Vasilchenko, I.T. (1960) Seedlings of Trees and Shrubs (Key). Publ. of the USSR Academy of Sciences, 303 p. (In Russian)
- [9] Ponomarev, A.N. (1960) Study of Flowering and Pollination of Plants. In: *Field Geobotany*, Vol. 2, Publ. of the USSR Academy of Sciences, 9-19. (In Russian)
- [10] Shalyt, M.S. (1960) Vegetative Propagation and Renewal of Higher Plants and Methods of Its Study. In: *Field Geobotany*, Vol. 2, Publ. of the USSR Academy of Sciences, 163-205. (In Russian)
- [11] Slavkina, T.I. and Podolskaya, O.I. (1987) Decorative Gardening. *Mehnat*. (In Russian)
- [12] Ergasheva, G.N. (1995) Structural and Functional Features of Some Shrub Vines in Tajikistan: Avoref. Dushanbe, 26 p. (In Russian)
- [13] Shavlakadze, T.Sh. (1989) Study of Bioecological Features of Woody Vines in Imereti Conditions and Their Application in Green Building: Abstract of Diss. ... Sugar. Biol. Science, 20 p. (In Russian)