https://doi.org/10.46341/PI2024007
UDC 504.54.062.4, 582.931.4 (477.41)

RESEARCH ARTICLE

Project of optimization of the collection and exposition area "Syringarium" the "Olexandria" State Dendrological Park of the NAS of Ukraine

Nataliia Doiko [1,*], **Larisa Kryvdiuk** [1], **Nina Dragan** [1], **Oleksandr Sylenko** [2,1]

[1] The "Olexandria" State Dendrological Park of the National Academy of Science of Ukraine, 09113 Bila Tserkva, Kyiv region, Ukraine; * alexandriapark@ukr.net

[2] Institute for Evolutionary Ecology of the National Academy of Sciences of Ukraine, Academician Lebedev str. 37, 03143 Kyiv, Ukraine

Received: 26.08.2024 | **Accepted**: 06.10.2024 | **Published online**: 01.12.2024

Abstract

The paper presents the results of research of archival materials on the introduction of taxa of the genus *Syringa* in the "Olexandria" State Dendrological Park of the National Academy of Science of Ukraine (Dendrological Park "Olexandria" NAS of Ukraine). Conventionally, two main stages of lilac introduction in the Dendrological Park "Olexandria" NAS of Ukraine were distinguished: the first stage – from the end of the 18th century until 1918 and the second stage – from 1946 until the present time.

The laying of the monogarden "Syringarium" is considered to have appeared between 1948 and 1950. In 2021, the collection of "Syringarium" comprised two species, one artificial hybrid, and 37 cultivars and was represented by three age groups (i.e., I age group – 76 specimens of 19 cultivars; II age group – 90 specimens of 24 cultivars; III age group – 54 specimens of 15 cultivars).

Considering over 70 years of lilac cultivation on one plot, it went through many difficulties, which resulted in changes in its diversity and a decrease in the quantitative composition of the collection. In particular, allelopathic soil fatigue caused significant weakening of plants and reduced their resistance to disease and pest damage. Therefore, there was a need to optimize the site of the "Syringarium" (i.e., partially replace the soil; re-root the plants on their own roots to extend their life; restore the varietal diversity by introducing the new cultivars, including those of Ukrainian selection, etc.). According to the project developed by the scientists of the Dendrological Park "Olexandria" NAS of Ukraine on optimization of the mono-garden "Syringarium", it is planned to plant 91 specimens of 47 lilac. For the eco-educational purpose, it is also planned to create an area representing original lilacs species.

Keywords: *Syringa*, Dendrological Park "Olexandria" NAS of Ukraine, monogarden, introduction history, cultivation problems, optimization

Authors' contributions: N. Doiko – conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, writing – original draft, writing – review & editing. L. Kryvdiuk – data curation, investigation, methodology, supervision, validation, visualization, writing – original draft, writing – review & editing. N. Dragan – investigation, methodology, writing – review & editing. O. Sylenko – methodology, visualization, writing – review & editing.

Funding: The work was carried out within the framework of the departmental theme of applied research "Enrichment of the taxonomic composition and optimization of the landscape structure of the collection and exhibition site "Syringarium" in the Dendrological Park "Olexandria" of the National Academy of Sciences of Ukraine" (2022–2024) financed under the budget program 6541030 (applied research).

Competing Interests: The authors declare no conflict of interest.

Introduction

In general, the genus *Syringa* L. comprises 12 native species (POWO, 2024). From this number, only S. *josikaea* J.Jacq. ex Rchb. enters Ukraine and natively occurs in the Ukrainian Carpathians (Rubtsov et al., 1980; Gorb, 1989; Didukh, 2009). Lilac has been cultivated in Europe for over 400 years (Mark & DeBard, 2021). Its propagation in nurseries began in the second half of the 18th century; today, over 2000 cultivars are known. The first lilac species introduced to Ukraine were S. *vulgaris* L. (introduced in the 17th century) and S. *chinensis* Willd. (introduced in 1809) (Kokhno & Kurdyuk, 1994).

Among the objects of landscape architecture, a special place is occupied by monocultural gardens, where so-called 'syringaria' are distinguished by their extreme ornamentality. The prototype of lilac monoculture in Ukraine can be considered the largest in Europe artificial area covering ca. 2 ha in the vicinity of Dikanka, Poltava region (Rubtsov et al., 1980).

Until the 20th century, the noble estates served as centers of plant introduction in Ukraine. They became valuable objects for studying cultural and historical heritage and understanding the traditions of garden and park art of that time. Unfortunately, in the Dendrological Park "Olexandria" NAS of Ukraine, like in many other noble estates, the lists of plants that initially grew in the park at the stages of its development have not been preserved. We find only scattered information in the memoirs of contemporaries of that era, personal correspondence, drawings, lithographs, and photographic documents. The first mention of lilacs in the garden of Branicki (now the Dendrological Park "Olexandria" NAS of Ukraine) dates back to the early 19th century in the correspondence of Auguste Pelletier de Lagarde (La Garde-Chambonas, 1824). We found mention of lilacs for the Dendrological Park "Olexandria" NAS of Ukraine at the end of the 19th century in the works of Sulimierski et al. (1880) and Aftanazy (1993).

It is unknown which exactly lilacs grew in the park at that time. However, there is a list of trees and shrubs that were acclimatized in one of the estates of Count Branicki near Tarashcha in the Kyiv region (Nebesky, 1899). This list includes *Syringa emodi* Wall. ex Royle, S. *josikaea*, S. *persica* L., S. *persica* 'Alba', S. ×*rothomagensis* (Renault) A.Rich., S. ×*rothomagensis* 'Alba', S. ×*rothomagensis* 'Rubra', S. *vulgaris* L., S. *vulgaris* 'Alba', S. *vulgaris* 'Charles X', S. *vulgaris* 'Croix de Brahy', S. *vulgaris* 'fl.pl.', S. *vulgaris* 'Géant des Batailles', S. *vulgaris* 'Marlyensis', and S. *vulgaris* 'Rubra'. Hence, we can assume that there was not a lesser collection of lilacs in the Dendrological Park "Olexandria" NAS of Ukraine, which served as the central estate of the Branicki family. At the beginning of the twentieth century (1918–1922), the park collection suffered a series of adverse events, and many plants were destroyed. As a result, Manin (1927) mentions only one survived lilac species for the Dendrological Park "Olexandria" NAS of Ukraine.

Since the second half of the 20th century, old parks, many of which became part of the National Academy of Sciences of Ukraine, have become centers for preserving unique age-old plants. New scientific collections, including monocultural gardens, were created on their territories. Such monocultural gardens were designed according to the principle of generic complexes developed by Rusanov (1971) and included 'rosaria', 'coniferetaria', 'syringaria', and other collections gathered representatives of the particular genus. Such plantings were created at the Dendrological Park "Olexandria" NAS of Ukraine as well.

The information about the species composition in the Dendrological Park "Olexandria" NAS of Ukraine for 1927 provided by Manin (1927) is probably incomplete since he mentioned only the most common species. Later, Deriy (1958) listed seven *Syringa* species for the park and indicated their age: S. *chinensis* Willd. – 60 years old, S. *vulgaris* – 60 years old, S. *amurensis* Rupr. – 50 years old, S. *reflexa* Schneid. – 7 years old, S. *robusta* Nakai – 7 years old, S. *josikaea* – 6 years old, and S. *villosa* Vahl. – 6 years old. He also listed eight S. *vulgaris* cultivars, including 'Andenken an Ludwig Spaeth' – 12 years old, 'Congo' – 12 years old, 'Charles Joly' – 12 years old, 'Charles X' (S. *rubra* 'Major') – 12 years old, 'Mad. Casimir Perier' – 12 years old, 'Mrs. Edwig Harding' – 12 years old, 'Perle von Teltow' – 12 years old, 'President Grevy' – 12 years old. It is also Deriy (1958), who considered 1948–1950 as the most probable date of establishment of the modern

lilac collection in the Dendrological Park "Olexandria" NAS of Ukraine.

According to Rubtsov et al. (1980), the collection of lilacs in the Dendrological Park "Olexandria" NAS of Ukraine until 1980 changed only considering its varietal composition. It was replenished with new cultivars of *S. vulgaris*: 'Belle de Nancy', 'Hugo de Vries', 'Capitaine Baltet', 'Lemoine', 'Leon Gambetta', 'Maximowicz', 'Marechal Foch', 'Princesse Clementine'. Hence, in total, it included seven species and 18 cultivars, which is proved by results of 1979–1983 inventory. At that time, the lilac cultivars were present in the 'Fruticetum' plot, while the species were present in the general park compositions. In 1985, a monogarden "Syringarium" was created on an area of 0.46 ha and included two species and 29 cultivars of *S. vulgaris*.

Purpose of the current research was: to explore the history of introduction of species and cultivars of the genus *Syringa* in the "Olexandria" State Dendrological Park of the National Academy of Science of Ukraine; to analyze changes in its taxonomic composition for almost 70 years; to study age and spatial structure of plantations of the collection plot "Syringarium"; and to clarify the phytosanitary condition and to develop ways to optimize the plot.

Material and methods

When carrying out the work, we used the method of complex analysis (historical-analytical), field surveys (photo capturing, measurements, sketches), and principal statistics. The names of lilac varieties and color range are provided according to the "International Register and checklist of names of varieties of the genus *Syringa* L." (International Lilac Society, 2024). Diseases were determined following Prutenskaya (1982), and plant pests – following Sinadsky (1982) and Stark (1932).

Results and discussion

The collection of lilacs in the "Syringarium" plot of the Dendrological Park "Olexandria" NAS of Ukraine has constantly been increasing by attracting material from state botanical institutions and private collections of Ukraine, and as of 2021, it comprised two species, one artificial hybrid, and 37 varieties. Because of the gradual increase of the monogarden collection, three age groups of lilacs became clearly defined: I – plantings of 1950–1980, II – plantings of 1985, III – plantings of 2003–2005.

However, due to the long-term (over 70 years) cultivation of lilacs on the same plot, several problems arose, including the ones listed below.

Allelopathic soil fatigue. Soil oversaturation by lilac roots leads to soil fatigue and soil nutrition deficiency (Gorb, 2012, 2022). It resulted in the suppression of plant immunity expressed in the progressive deterioration of garden plants: desiccation and shortening of shoots, the appearance of lichens on the bark even on young plants, decreased drought and frost resistance, decreased disease resistance and even plant mortality (Gorobets et al., 2002; Pavliuchenko, 2003; Ellanskaya et al., 2011; Dovgaluk et al., 2016).

Phytosanitary condition. In natural conditions, lilacs are considered unpretentious and quite resistant to diseases. However, due to long cultivation in the same place with constant increased recreational load, the plants demonstrated decreased immunity and suffered from many diseases (Mmbaga et al., 2005). Our studies confirmed that lilacs in the plot "Syringarium" of the Dendrological Park "Olexandria" NAS of Ukraine are affected by many fungal, viral, and bacterial diseases, as well as pests. Among fungal diseases, powdery mildew (caused by *Erysiphe syringae* (Schwein.) H.Magn.), which many researchers consider a dangerous disease (Hibben et al., 1977; Daughtrey et al., 2007), appeared to the greatest extent. The first signs of the disease appeared by the mid-summer, and later, the leaves shriveled and fell prematurely, depriving the plant of nutrition, which led to insufficient shoot maturation, poor overwintering and reduced the plant's resistance to other diseases.

Most cultivars were significantly affected by blotch blight caused by various fungi. The most common was brown spot (*Phyllosticta syringae* Westendorp) and phytophthora (*Phytophthora syringae* (Kleb.) Kleb. and *P. cactorum* (Lebert & Cohn) J.Schrot), which caused significant damage to lilacs in the plot. The disease started with the appearance of

Figure 1. The restoration of the lilac bush by deepening the grafting site.

Figure 2. The stem thickness formation at the grafting site.

watery spots on leaves, which rapidly enlarged and darkened, while white fungus formed on the underside of the leaves. The leaves fell off rapidly. Inflorescences often turned brown and failed to develop, and necrosis spread on young shoots. Necrotic spots appeared on older shoots, and some shoots died. These are well-known symptoms of lilac phytophthorosis (Shishkoff, 2007).

Among the pests, the most dangerous for lilacs are *Gracillaria syringella* (Fabricius, 1794), *Lepidosaphes ulmi* (Linnaeus, 1758), *Eriophyes saalasi* (Lipo, 1940), *Tropinota hirta* (Poda, 1761), *Archips* sp. and other found on the site. However, the number of these pests was relatively small during the observation, and they did not cause any significant damage to plants.

Plant dieback. Because of the reasons mentioned above and neglected planting on the plot, intensive plant decline is observed. In 2012, 307 lilacs were growing on the plot, but by 2017, the number of plants had decreased by 24.8 % (76 specimens died).

Among the lost plants, 13.2 % (ten specimens) represented the III age group (planted in 2003–2005) and 86.8 % (66 specimens) – the II age group (planted in 1985). Losses among the oldest plantings, the I age group (planted in 1950–1980), were not observed. The peculiarity of plant grafting can explain this situation. The plants of the I and III age groups were grafted near the root neck, and the grafting site is deepened into the ground. Therefore, the plants have an opportunity to regenerate the bush (Fig. 1). Taking into account that lilacs in case of deepening of the grafting site can eventually form their own roots (Gorb, 1989), we can assume that the plants of the I age group are already rootstocked, although the stalks that correspond to the variety were observed only in two cases. At the same time, if the grafting was done on the stem – there could be a late incompatibility. The difference in the growth intensity of the rootstock and the scion leads to the thickness formation at the grafting site, where the plant then breaks. Due to this reason, 15.2 % of the plants were lost (Fig. 2). The death of the central root of the rootstock also lead to the death of the stem and the whole plant in some cases.

Table 1. Characteristics of the lilac collection at "Syringarium" in 2021.

Nr	Species and/or cultivar	Number of plants by age groups			Lilac color group	Flower formation	Flowering time
		I	II	III			
	S. × *chinensis* Willd.						
1	'Duplex'	-	4	-	M	D	mb
	S. × *hyacinthiflora* Rehder						
2	'Buffon'	-	-	4	P	S	eb
3	'Necker'	-	-	2	P	S	eb
	S. vulgaris L						
4	'Andenken an Ludwig Spaeth'	-	-	4	M	S	lb
5	'Belle de Nancy'	7	1	2	V	D	mb
6	'Bogdan Khmelnickiy'	-	5	3	Pr	D	mb
7	'Capitaine Baltet'	-	2	-	M	S	mb
8	'Charles Joly'	4	6	5	M	D	mb
9	'Charles X'	-	3	-	M	S	mb
10	'Condorcet'	1	2	-	V	D	mb
11	'Congo'	1	-	-	M	S	mb
12	'Emile Lemoine'	-	1	-	V	D	eb
13	'Frau Katherine Havemeyer'	4	2	4	P	D	mb
14	'Herman Eilers'	1	-	-	V	S	lb
15	'Hugo de Vries'	14	-	-	M	S	lb
16	'Hugo Koster'	16	-	-	V	S	mb
17	'Krasavitza moskvy'	-	4	-	W	D	mb
18	'Lemoinei'	4	-	-	V	D	mb
19	'Leon Gambetta'	3	16	-	V	D	eb
20	'Marechal Foch'	-	3	-	M	S	mb
21	'Maximowicz'	2	2	-	V	D	mb
22	'Michel Büchner'	2	-	-	V	D	lb
23	'M-me Antuan Buchner'	1	1	3	Pr	D	mb
24	'M-me Casimir Perier'	2	2	4	W	D	mb
25	'M-me Lemoinei'	3	5	2	W	D	lb
26	'Mont Blanc'	1	4	-	W	S	mb
27	'Mrs Edwig Harding'	4	9	3	M	D	mb
28	'Night'	-	1	-	Pr	S	lb
29	'Ogni Donbassa'	-	1	-	V	D	mb
30	'Perle von Teltow'	6	-	-	M	S	mb
31	'President Grevy'	-	2	-	B	D	eb
32	'Primrose'	-	-	1	Y	S	lb
33	'Princesse Clementine'	1	2	-	W	D	mb
34	'Reaumur'	-	-	4	Pr	S	mb
35	'Sinai dunken lila'	-	6	-	M	S	lb
36	'Taras Bulba'	-	6	2	Pr	S	lb
37	'Vestale'	-	-	3	W	S	lb
	220	76	90	54			

Note. **Age groups: I** – 1950–1980; **II** – 1985; **III** – 2003–2005. **Lilac color group: W** – white; **P** – pink; **Y** – yellow; **B** – blue; **V** – violet; **Pr** – purple; **M** – magenta. **Flower formation: S** – single flower; **D** – double flower. **Flowering time: eb** – early blooming; **mb** – medium blooming; **lb** – late blooming.

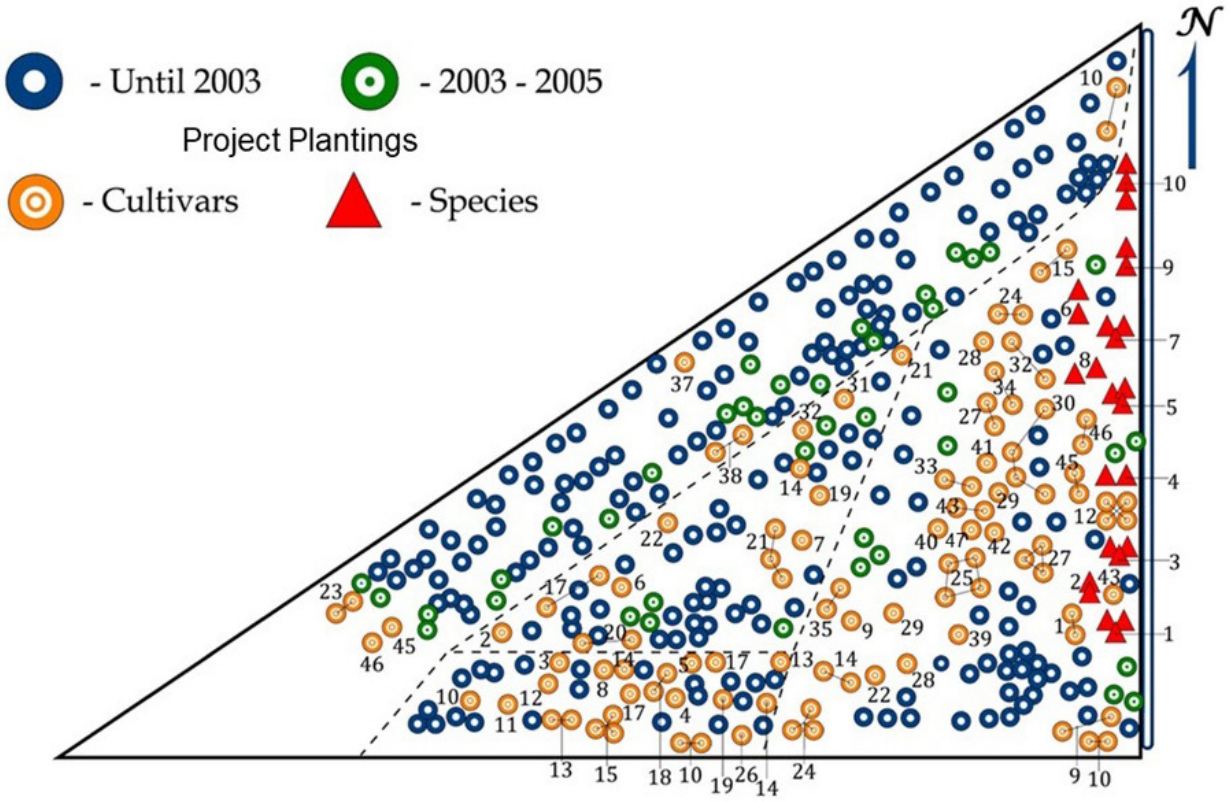

Figure 3. Project planting scheme of lilacs in the Dendrological Park "Olexandria" NAS of Ukraine.

Losses among plants of the III age group, as well as suppressed growth and exhausted appearance of plants of the specified age, in our opinion, are explained by soil fatigue.

During the next exploration period (2017–2021), 11 more specimens of the III age group fell out. However, there were no losses in the I and II age groups.

Thus, by 2021, the number of plants in the collection plot decreased, resulting in a color imbalance, planting gaps, shifted flowering dates, etc. The state of the collection at the beginning of the monogarden optimization is presented in Table 1.

According to the 11-grade scale of the "International register & checklist of cultivar names for the genus *Syringa* L." (International Lilac Society, 2024), the seven color groups represent the collection in the following ratio: white – 16.2%, pink – 8.1%, yellow – 2.7%, blue – 2.7%, violet – 2.7%, purple – 13.5%, magenta – 29.7%

Considering the flower structure, the cultivars with double flowers prevail and contribute 51.4%, while the cultivars with single flowers represent 48.6%.

The collection includes cultivars with different flowering dates: early flowering (13.5%), medium flowering (59.5%), and late flowering (27.0%). Hence, the group of medium flowering lilacs is the most numerous.

Taking into account the modern demands of visitors, as well as fulfilling the objectives of international codes on biodiversity conservation, the staff of the Dendrological Park "Olexandria" NAS of Ukraine developed a project to optimize the monogarden "Syringarium". The objectives of this project are: to improve the growing conditions of plants by partial replacement of the soil; to restore the number of fallen plants; to replenish the collection with new species and cultivars, including those of domestic selection; as well as, taking into account the growing interest in this group of plants, to create a plot representing original lilacs species.

The project involves the planting of 93 specimens representing 47 lilac cultivars (Fig. 3; Table 2). From this number, 77 specimens (82.8%) are own-rooted plants, and 16 specimens are grafted (17.2%) plants.

To extend the visitors' outlook and for eco-educational purposes, a collection of original

Table 2. Project plantings of lilac hybrids and cultivars in the Dendrological Park “Olexandria” NAS of Ukraine.

Nr	Hybrid/cultivar	Seedling age	Sapling type	Planting year/ quantity	Color group	Flowering time	Number on the scheme (fig. 3)
1	*S.* × *henryi* C.K.Schneid.	7	G	2023 / 1	P	lb	47
2	*S.* × *hyacinthiflora* ‘Buffon’	7	G	2023 / 2	P	eb	38
3	*S.* × *hyacinthiflora* ‘Necker’	8	G	2023 / 2	P	eb	20
4	*S.* × *prestonae* ‘Hiawatha’	8	G	2023 / 1	P	lb	1
5	*S.* × *prestonae* ‘Minuet’	6	G	2023 / 2	P	lb	45
6	*S. chinensis* ‘Duplex’	8	G	2023 / 4	M	mb	43
7	*S. meyeri* ‘Palibin’	6	G	2023 / 2	Pr	lb	44
8	*S. meyeri* × *S. patula* × *S. microphylla* ‘Josee’	6	G	2023 / 1	P	eb	46
9	*S. vulgaris* ‘Andenken an Ludwig Späth’	8	G	2023 / 2	M	lb	22
10	*S. vulgaris* ‘Aucubaefolia’	10	G	2023 / 2	B	mb	23
11	*S. vulgaris* ‘Belle de Nancy’	8	G	2023 / 1	V	mb	11
12	*S. vulgaris* ‘Bogdan Khmel’nickiy’	10	G	2023 / 1	Pr	eb	29
13	*S. vulgaris* ‘Emile Lemoine’	7	G	2023 / 2	V	eb	31
14	*S. vulgaris* ‘Charles Joly’	10	G	2023 / 1	V	mb	26
15	*S. vulgaris* ‘Charles X’	7	G	2023 / 3	M	mb	12
16	*S. vulgaris* ‘Capitaine Baltet’	7	G	2023 / 1	M	mb	36
17	*S. vulgaris* ‘Fürst Bülow’	5	Rp	2023 / 1	V	mb	9
18	*S. vulgaris* ‘Herman Eilers’	7	G	2023 / 1	V	mb	16
19	*S. vulgaris* ‘Hugo de Vries’	8	G	2023 / 2	M	lb	37
20	*S. vulgaris* ‘Indija’	5	Rp	2023 / 1	Pr	mb	2
21	*S. vulgaris* ‘Kramara Nr 1’	8	Rp	2023 / 1	P	mb	3
22	*S. vulgaris* ‘Krasavica Moskvy’	7	Rp	2023 / 3	W	mb	15
23	*S. vulgaris* ‘Lemoine’	6	G	2023 / 1	W	mb	42
24	*S. vulgaris* ‘Leon Gambetta’	8	G	2023 / 3	V	eb	21
25	*S. vulgaris* ‘Lesya Ukrainka’	5	Rp	2023 / 1	W	mb	4
26	*S. vulgaris* ‘Maréchal Foch’	7	G	2023 / 3	M	mb	13
27	*S. vulgaris* ‘Marie Legraye’	6	G	2023 / 1	W	mb	41
28	*S. vulgaris* ‘Maximowicz’	1	G	2023 / 3	V	mb	32
29	*S. vulgaris* ‘Mechta’	5	Rp	2023 / 1	M	mb	5
30	*S. vulgaris* ‘Michel Büchner’	7	Rp	2023 / 1	V	lb	33
		2	G	2023 / 2			
31	*S. vulgaris* ‘M-me Antoine Büchner’	8	Rp	2023 / 2	Pr	mb	34
32	*S. vulgaris* ‘M-me Casimir Périer’	7	G	2023 / 2	W	mb	18
33	*S. vulgaris* ‘M-me Lemoine’	10	G	2023 / 5	W	lb	24
34	*S. vulgaris* ‘M-me Florent Stepman’	6	G	2023 / 1	W	mb	40
35	*S. vulgaris* ‘Mont Blanc’	9	G	2023 / 2	W	mb	25
36	*S. vulgaris* ‘Mrs Edwig Harding’	10	G	2023 /5	M	mb	27
37	*S. vulgaris* ‘Night’	6	G	2023 / 2	Pr	lb	35
38	*S. vulgaris* ‘Ogni Donbassa’	10	Rp, G	2023 / 2	V	mb	19
39	*S. vulgaris* ‘Olimpiada Kolesnikova’	8	Rp	2023 / 1	V	mb	6

Table 2. Continued.

Nr	Hybrid/cultivar	Seedling age	Sapling type	Planting year/ quantity	Color group	Flowering time	Number on the scheme (fig. 3)
40	S. *vulgaris* 'Poltava'	8	Rp	2023 / 1	V	eb	7
41	S. *vulgaris* 'Président Grévy'	8	Rp	2023 / 3	B	eb	14
42	S. *vulgaris* 'Président Loubet'	5	Rp	2023 / 1	M	mb	8
43	S. *vulgaris* 'Primrouse'	7	G	2023 / 3	Y	lb	10
44	S. *vulgaris* 'Sensation'	7	Rp	2023 / 1	M	lb	39
45	S. *vulgaris* 'Sinai dunken lila'	6	G	2023 / 2	M	lb	17
46	S. *vulgaris* 'Taras Bulba'	10	G	2023 / 3	Pr	lb	30
47	S. *vulgaris* 'Vestale'	9	G	2023 / 2	W	lb	28

Note. **Sapling type: Rp** – rooted plant; **G** – grafting. **Color group: W** – white; **P** – pink; **Y** – yellow; **B** – blue; **V** – violet; **Pr** – purple; **M** – magenta. **Flowering time: eb** – early blooming; **mb** – medium blooming; **lb** – late blooming.

Table 3. Project plantings of original *Syringa* species in the Dendrological Park "Olexandria" NAS of Ukraine.

Nr	Species/subspecies	Representing area	Seedling age	Planting year / quantity	Presence of aroma, flower color	Flowering time
1	S. *emodi* Wall. ex Royle	Pakistan to Nepal and Tibet	7	2023 / 3	the flowers have a faint pleasant aroma, lilac-pink	lb
2	S. *josicaea* J.Jacq ex Rchb.	E & S Carpathians	10	2023/ 1	flowers are fragrant, lilac-pink	lb
3	S. *komarowii* C.K.Schneid.	Central China	8	2023 / 3	purple-pink flowers	lb
4	S. *oblata* Lindl.	N & Central China to Korea	8	2023 / 3	flowers are fragrant, pale violet-lilac	eb
5	S. *persica* L.	E Afghanistan to W Himalaya, E Qinghai to China	5	2023 / 3	flowers are fragrant, lilac-pink	mb
6	S. *pubescens* Turcz. subsp. *microphylla* (Diels) M.C.Chang & X.L.Chen	N & Central China	8	2023 / 3	flowers are fragrant, dark pink	lb
7	S. *reticulata* (Blume) H.Hara subsp. *amurensis* (Rupr.) P.S.Green & M.C.Chang	Russian Far East to N China and Korea	7	2023 / 1	flowers white or creamy white	lb
8	S. *reticulata* subsp *pekinensis* (Rupr.) P.S.Green & M.C.Chang	N & Central China	8	2023 / 3	flowers white or creamy white	lb
9	S. *reticulata* subsp. *reticulata*	S Kuril Islands to Japan	8	2023 / 3	flowers are faintly scented, white or creamy white	lb
10	S. *tomentella* Bureau & Franch. subsp. *sweginzowii* (Koehne & Lingelsh.) Jin Y.Chen & D.Y.Hong	SE Tibet to China	8	2023 / 3	flowers are fragrant, pink and white	lb

Note. **Flowering time: eb** – early blooming; **mb** – medium blooming; **lb** – late blooming.

lilac species is also planned. It should include 26 specimens from ten species and subspecies and represent three natural areas (Fig. 3, Table 3).

Conclusions

1. According to the studied historical materials, we can conditionally distinguish two stages of introduction of lilac species and varieties into the culture of the Dendrological Park "Olexandria" NAS of Ukraine: first – from the end of the 18th century till 1918; second – from 1948 to the present day. Monogarden "Syringarium" in the Dendrological Park "Olexandria" NAS of Ukraine was laid in 1948–1950.

2. Due to the long-term cultivation of lilacs in the same place, several problems arose: overwork of the soil and, as a consequence – increased incidence of fungal diseases; mismatch of growth rates of rootstock and scion, which led to the death of plants. In 2012, 307 lilacs were growing on the site. By 2017, the number of plants in the garden decreased 24.8 % (76 specimens died). Among the dead plants, 86.8 % (66 specimens) belonged to age group II (1985 plantings) and 13.2 % (10 plants) to age group III (2003-2005 plantings). We observed no losses among age group I (1950-1980 plantings). In the following four years, 11 more specimens of the III age group were lost.

3. By 2021, 220 lilac specimens remained in "Syringarium": 207 specimens of S. *vulgaris* represented by 34 cultivars, one specimen of S. ×*chinensis* 'Duplex', one specimen of S. ×*hyacinthiflora* 'Buffon' and one specimen of S. ×*hyacinthiflora* 'Necker'. As a result, the decorative appearance of the site deteriorated. Therefore, optimizing the collection and demonstration plot "Syringarium" became crucial.

4. The developed project of optimization of monogarden "Syringarium" includes: improvement of conditions of lilac cultivation by partial replacement of soil; restoration of the quantitative composition of existing 30 varieties; introduction of new 17 varieties, including three varieties of Ukrainian selection; creation of a site representing original *Syringa* species. To increase the life span of plants, 35 cultivars (82.8 %) should be transferred to growth on their own roots. As a result of the introduction of new cultivars and species with different flowering times, it is expected that the attractive period of the plot will be extended by 15–20 days during the vegetation season.

Acknowledgements

The authors are grateful to Dr. V.K. Gorb, senior researcher of the Dendrology Department of the M.M. Gryshko National Botanical Garden of the National Academy of Sciences of Ukraine, for many years of support and professional advice on cultivating lilacs. The authors are also grateful to Dr. G.I. Dragan for determining lilac pests in the Dendrological Park "Olexandria" NAS of Ukraine.

References

Aftanazy, R. (1993). *Dzieje rezydencji na dawnych kresach Rzeczypospolitej. T. 11. Województwo kijowskie* (p. 288). Warszawa.

Daughtrey, M., Mickaliger, L., Loizos, L., Tobiasz, M., & Seagraves, B. (2007). *Evaluating lilac resistance to powdery mildew.* Long Island Research and Extension Center Research Summaries.

Deriy, I.G. (1958). *Dendroflora of the park "Olexandria" of the Botanical Garden of the Academy of Sciences of the Ukrainian SSR* (pp. 110–132). Publishing House of the Academy of Sciences of the Ukrainian SSR, Kyiv. (In Russian)

Didukh, Y.P. (Ed.). (2009). *Red book of Ukraine. Plant world.* Globalconsulting, Kyiv. (In Ukrainian)

Dovgaluk, N.I., Zaimenko, N.V., Pavliuchenko, N.A., & Gorb, V.K. (2016). Problems of long-term exhibit of *Syringa* L. in a monoculture in the M.M. Gryshko National Botanical Garden of NAS of Ukraine. *Monoculture in the Formation of Urban Green Area Scientific Articles, 1*(13), 84–89. (In Russian)

Ellanskaya, N.T., Pavluchenko, N.A., & Yunosheva, O.P. (2011). Effect of duration of cultivation of *Syringa vulgaris* L. cultivars on microbiota and allelopathic state of soil. *Plant Introduction, 50*, 98–103. (In Ukrainian). https://doi.org/10.5281/zenodo.2544875

Gorb, V.K. (1989). *Lilacs in Ukraine*. Kyiv, Naukova Dumka. (In Russian)

Gorb, V.K. (2012). The problem of longevity of *Syringa vulgaris* L. varieties in connection with condition of its cultivation. In *International readings dedicated to the 110th anniversary of the birth of Doctor of Biological Sciences, Professor Leonid Ivanovich Rubtsov* (pp. 271–276). Kyiv. (In Ukrainian)

Gorb, V.K. (2022). Dynamism in the development of the NBG lilac garden collection and exhibition site. In N.V. Zaimenko & D.B. Rakhmetov (Eds.), *Fundamental and applied aspects of the introduction and preservaionn of plants in the M.M. Gryshko National Botanical Garden of NAS of Ukraine* (pp. 110–119). Lira-K, Kyiv. (In Ukrainian)

Gorobets, S.A., Pavluchenko, N.A., & Blum, A.A. (2002). Allelopathic methods of regulation of soil processes at long-term cultivation of *Syringa vulgaris* L. *Plant Introduction, 14,* 80–87. (In Ukrainian). https://doi.org/10.5281/zenodo.3332980

Hibben, C.R., Walker, J.T., & Allison, J.R. (1977). Powdery mildew ratings of lilac species and cultivars. *Plant Disease Reporter, 61*(3), 192–196.

International Lilac Society. (2024). International register & checklist of cultivar names for the genus *Syringa* L. https://wwwinternationallilacsocietyorg/public-register/

Kokhno, N.A., & Kurdyuk, A.M. (1994). *Theoretical bases and experience of introduction of woody plants in Ukraine.* Naukova Dumka, Kyiv. (In Russian)

La Garde-Chambonas, A.-L.-C. d. M. (1824). *Voyage de Moscou à Vienne par Kiew, Odessa, Constantinople, Bucharest et Hermanstadt, ou Lettres adressées à Jules Griffith.* Treuttel et Würtz, Paris.

Manin, K.Z. (1927). Belotserkovsky forestry. *Works of Agricultural Botany, 1*(4), 176–180. (In Ukrainian)

Mark, L., & DeBard, M.D. (2021). Chronological outline history of *Syringa* species (lilacs). *Lilacs, 51*(2), 44–55.

Mmbaga, M.T., Sauve, R.J., Nnodu, E., & Zhou, S. (2005). Multiple disease resistance to powdery mildew, bacterial blight, and alternaria blight in lilacs (*Syringa* spp.). *Journal of Arboriculture, 31*(1), 1–9. https://doi.org/10.48044/jauf.2005.001

Nebesky, A.O. (1899). List of tree and shrub species of plants acclimatized in the garden of Count A. Branitsky near Kyiv. *Proceedings of the Botany Department of the Imperial Society for the Acclimatization of Animals and Plants, 1,* 122–132. (In Russian)

Pavliuchenko, N.A. (2003). Allelopathic features of *Syringa vulgaris* L. PhD thesis. Kyiv. (In Ukrainian)

POWO. (2024). Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Published on the Internet. https://powo.science.kew.org/

Prutenskaya, M.D. (1982). *Atlas of diseases of flower and ornamental plants.* Naukova Dumka, Kyiv. (In Russian)

Rubtsov, L.I., Mikhailov, N.L., & Zhogoleva, V.G. (1980). *Lilac species and varieties cultivated in the USSR: Catalogue-guide.* Naukova Dumka, Kyiv. (In Russian)

Rusanov, F.N. (1971). Method of generic complexes in plant introduction and its further development. *Bulletin of the Main Botanical Garden of the USSR Academy of Sciences, 81,* 15–20. (In Russian)

Shishkoff, N. (2007). Susceptibility of some lilac cultivars and other members of the Oleaceae to *Phytophthora ramorum*. *Plant Health Progress, 8*(1), Article 1101-02-RS. https://doi.org/10.1094/PHP-2007-1101-02-RS

Sinadsky, Y.V. (Ed.). (1982). *Pests and diseases of floral and ornamental plants.* Nauka, Moscow. (In Russian)

Stark, V.N. (1932). *Manual on forest damage accounting (with definition).* Publishing House of Agricultural, Collective and Cooperative Literature, Moscow–Leningrad. (In Russian)

Sulimierski, F., Chlebowski, B., & Walewski, W. (Red). (1880). *Słownik geograficzny Królestwa Polskiego i innych krajów słowiańskich. T. 1* (s. 179). Warszawa, Nakładem Filipa Sulimierskiego i Władysława Walewskiego.

Проєкт оптимізації колекційно-експозиційної ділянки “Сирінгарій” Державного дендрологічного парку “Олександрія” НАН України

Наталія Дойко [1,*], Лариса Кривдюк [1], Ніна Драган [1], Олександр Силенко [1,2]

[1] Державний дендрологічний парк “Олександрія” НАН України, Біла Церква-13, Київська обл., 09113, Україна; * alexandriapark@ukrnet

[2] Інститут еволюційної екології НАН України, вул. Академіка Лебедєва, 37, Київ, 03143, Україна

У роботі представлено результати досліджень архівних матеріалів з інтродукції таксонів роду *Syringa* в Державному дендрологічному парку “Олександрія” НАН України. Умовно виділено два великі

етапи інтродукції бузків до парку “Олександрія”: перший етап – від кінця XVIII століття до 1918 року і другий етап – з 1946 року до сьогодення.

Датою закладення моносаду “Сирінгарій” уважаються 1948–1950 роки. Станом на 2021 рік “Сирінгарій” включає два види, один штучний гібрид і 37 сортів, які розподіляються за трьома віковими групами (I вікова група представлена 76 екземплярами 19 сортів, II – 90 екземплярами 24 сортів і III – 54 екземплярами 15 сортів).

Понад 70 років культивування бузків на одній ділянці, де проявилась низка проблем, які призвели до змін сортового різноманіття та зменшення кількісного складу колекції: ґрунтовтома сприяла значному послабленню рослин та зменшенню їх стійкості до ураження хворобами і шкідниками. Тому виникла потреба оптимізації ділянки моносаду “Сирінгарій” (зокрема, часткової заміни ґрунту; переведення рослин на “власне” коріння для подовження терміну їх життя; відновлення сортового розмаїття шляхом уведення нових сортів, у тому числі й української селекції). Згідно проєкту науковців дендропарку “Олександрія”, у рамках оптимізації моносаду “Сирінгарій”, заплановано висадити 91 екземпляр 47 сортів бузків. З метою розвитку еколого-просвітницької діяльності рекомендовано створити ділянку оригінальних видів бузку.

Ключові слова: *Syringa*, дендропарк “Олександрія”, моносад, історія інтродукції, проблеми культивування, оптимізація