CLEMATISES IN KYIV GREEN SPACES

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Clematis range cultivated in botanical gardens and Kyiv green spaces was analyzed, and the main factors of insufficient using in ornamental nursery and landscape gardening construction were defined. Actuality and prospects of the clematises wider application in Kyiv landscaping were substantiated.

Clematis, species, sort, frost resistance, features of flowering, variety.

Tight construction of modern cities demands more intensive gardening in limited areas. One suitable technique for this situation is more active using of climbing plants. Today the range of vines suitable for growing in Kyiv climate is wide and varied. The most common of these is Parthenocissus quinquefolia Planch., which due to its unpretentiousness and reproduction simplicity has become an integral of urban landscape. Other species, despite its affinity, quantitatively inferior to the previous one. These include representatives of the genus Clematis L..

Genus Clematis L. combines vines, which differ in morphological characteristics, dynamics of seasonal development and cultivation techniques. There are many plants which form dense shrub with herbaceous or lignified shoots among them. Morphological diversity, high ornamental quality and suitability for cultivation in temperate zone cause considerable relevance and perspectives for clematises planting practice in settlements and in Kyiv, particularly.

Objective. To analyze the range of clematises, which grow in the Kiev botanical gardens and green spaces. Next one is to evaluate the current state and prospects of their use for landscaping.

Materials and methods. The materials that contain information about the range of clematises were provided by scientists of Kyiv botanical gardens and CU

"Kuivzelenbud" employees. In the course of the studies used data relating to the success of genus Clematis L. introduction, their morphology, taxonomy and guidelines for breeding and farming cultivation of clematises. For processing the collected research materials general scientific methods were used: analysis, synthesis and comparison.

Investigation results. Genus Clematis L. belongs to the family Ranunculaceae Juss. and integrates flowering perennials. The most popular among them are vines. High decorative features, unpretentiousness and steadiness of the genus in urban environment show their suitability for widespread use in the system of urban spaces and planting gardens.

For the first Garden classification which was developed by Jakman and Moore in 1872, all clematises were divided in two groups: climbing and bushy. Climbing, in turn, were divided into large-flowered and small-flowered groups [1]. In 1994 Gardeners Royal Society (UK) became the international institute authorized to register clematises varieties. Somewhat modified classification was developed by its representatives, according to which all kinds of cultivars are divided into two categories: small-flowered cultivars and large-flowered cultivars.

Small-flowered clematises were originally divided into the following groups: Armandi, Atragene, Cirrosa, Flammula, Heraclifolia, Montana, Tangutica, Taxensis, Viorna, Vitalba, Integrifolia, Ispaganica and others.

Large-flowered cultivars depending on the characteristics of the flowers formation (on the shoots of the previous or current year) and duration of flowering are united into two groups: early large-flowered and. First group includes varieties of groups Patens and Florida. Flowers are simple, semi-double or double, and appear in spring or early summer on last year's shoots. Bloom can often repeat on current year growth. Some varieties can bloom continuously all season. The leaves are usually simple or ternate , sometimes cirrus . The late large-flowered clematises group includes varieties of Lanuginosa and Jackmanii selection. This clematises group blossoms on this year growth in the summer or early autumn. The flowers are usually simple, sometimes double or semi-double . The leaves are trifoliate or pinnate, rarely - simple [2 , 3].

High ornamental quality contributed to their proliferation and breeding work. Active clematises introduction in Ukraine started in 50-th of the last century. An important contribution was made by members of the Nikitsky Botanical Garden, A.N. Volosenko-Valenis and M.A. Beskaravayna who founded the country's first scientific collection, numbering about 200 species, varieties, cultivars and hybrid forms of genus Clematis L. [2,4]. At the same time, scientists in Central Botanical Garden with M. Orlov heading began research on the introduction and selection of clematises. During long-term experimental studies in which interspecific hybridization methods, free and artificial pollination were used methods of cultivation clematises in Ukraine was elaborated and incorporated a unique collection of varieties and hybrids [5]. Unfortunately, the collection was lost, and currently restoration and replenishment take place at the National Botanic Garden of them M.M. Grishko led by N.G. Vahnovska.

One of the important objectives of the research was to determine the characteristics of clematises use in Kyiv .

According to data provided by the Department of Dendrology CU "Kievzelenbud" V. Berdichevsky, despite of numerous assortment genus Clematis L. representatives they are not grown in nurserys and are not included in requests for purchase of seeds and propagating material of ornamental plants in 2013 and are not growing in the hold, CU "Kievzelenbud". The main reasons for this paradoxical situation is the high cost of planting clematises, lack of modern reproduction and growth technologies which are consistent with the biological characteristics of plants and evidence-based recommendations for their use for landscaping.

Sector of Dendrology, headed by Z.G. Bonyuk is engaged in plant accounting and replenishment in the Botanical Garden a.n. O.V. Fomin. Collection Clematises presents seven species and one variety . Most of them were planted between 2006 and 2009. However, some appeared earlier. So Clematis viticella has been growing in a botanical garden since 1925. Due to the ability to self-seed multiplication it quickly spread throughout the territory. Purple clematis was planted in the botanical garden in 1961, integrifolia - in 1993 . Some plants were replaced.

Geographically in National Botanical Garden n.a. M.M. Grishko NAS of Ukraine clematises are located in two areas: the collection and climbing plants demonstration. Their range includes nine species, one form , three small-flowered and eleven large-flowered varieties.

One way to recharge is an international exchange seed program between botanical gardens Delectus. As long Clematises collection grows at a constant location the first one challenge is to overcome the effects of monoculture cultivation. As the results of research conducted by the Department of allelopathy, effective way for improving soil conditions is sowing green manure [9], and the number of root-knot nematode infected plants can be reduced by seeding along marigolds, calendula [7].

There are two genus Clematis L.representatives in Botanic Garden of National University of Life and Environmental Science of Ukraine, they are Clematis vitalba L. and interspecific hybrid C. × jackmanii T. Moore (C. lanuginosa x C. viticella).

Results obtained during the study show that 14 species, one interspecific hybrids and 15 varieties of the genus Clematis L. are growing in Kyiv botanical gardens. The most common among them is vynohradolystyy Clematis vitalba L., C. viticella L. and C. virginiana L..

Among the range of clematises species there are strong vines and shrubs up to 1 m often flowers painted white, but there are blue , yellow , purple and pink between them [1 , 2, 3, 8 , 9]. Flowering period varies from two to five months (Table 1).

1. Morphological characteristics of clematises species and form range in the collections of Kyiv botanical gardens

Назва	Place of cultivation*	Biomorfological form	Height m	Color of flower	Flowering period
C. brevicaudata DC.	1	vine	>7	white	VII-X
C. heracleifolia DC.	3	bush	<1	blue	VII-IX
C. integrifolia L	3	bush	<1	blue	VI-IX
C. lasiandra Maxim	1	vine	3-5	pink	VIII-XI

C. ligustifolia Nutt.	1	vine	5-7	white	VI-X
C. paniculata J.F. Gmel	1	vine	3-4	white	V-VI
C. serratifolia Rehder	1	vine	4-5	yellow	VII-X
C. songarica Bunge	3	bush	1-1,5	white	VII-IX
C. heracleifolia f. stans Siebold & Zucc.	1	bush	1-1,5	blue	VIII-X
C. terniflora DC.	3	vine	5 - 8	white	VIII-IX
C. tibetana Kuntze	1	vine	4-5	yellow	VII-IX
C. virginiana L.	1, 3	vine	5-7	white	VI-X
C. vitalba L.	1, 2, 3	vine	>7	white	VII-IX
C. viticella L.	1, 3	vine	4-5	violet	VII-IX

* 1 - National Botanical Garden n.a. M.M. Grishko NAS of Ukraine

2 - Botanic Garden of National University of Life and Environmental Science of Ukraine

3 - Botanical Garden of the O.V. Fomin Kyiv National Taras Shevchenko University

Species of the genus, depending on origin, substantially differ from each other by frost resistance[1,9]. Some species can withstand temperatures down to -40^{o}C (C. integrifolia L.), while others -23^{o}C (C. serratifolia Rehder, C. songarica Bunge, C. tibetana Kuntze, C. viticella L., Figure 1). Last species are insufficient for cultivation in the city of Kyiv because of cold winters with little snow and possible freezing of shoots.

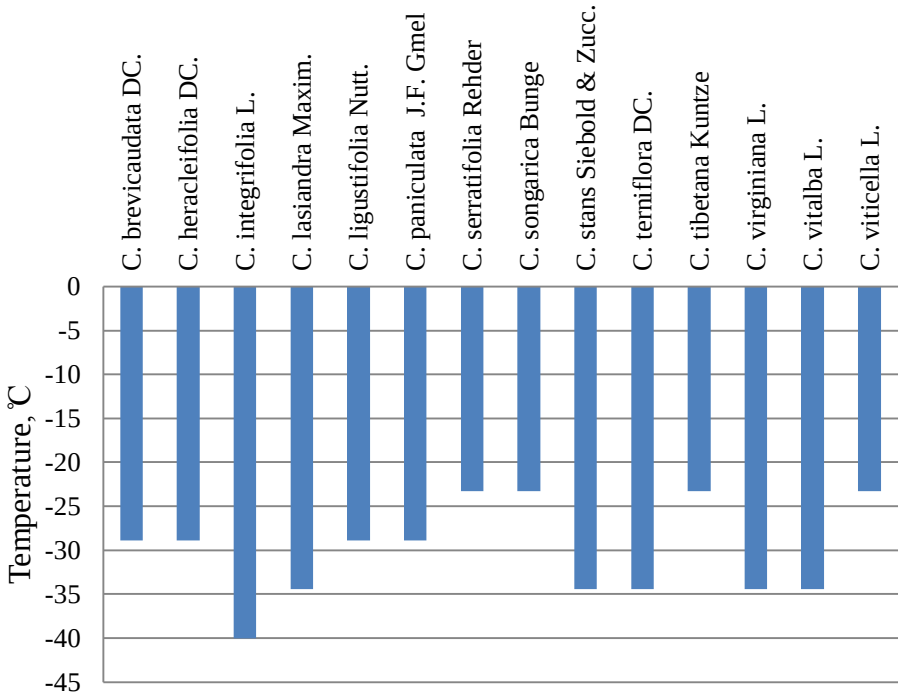

Figure 1. Frost resistance of clematis species

Interspecific hybrid of Clematis × Jackmanii Th. Moore. was obtained as a result of crossing S. lanuginosa × C. viticella. It belongs to the group of late large-flowered clematises. Length of shoots is 3 - 4 m, flower diameter - 10 - 15 cm, and the flowering period lasts from July to September [1,2]. It can grow in USDA- fourth zone, i.e. the frost exceeds the value required for cultivation in Kiev. Clematis Jakmana (Clematis × Jackmanii Th. Moore.) is successfully grown in a Botanic Garden of National University of Life and Environmental Science of Ukraine [1].

Disclosed varieties belong to seven groups, including four (Flammula, Ispahanika, Integrifolia, Vitalba) small-flowered and three - to large-flowered (Lanuginosa, Florida, Jackmanii) (Fig. 2).

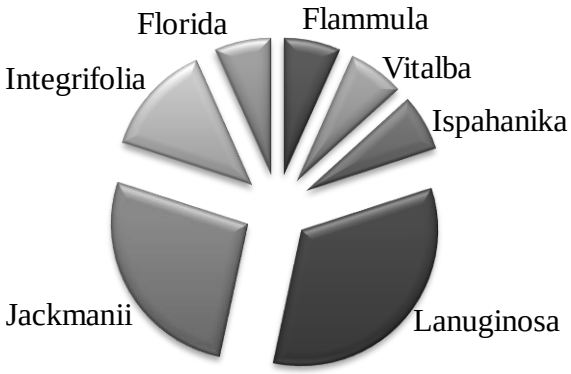

Figure 2. Parity of clematis sorts in Kyiv botanical gardens

One variety, namely Clematis recta 'Purpurea', grows in the Botanical Garden n.a. O.V. Fomin. All others are growing at the National Botanic Garden n.a. M.M. Grishko.

The majority of varieties have been bred by breeders of Kyiv and Yalta botanical gardens. Five small-flowered and ten large-flowered sorts were marked during researches [1, 2, 7 , 8] (Table 2).

2. Characterization of Clematis sorts range in collections of Kyiv botanical gardens

Name	Group of sorts	Height, m	USDA-zone of frost resistance
Clematis 'Aljonushka'	*Integrifolia*	1,5 – 2,0	4
C. 'Alpinist'	*Lanuginosa*	2,0 – 3,0	3
C. 'Blue Light'	*Florida*	2,0 - 2,5	4
C. 'Chaika'	*Lanuginosa*	2,5 – 3,0	4
C. 'Elegiia'	*Jackmanii*	3,0 – 4,0	4
C. 'Iunost'	*Lanuginosa*	1,5 – 2,0	4
C. 'Kosmicheskaja Melodija'	*Jackmanii*	2,5 – 3,0	4
C. 'Kozetta'	*Lanuginosa*	1,5 – 2,0	4
C. 'Pamjatj Serdtza'	*Integrifolia*	1,5 – 2,0	3
C. 'Purpurea'	*Flammula*	1,5 – 2,0	3

C. 'Serenada Kryma'	*Lanuginosa*	2,0 - 2,5	4
C. 'Sputnik'	*Jackmanii*	2,5 – 3,0	4
C. 'Triumf'	*Jackmanii*	2,5 – 3,0	4
C. 'Zvezdograd'	*Ispahanika*	2,0 - 2,5	4
C. 'Fargesioides'	*Vitalba*	5,0 – 7,0	3

Collection of clematises includes 2 early large-flowered varieties, they are 'Blue Light', 'Chaika'. Varieties of this group require careful maintenance, as flowers in May -June on the shoots of previous year full of great colors, and again in late summer and early autumn - simple. The longest blooming belongs to the large-flowering varieties 'Triumf' and small-flowered - 'Fargesioides' and continues for five months [1, 2 , 7, 8] (Table 3).

3. Peculiaritys of clematises sorts blossom

Name	**Flowers**		**Period of blossom**					
	colour	**diameter, sm**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
Clematis 'Aljonushka'	pink	5-8						
C. 'Alpinist'	pink	<14						
C. 'Blue Light'	blue	11-15						
C. 'Chaika'	white	12-16						
C. 'Elegiia'	purple	12-14						
C. 'Iunost'	pink	13-16						
C. 'Kosmicheskaja Melodija'	purple	12-14						
C. 'Kozetta'	blue	12-15						
C. 'Pamjatj Serdtza'	lilac	8-10						
C. 'Purpurea'	white	3						
C. 'Serenada Kryma'	blue	<14						
C. 'Sputnik'	blue	<10						

C. 'Triumf'	violet	12-14						
C. 'Zvezdograd'	yellow and lilac	6						
C. 'Fargesioides'	white	3						

Today the Ukrainian collectors and amateur gardeners growing interest in the genus Clematis L., mainly those related to large-flowered group at a time when Europe is increasingly becoming more popular small-flowered [7]. In our opinion, the reasons for this trend is a long history of culturing large-flowered clematises in Europe and ruggedness and resistance to disease of small-flowered sorts.

Conclusions

Among the wide range of the genus Clematis L. there are representatives that bloom in spring. These include Atragene, Montana and others groups. This fast-growing, undemanding plants with beautiful, sometimes fragrant, flowers richly cover shoots from May (April) to June. The brightest representatives of early-flowered clematises are: 'Rosy O'Grady', 'Pamela Jackman', 'Ruby', 'Maidwell Hall' (group Atragene), 'Freda', 'Grandiflora', 'Rubens', 'Pink Perfection' (Montana). These plants can give park composition a perfect spring decorative effect.

Early large-flovered clematises become extraordinary decoration of landscape composition in June. Representatives of this group are inherent large complex highly decorative flowers and sometimes repeat of bloom. 'Miss Bateman', 'Snow Queen', 'Duchess of Edinburg', 'Warszawska Nike', 'Nelly Moser', 'Vyvyan Pennel', 'Multi Blue' and many other varieties can be extraordinary decoration for arches and arbours, turn homely pole or fence to landscape decoration.

Late large-flowered clematises are most popular because they have high decorative effect and simple cultivation techniques. A wide palette of flower colours and suitability for cultivation in Kyiv indicates the relevance for use varieties of this group ('Komtes de Bouchaud', 'Ernest Markham', 'Blekitny Aniol', 'Ville de Lyon', 'Rouge Cardinal', 'Huldine') in the system of green spaces. Clematises can be used as ground covering plants for creating blooming carpets. Additional supports (wooden wallpaper, grid) are installed for landscaping walls with clematises. Besides

decorative effect, clematises make positive impact on the state of walls, preventing overheating and its wet.

Promising for wider implementation in culture at present are small-flowered clematises. Inherent ruggedness, disease resistance and winter hardness rise their suitability for use in urban areas stands. Obvious representatives of small-flowered clematises are 'Princess Diana', 'Duchess of Albany' (group Taxensis), 'Alba', 'Blue Bell', 'Rosea', 'Aljonushka', 'Pamjatj Serdtza' (Integrifolia), 'Zvezdograd' (Ispahanika), 'Fargesioides' (Vitalba).

Many clematis species were known as medicinal plants and medical practices applied in Asian nations before the introduction as ornamental plant. Such species like Clematis flammula L. and C. vitalba L. are characterized as phytoncide content that actualizes their use in urban plantings.

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