

# Growth and development of species *Syringa* L. section *Villosae* C.K. Schneid. in the updated collection of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences

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**Abstract.** The article is devoted to the study of the growth and development of *Syringa* species in the collection of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences. Heights of *Syringa* L. of the *Villosae* section in various geographical areas are given. Growth indicators of seven-year-old plants of hairy lilac in 7 species were studied. The heights, volume and area of the crown projection were measured, the number of formation shoots (skeletal branches), the number of generative shoots and branching shoots of the 1st order were calculated, and the length and diameter of branching shoots were measured. Differences between the studied species are already significant at an early age. The best indicators were found in *S. sweginzowii* Koehne et Lingelsh. (h-1.51 m, number of branching shoots 218, generative shoots - 28); *S. Henry* Schneid. - 1.43; 193; nine; *S. villosa* Vahl. - 1.36; 140; 17; *S. tomentella* Bur. et Franch. - 1.33; 159; 13; *S. komarovii* Schneid. - 1.07; 133; 10; *S. velutina* Komar. - 1.25; 119; eleven; *S. wolfii* Schneid. - 1.15; 23; 8. The beginning of flowering was noted at the age of 5 in *S. sweginzowii*, other species from

## 1 Introduction

The genus *Syringa* L. is characterized by the presence of a perennial apical growth of skeletal branches monopodial or sympodial [1]. Shaggy lilacs are large shrubs widely used in landscaping as border and solitary plants, creating a color range from white-pink to red-violet. Flowering begins from 5-7 years, in May the common lilac begins to bloom, after two weeks the hairy lilacs bloom, and after another two weeks the Amur lilac pleases us with white, fragrant flowers, prolonging the blooming background in landscape gardening. The maximum heights were noted for Zvegintsov's lilac in the Botanical Garden of Moscow - 7 m at the age of 54 years [2] and in Minsk - 6.5 m at the age of 41 [3], but in the

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middle taiga - Syktyvkar - only 2.2 m in 41 years old [4], in Orenburg at 5 years old - *S. henry* - 0.68 m [5] (table 1).

**Table 1.** Height of bushes of *Syringa* L. species in different geographical areas (m).

Kinds	Yekaterinburg	Moscow, GBS	Minsk, CR BS	Syktyvkar, BS Komi scientific center	Orenburg
<i>S. sweginzowii</i> Koehne et Lingelsh.	1.57 (7)	4.8 (33) 7.0 (54)	5.0 (27) 6.5 (41)	4.5 (25)	0.58 (5)
<i>S. henry</i> Schneid.	1.43 (7)	6.5 (41)	2.5 (41)	4 (25)	0.68 (5)
<i>S. villosa</i> Vahl.	1.36 (7)	5.0 (29)	5.8 (28)	2.2 (8) 6.0 (25)	-
<i>S. tomentella</i> Bur. et Franch.	1.33 (7)	3.7 (14)	7.6 (41)	2.2 (41)	-
<i>S. komarovii</i> Schneid.	1.07 (7)	1.4 (6)	3.2 (21)	4.5 (25)	0.59 (5)
<i>S. velutina</i> Komar.	1.25 (7)	6.4 (35)	4.5 (40)	-	-
<i>S. wolfii</i> Schneid.	1.15 (7)	3.5 (20)	5.8 (41)	1.65 (8) 3.0 (25)	-

\*Note. In brackets - age, years.

Hairy lilacs have been successfully acclimatized, even in Central Yakutia they, despite the late vegetation period and adverse weather conditions, bloom and bear fruit [6]. The original collection of lilacs, created in 1959-1960 in the Botanical Garden of the Ural Branch of the Russian Academy of Sciences, died at the age of 55, it ended up in shading. The resumption of the collection was carried out in the early 90s, it was also in partial shade, in connection with this, weak flowering and fruiting were noted, and the death of large skeletal branches began. The next collection was created in 2015 from other geographical samples and in a sunny meadow.

## 2 Materials and methods

Objects - various types of lilacs of the Villosae section at the age of 6-7 years, growing in homogeneous conditions in the collection of the Botanical Garden of the Ural Branch of the Russian Academy of Sciences. Heights, projection area and crown volume, length and diameter of first-order branching shoot, number of skeletal branches and generative shoots were measured. A total of 985 shoots of branching of the 1st order were studied.

The purpose of the study is the comparative morphogenesis of hairy lilac species.

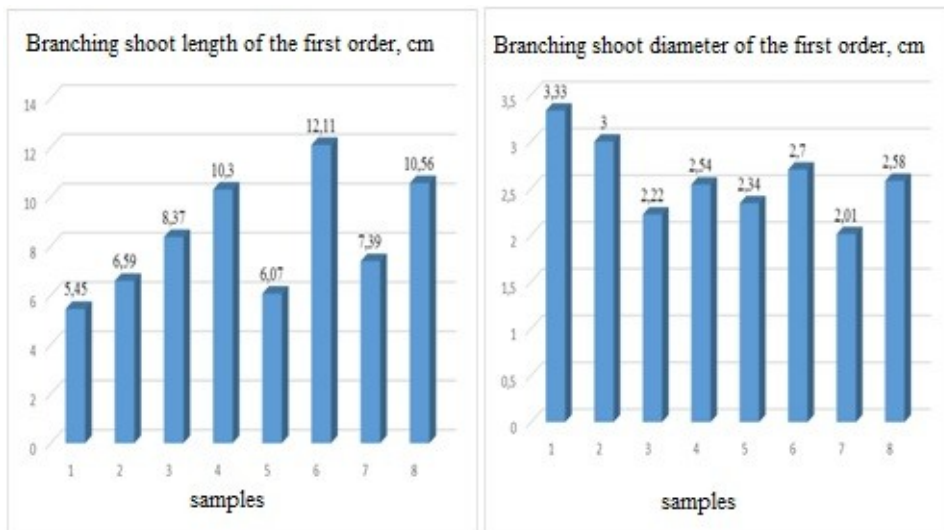
## 3 Results

The studied lilacs are mainly of Chinese origin (Table 2). Five species were grown from the seeds of the Arkhangelsk Botanical Garden in 2015, so the growth rates for comparison are correct. The largest plant was Zvegintsov's lilac in height (1.51 m), crane volume (0.54), in terms of the number of formation shoots (skeletal branches - 14) and the number of branching shoots of the 1st order - 218, as well as generative shoots - 28), in length and shoot diameter are shorter and thinner (Figure 1).

During the cultivation of lilac species, the average temperature and rainfall were more favorable compared to previous years (table 3).

**Table 2.** Range and origin of seed specimens of lilac species.

No.	Sample name	Origin of sample, year of sowing	Area
1	<i>S.wolfii</i> Schneid.	Blagoveshchensk, 2016	Far East, East Asia
2	<i>S.sweginzowii</i> Koehne et Lingelsh.	Arkhangelsk, 2015	China
3	<i>S.tomentella</i> Bur. et Franch.	Tallinn, 2015	Western China
4	<i>S.komarovii</i> Schneid.	Arkhangelsk, 2015	China
5	<i>S.henry</i> Schneid.	Arkhangelsk, 2015	hybrid <i>S.villosa</i> x <i>S.josikae</i>
6	<i>S.velutina</i> Komar.	Arkhangelsk, 2015	North Korea
7	<i>S.villosa</i> Vahl.	Arkhangelsk, 2015	China



**Fig. 1.** First-order branching shoot characteristic.

**Table 3.** Average annual temperature and precipitation for 2015-2021.

Of the year	Temperature, °C	The amount of precipitation, mm
2015	3.7	631
2016	3.7	403
2017	3.6	486
2018	2.6	473
2019	4	583
2020	5.4	443
2021	4.1	446

During the growing season, the average air temperature varied from 6 to 20.9 °C, and the amount of precipitation from 11 to 86 mm (Table 4). High rates were found in the hybrid species *S.henry* Schneid., but generative shoots are three times less than in *S.sweginzowii* Koehne et Lingelsh. (Table 5), but longer and thicker branching shoots. *S.komarovii* Schneid has the smallest height. (1.07) but with more branching shoots (133), *S.wolfii* Schneid has the worst growth performance. at a height of 1.15 m, there are only 23 branching shoots, and they are medium in length, but the thickest, d - 3.33 mm. According

to the speed of growth and bushiness, the species were distributed in the following order - *S.sweginzowii*, *S. henry*, *S. villosa*, *S. tomentella*, *S.komarovii*, *S. velutina*, *S.wolfii*.

**Table 4.** Climatic conditions for the growing season 2022.

Month	Average temperature, °C	The amount of precipitation, mm	Number of days with precipitation
April	6	35	19
May	10.9	73	25
June	15.7	86	22
July	20.9	11	15
August	20.6	13	11
September	10.9	54	16

## 4 Discussion

Lilacs from the hairy section are the most popular in landscaping, as they are frost and gas resistant, reproduce well, grow quickly and bloom within two weeks. Among the studied 7 species of lilacs, under our conditions, *S.sweginzowii* turned out to have the best growth rates, the remaining species are ranked in the following order: *S.henry*; *S.villosa*; *S.tomentella*; *S.komarovii*; *S. velutina*; *S.wolfii*. *S.sweginzowii* bloomed at 5 years old, at a height of 1.5 m, other species at 6 years old.

Polyakova N.V. [7] in the Bashkir Cis-Urals distributed lilac species according to decorative points in the following order: *S. sweginzowii* - 76; *S. josikae*, 72; *S. velutina*, 72; *S. henry*, 69; *S. komarovii*, 65; *S. wolfii* - 62, these data are close to our estimate.

**Table 5.** Growth indicators of the studied lilac species.

No.	Species name	Height, m	Crown projection area, m <sup>2</sup>	Crown volume, m <sup>3</sup>	Number of formation shoots, pcs.	Number of generative shoots, pcs.	Number of branching shoots of the first order, pcs.
1	<i>S.wolfii</i> Schneid.	1.15±0.08	0.16±0.02	0.06±0.01	5	1	23
2	<i>S.sweginzowii</i> Koehne et Lingelsh.	1.51±0.12	1.09±0.08	0.54±0.01	14	28	218
3	<i>S.tomentella</i> Bur. et Franch.	1.33±0.03	0.74±0.08	0.33±0.04	11	13	159
4	<i>S.komarovii</i> Schneid.	1.07±0.10	0.65±0.06	0.23±0.04	4	10	133
5	<i>S.henry</i> Schneid.	1.43±0.17	1.01±0.09	0.49±0.10	13	9	193
6	<i>S.velutina</i> Komar.	1.25±0.16	0.85±0.14	0.37±0.11	6	11	119
7	<i>S.villosa</i> Vahl.	1.36±0.21	1.02±0.21	0.49±0.15	6	17	140

## 5 Conclusion

Among the studied species of lilacs, already at a young age, species specificity is manifested in terms of growth and development. *Syringa sweginzowii* stands out, it bloomed before everyone else and turned out to be the best in terms of growth rate, although all species of the same age and origin of seeds and grown in uniform conditions.

## Acknowledgement

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